# CULTURAL HERITAGE IMPACT ASSESSMENT OF THE PROPOSED MTHALENI 2 EXTENSION MUD TRACK, MSINGA LOCAL MUNICIPALITY, UMZINYATHI DISTRICT MUNICIALITY, KWAZULU-NATAL.

## ACTIVE HERITAGE cc.

For: Hanslab (PTY) Ltd

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**Declaration of Consultants independence**

Frans Prins is an independent consultant to green Door Environmental and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances whatsoever that compromise the objectivity of this specialist performing such work.

Frans Prins

## LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| EIA | Early Iron Age |
| ESA | Early Stone Age |
| HISTORIC PERIOD | Since the arrival of the white settlers - c. AD 1820 in this part of the country |
| IRON AGE | Early Iron Age AD 200 - AD 1000<br>Late Iron Age AD 1000 - AD 1830 |
| LIA | Late Iron Age |
| LSA | Late Stone Age |
| MSA | Middle Stone Age |
| NEMA | National Environmental Management Act, 1998 (Act No. 107 of 1998 and associated regulations (2006). |
| NHRA | National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations (2000) |
| SAHRA | South African Heritage Resources Agency |
| STONE AGE | Early Stone Age 2 000 000 - 250 000 BP<br>Middle Stone Age 250 000 - 25 000 BP<br>Late Stone Age 30 000 - until c. AD 200 |

## EXECUTIVE SUMMARY

A cultural heritage survey of the proposed Mthaleni 2 Extension Road Upgrade identified no heritage sites and graves on the footprint. The area is also not part of any known cultural landscape. However, a very high palaeontological sensitivity is allocated to sections of road underlain by the Vryheid Formation on the footprint. A Phase 1 PIA document and "Chance Find Protocol" is essential during the first month of excavation for road foundations deeper than 1.5m. Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

# 1 BACKGROUND INFORMATION ON THE PROJECT

**Table 1. Background information**

| | |
|---|---|
| Consultants: | Frans Prins of Active Heritage cc conducted the general Heritage Impact Assessment study. Active Heritage cc was sub-consulted by Hanslab (PTY) Ltd. Dr Gideon Groenewald conducted the desktop paleontological study of the project area (Appendix 1). |
| Type of development: | The KZN Department of Transport (DOT) proposes to upgrade the existing Mthaleni 2 Ext mud track to a type 7A gravel road. The upgraded local road will be approximately 0.66km in length, and 6 m width with a 20m road reserve which conforms to DOT standards for local road upgrades. The upgrade will take place in the Makhasana area in Pomeroy under the Msinga Local Municipality, administered by the Umzinyathi District Municipality. The mud track traverses a watercourse, therefore the applicant proposes to construct a portal causeway structure at the water crossing point to allow for the natural flow of water within the watercourse. The upgrade of the track will allow for improved access for residents and minimize erosion along the track as a result of storm water run-off. |
| Rezoning or subdivision: | Not applicable |
| Terms of reference | To carry out a Heritage Impact Assessment. |
| Legislative requirements: | The Heritage Impact Assessment was carried out in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and following the requirements of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, 1997 (Act No. 4 of 2008) |

## 1.1. Details of the area surveyed:

The Mthaleni 2 Ext Mud Track is situated approximately 6km to the east of Pomeroy within the Msinga Local Municipality and Umzinyathi District Municipality, KwaZulu-Natal (Figs 1 & 2). There are no site alternatives that have been investigated in this report, as the existing mud track will be upgraded to a gravel road. The area is rural with some Zulu homesteads scattered over the landscape and along the existing mud track (Fig 3). The area is overgrazed with some evidence for small-scale subsistence farming. The mud track traverses a watercourse, therefore the applicant proposes to construct a portal

causeway structure at the water crossing point to allow for the natural flow of water within the watercourse. The upgrade of the track will allow for improved access for residents and minimize erosion along the track as a result of storm water run-off. Based on DOT standard details for a concrete slab structure, the approximate width is 13.12m and length is 8.00m which varies according to the stream width.

