

**DESKTOP HERITAGE IMPACT ASSESSMENT OF THE
PROPOSED FRASER FARM DAM**

FOR GREEN CHOICE CONSULTING

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Abbreviations

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

INTRODUCTION

The Dartford Farm is comprised of a number of properties, the majority of which were purchased in the late 1980s. The project property was purchased by the Dartford Farming Trust in the mid-2000s. Dartford Farm is currently operating as a dairy farm which has a capacity to milk 600 dairy cattle, and comprises a total of 115 hectares of pasture. In order for the business to grow and be profitable, the Dartford Farming Trust must at least double its current milking capacity. To do this, additional grass pastures will need to be cultivated and watered to feed additional cattle, resulting in the need for a storage dam for irrigation purposes.

The Dartford Farming Trust intends on developing an in-stream dam on Portion 0 of Lot FP 173 No. 8581 within the Ekamanzi Stream which flows along the northern boundary of the project property. It is anticipated that at full capacity, the proposed dam will cover an area of 37.5 hectares, and have a total capacity of 1 500 000m³. The dam will have a maximum depth of 8m when at full capacity. The dam wall will be 10.5m in height with two spillway channels located on each end of the dam wall. Access to the proposed dam will be gained by existing farm roads as well as the construction of a gravel road around the basin and embankment of the dam footprint. The new access road will not exceed 4m in width. A new pump house will be constructed adjacent to the dam wall. An intake area will be developed with associated outlet pipelines and outlet valves for irrigation use. The proposed development will comprise the following activities and infrastructure:

- The development of an in-stream dam with a maximum storage capacity of 1 500 000m³, a maximum depth of 8m, and covering an area of 37.5 hectares when at full capacity.
- The construction of an earthen dam wall (embankment), which will have a height of 10.5m, a width of 3m and a length of 242m. Two spillways will be constructed on either end of the dam wall.

- The installation of two drop boxes to allow for seasonal stream flow to flow back into the stream without the water flowing over the spillway. The drop boxes will include the installation of 400mm UPVC pipeline.
- The installation of an intake area, irrigation pipeline of 60m in length and 315mm in diameter, with outlet valve for irrigation use.
- The construction of a pump station (approximately 150m²)
- The construction of a 4m wide gravel access road which will surround the dam basin and embankment.

ASSUMPTIONS AND LIMITATIONS

- The footprint of the proposed development will remain within the site boundary provided to Umlando by the client.
- The site falls in the general pattern of archaeological scatters noted from previous archaeological and heritage surveys.
- The FSL of the dam will increase the absorption of water within the sandstone and thus may increase the rate of deterioration of possible rock art sites. Any affected rock art site would need to be recorded over several years to determine if this was the case.
- The survey relies on the experience of the heritage practitioner to locate heritage sites.

SCOPE OF WORK

- Undertake a Phase 1 study of the proposed development.
- Assess heritage sites in terms of significance.
- Provide a management plan for each site.

FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT

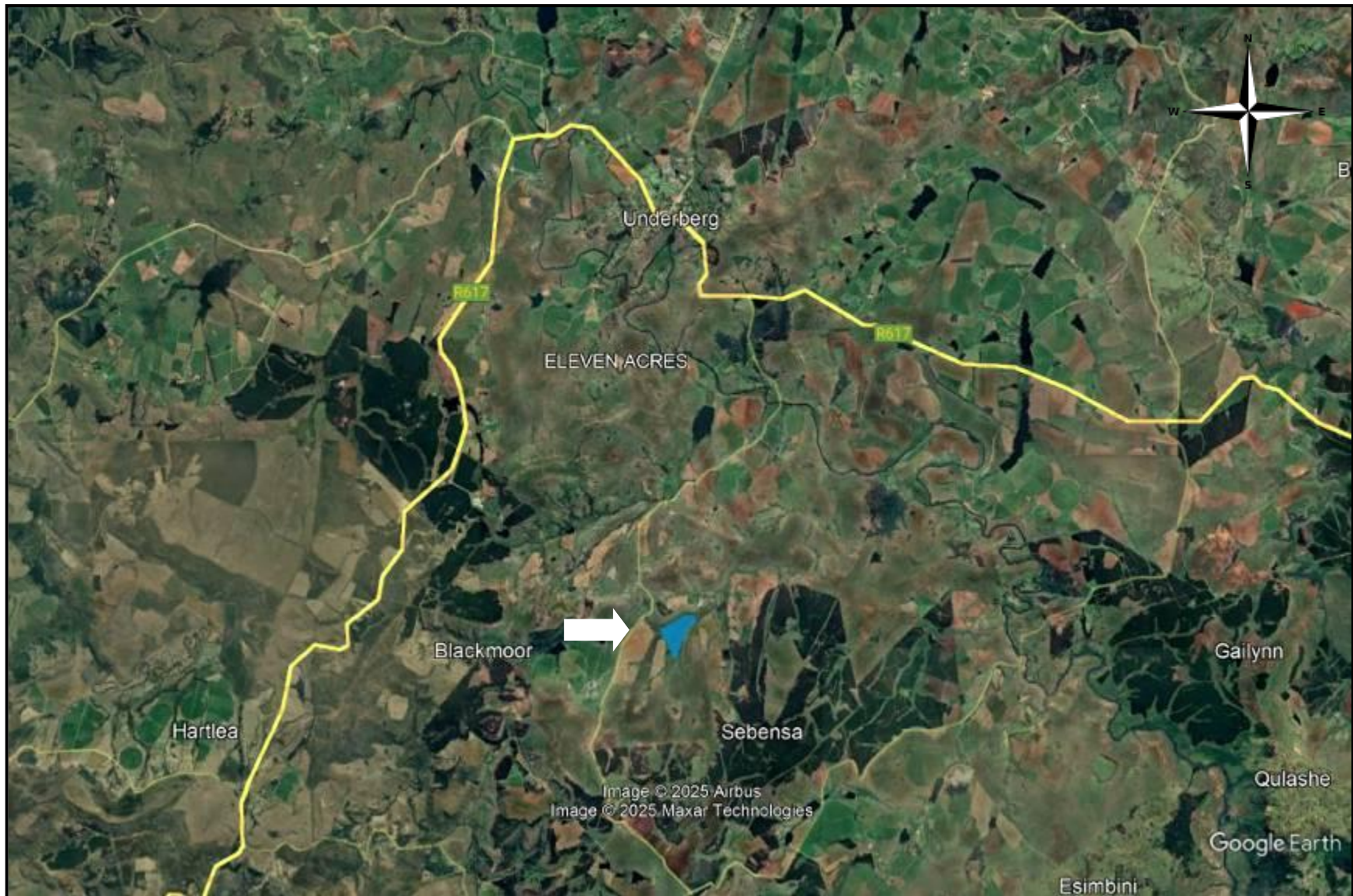
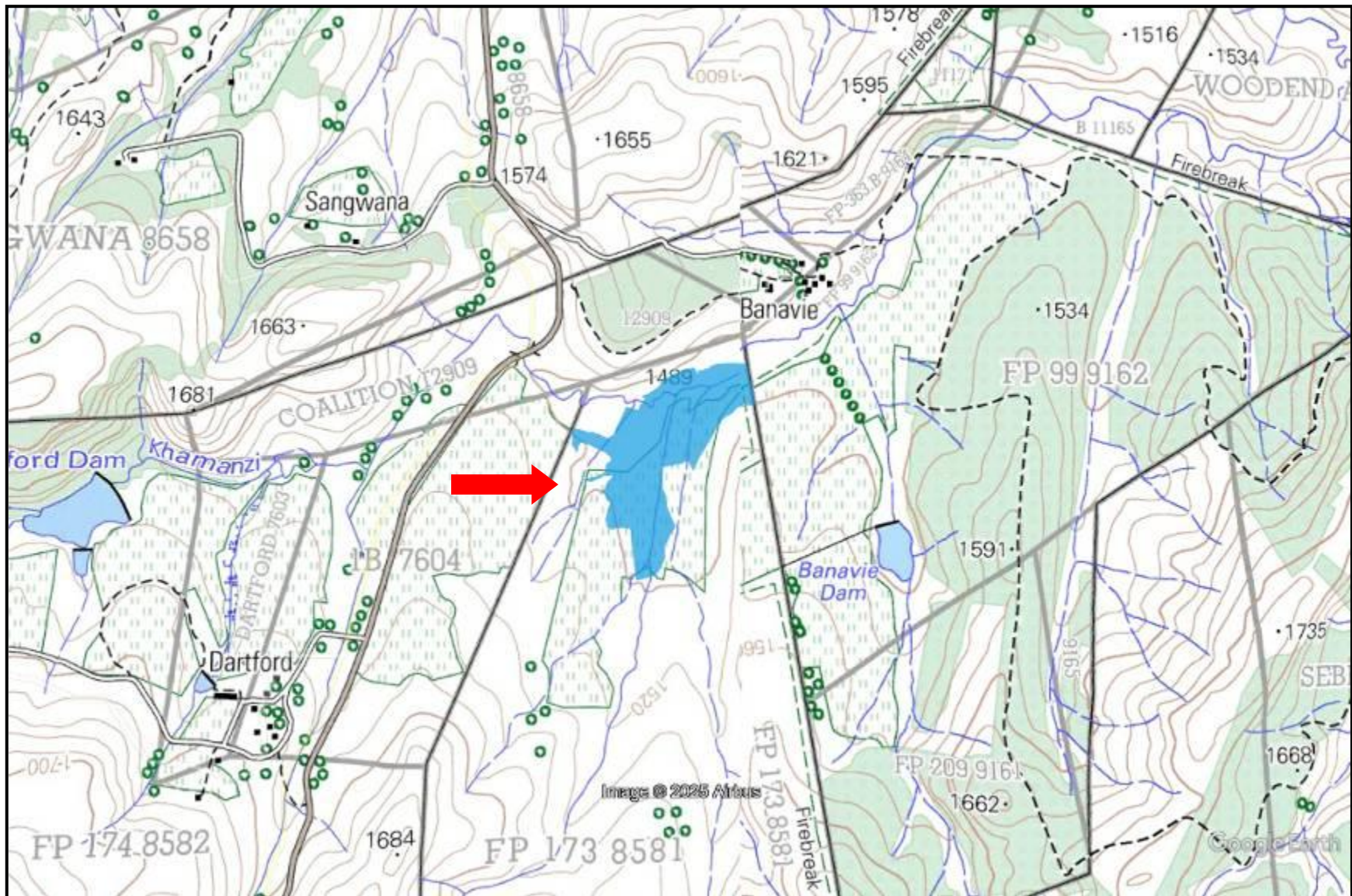


FIG. 2: AERIAL OVERVIEW OF THE DEVELOPMENT



FIG. 3 TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT¹



¹ 2929CD Underberg 2000, 2929DC 2000 Pevensy

FIG. 4: SCENIC VIEWS OF THE DEVELOPMENT AREA



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

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

“General protection: Structures.

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

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

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

(a) A defined geographical area; or

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

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

General protection: Graves of victims of conflict.

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

(a) the grave of a victim of conflict;

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

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

General protection: Informal and private burial grounds

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- (a) any category of archaeological object;

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

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

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

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

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This database contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa 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

GENERAL HISTORY OF THE AREA

Prins (2013) more than adequately summarises the history of the Underberg area as follows. "The stone tool assemblages belonging to the immediate ancestors of the San or Bushmen have been termed Later Stone Age. Later Stone Age tools are generally much smaller but also more diversified than the earlier tool kits. It was during this period that the bow and arrow was used extensively, and societies exploited their environments distinctly more intensively and effectively. Literally hundreds of Later Stone Age sites prevail in the Drakensberg region. In addition, most of the rock art in the region was created by the San. The earliest evidence for Later Stone Age occupation of the Maloti Drakensberg comes from Sehonghong Cave in south eastern Lesotho and from Strathalan Cave in the Eastern Cape section of the region. Here a specific Later Stone Age period called the Robberg Industry has been dated to approximately 20 000 years ago. In contrast, evidence from Good Hope shelter 1 near the bottom of Sani Pass suggests that the earliest archaeological evidence for San people in the KwaZulu-Natal portion of the Drakensberg dates back to approximately 8 000 years ago. Whereas most parts of the Maloti Drakensberg were only seasonally occupied by San hunter gatherers for the larger part of the last 20 000 years, the situation started to change during the later part of the Holocene around 5 000 years ago. This was compounded by the arrival of immigrant black farmers in the region soon after 1600 AD and European colonialism around 1834 AD (Wright & Mazel 2007). During the historical period, the Maloti Drakensberg and adjacent mountainous areas became the last stronghold for various southern San groups such as the Baroa, //Xegwi !Ga!ne, //Kx'au, and //Ku//ke. Their Later Stone Age way of life finally came to an end during the late 19th century. San descendants still live in the area but for all practical purposes have assimilated with their more powerful neighbours. Many place names within the region still retained their original San pronunciations such as the Inxu, Sehonghong, Qomoqomong and Qhoasing rivers, and the Qeme,

Qhuqhu, Qhalasi, and Qholaqhoe mountains. Approximately 1 300 Later Stone Age sites are known within the South African side of the Drakensberg.

