IA OF THE PROPOSED RESIDUE STORAGE FACILITY AT FAIRBREEZE MINE ONTO THE EVERGLADES FARM, MTUNZINI KZN

FOR SRK CONSULTING

DATE: 27 SEPTEMBER 2020

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Abbreviations

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

INTRODUCTION

Tronox is proposing to expand it's existing Residue Storage Facility at Fairbreeze Mine near Mtunzini onto the adjacent Everglades Farm – Portion 1 of Lot 85 Obanjeni 9141. Tronox has purchased the farm which is currently under sugarcane cultivation.

"Tronox KZN Sands (Pty) Ltd (Tronox) is currently mining the mineralised sand dunes of the Fairbreeze deposit located near Mtunzini on the north coast of KwaZulu-Natal. The coastal dunes in this area contain economic deposits of heavy minerals including ilmenite, leucoxene, zircon and rutile. During hydraulic mining, the slurry (called Run of Mine) formed at the ore body is pumped to the Primary Wet Plant (PWP) for separation as follows:

- The Heavy Mineral Concentrate is transported by truck to the Central Processing Complex at Empangeni.
- The coarse discard or tailings is slurried and pumped back to the mining area to backfill the mining void.
- The fine discard or residue is currently pumped to the Mega Sabeka Residue Storage Facility (RSF) for disposal.

The residue storage system at the Fairbreeze Mine consists of two phases. During the current Phase 1 operation (estimated for the initial six year period), all fine residue is deposited in the Mega Sabeka RSF and the associated supernatant water is temporarily stored in the Valley Return Water Dam (RWD) before being returned to the PWP for reuse.

Furthermore, "Tronox propose to expand the Site C Extension offset area to Tronox owned properties to the south, which will result in a large portion of the Siyaya catchment being rehabilitated and managed as a conservation area once mining is complete. The rehabilitation activities for the proposed expanded offset

area are included in the current applications" (SRK BID 2019). This is referred to as the iSiyaya Biodiversity Offset.

Umlando was requested to undertake an assessment of the proposed developments. 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