The GPS coordinates for the Mthaleni 2 Ext Mud Track are:

| | | |
|---|---|---|
| **Start Point** | 28°33'7.96"S | 30°29'52.28"E |
| **Middle Point** | 28°33'3.15"S | 30°30'7.23"E |
| **End Point** | 28°33'1.51"S | 30°30'28.74"E |

The GPS coordinates for the Water Causeway are: 28°33'1.97"S 30°30'13.85"E

## 2 BACKGROUND TO ARCHAEOLOGICAL HISTORY OF AREA

The archaeological history of the Province of KwaZulu-Natal (KZN) dates back to about 2 million years and possibly older, which marks the beginning of the Stone Age. The Stone Age in KZN was extensively researched by Professor Oliver Davies formerly of the Natal Museum. The Stone Age period has been divided in to three periods namely: Early Stone Age (ESA) dating between 2 million years ago to about 200 000 years ago, Middle Stone Age (MSA) dating between 200 000 years ago to about 30 000 years ago, and the Later Stone Age (LSA) which dates from 30 000 to about 2 000 year ago. The Stone Age period ends around approximately 2 000 years ago when Bantu speaking Age farmers from the north arrived in southern Africa. The Iron Age is also divided into three periods, namely: Early Iron Age (EIA) dating between AD 200 and AD 900, Middle Iron Age (MIA) dating between AD 900 and AD 1300, Late Iron Age (LIA) dating between AD 1 300 and 1 820.

### 2.1 Stone Age

#### *2.1.1 Early Stone Age (ESA)*

The ESA is considered as the beginning of the stone tool technology. It dates back to over 2 million years ago until 200 000 years ago. This period is characterised by Oldowan and Acheulean industries. The Oldowan Industry, dating to approximately between over 2 million years and 1.7 million years predates the later Acheulean. The Oldowan Industry

consists of very simple, crudely made core tools from which flakes are struck a couple of times. To date, there is no consensus amongst archaeologists as to which hominid species manufactured these artefacts. The Acheulean Industry lasted from about 1.7 million years until 200 thousand years ago. Acheulean tools were more specialized tools than those of the earlier industry. They were shaped intentionally to carry out specific tasks such as hacking and bashing to remove limbs from animals and marrow from bone. These duties were performed using the large sharp pointed artefacts known as handaxes. Cleavers, with their sharp, flat cutting edges were used to carry out more heavy duty butchering activities (Esterhuysen, 2007). The ESA technology lasted for a very long time, from early to middle Pleistocene and thus seems to have been sufficient to meet the needs of early hominids and their ancestors. ESA tool occurrence has been reported in open air context on seven sites in the greater Weenen area. None of these sites occur on the actual footprint. Apart from stone artefacts, the ESA sites have produced very little as regards other archaeological remains. This has made it difficult to make inferences pointing to economical dynamics of the ESA people in this part of the world. The diet of ESA peoples has therefore had to be reconstructed on the basis of evidence from elsewhere that it comprised primarily of animal and plant foods (Mazel 1989).

### *2.1.2 Middle Stone Age (MSA)*

The MSA dates to between 200 000 and 30 000 years ago, coinciding with the emergence of modern humans. The MSA technology is therefore believed to have been manufactured by fully modern humans known as *Homo sapiens* who emerged around 250 000 years ago. While some of the sites belonging to this time period occur in similar contexts as those of ESA, most of the MSA sites are located in rock shelters. Palaeoenvironmental data suggest that the distribution of MSA sites in the high lying Drakensberg and surrounding areas was influenced by the climate conditions, specifically the amount and duration of snow (Carter, 1976). In general, the MSA stone tools are smaller than those of the ESA. Although some MSA tools are made from prepared cores, the majority of MSA flakes are rather irregular and are probably waste material from knapping exercises. A variety of MSA tools include blades, flakes, scrapers and pointed tools that may have been hafted onto shafts or handles and used as spearheads. Between 70 000 and 60 000 years ago new tool types appear known as segments and trapezoids. These tool types are referred to as backed tools from the method of preparation. Residue analyses on the backed tools from South African MSA sites including those in KZN indicate that these tools were certainly used as spear heads and perhaps even arrow points (Wadley, 2007). A few

