

**HERITAGE IMPACT ASSESSMENT FOR AMI
COLLIERY, VRYHEID, KWAZULU-NATAL**

FOR GEOFF SILK CONSULTING

DATE: 26 MAY 2015

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INTRODUCTION

Umlando was subcontracted by Geoff Silk Consulting to undertake a heritage impact assessment of the AMI Colliery, near Hlobane, Vryheid, KwaZulu-Natal. The existing AMI colliery occurs 20km east of Vryheid and south of the R69 and R618. Much of the area has been disturbed by existing coal mining and dumping. Other areas are covered in wattle plantations and a small portion is still grassland. Figures 1 – 3 show the location to the study area.

The existing colliery will be expanding its operations within the general area. The project involves the establishment of a dense medium coal processing plant and a spiral fine coal handling plant on Portion 29 of the Farm Rietvlei 150-HU in the District of Vryheid, within the Abaqulusi Local Municipal area of Northern KwaZulu Natal. This is in order to re-process existing mine residue material on the site that was generated by previous mining and coal processing operations in that area. The impact area has now been extended further than the original application.

This HIA was in response to a request by Amafa KZN. All areas where coal is found are highly sensitive for fossil remains, and thus the HIA included the palaeontological aspect as well.

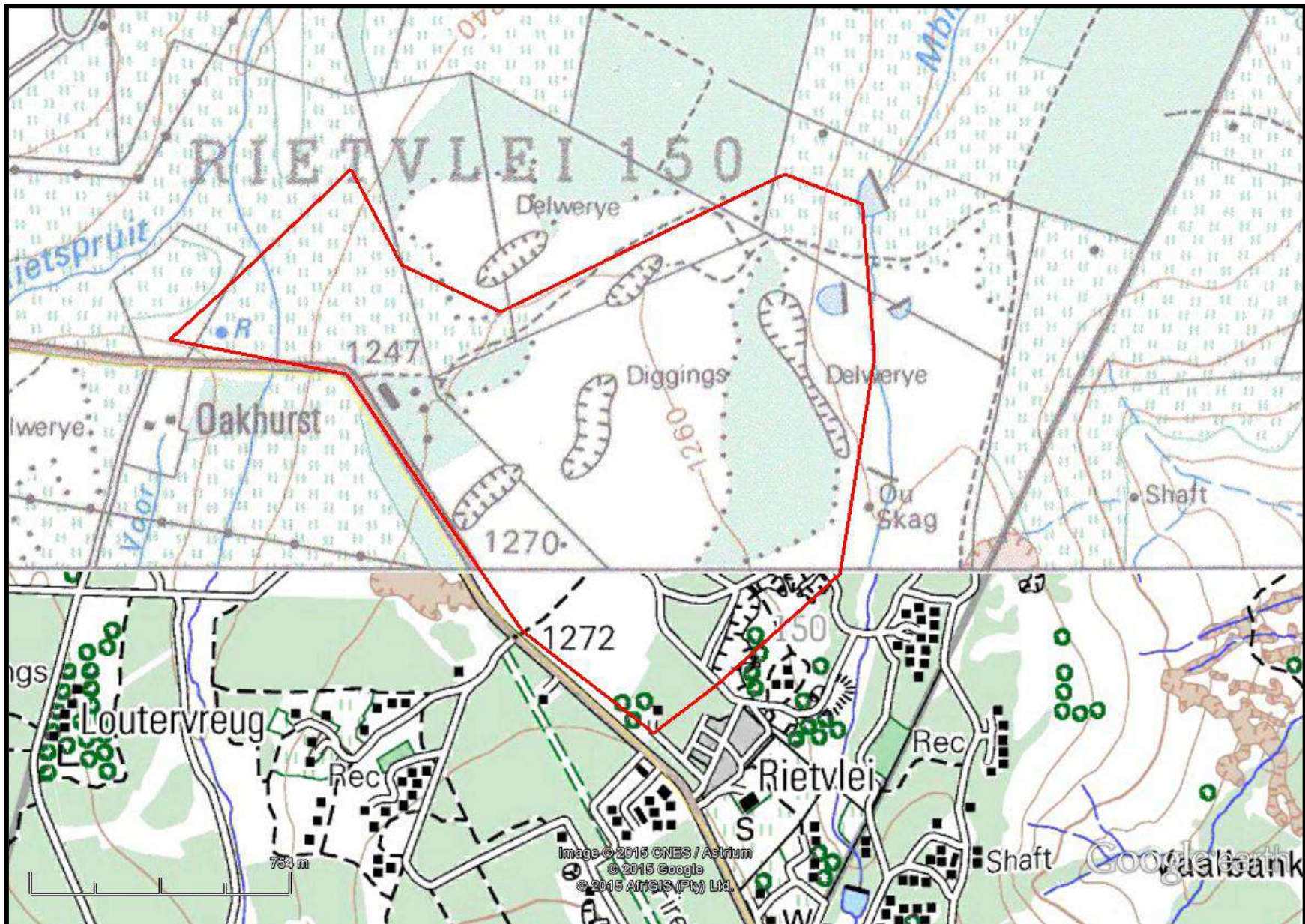
FIG. 1 GENERAL LOCATION OF THE STUDY AREA