Around 2 000 years ago the southern African demographic landscape was transformed with the arrival of the first Bantu-speaking agriculturists in the sub-region. These subsistence farmers lived for the most part in the lower altitude, wooded areas of the eastern seaboard. Around 1250 AD certain agriculturists started occupying the higher altitude, grassland areas. Sites belonging to this period in KwaZulu-Natal are referred to as Moor Park settlements and they typically occupy hill tops with a low stone walling effect. Although none occur within the designated Maloti-Drakensberg project area, they can be found at the fringes, at an altitude of approximately 1 200-1 400 m. By 1600 AD, groups such as the amaZizi reached the foothills of the northern Drakensberg near Winterton (Wright and Mazel 2007). Various splinter groups of the amaZizi left KwaZulu Natal and also settled in parts of Lesotho where, over time, they adopted a Sotho identity. The baPhuti of south eastern Lesotho are perhaps the best known of these early immigrants. By the early 1700s various other Sotho and Ngunispeaking groups moved into the area and established chieftaincies in those areas below the 1 800 m contour. Impressive Iron Age sites belonging to this period and built in typical Sotho-style occur near Harrismith and Phuthaditjhaba in the Eastern Free State. Nguni-style sites of this period have also been found in KwaZulu-Natal and the Eastern Cape parts of the Drakensberg. The expansion of the Zulu kingdom around 1818 had a major impact on Iron Age settlement in the region. Various chieftaincies were attacked, and their routed remnants typically traversed the Maloti Drakensberg region in search of better settlement elsewhere. Bandits often hid out in the mountains, and a number allegedly practised cannibalism. Perhaps the most significant development during this period was the founding of the Southern Sotho nation under King Moshoeshe I. Various sites in Lesotho belong to this period – some of them, like Thaba Bosiu, are typically mountain strongholds. Almost 2 000 Iron-Age sites have been identified in the Maloti Drakensberg region, and most occur in altitudes lower

than 1 800 m contour. Some well preserved Later Iron Age and historical era Nguni sites occur near Lotheni and Mpendhle about 30km from the footprint.

The historical period spans the era of colonialism that started around 1830 AD when the first missionaries and Dutch immigrants arrived from the Cape Colony in the Maloti Drakensberg region. Sites associated with Voortrekker settlement of the area occur in the eastern Free State and the northern portion of KwaZulu-Natal near Winterton and Bergville. For the most part, these were the places where laagers were formed (with very low archaeological visibility) and old farmsteads with associated grave yards. A particular site worth mentioning is Kerkenberg near Oliviershoek Pass, where Debora Retief painted the initials of her father on a rock before the trekkers descended into KwaZulu Natal. In Lesotho, the rebellion by Chief Moorosi and the resultant action by the Cape Colony government at the southern tip of the country left footprints of forts and associated graves at Moyeni Camp, Fort Hartley, Cutting Camp, and Mount Moorosi. The most important structure relating to the history of Bushman raids is most probably Forth Nottingham, in KwaZulu-Natal, which was built around 1852. Various historical mission stations founded in the mid to late 1800s such as those at Morija and St James in Lesotho and Emmaus, Reichenau, and Mariazell in South Africa, are still in active use. The Reichenau Mission, which is situated approximately 5km from the footprint, was founded by Trappist missionaries around 1878. The Ongeluksnek Pass in the Eastern Cape is intimately associated with the epic trek of the Griqua people in 1861, led by Adam Kok. The area associated with the first native uprising against the British colonial government, by the celebrated Hlubi chief Langalibalele in 1873, is at Giants Castle Nature Reserve in the uKhahlamba Drakensberg Park World Heritage Site. Various battle sites associated with the Basotho Wars between the Boer Republic of the Orange Free State and the Sotho Kingdom of Moshoeshoe I are to be found in the eastern Free State and adjacent parts of Lesotho. Sites belonging to the period of the Anglo-Boer War (1898-1901) abound in the eastern Free State portion of the project area. These are typically areas where skirmishes took place or where ammunition was destroyed. A few rock engravings belonging

to the Anglo-Boer War period have been documented from the Golden Gate Highland Park. However, thorough research is still required to ascertain the meaning and value of these engravings. Many historical sites can be categorised as belonging to the “built environment” as defined in heritage legislation. These are the physical remnants and traces of historical settlements that underpin the cultural value and meaning of the surrounding communities. One of the earliest European explorers in the Bulwer/Underberg area was Captain Allen Gardener. Gardener skirted the southern KwaZulu-Natal Drakensberg in 1835 seeking a route from Natal to the Cape Colony. Some Voortrekker farmers settled in the area, albeit briefly, around 1840 but it was only after 1850 when Natal became a British colony that more European, especially English-speaking, settlers arrived in the area. They were preceded and followed by French and German missionaries. The Trappist mission of Rheicenau, in the near vicinity of the footprint, became a prominent landmark in the Underberg District. The buildings associated with these early missionaries as well as farmsteads and associated graveyards, dating from approximately 1860, occur at various localities in the Bulwer/Underberg area (McKenzie 1946). Another prominent historical building is the old jail of Himeville. This building was erected in the 1870’s and was meant to act as a defensive fort for the inhabitants of Himeville during the Anglo-Zulu War. Fortunately the war never reached as far south in the colony and today the old building functions as a museum.