sites with impressive MSA deposits have been excavated in KZN. Perhaps the best known ones are Sibudu Cave and Umhlatuzana Cave to the south east of the study area, and Border Cave to the north of the study area. All these sites provided impressive evidence for fine resolution data and detailed stratigraphy (Wadley & Jacobs, 2006). Fourteen Middle Stone Age sites have been recorded in the greater Msinga area. These, like the Early Stone Age sites, are mostly restricted on open air sites with little archaeological context remaining. None of the known Middle Stone Age sites occur on the footprint.

### *2.1.3 Late Stone Age (LSA)*

Compared to the earlier MSA and ESA, more is known about the LSA which dates from around 30 000 to 2 000 (possibly later) years ago. This is because LSA sites are more recent than ESA and MSA sites and therefore achieve better preservation of a greater variety of organic archaeological material. The Later Stone Age is usually associated with the San (Bushmen) or their direct ancestors. The tools during this period were even smaller and more diverse than those of the preceding Middle Stone Age period. LSA tool technology is observed to display rapid stylistic change compared to the slower pace in the MSA. The rapidity is more evident during the last 10 000 years. The LSA tool sequence includes informal small blade tradition from about 22 000 – 12 000 years ago, a scraper and adze-rich industry between 12 000 – 8 000 years ago, a backed tool and small scraper industry between 8 000 – 4 000 years and ending with a variable set of other industries thereafter (Wadley, 2007). Adzes are thought to be wood working tools and may have also been used to make digging sticks and handles for tools. Scrapers are tools that are thought to have been used to prepare hides for clothing and manufacture of other leather items. Backed tools may have been used for cutting as well as tips for arrows It was also during Later Stone Age times that the bow and arrow was introduced into southern Africa – perhaps around 20 000 years ago. Because of the bow and arrow and the use of traps and snares, Later Stone Age people were far more efficient in exploiting their natural environment than Middle Stone Age people. Up until 2 000 years ago Later Stone Age people dominated the southern African landscape. However, shortly after 2 000 years ago the first Khoi herders and Bantu-speaking agro pastoralists immigrated into southern Africa from the north. This led to major demographic changes in the population distribution of the subcontinent. San hunter-gatherers were either assimilated or moved off to more marginal environments such as the Kalahari Desert or some mountain ranges unsuitable for small-scale subsistence farming and herding. The San in the coastal areas of KZN

were the first to have been displaced by incoming African agro pastoralists. However, some independent groups continue to practice their hunter gatherer lifestyle in the foothills of the Drakensberg until the period of white colonialisation around the 1840's (Wright & Mazel, 2007). According to the KwaZulu- Natal Museum archaeological database there are fourteen Later Stone Age sites in the greater Msinga area. Also dating to the LSA period is the impressive Rock Art found on cave walls and rock faces. Rock Art can be in the form of rock paintings or rock engravings. The province of KZN is renowned for the prolific San rock painting sites concentrated in the Drakensberg. Rock art sites do occur outside the Drakensberg including the Msinga area, however, these sites have not been afforded similar research attention as those sites occurring in the Drakensberg. No known rock art sites occur near the footprint.

## 2.2 Iron Age

### *2.2.1 Early Iron Age (EIA)*

Unlike the Stone Age people whose life styles were arguably egalitarian, Iron Age people led quite complex life styles. Their way of life of greater dependence on agriculture necessitated more sedentary settlements. They cultivated crops and kept domestic animals such as cattle, sheep, goats and dogs. Pottery production is also an important feature of Iron Age communities. Iron smelting was practised quite significantly by Iron Age society as they had to produce iron implements for agricultural use. However no smelting sites were discovered in the study area as it is the northern KZN that is rich in abandoned iron smelting sites (Maggs, 1989). Although Iron Age people occasionally hunted and gathered wild plants and shellfish, the bulk of their diet consisted of the crops they cultivated as well as the meat of the animals they kept. EIA villages were relatively large settlements strategically located in valleys beside rivers to take advantage of the fertile alluvial soils for growing crops (Maggs, 1989). The EIA sites in KZN date to around AD 500 to AD 900. Extensive research in the province, in the greater Weenen and Muden areas, of this period led to it being divided in the following time lines according to ceramic styles (Maggs, 1989; Huffman 2007):

_ Msuluzi (AD 500);

_ Ndondondwane (AD 700 – 800);

_ Ntshekane (AD 800 – 900).