FIG. 2: AERIAL OVERVIEW OF THE GENERAL STUDY AREA



FIG. 3: TOPOGRAPHICAL MAP OF THE STUDY AREA



KWAZULU-NATAL HERITAGE ACT NO. 4 OF 2008

“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.” (KZN Heritage Act of 2008)

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. These 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.

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. The archaeological database indicates that there are archaeological sites in the general area (fig. 4). These sites include all types of Stone Age and Iron Age sites. No sites occur in the study area. No national monuments, battlefields, or historical cemeteries are known to occur in the study area.

The 1937 aerial photographs suggest that nine settlements occurred within the study area (fig. 5). All of these have been mined with the exception of a9. The settlements would probably have human graves associated with them. The 1969 topographical map indicates that there are three buildings in the study area (fig. 6). These buildings have been removed by 1986, and replaced by office buildings.

Table 1 lists the locations of these sites.

FIG. 4: LOCATION OF KNOWN HERITAGE SITES NEAR THE STUDY AREA



FIG. 5: STUDY AREA IN 1937

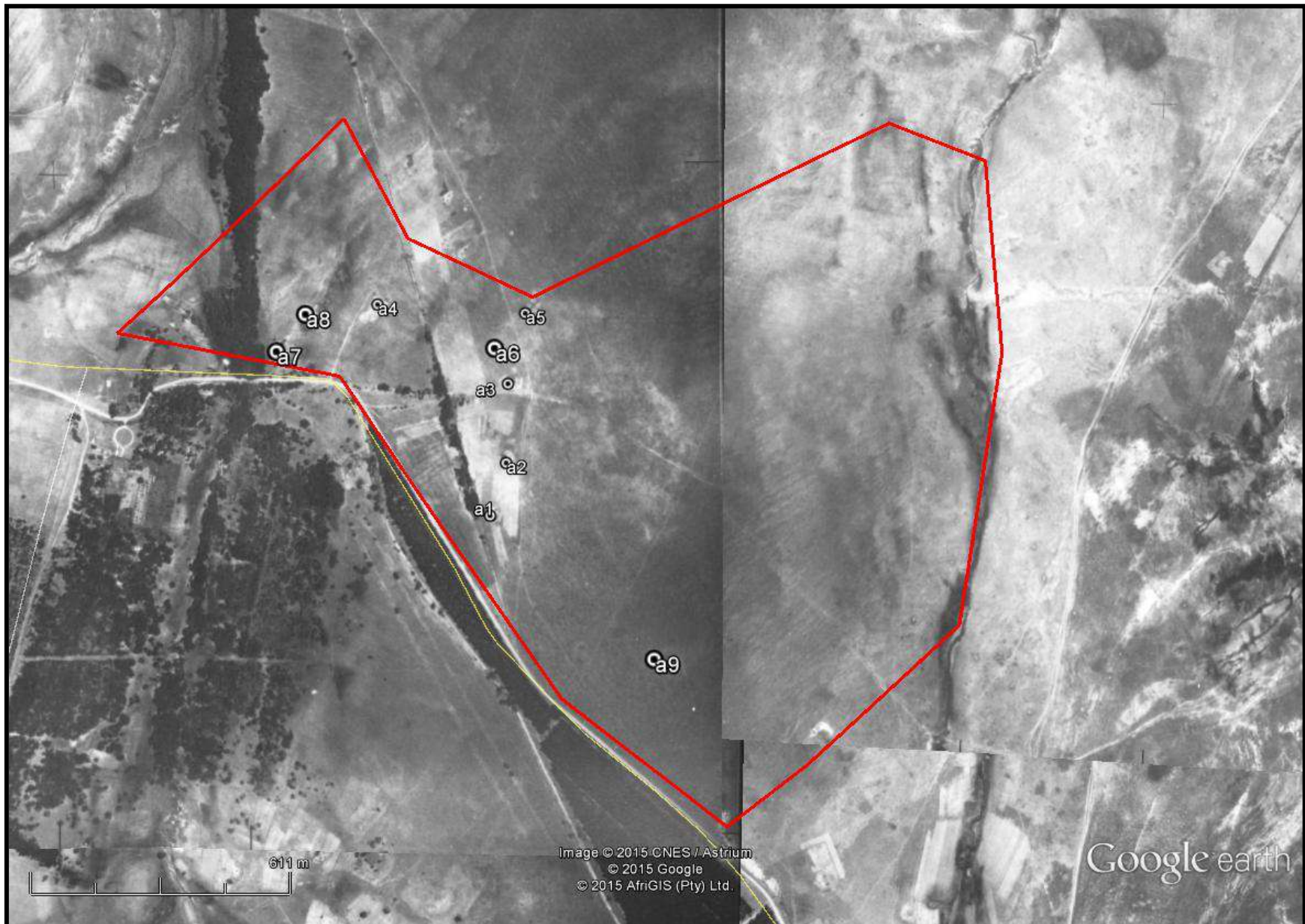


FIG. 6: STUDY AREA IN 1969 and 1961 (top)