By the 1880’s there was a shortage of vacant land for farming in the then colony of Natal and the children and grandchildren of the 1820 and 1840 settlers were looking for land of their own. The land along the Southern Drakensberg, a hitherto undeveloped area, provided vast tracts of unclaimed land. The area had been surveyed in 1880 by Dr Peter Sutherland, the Surveyor-General for Natal, and farms had been identified. But when Dr Sutherland was approached by a certain Richard Cockerell for permission to take up land he was told that he could have as much as he wanted because the land was uninhabitable. Undeterred, Cockerell settled on “Fondeling” along the Bushman’s Nek Road. Cockerell was soon joined by Robert Christison who settled along the river below Underberg on

“Scotston”. These two intrepid pioneers were soon followed by others and the district of Underberg was born in 1886.”

The original name of Underberg was first at the base of the Van Reenen’s Pass, with the Green Lantern being the top of the pass. This was changed and the then Underberg’s first village was next to the Farm El Ranchito that still has the original cemetery (Anderson 2017).

It is with this historical narrative that the desktop is undertaken.

DESKTOP STUDY

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

The general area is known for heritage sites (fig. 5). Many of these sites are open Stone Age scatters of low significance. However, many of the sandstone overhangs have rock art images. Two rock art images occur in the next valley to the north at the same level as the dam. Other rock art sites occur upstream of the river and south. The sandstone ridge above the dam thus has potential for rock art. The Late Iron Age is sparsley represented; however the Historical Period has several sites in the general area.

The Surveyor General map indicates that FP173 was granted in 1913 (fig. 6).

The 1940 aerial photographs were not available at the time of the report .

In 1972 and 1986 1st edition topographical maps indicate that the area is under cultivation (fig. 7).

The desktop study suggests that rock art sites may occur above the dam FSL.

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

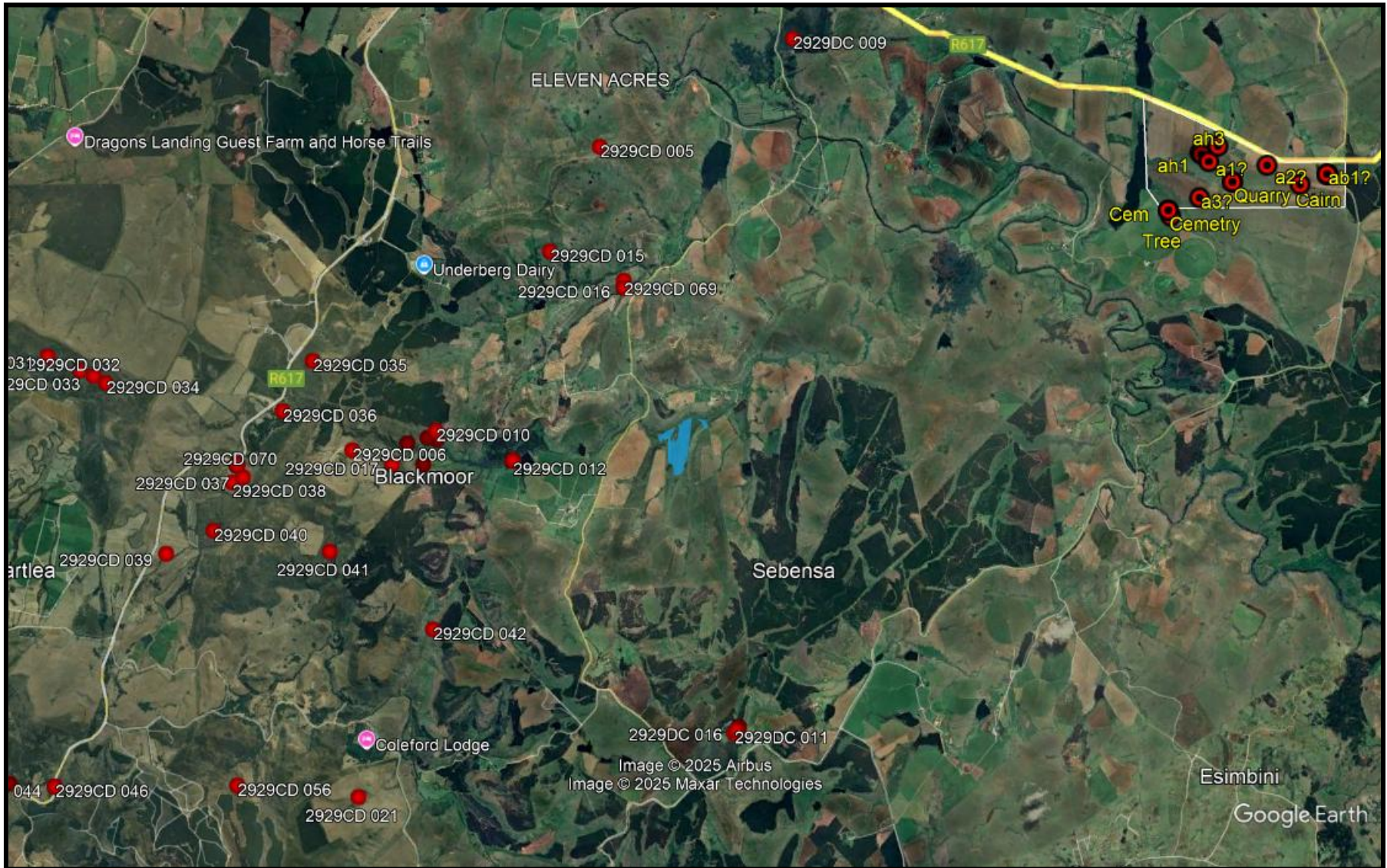


FIG. 6: SURVEYOR GENERAL MAP OF FP 173 (1913)