The archaeological data base of the KwaZulu-Natal Museum indicates that ten Early Iron Age sites occur in the Tugela Valley catchment area. Here they are situated at altitudes

below 1000m adjacent to the Mooi, Mhlopeni and Msuluzi Rivers. These sites occur to the south of the project area.

### *2.2.2 Late Iron Age (LIA)*

The LIA is not only distinguished from the EIA by greater regional diversity of pottery styles but is also marked by extensive stone wall settlements. However, in this part of the world, stone walls were not common as the Nguni people used thatch and wood to build their houses. This explains the failure to obtain sites from the aerial photograph investigation of the study area. Trade played a major role in the economy of LIA societies. Goods were traded locally and over long distances. The main trade goods included metal, salt, grain, cattle and thatch. This led to the establishment of economically driven centres and the growth of trade wealth. Keeping of domestic animals, metal work and the cultivation of crops continued with a change in the organisation of economic activities. Evidence for this stems from the fact that iron smelting evidence was not found in almost every settlement (Maggs, 1989; Huffman 2007). Later Iron Age sites have been recorded in the greater Tugela Valley catchment area. The majority of these were most probably inhabited by early Nguni-speaking agropastoralists before the Shakan era in the beginning of the 19$^{th}$ century. However, despite the occurrence of numerous sites in this area they, in contrast with the Early Iron Age sites, have not been well researched. No known Later Iron Age sites occur near the project area.

## 2.3 Historic Period

Oral tradition is the basis of the evidence of historical events that took place before history could be recorded. This kind of evidence becomes even more reliable in cases where archaeology could be utilised to back up the oral records. Sources of evidence for socio political organization during the mid-eighteenth to early nineteenth century in the study area and the larger former Natal Province suggest that the people here existed in numerous small-scale political units of different sizes, population numbers and political structures (Wright & Hamilton, 1989). This period was largely characterised by rage and instability as political skirmishes broke due to the thirst for power and resources between chiefdoms. During the 2nd half of the eighteenth century, stronger chiefdoms and paramouncies emerged. However, these were not fully grown states as there was no proper formal central political body established. This changed in the 1780's when a shift towards a more centralized political state occurred. This shift was mainly characterized by

population growth and geographical expansion of states. The most important and largest and strongest states at the time were the Mabhudu, Ndwandwe and Mthethwa. However, other smaller states, also established themselves in the area. These included in the south the Qwabe, Bhaca, Mbo, Hlubi, Bhele, Ngwane and many others (Wright & Hamilton, 1989). The greater Msnga area was inhabited by the Thembu and Mcunu clans. The Zulu kingdom, established by King Shaka however remained the most powerful in the region in the early years of the 19th century. Shaka fought ruthlessly and often defeated his rivals and conquered their cattle, wives and even burnt their villages. These wars are often referred to as Difaqane and this period was characterised by rage and blood shedding. Shaka was assassinated in 1828 at which time he had transformed the nature of the society in the Natal and Zululand regions. He was succeeded by Dingaan (Wright & Hamilton, 1989). The location of the Tembu and Mcunu in the greater project area is a direct result of the expansionistic policies of the King Shaka. Colonial and Apartheid-era policies in more recent years contributed tremendously to the high incidence of faction fighting and interpersonal violence that his area has been experiencing (Clegg 1979).

Dutch farmers unhappy with the British rule in Cape Town decided to explore into the interior of the country, away from British rule. Some groups remained in the Eastern Cape, others kept going and a few settled in the Orange Free State and the Transvaal. A great number, led by Piet Retief and Gerrit Maritz, crossed the Drakensberg into Natal.