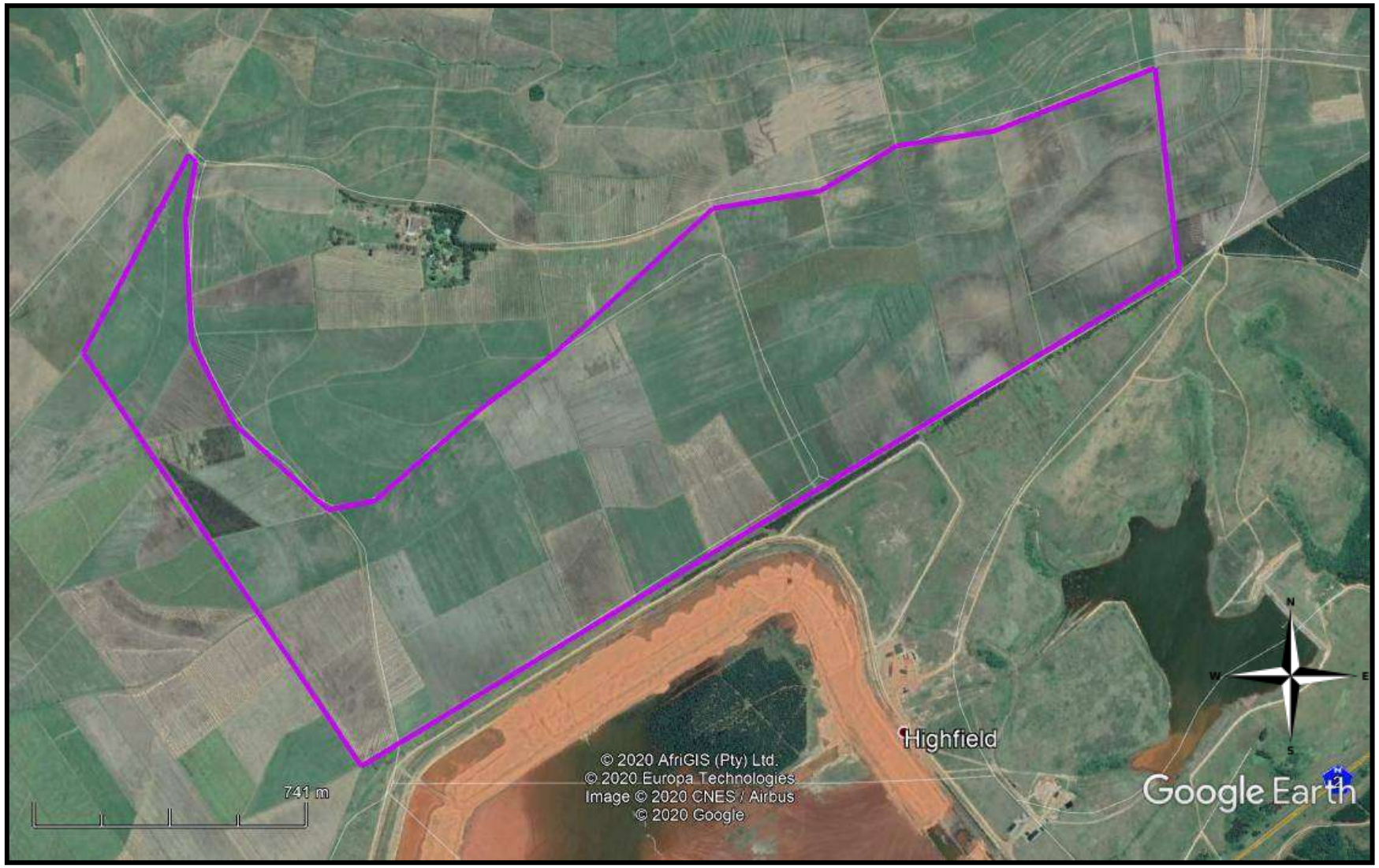


FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (2002)