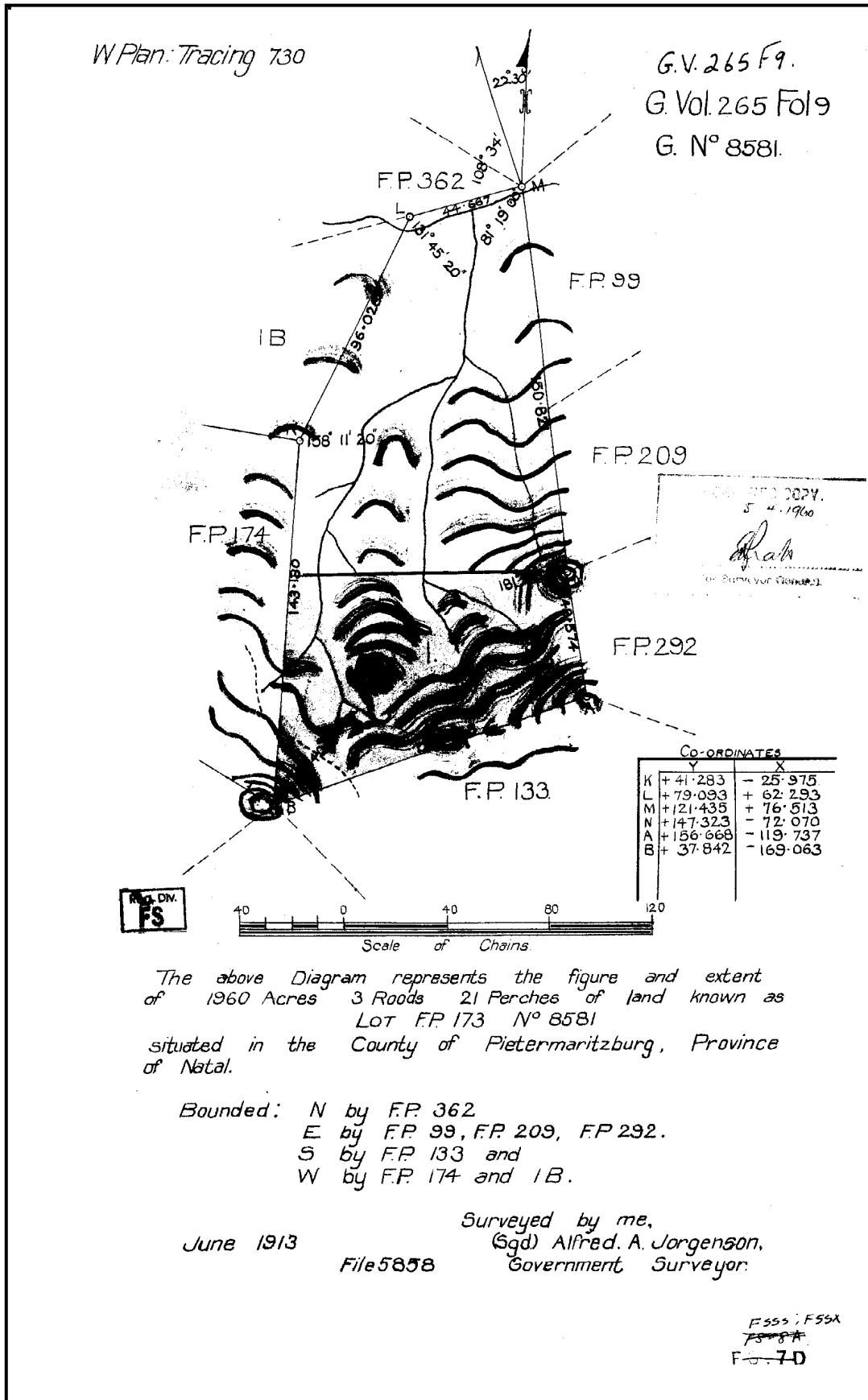
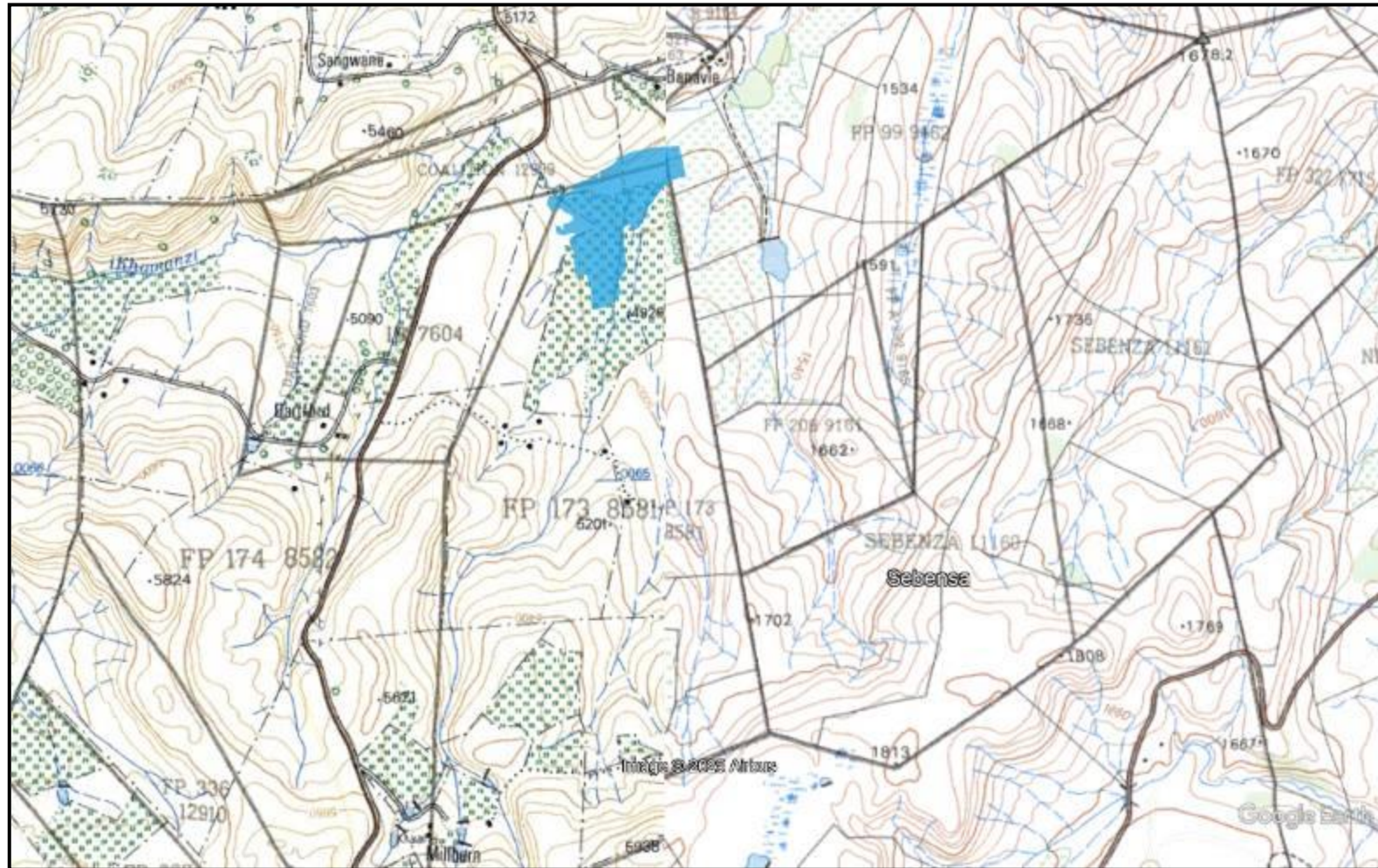