Here they encountered the Zulus who lured them into a trap and brutally massacred many of them. This was only one of the many failures of the white settler expeditions in the frontier areas and when the shocking news reached the Cape, more groups were sent to the interior to revenge. A series of battles were fought but the most notable was the Battle of Blood River in 1838 where the Boers defeated the Zulus. This ended the Zulu threat to the white settlers and a permanent and formal settlement in Natal was established. However the Zulu kingdom remained independent for a couple of decades. The Republic of Natalia was annexed by the British in 1845 and in 1879 the Zulu kingdom was also invaded (Wright & Hamilton, 1989). The Anglo-Zulu War has been well recorded and an important occurrence took place at Keates Drift and Jamesons Drift, near the project area, when a few British soldiers attempted to cross the Tugela River after their defeat at the battle of Isandlwana. Although no relicts or artefacts survive from this encounter the surrounding landscape is still imbued with the meaning of this important period in the colonial history of KwaZulu-Natal. The town of Pomeroy that is situated to the immediate

west of the project area was named after Sir George Pomeroy Volley who led the ill-fated British force during the Battle of Majuba Hill in 1881. It was initially established as the Gordon Memorial Mission in 1867 in memory of James Henry Hamilton-Gordon, he son of George Hamilton-Gordon the 5th Earl of Aberdeen. The Mission worked with the Zulu people of the area. The Gordon Memorial is situated approximately 1.5km to the west of the footprint (Fig 4). The Bambata Rebellion of 1906 saw various incidents in the near vicinity of the project area. The most significant is perhaps the Bambata Rock Ambush that occurs approximately 30km to the south of the footprint.

# 3 BACKGROUND INFORMATION OF THE SURVEY

## 3.1 Methodology

A desktop study was conducted of the heritage databases housed in the KwaZulu-Natal Museum. In addition, the available archaeological and historical literature covering the greater Msinga area was also consulted. The SAHRIS website was consulted to obtain information on previous heritage surveys and site data near the study area.

A ground survey, following standard and accepted archaeological procedures, was conducted by the consultant on the 5th November 2017. A zone of 50m on either side of the proposed road upgrade was surveyed. In addition, the consultant also interviewed local residents regarding the potential occurrence of graves and other heritage sites adjacent to the proposed road upgrade (Fig 6).

## 3.2 Restrictions encountered during the survey

### *3.2.1 Visibility*

Visibility was good

### *3.2.2 Disturbance*

No disturbance of any heritage sites was noted.

### 3.3 Details of equipment used in the survey

GPS: Garmin Etrek
Digital cameras: Canon Powershot A460
All readings were taken using the GPS. Accuracy was to a level of 5 m.

## 4 DESCRIPTION OF SITES AND MATERIAL OBSERVED

### 4.1 Locational data

*Province:* KwaZulu-Natal
*Town:* Pomeroy
*Municipality*: Msinga Local Municipality, Umzinyathi District Municipality

### 4.2 Heritage Sites Located during the Survey

#### *4.2.1 Background*

A desktop survey of the greater Msinga area indicated that a wide range of heritage sites and features may occur in the area. These include stone age, iron age, rock art sites, historical period sites, and potential 'living heritage' sites. None of the known heritage sites, as indicated by the available data bases, occur on the footprint (Fig 3). The ground survey of the project area also did not locate any heritage sites and graves within 50m from the proposed road upgrade. Some isolated Zulu homesteads are located adjacent to the road but none of these had associated graves (Fig 3). The area is also not part of any known cultural landscape and no 'living heritage' sites were observed (Table 2). These observations were confirmed by local residents interviewed.

The desktop paleontological survey indicate that no significant fossils are expected before deep excavation (>1.5m) are done. It is however highly likely that significant fossils will be recorded during excavations. The recording of fossils will contribute significantly to our knowledge of the Palaeontological Heritage of the KwaZulu-Natal Province (Appendix 1).