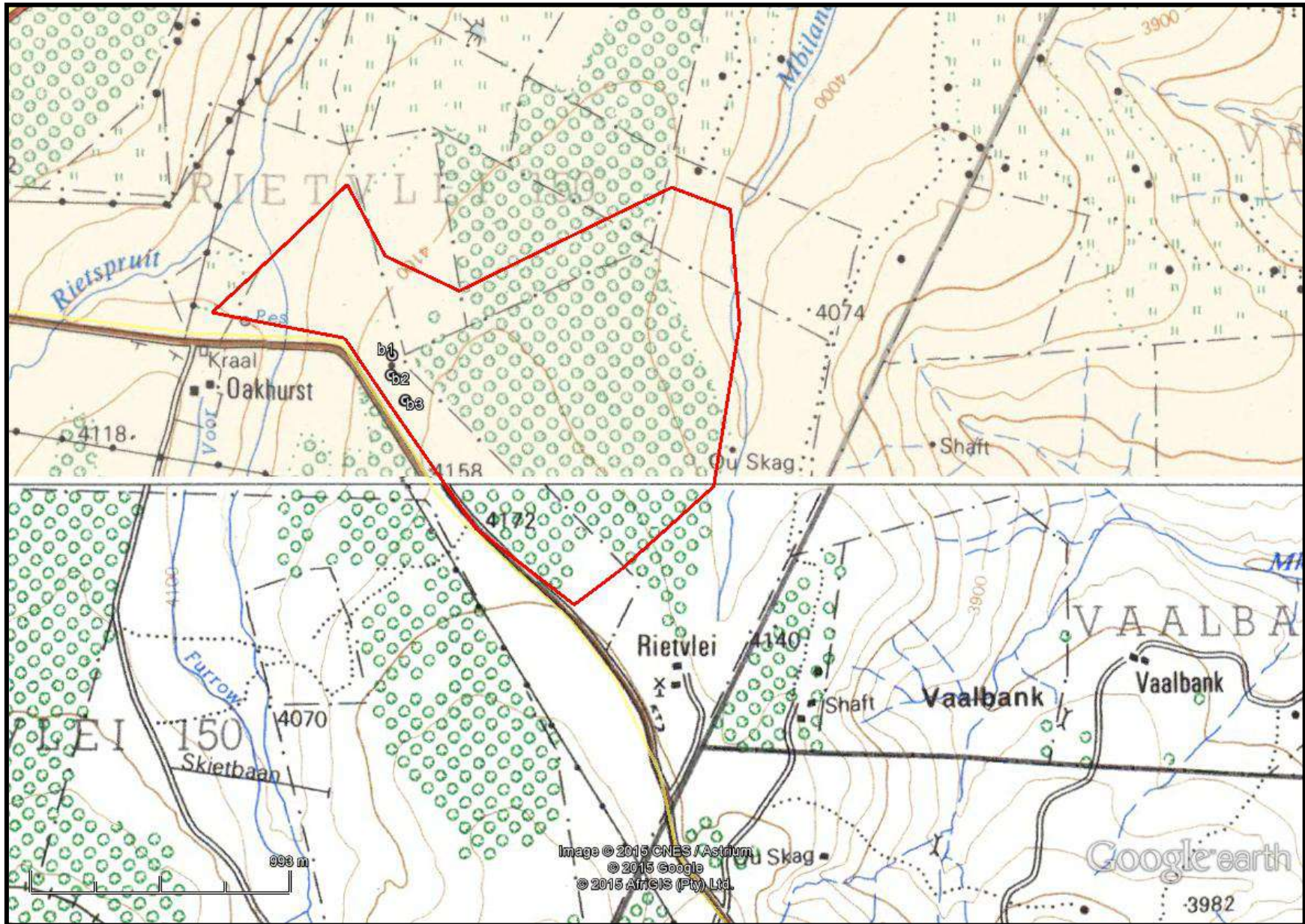


TABLE 1: LOCATION OF SITES FROM THE DESKTOP STUDY

NAME	LATITUDE	LONGITUDE	DESCRIPTION
a1	-27.748062450	31.030752320	Settlement
a2	-27.746948564	31.031133806	Settlement
a3	-27.745277157	31.031175057	Settlement
a4	-27.743582342	31.028014901	Settlement
a5	-27.743785881	31.031583147	Settlement
a6	-27.744518874	31.030860192	Settlement
a7	-27.744565116	31.025557862	Settlement
a8	-27.743774152	31.026265809	Settlement
a9	-27.751068577	31.034674292	Settlement
b1	-27.746160814	31.028989433	Building 1961
b2	-27.746627578	31.029344385	Building 1961
b3	-27.747410303	31.029467461	Building 1961
Buildings	-27.745717562	31.028691847	Building 1986

FIELD SURVEY

The survey was undertaken in April 2015. Much of the extension area is under wattle plantation and/or has been disturbed by some form of activity already probably related to mining. Fig. 6 shows some of the views of the site.

All buildings and structures on the site are younger than 60 years in age and do not require further mitigation. These buildings and structures are related to the colliery (fig. 7 bottom right and 8).

The only area that has not been affected by mining and/or wattle is the top of the hill in the location of 'a9' of the desktop study. This area is a grassland; however no features of the settlement could be observed (fig. 8). In the aerial photograph the site 'a9' was in agricultural field. The area should be noted as having the potential for human remains if mined. If human remains are uncovered during the mining process, then the SAPS and Amafa KZN need to be informed immediately.