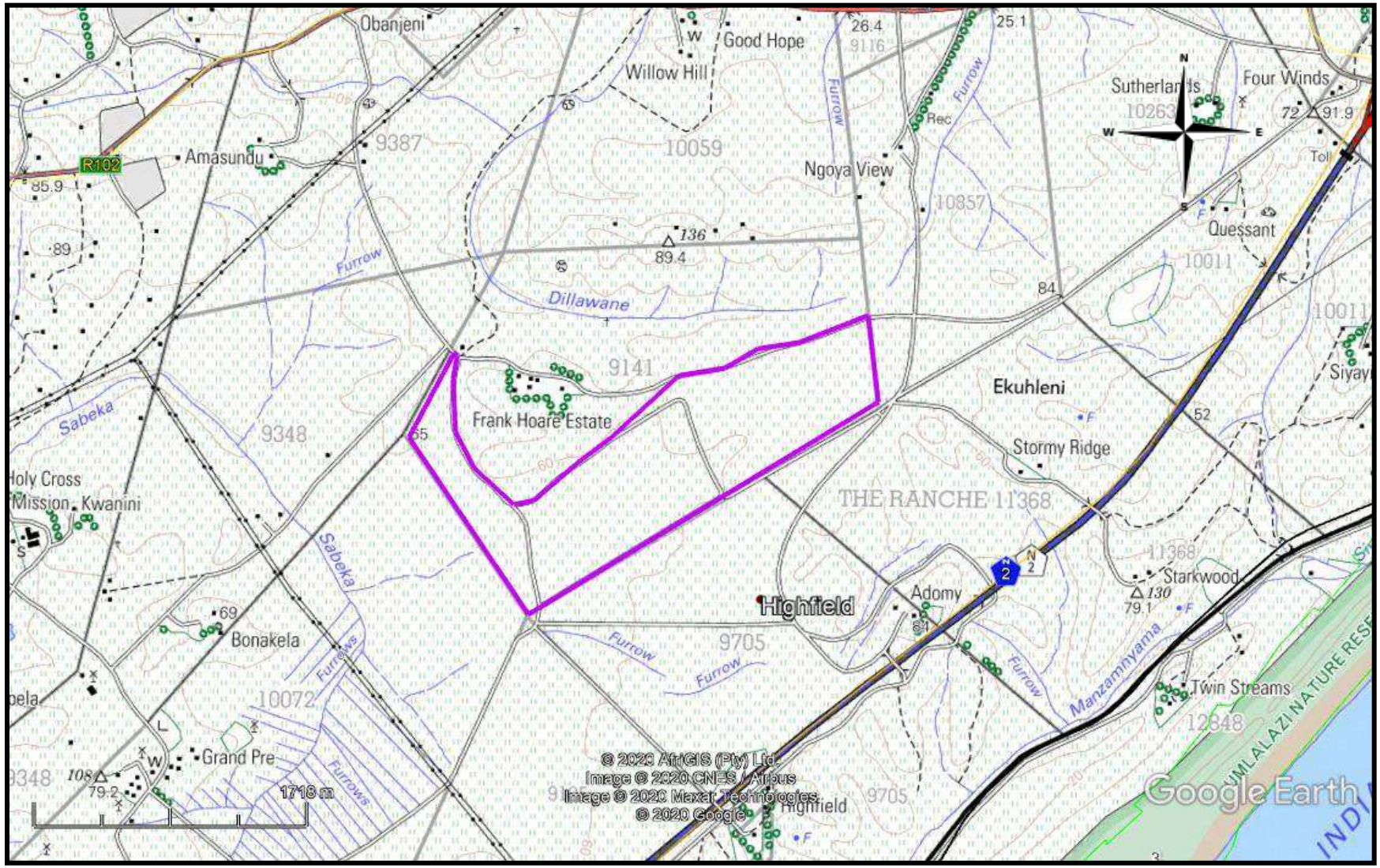


FIG. 4: SCENIC VIEW OF STUDY AREA

KWAZULU NATAL AMAFA AND RESEARCH INSTITUTE, ACT 05, 2018

"General protection: Structures.—

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

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

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

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

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

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

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

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

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

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

METHOD

The method for Heritage assessment consists of several steps.

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

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

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

Defining significance

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

These criteria are:

1. State of preservation of:

1.1. Organic remains:
1.1.1. Faunal
1.1.2. Botanical
1.2. Rock art
1.3. Walling
1.4. Presence of a cultural deposit
1.5. Features:
1.5.1. Ash Features
1.5.2. Graves

1.5.3. Middens

1.5.4. Cattle byres

1.5.5. Bedding and ash complexes

2. Spatial arrangements:

2.1. Internal housing arrangements

2.2. Intra-site settlement patterns

2.3. Inter-site settlement patterns

3. Features of the site:

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

3.2. Is it a type site?

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

4. Research:

4.1. Providing information on current research projects

4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

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

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

6. Archaeological Experience:

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

7. Educational:

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

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

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

8. Other Heritage Significance:

8.1. Palaeontological sites

8.2. Historical buildings

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

8.4. Graves and/or community cemeteries

8.5. Living Heritage Sites

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

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

TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES

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

RESULTS

DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. Many archaeological sites occur in the general area. The archaeological sites tend to be open Stone Age and Iron Age scatters of low significance (fig. 5). Most of the sites recorded in the general area are related to the Fairbreeze mine (Anderson 2010). One Historical Period site was excavated in March and June 2020 (Anderson 2020).

Lot 85 Obanjeni was first surveyed in 1905 (fig. 6). This is in response to the Land Delimination Act of 1905 whereby KwaZulu-Natal was divided by the British Government. There was a proposed tramway, form the main railway in 1930 that would have followed an existing road (fig. 7). The tramway does not show on the 1937 aerial photograph (fig. 8), but the farm buildings do. The buildings thus predate 1937, and are automatically protected by virtue of being older than 60 years in age. These buildings are just outside of the study area.

The buildings, and a few more recent ones, occur on the 1968 topographical map (fig. 9), as well as a cemetery. The cemetery may occur on the 1937 aerial photograph as being under a large tree. The cemetery is outside of the study area.

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

FIG. 6: LOT 85 OBANJENI (1905)