**Table 2. Evaluation and statement of significance of identified heritage sites in the project area.**

| Significance criteria in terms of Section 3(3) of the NHRA | | |
|---|---|---|
| | **Significance** | **Rating** |
| **1.** | **Historic and political significance -** The importance of the cultural heritage in the community or pattern of South Africa's history. | None. |
| **2.** | **Scientific significance** – Possession of uncommon, rare or endangered aspects of South Africa's cultural heritage. | None |
| **3.** | **Research/scientific significance** – Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage. | None |
| **4.** | **Scientific significance** – Importance in demonstrating the principal characteristics of a particular class of South Africa's cultural places/objects. | None |
| **5.** | **Aesthetic significance** – Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group. | None |
| **6.** | **Scientific significance** – Importance in demonstrating a high degree of creative or technical achievement at a particular period. | None |
| **7.** | **Social significance** – Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. | None |
| **8.** | **Historic significance** – Strong or special association with the life and work of a person, group or organization of importance in the history of South Africa. | None |
| **9.** | The significance of the site relating to the history of slavery in South Africa. | None. |

# 5 STATEMENT OF SIGNIFICANCE (HERITAGE VALUE)

## 5.1 Field Rating

The SAHRA rating system (Table 2) does not apply as no heritage sites occur on the footprint.

**Table 2. Field rating and recommended grading of sites (SAHRA 2005)**

| Level | Details | Action |
|---|---|---|
| National (Grade I) | The site is considered to be of National Significance | Nominated to be declared by SAHRA |
| Provincial (Grade II) | This site is considered to be of Provincial significance | Nominated to be declared by Provincial Heritage Authority |
| Local Grade IIIA | This site is considered to be of HIGH significance locally | The site should be retained as a heritage site |
| Local Grade IIIB | This site is considered to be of HIGH significance locally | The site should be mitigated, and part retained as a heritage site |
| Generally Protected A | High to medium significance | Mitigation necessary before destruction |
| Generally Protected B | Medium significance | The site needs to be recorded before destruction |
| Generally Protected C | Low significance | No further recording is required before destruction |

## 6 RECOMMENDATIONS

The proposed development may proceed from a general heritage point of view as no heritage sites of features occur on the footprint. However, from a paleontological perspective the following conditions apply:

- The EAP and ECO must be informed of the fact that a Very High Palaeontological Sensitivity is allocated to sections of road underlain by the Vryheid Formation in the study area. A Phase 1 PIA document and “Chance Find Protocol” is essential during the first month of excavation for road foundations deeper than 1.5m.

- When fossils are recorded, a “Chance Find Protocol” must be prepared by a suitably qualified Palaeontologist and recommendations contained in the Phase 1 PIA must be approved by AMAFA and SAHRA for inclusion in the EMPr of the project.

- These recommendations must be included in the EMPr of this project.

It must be noted that the Provincial Heritage Act requires that operations exposing paleontological material, archaeological sites, historical residues, as well as graves, should cease immediately pending an evaluation by the heritage authorities.