No heritage sites were noted during the survey and no further mitigation is required.

FIG. 7: VIEWS OF THE STUDY AREA



FIG. 8: RECENT STRUCTURE AT THE COLLIERY



FIG. 9: GRASSLANDS IN UNDISTURBED AREA NEAR 'A9'



PALAEONTOLOGICAL DESKTOP IMPACT ASSESSMENT

“The plant fossils, associated with the interbedded carbonaceous shales of the Vryheid Formation are fragmentary and coalified. The fossils are associated with small pieces of coal and are not in situ” (Groenewald Appendix A). Thus this section of the mine is given low paleontological significance. However, if well-defined plant material are recorded, the ECO must be informed and the fossils must be rescued by a professional palaeontologist.

A full PIA desktop report is given in Appendix A

CONCLUSION

A heritage survey was undertaken for the extension of the AMI Colliery processing area. The desktop heritage report noted that there were settlements in the study area as well as buildings. Furthermore, the study area is rated as highly sensitive for palaeontological remains on the SAHRIS map.

No heritage sites were observed during the survey; however, one area has not been mined and has potential human remains. This area should be noted as being sensitive if mined.

The palaeontological survey noted that while the area is highly sensitive, the fossil remains were highly fragmented and of low significance. If complete fossils were noted then a qualified palaeontologist would be required.