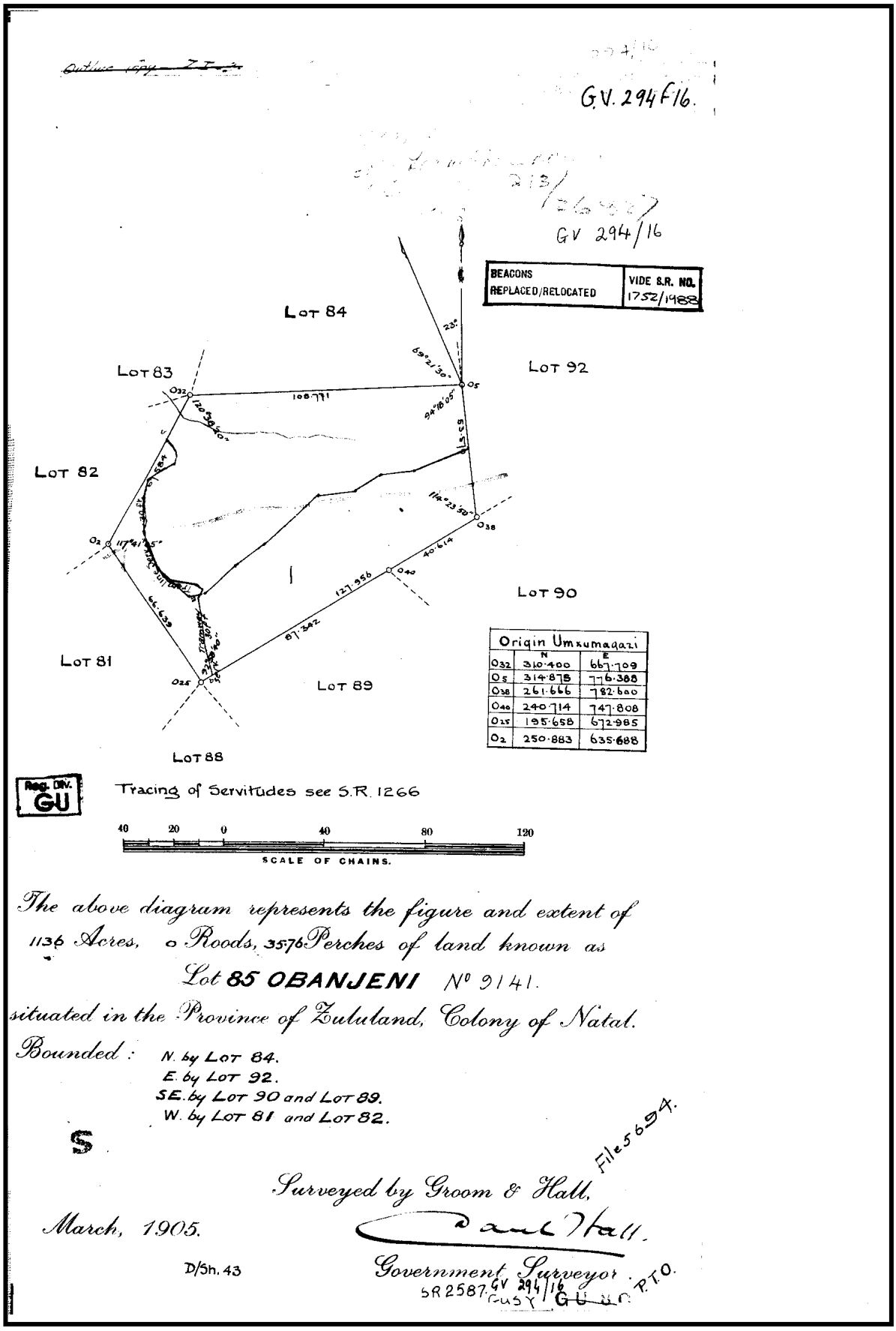


FIG. 7: LOT 85 OBANJENI PROPOSED TRAMWAY (1930)