## 7 MAPS AND FIGURES

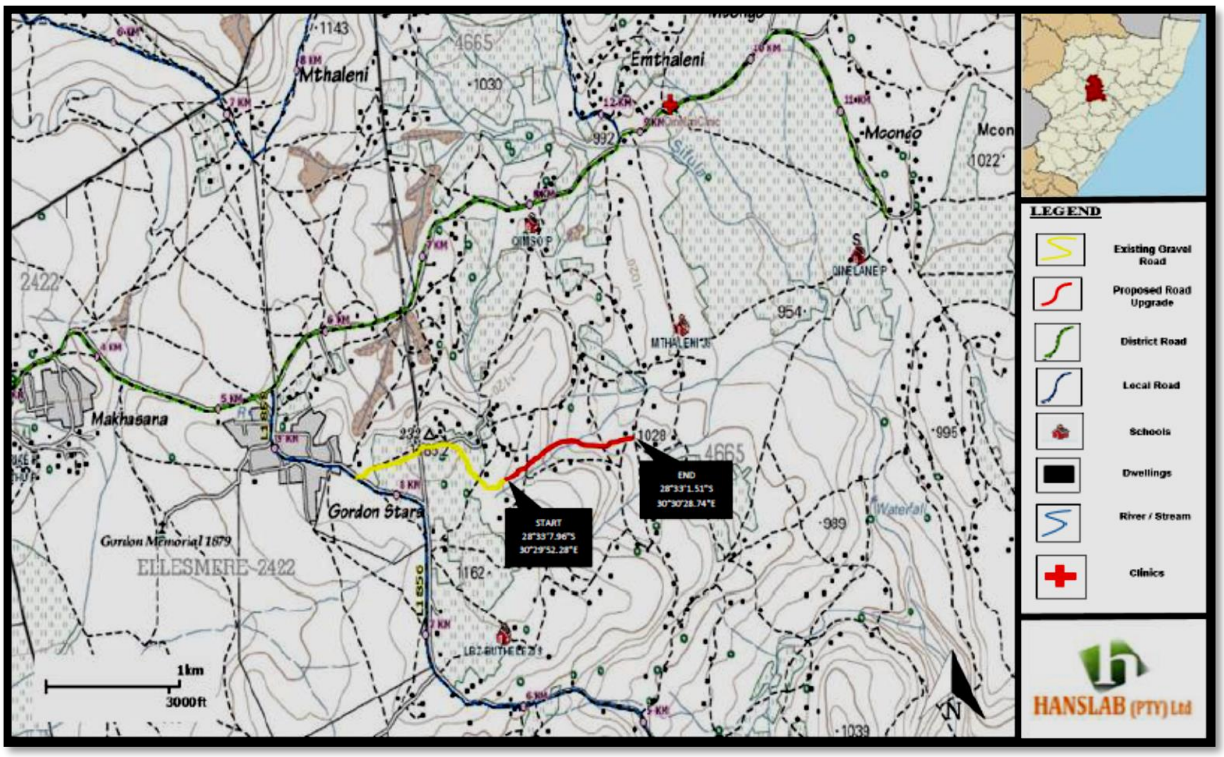


***Figure 1. Map of the project area (Source: Hanslab).***


***Figure 2. Google Earth Imagery showing the location of the Mthaleni 2 Ext Mud Track. The Gordon Memorial (orange marker) is the only known heritage site in the general area. However, it occurs more than 1.5km to the west of the footprint.***

***Figure 3. General view of the project area, the Mthaleni 2 Ext Road in the foreground.***

***Figure 4. The Gordon Church Memorial is situated approximately 1.5km to the west of the project area.***

***Figure 5. The Water Causeway.***

***Figure 6. Two local residents interviewed during the ground survey. Phillemon Mkhize and Verionica Langa. They were not aware of any graves or heritage sites adjacent to the proposed road upgrade.***

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**APPENDIX 1.**

# DESKTOP PALAEONTOLOGICAL ASSESSMENT FOR THE PROPOSED UPGRADING AND EXTENSION OF THE MTHALENI 2 EXT ROAD, MSINGA LOCAL MUNICIPALITY, UMZINYATHI DISTRICT MUNICIPALITY, KWAZULU-NATAL PROVINCE.

**FOR**

**Active Heritage**

**DATE: 21 October 2017**

**By**

**Gideon Groenewald**

**Cell: 078 713 6377**

## 10 EXECUTIVE SUMMARY

Gideon Groenewald was appointed to undertake a Desktop Palaeontological Assessment Survey and to propose a "Chance Find Protocol", for the proposed Upgrading and Extension of the Mthaleni 2 Ext Road, Msinga Local Municipality, Umzinyathi District Municipality, Kwazulu-Natal Province.

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 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 on palaeontological heritage within the development footprint.

The development site applicable to the application for the Upgrading and Extension of the Mthaleni 2 Ext Road, Msinga Local Municipality, Umzinyathi District Municipality, Kwazulu-Natal Province is underlain by shales and sandstone of the Permian aged Vryheid Formation of the Ecca Group and Jurassic aged dolerite.

No significant fossils are expected before deep excavation (>1.5m) are done. It is however highly likely that significant fossils will be recorded during excavations. The recording of fossils will contribute significantly to our knowledge of the Palaeontological Heritage of the KwaZulu-Natal Province.