FIG. 7: LOCATION OF THE DAM IN 1972, 1986²



² 2929CD Underberg 1972, 2929DC 1986 Pevensy

PALAEONTOLOGICAL SENSITIVITY

The area is mostly in an area of very high palaeontological sensitivity (fig. 11). Dr Alan Smith undertook a desktop study of the proposed housing area. He notes that “the area concerned is red-flagged by SAHRIS and would normally require a field work PIA however in this case it can be mitigated down to a desktop PIA on the assumption that foundations will not be deeper than 2m, in which case a suitably competent palaeontologist should be called in to survey the excavations. The reasoning is as follows:

The proposed dam site occupies an area which was capped by a thick Dolerite Sill prior to erosion to the present topography consequently any fossils would have been damaged millions of years ago during this intrusion.

1. The proposed dam will occupy land presently under agriculture....
2. The dam follows an existing river system floodplain comprising alluvium flood deposits.
3. The streams show a meandering pattern indicating deep weathering and a thick soil profile and a high water table which is not favourable for fossil preservation.
4. This earthen dam footprint will be very “lite” and will cause minimum damage to any existing palaeontological material.
5. No further palaeontological work is required unless the foundations are deeper than 2m, or the “**Chance Find Protocol**” is triggered.”

FIG. 8: PALAEOLOGICAL 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 22 January 2025. Ground visibility was good and access to the various shelters was possible, even via brambles. The aim of the survey was to identify rock art and shelters with potential deposit. Potential shelters were noted with the walk in along the top of the sandstone ridge. The various turns along the cattle path allowed the shelters to be viewed at various angles. The return walk was along the lower cattle track that allowed access to the shelters from below.

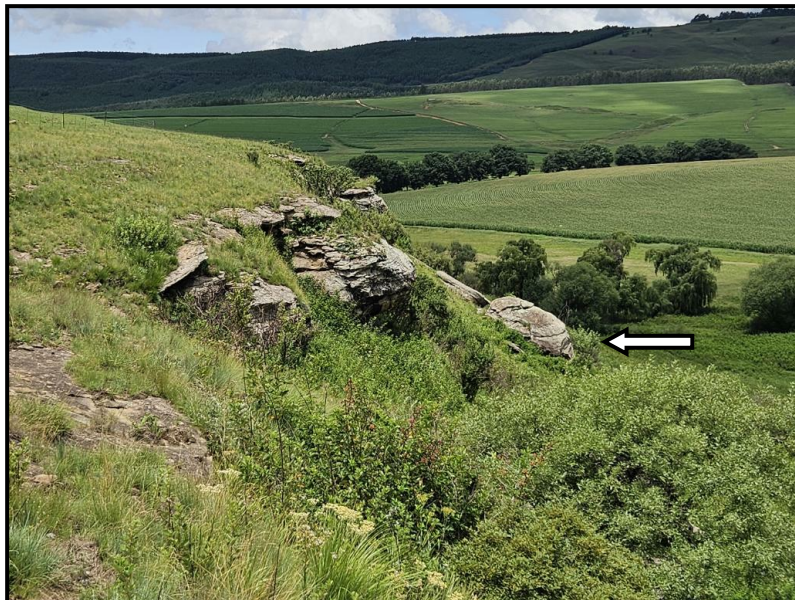
Only three potential shelters were noted. Many of the overhangs were not suitable for shelter or rock art and/or were eroded or had water seepage. The

three shelters could have housed 1 - 2 hunter-gatherers; however no evidence for an archaeological deposit nor rock art was noted. A single quartzite Late Stone Age flake was noted on the upper cattle track. Fig. 9 shows these overhangs and the stone tool. The stone tool supports the notion that hunter-gatherers were in this area.

The stone tool is of low significance and requires no further mitigation.

No further heritage mitigation is required, unless the excavations for the dam wall exceed 2m in depth.

FIG. 9: THREE POSSIBLE SHELTERS



MANAGEMENT PLAN

The heritage survey did not note any rock art sites along the sandstone outcrop. Three potential overhangs were found, yet none of these had rock art or archaeological deposits. No further mitigation will be required in terms of rock art and human cultural heritage.

The palaeontological results indicate that significant fossils could be located at the dam wall if the excavations exceed 2m in depth. The technical drawings for the dam wall will need to be provided before the report is submitted to KZANRI in order to validate the correct management plan.

The palaeontological monitoring, if needed, will only examine the excavated material in the spoil heap. It will not halt the excavations of the wall foundations.

CONCLUSION

A desktop and Phase 1 heritage survey was undertaken for the proposed dam at Frasers Farm. The initial desktop noted that there was a sandstone band that may have rock art images. Several other sites in the general area have rock art images at the same altitude, if not lower, in very similar sandstone outcrops.

The chances of cultural heritage sites occurring within the study areas are very low. No further mitigation is required.

The chances of palaeontological heritage sites occurring within the study areas is high if the excavations for the dam wall exceed 2m in depth. Engineering plans will need to be provided to confirm this and for the upload to SAHRIS.

No further mitigation is required. However, a Chance Find Protocol will be initiated and needs to form part of the EMP for the palaeontological finds.