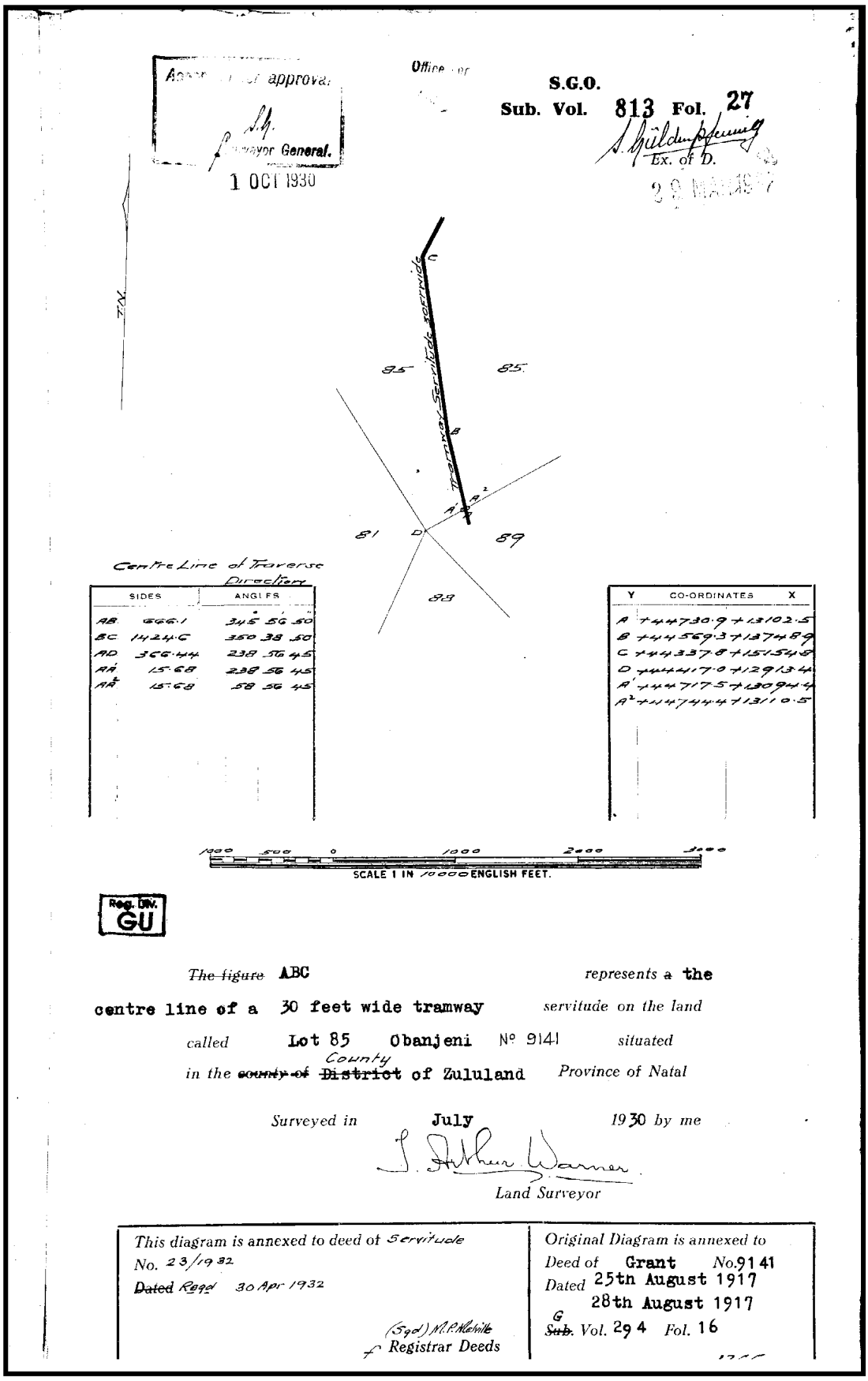
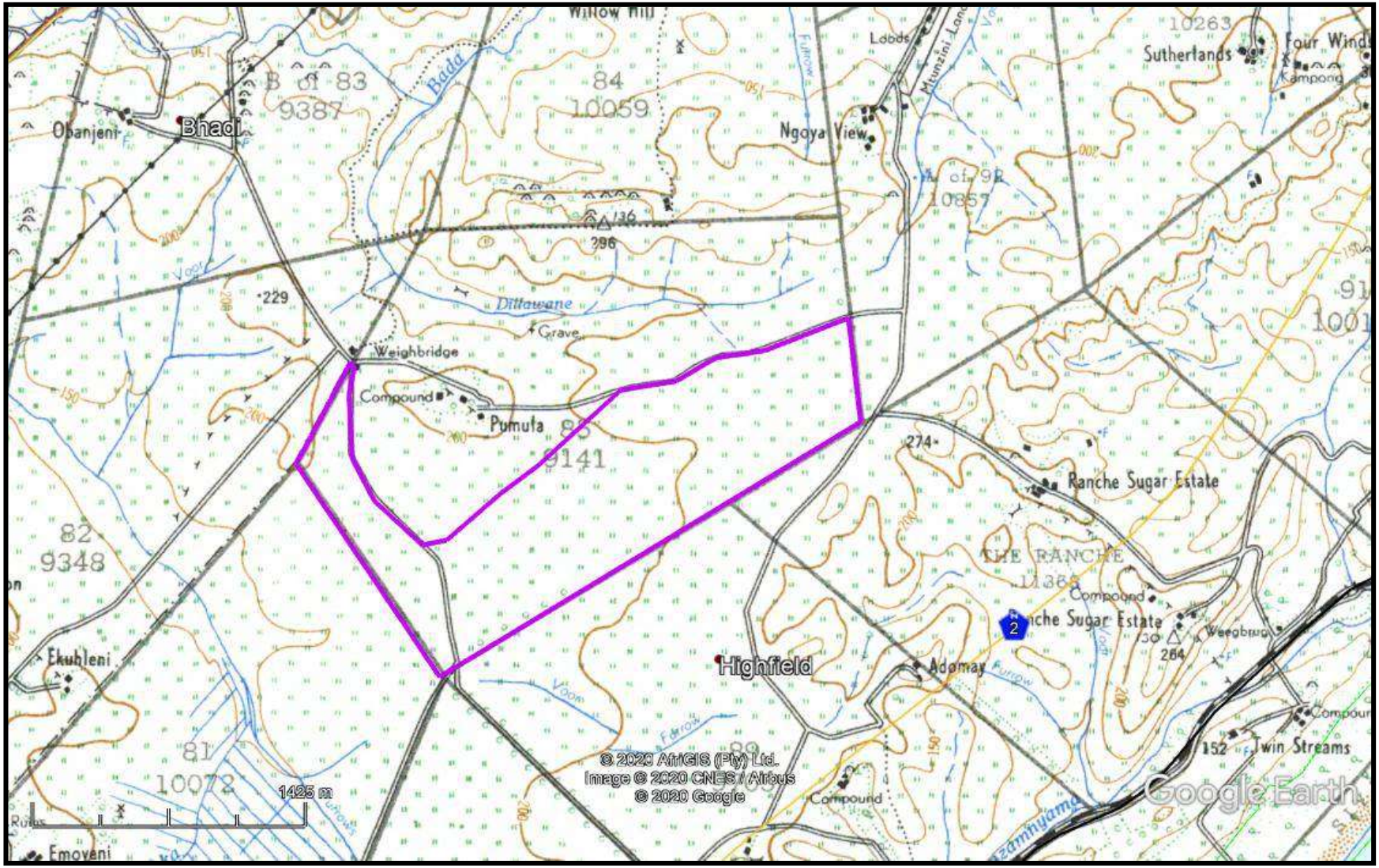