No further mitigation is required.

APPENDIX A
PALAEONTOLOGICAL DESKTOP ASSESSMENT

**PHASE 1 PALAEOLOGICAL
ASSESSMENT FOR THE PROPOSED
EXTENSION OF THE AMI COLLIERY ON
RIETVLEI 150, ABAQULUSI LOCAL
MUNICIPALITY, ZULULAND DISTRICT
MUNICIPALITY, KWAZULU-NATAL
PROVINCE.**

**FOR
Umlando**

DATE: 23 May 2015

By

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EXECUTIVE SUMMARY

Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Impact Assessment (PIA), assessing the potential Palaeontological Impact of the proposed extension of the reworking of the old mine dumps at the AMI Colliery on the farm Rietvlei 150, within the Abaqulusi Local Municipality, Zululand District Municipality, KwaZulu-Natal Province. The proposed activity includes the reworking of old mine dumps for the extraction of high quality coal from the previously mined material.

The development site for the proposed upgrade and extension of the AMI Colliery on the farm Rietvlei 150, within the Abaqulusi Local Municipality, Zululand District Municipality, KwaZulu-Natal Province, is underlain by Permian aged sedimentary rocks of the Vryheid Formation, Ecca Group.

The plant fossils, associated with the interbedded carbonaceous shales of the Vryheid Formation are fragmentary and coalified. The fossils are associated with small pieces of coal and are not in situ.

It is recommended that:

The EAP and ECO be informed of the fact that the mining of coal is, by definition, the mining of fossil plant material. If well-defined plant material are recorded, the ECO must be informed and the fossils must be rescued by a professional palaeontologist.

Due to the fact that the activities involve only the reworking of old mine dumps, no further mitigation for Palaeontological Heritage is required.

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INTRODUCTION

Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Impact Assessment (PIA), assessing the potential Palaeontological Impact of the proposed extension of the reworking of the old mine dumps at the AMI Colliery on the farm Rietvlei 150, within the Abaqulusi Local Municipality, Zululand District Municipality, KwaZulu-Natal Province. The proposed activity includes the reworking of old mine dumps for the extraction of high quality coal from the previously mined material. An extension of the mining works is planned towards the south of the existing exploration (Figure 1).

Figure 1 The Site of the mining activities at AMI Colliery



SOUTH AFRICAN NATIONAL HERITAGE RESOURCE ACT NO 25/1999 AND KWAZULU-NATAL HERITAGE ACT NO 4/2008

This Palaeontological Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999 as well as the KwaZulu-Natal Heritage Act No 4 of 2008. In accordance with Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), a HIA is

required to assess any potential impacts to palaeontological heritage within the development footprint.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

METHODOLOGY

Following the "SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports" the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

Prior to the field investigation a preliminary assessment (desktop study) of the topography and geology of the study area was made using appropriate 1:250 000 geological maps (2730 Vryheid) in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc) were identified within the study area and the known fossil heritage within each rock unit was inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

Priority palaeontological areas were identified within the development footprint to focus the field investigator's time and resources. The aim of the fieldwork was to document any exposed fossil material and to assess the palaeontological potential of the region in terms of the type and extent of rock outcrop in the area.

The likely impact of the proposed development on local fossil heritage was determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the minimal extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 below.

Table 1 Palaeontological sensitivity analysis outcome classification

Sensitivity	Description
Low Sensitivity	Areas where there is likely to be a negligible impact on the fossil heritage. This category is reserved largely for areas underlain by igneous rocks. However, development in fossil bearing strata with shallow excavations or with deep soils or weathered bedrock can also form part of this category.
Moderate Sensitivity	Areas where fossil bearing rock units are present but fossil finds are localised or within thin or scattered sub-units. Pending the nature and scale of the proposed development the chances of finding fossils are moderate. A field-based assessment by a professional palaeontologist is usually warranted.
High Sensitivity	Areas where fossil bearing rock units are present with a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops and the chances of finding fossils during a field-based assessment by a professional palaeontologist are very high. Palaeontological mitigation measures need to be incorporated into the Environmental Management Plan

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field-based assessment by a professional palaeontologist is usually warranted.