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Maps:

2929CD Underberg 1972, 2000

2929DC Pevensy 1986, 2000

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 South African Archaeology Association – CRM Section in 1998 that then became the Association of Southern African Professional Archaeologists. Gavin is rated as a Principle Investigator with expertise status in Rock Art, Stone Age and Iron Age studies. In addition to this, he was worked on both West and East Coast shell middens, Anglo-Boer War sites, and Historical Period sites.

DECLARATION OF INDEPENDENCE

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

A handwritten signature in black ink, appearing to read 'G. Anderson', with a horizontal line underneath.

Gavin Anderson
Archaeologist/Heritage Impact Assessor

**APPENDIX A
PIA DESKTOP**

**PROPOSED FARM DAM TO BE
CONSTRUCTED NEAR UNDERBERG DIARY,
KWAZULU-NATAL: DESKTOP
PALEONTOLOGICAL INVESTIGATION**

FOR

**UMLANDO: Archaeological Surveys & Heritage Management
PO Box 102532, Meerensee, KwaZulu-Natal 3901
phone (035)7531785 fax: 0865445631
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

3 February, 2025

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 N6 upgrade and Borrow Pit activity within the Aliwal North region, Maletswai Local Municipality, Eastern Cape.

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 area concerned is red-flagged by Sahrís and would normally require a field work PIA however in this case it can be mitigated down to a desk-top PIA on the assumption that foundations will not be deeper than 2m, in which case a suitably competent palaeontologist should be called in to survey the excavations. The reasoning is as follows:

1. The proposed dam site occupies an area which was capped by a thick Dolerite Sill prior to erosion to the present topography consequently any fossils would have been damaged millions of years ago during this intrusion.
2. The proposed dam will occupy land presently under agriculture.
3. No rock outcrop is visible on GoogleEarth.
4. The dam follows an existing river system floodplain comprising alluvium flood deposits.
5. The streams show a meandering pattern indicating deep weathering and a thick soil profile and a high water table which is not favourable for fossil preservation.

6. This earthen dam footprint will be very “lite” and will cause minimum damage to any existing palaeontological material.

7. A “Chance Find Protocol” has been inserted in the case of *surprise fossil finds* (Appendix 1).

No further palaeontological work is required unless the foundations are deeper than 2m, or the “**Chance Find Protocol**” is triggered.

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 a proposed farm dam construction, near Underberg Dairy, KwaZulu-Natal (Figure 1 and 2). 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: Regional location of the proposed Farm Dam. Image background from GoogleEarth.



Figure 2: Zoomed in location of the proposed Farm Dam. Dam is roughly triangular and 800 X 700 m in area. Image background from GoogleEarth.

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 Scoping and EIA 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 Appendix 2) were used in this desk-top PIA research.

4. GEOLOGY

The Tarkastad Subgroup of the Beaufort Group (red) and Karoo Dolerite (grey) are mapped on this present on this site (Figure 3). Alluvium will be present but has not been mapped.



Figure 2: Extract from the Sahrís Map. Approximate area of the proposed farm dam is boxed). Although this a palaeosensitivity map it was created from the 2828Drakensberg 125 000 scale geological map.

Tarkastad Subgroup

The Tarkastad Subgroup is characterized by sandstones and red and grey mudstones. These lithologies are often arranged in fining-upward units (coarse-grained sandstone at the base and mudstones above). The original sediments were deposited by fluvial processes within an arid Triassic Period landscape. In this area river flow was generally north to south. Fossils could be expected to be within the floodplain mudstones, rather than the river channels where preservation is unlikely.

Alluvium

Alluvium may be encountered.

Karoo Dolerite

Within this area the Karoo Dolerite is represented by dolerite sills (generally horizontal sheets) which can exceed 100m in thickness. This dolerite is part of the Karoo Large Igneous Province (LIP), which consists of a sequence of lavas up to 4.5 km thick and 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 takes place by fissure eruption. This event triggered the break-up of the Gondwana supercontinent (Hastie et al., 2014). Sills comprise relict magma that was emplaced below the surface and which provided temporary storage before it reached the surface.

5. PALAEOLOGY

The colour coding used in the Sahris Palaeosensitivity Map is shown in Table 1 below.

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
GREY	N/A	No fossils will be found, no palaeontological work required

Tarkastad Subgroup

The Tarkastad Subgroup is flagged red (Table 1) consequently it is an important fossil bearing rock (Neveling et al., 2006). It is considered highly palaeontologically sensitive.

The base of the Tarkastad Subgroup represents the boundary between the Permian and the Triassic Periods, which is marked by the Permo-Triassic Extinction Event. This is the greatest extinction even in the last billion years and known as the PT Boundary. This boundary marks a geological event known as the “Great Dying” which resulted in the extinction of almost all life on Earth. However, the PT Boundary has not been recorded in this area. This may be due to erosion or non-deposition.

Continental biotas of Early Triassic age are recorded from the Tarkastad Subgroup. It is known to contain palaeontologically important Early Triassic terrestrial fossils which post-date the 252 Ma (million years old) PT Boundary, (Groenewald & Kitching 1995, Rubidge 2005, Smith et al. 2012). This fauna is dominated by therapsids or “mammal-like reptiles” and other tetrapods. Rare vascular plants and trace fossils are known. The uppermost two biozones of the Beaufort Group, the *Lystrosaurus* and *Cynognathus* assemblage zones, record terrestrial biotic recovery following the Permo-Triassic mass extinction event (Neveling et al 2006)..

Karoo Dolerite

Karoo Dolerite is also present. This is an igneous intrusive rock and by definition cannot be fossiliferous.

Alluvium

Palaeontological Material could be found in the Quaternary alluvium sediments, but is unlikely.

Mitigation

Should the foundations exceed 2m then a suitably qualified palaeontologist needs to assess the founding excavations as the rocks are flagged red for palaeontological content. Should the foundations be less than 2m deep a desk-top palaeontological impact assessment will suffice due to the following mitigation:

1. The proposed dam site occupies an area which was capped by a thick Dolerite Sill prior to erosion to the present topography consequently any fossils would have been damaged millions of years ago during this intrusion.
2. The proposed dam will occupy land presently under agriculture.
3. The dam follows an existing river system floodplain comprising alluvium.
4. The streams show a meandering pattern indicating deep weathering and a thick soil profile and high water table which is not favourable for fossil preservation.
5. This earthen dam footprint will be very "lite" and will cause minimum damage to any existing palaeontological material.