FIG. 8: STUDY AREA IN 1937[1]

[1] 117C_055_38120

FIG. 9: STUDY AREA IN 1964



PALAEONTOLOGICAL SENSITIVITY

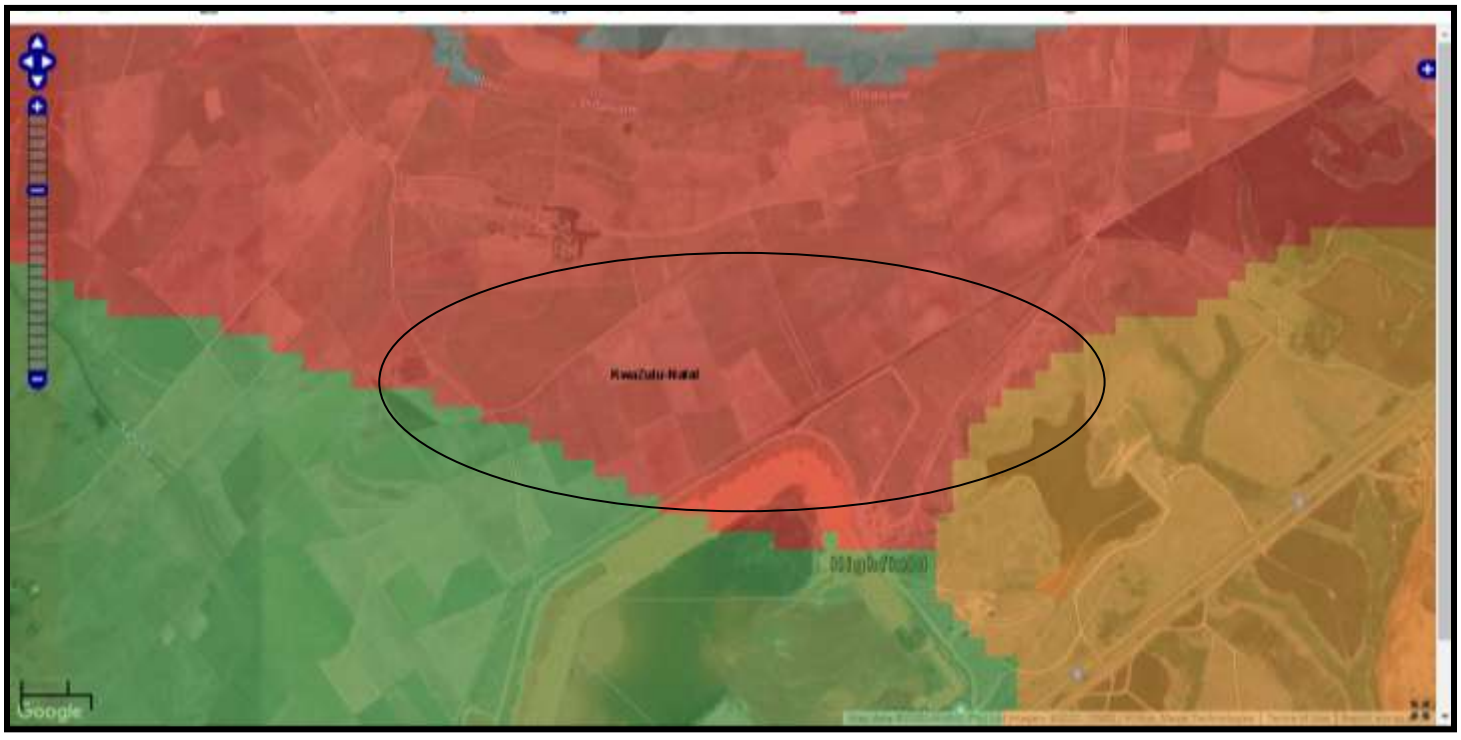
The area is in an area of very high palaeontological sensitivity (fig. 10). However, the PIA desktop reports that the area is of low significance (Smith 2020,Appendix A). Dr Smith states:

"The Umkwelane (Berea Red Sand) Formation is not fossiliferous. Theoretically it could contain fossils but nothing significant has been recorded.

The Vryheid Formation can be fossiliferous. Trace fossils, not significant, are common. Vertebrate fossils have been recorded but are extremely rare. The Pietermaritzburg Formations and the Dwyka Group can show trace fossils (not significant) but are not known for any significant Palaeontological Material."

A Chance Find Protocol was initiated for the construction phase. This CFP can be extended to the iSiyaya Biodiversity Offset.

FIG. 10: PALAEONTOLOGICAL SENSITIVITY MAP



FIELD SURVEY

A field survey was undertaken on the 23 September 2020. Most of the sugar cane had been cut, resulting in good ground visibility. The cemetery (28°58'4.50"S 31°41'23.49"E) was assessed (fig. 11) and it occurs behind a hill where the proposed development will occur. There will be no visual impact. The landowner sated that the cemetery is probably that for farm labourers and the last internment was approximately 20 years ago. This is an unrecorded cemetery on the SAHRIS database.

FIG. 11: HISOTRICAL CEMETERY ON THE FARM EVERGLADES

The survey did not record any heritage sites within the study area. This is probably a result of the soil being a clay-like in composition and is mostly avoided

for human settlements. Higher, and more sandy soils, do exist in the study area, but they had no artefacts.

The Biodiversity offsets formed part of the original HIA (Anderson 2010). No heritage sites were noted in this specific area. Furthermore, this area is part of the general monthly surveys and monitoring undertaken by Umlando at the Fairbreeze mine. No further nor additional HIA mitigation is required.

RECOMMENDATIONS

No heritage sites have been recorded in the study area. The project should be exempt from further HIA mitigation.

The Biodiversity offsets require no further mitigation.

CONCLUSION

A HIA was undertaken for the proposed Residue Storage Facility at Fairbreeze Mine, Mtunzini, onto the adjacent Everglades Farm – Portion 1 of Lot 85 Obanjeni 9141. A comment was made for the Siyaya Biodiversity offsets.

The desktop study indicated that there were no known heritage sites in the study areas. The field survey did not record any heritage sites. The Biodiversity offsets occur in a previously surveyed area, and is part of the general monthly monitoring program.

No further HIA mitigation should be required.

REFERENCES

Anderson, G. 2010. Heritage Survey Of The Proposed Fairbreeze Mine. HIA Report fro Tronox Sands.

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

Expansion of Residue Storage Facility at Fairbreeze Mine near Mtunzini onto the adjacent Everglades Farm – Portion 1 of Lot 85 Obanjeni 9141

FOR

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29 September 2020

EXECUTIVE SUMMARY

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Chances of finding **Palaeontological Material** is very low, however it is not zero and so a ***"Chance Find Protocol"*** has been inserted.

No further **Palaeontological Investigation** is warranted

1. BACKGROUND AND PROPOSED PROJECT

Tronox is proposing to expand its existing Residue Storage Facility at Fairbreeze Mine near Mtunzini onto the adjacent Everglades Farm (Portion 1 of Lot 85 Obanjeni 9141) (Fig. 1). Tronox has purchased the farm which is currently under sugarcane cultivation.

Figure 1: Location of the proposed Residue Storage Facility extension (Purple Box). Source map GoogleEarth.

2. GEOLOGY

The proposed Residue Storage Facility extension site is to be located on land that may be underlain by Dwyka Group, Pietermaritzburg Formation, Vryheid Formation and the Umkwelane Formation (Berea Red Sandstone) (Botha, 2018) (Fig. 2).