Scope and Limitations of the Phase 1 Investigation

The scope of a phase 1 Investigation includes:

- an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units;
- a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports;
- data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged) and
- where feasible, location and examination of any fossil collections from the study area (e.g. museums).

- an on-site investigation to assess the identified palaeontological sensitive areas within the development footprint/study area rather than formal palaeontological collection. The investigation focussed on the bedrock exposure where excavations would most probably require palaeontological monitoring.

The results of the field investigation are then used to predict the potential of buried fossil heritage within the development footprint. In some investigations this involves the examination of similar accessible bedrock exposures, such as road cuttings and quarries, along roads that run parallel to or across the development footprint.

PROPOSED DEVELOPMENT DESCRIPTION

AMI Colliery plans to extend the reworking of old mine dumps on the farm Rietvlei 150. The reworking of the mine dumps includes the sorting of material to extract the higher quality coal from the old dump sites.

GEOLOGY OF THE AREA

The study area is underlain by Permian aged sedimentary rocks and Jurassic aged Dolerite of the Karoo Supergroup. The reworking of material is restricted to the reworking of old mine dumps on the site.



Figure 2 The study area at Rietvlei 150 is underlain by the Vryheid Formation.

Karoo Supergroup

Ecca Group - Vryheid Formation (Pv)

The Permian aged Vryheid Formation is a thick sequence of sedimentary rocks dominated by light grey sandstones with

interbedded grey shale and thick, economically important coal seams. These sandstones were deposited along ancient sandy shorelines behind which lay vast swamplands. Burial of vegetation in the swamps eventually formed coal which is mined at various localities in the area.

PALAEONTOLOGY OF THE AREA

Karoo Supergroup

Ecca Group -Vryheid Formation (Pv, brown colour on map above).

The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; *Azaniodendron fertile*, *Cyclodendron leslii*, *Sphenophyllum hammanskraalensis*, *Annularia sp.*, *Raniganjia sp.*, *Asterotheca spp.*, *Liknopetalon enigmata*, *Glossopteris > 20 species*, *Hirsutum 4 spp.*, *Scutum 4 spp.*, *Ottokaria 3 spp.*, *Estcourtia sp.*, *Arberia 4 spp.*, *Lidgettonia sp.*, *Noeggerathiopsis sp.* and *Podocarpidites sp.*

According to Bamford (2011) “Little data have been published on these potentially fossiliferous deposits. Around the coalmines there is most likely to be good material and yet in other areas the exposures may be too poor to be of interest. When they do occur fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites, however, in the interests of heritage and science such sites should be well recorded, sampled and the fossils kept in a suitable institution.

Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1985). It should be noted, however, that the aquatic reptile, *Mesosaurus*, which is the earliest known reptile from the Karoo Basin, as well as fish (*Palaeoniscus capensis*), have been recorded in equivalent-aged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999; Modesto, 2006). Indications are that the Whitehill Formation in the main basin might be correlated with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that *Mesosaurus* could be found in the Vryheid Formation.

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation of Natal. The Karoo sediments are almost entirely lacking in body fossils but ichnofossils (trace fossils) are locally abundant. Modern sedimentological and ichnofaunal studies suggest that the

north-eastern part of the Karoo basin was marine. In KwaZulu-Natal a shallow basin margin accommodated a prograding fluviodeltaic complex forming a broad sandy platform on which coal-bearing sediments were deposited. Ichnofossils include U-burrows (formerly *Corophioides*) which are assigned to ichnogenus *Diplocraterion* (Mason and Christie, 1985).

Following the desktop analysis a High Palaeontological Sensitivity is allocated to the areas underlain by the Vryheid Formation.

Karoo Dolerite

Due to the igneous character of the rocks no fossils will be present.

PRELIMINARY ASSESSMENT RESULTS





The palaeontological sensitivity was predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity was predicted as significant, due to the potential abundance of Permian aged fossils including plant fossils in the Vryheid Formation.





FIELD INVESTIGATION





Dr Gideon Groenewald, and Patricia Groenewald experienced fieldworkers, visited the site of the proposed upgrading of the AMI Colliery on Tuesday 12 May 2015. The study area is underlain by coal from the old mine dumps and no outcrops of the Vryheid Formation were recorded during the field investigation. Plant fossils are associated with the coal and are the fossils are fragmentary and carbonaceous.