A "Chance Find Protocol" has been inserted in the case of *surprise fossil finds* (Appendix 1).

6. SUMMARY

This desk-top PIA is based on the assumption that foundations will not be deeper than 2m. Should this be the case then a suitably qualified palaeontologist must be called in to inspect the foundation excavations.

If the foundations are shallower than 2m then this desk-top PIA will suffice. The chance of fossils being found in this area are considered Low. A “**Chance Find Protocol**” has been included to cover any eventuality. No further palaeontological work is required, unless the foundations are deeper than 2m, or the “**Chance Find Protocol**” is triggered 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.

Appendix 1: 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.

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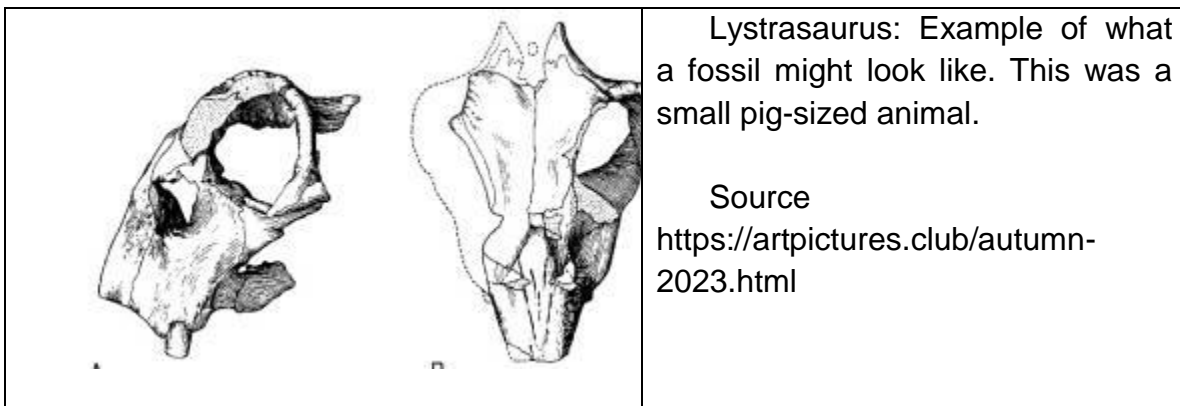
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Appendix 1: CHANCE FIND PROTOCOL

This Chance Find Protocol must be included in the site EMPr. This will be triggered by findings during excavation.

The rock encountered on this site is flat-laminated shale. If this appears to be highly disturbed a fossil could be exposed by excavation. Fossils could range from a skull to bone fragments.



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:

- If anything is seen that could be a fossil, images (with scale) should be captured by the ECO and/ or EAP (or their delegates) and sent to a palaeontologist.
- 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.

- Work should cease in this area until the all clear is given by the palaeontologist. Further palaeontological work may be required at the discretion of the palaeontologist.

Functional responsibilities of the Developer for finds

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.

Appendix 2: DETAILS OF SPECIALIST

Dr Alan Smith

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

&

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

Role: Specialist Palaeontological Report production

Expertise of the specialist:

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- MSc in Geology (University of KwaZulu-Natal)
- MSc topic concerned the stromatolites of Etosha Pan (palaeontological subject)
- Alan has authored and co-authored 10 refereed publications on the subject of *Stromatolites* with another in review. He is part of the EpstromNet project which spans 3 continents.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published + 50 journal articles with +700 citations (detailed CV available on request).
- Alan has attended, and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected 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.

APPENDIX B
CHANCE FIND PROTOCOL

CHANCE FIND PROTOCOL – HERITAGE RESOURCES

PURPOSE

Potential impacts on heritage resources can occur during construction as a result of unearthing during construction. This protocol outlines the procedures to be followed in the event that a heritage resource is uncovered.

Palaeontological finds

Monitoring Programme for Palaeontology is to commence once the excavations for all structures and infrastructure begin. The following procedure is only required if fossils are seen on the surface and when excavations commence.

1. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (silicified wood, plants, insects, bone, shells) should be put aside in a suitably protected place. This way the construction activities will not be interrupted.
2. Where possible, photographs of similar fossils must be provided to the contractor to assist in recognizing the fossil plants and bones that might be encountered on site. This information must be built into the EMP's training and awareness plan and procedures.
3. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
4. If there is any possible fossil material found by the Contractor/environmental officer then a qualified palaeontologist should visit the site to inspect the selected material and check the excavations where feasible.
5. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made

available for further study. Before the fossils are removed from the site, a South African Heritage Resources Agency (SAHRA) permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

6. If no good fossil material is recovered, then any site inspections by the palaeontologist will not be necessary.

7. If no fossils are found and the excavations have finished, then no further monitoring is required.

Archaeological finds

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

1. The heritage resource must be avoided and all activities in the immediate vicinity temporarily ceased.
2. A suitably qualified specialist must be informed and commissioned to consider the heritage resource, either via communicating with the Environmental Officer via telephone or email, or based on a site visit.
3. Appropriate measures are to be provided by a qualified specialist towards immediate management of the heritage resource.

Should the specialist conclude that the find is a heritage resource protected in terms of the NRHA (1999) Sections 34, 36, 37 and NHRA (1999) Regulations (Regulation 38, 39, 40), the specialist must notify SAHRA on behalf of the Developer.

If required by SAHRA, the specialist must conduct a HIA in terms of NHRA Section 38 that must include rescue actions/excavations.

Graves

Should any unmarked human burials/remains be found during the course of construction:

1. Work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA).
2. Where human remains are part of a burial they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500).
3. For newer graves, should the specialist conclude that the find is a heritage resource protected in terms of the NHRA (1999) Section 35 and NHRA (1999) Regulations (Regulation 38, 39, 40) SAHRA may require that an identification of interested parties, consultation and /or grave relocation take place;
4. Consultation must take place in terms of NHRA (1999) Regulations 39, 40, 42;
5. Grave relocation must take place in terms of NHRA (1999) Regulations 34.
6. These measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions, laws and by-laws pertaining to human remains.

If required by current, relevant legislation, a full social consultation process should occur in conjunction with the mitigation of cemeteries and burials.

Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.