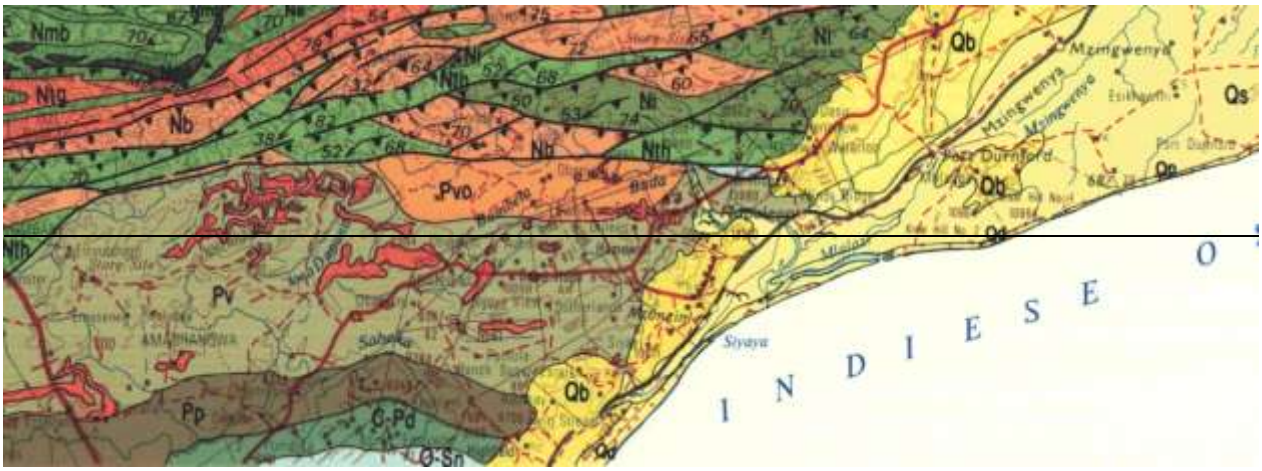

Figure 2: Extract from the Dundee 2830 1:250 000 Geological Map. Qb is Umkwelane ***(Berea Red Sand) Formation.***

The Dwyka Group represents sediments deposited during the Late Palaeozoic Glaciation. This glaciation the end of the Carboniferous (~305 to 307 Ma) to the early Permian (about 290 Ma) Visser, 1997; Herbert and Compton, 2007). This was followed by the Ecca Group deposited between approximately 290 Ma and 265 Ma in the foredeep of the main Karoo Basin (Catuneanu et al, 1998).

The Pietermaritzburg Formation (lowest part of the Ecca Group) was deposited during the sealevel rise that followed the Late Palaeozoic Glaciation termination.

The Vryheid Formation (middle portion of the Ecca Group) was deposited within the marine Karoo Sea (Catuneanu et al., 1998).

The Umkwelane is of uncertain age (Mid-Miocene-Pleistocene). It is comprised of Aeolian deposits which have been strongly chemically weathered to give the red colour. This is a relict coastal dune cordon which formed during a former sea level highstand.

3. PALAEONTOLOGY

The Umkwelane (Berea Red Sand) Formation is not fossiliferous. Theoretically it could contain fossils but nothing significant has been recorded.

The Vryheid Formation can be fossiliferous. Trace fossils, not significant, are common. Vertebrate fossils have been recorded but are extremely rare. The Pietermaritzburg Formations and the Dwyka Group can show trace fossils (not significant) but are not known for any significant Palaeontological Material.

Fig3 Palaeosensitivity of rocks in the proposed Residue Storage Extension area.

Although the chances of finding **Palaeontological Material** is low it is not zero, thus a ***"Chance Find Protocol"*** has been inserted into this document.

4. CHANCE FIND PROTOCOL

As this site includes areas flagged red on the SAHRIS PalaeoSensitivity Map (Fig. 3), a ***"Chance Find Protocol"*** is **Recommended**.

In the case of any unusual finds, 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.

5. CONCLUSIONS & RECOMMENDTIONS

Chances of finding **Palaeontological Material** is very low, however it is not zero and so a ***"Chance Find Protocol"*** has been inserted.

6. REFERENCES

Botha, G (2018). Lithostratigraphy of the late Cenozoic Maputaland Group. South African Journal of Geology, 121, 95-108. doi:10.25131/sajg.121.0007

Catuneanu, O., Hancox, P.J., Rubidge, B.S., 1998. Reciprocal flexural behaviour and contrasting stratigraphies: a new basin development model for the Karoo retroarc foreland system, South Africa. Basin Res. 10, 417–439.

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7. DETAILS OF SPECIALIST

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

&

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

Role: Specialist Palaeontological Report production
Expertise of the specialist:

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published more than 50 journal articles with 360 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhekuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- 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.