Table 2 Photographic record of exposures





Photo	GPS	Description	Picture





1	27 44 50,8S 31 01 46,4E	The mining activity entails the reworking and sorting of old mine dumps	
2	27 44 50,8S 31 01 46,4E	Plant fossils are fragmentary and carbonaceous, associated with coal beds.	
3	27 44 50,8S 31 01 46,4E	Spoil material consists of an assortment of coal, varying in quality.	
4	27 44 50,8S 31 01 46,4E	Plant fossils, fragmentary and carbonaceous, associated with coal	

5	27 44 50,8S 31 01 46,4E	Old mine dumps overgrown by grass and exotic trees	
6	27 44 50,8S 31 01 46,4E	Plant fossils fragmentary and coalified	
7	S27 44 52.9 E31 01 50.0	General view of the reworking of the mine dumps	
8	S27 44 52.9 E31 01 50.0	Mine dumps that will be reworked	

9	S27 44 52.9 E31 01 50.0	Reworking of the mine dumps. Plant fossils are fragmentary and associated with the coal.	
10	S27 44 54.0 E31 01 52.6	Part of the historic dumpsite is smoldering	
11	S27 44 54.0 E31 01 52.6	Partly reworked areas where plant fossils are associated with the coal. Fossils are fragmentary and coalified	
12	S27 44 56.1 E31 01 59.8	Old mine dumps overgrown by grass and exotic trees. No fossils were observed.	

13	S27 44 56.1 E31 01 59.8	Southern part of the study area where extension of the reworking is planned. No outcrop and no fossils were observed	
14	S27 44 47.1 E31 01 55.7	Reworked dump sites, plant fossils are fragmentary and associated with coal	
15	S27 45 01.6 E31 02 03.5	General view of southern area. No outcrop and no fossils were recorded	
16		Plant fossils associated with coal are highly carboniferous	

17	27 44 78,1S 31 02 22,5E	Exploration boreholes in southern section, no outcrop and no fossils observed	
18	27 44 22,0S 31 02 25,1E	Old infrastructure built on the old dump site, no outcrop and no fossils observed	
19	27 44 37,3S 31 02 35,7E	Exotic forest on old dump site that is planned to be reworked	
20	S27 44 44.8 E31 02 10.5	Old dump sites. Plant fossils fragmentary and associated with coal	

21	S27 44 44.8 E31 02 10.5	Oxidized shale due to burning of coal dumps. No fossils observed	
22	S27 44 52.9 E31 01 56.0	Mine dump smoldering.	
23	S27 44 52.9 E31 01 56.0	Sulphur concentrated on surface after burning of coal.	
24	S27 44 52.9 E31 01 56.0	Pyrite crystal concretion – possible explanation for erroneous recording of fossilized eggs from this site in the past	

25	S27 45 06.7 E31 02 12.3	Exotic forests in the southern part of the development area where extension of the reworking of mine dumps are planned. No fossils were observed.	
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PALAEONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews as well as information gathered during the field investigation. The field investigation confirms that the study area is underlain by coarse-grained sandstone and dark grey to black-coloured carbonaceous shale and economically minable coal beds of the Vryheid Formation of the Ecca Group of the Karoo Supergroup.

Due to the fact that the planned operation entails the reworking and sorting of old mine dumps, and the fact that all the plant fossils are highly fragmentary and associated with coal that is not in situ anymore, a Low Palaeontological Sensitivity is allocated to the development area.

CONCLUSION

The development site for the proposed upgrade and extension of the AMI Colliery on the farm Rietvlei 150, within the Abaqulusi Local Municipality, Zululand District Municipality, KwaZulu-Natal Province, is underlain by Permian aged sedimentary rocks of the Vryheid Formation, Ecca Group.

The plant fossils, associated with the interbedded carbonaceous shales of the Vryheid Formation are fragmentary and coalified. The fossils are associated with small pieces of coal and are not in situ.

It is recommended that:

The EAP and ECO be informed of the fact that the mining of coal is, by definition, the mining of fossil plant material. If well-defined plant material are recorded, the ECO must be informed and the fossils must be rescued by a professional palaeontologist.

Due to the fact that the activities involve only the reworking of old mine dumps, no further mitigation for Palaeontological Heritage is required.

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, 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 palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.



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