It is recommended that:

- The EAP and ECO must be informed of the fact that a Very High Palaeontological Sensitivity is allocated to sections of road underlain by the Vryheid Formation in the study area. A Phase 1 PIA document and "Chance Find Protocol" is essential during the **first month** of excavation for road foundations deeper than 1.5m.
- When fossils are recorded, a "Chance Find Protocol" must be prepared by a suitably qualified Palaeontologist and recommendations contained in the Phase 1 PIA must be approved by AMAFA and SAHRA for inclusion in the EMPr of the project.
- These recommendations must be included in the EMPr of this project.

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## 12 INTRODUCTION

Gideon Groenewald was appointed to undertake a Desktop Palaeontological Assessment Survey and to propose a “Chance Find Protocol”, for the proposed Upgrading and Extension of the Mthaleni 2 Ext Road, Msinga Local Municipality, Umzinyathi District Municipality, Kwazulu-Natal Province (Figure 1).

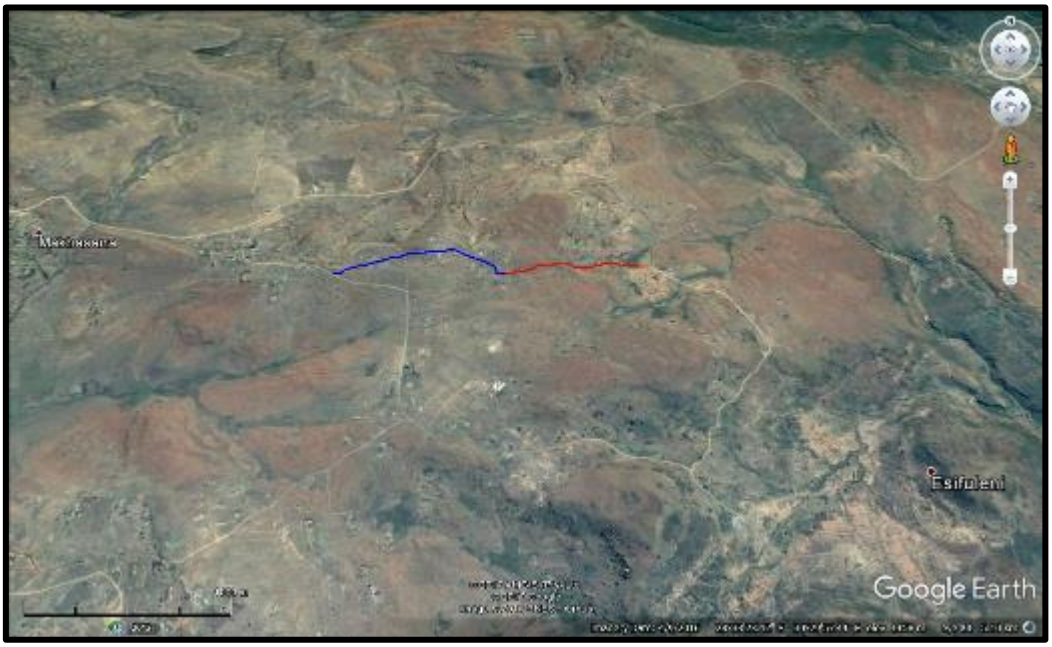


**Figure 1 Locality of Mthaleni 2 Ext Road upgrade**

### *12.1.1 Legal Requirements*

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 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 on 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; and
- objects with the potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage.

### *12.1.2 Aims and Methodology*

A Desktop investigation is often the only opportunity to record the fossil heritage within the development footprint. These records are very important to understand the past and form an important part of South Africa’s National Estate.

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 identifying exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assessing 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 a field investigation a preliminary assessment (desktop study) of the topography and geology of the study area were made using appropriate 1:250 000 geological maps (2830 Dundee) 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 is inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

Priority palaeontological areas are identified within the development footprint to focus the field investigator's time and resources. The aim of the desktop survey is 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 is 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 2 Palaeontological sensitivity analysis outcome classification**

| **PALAEONTOLOGICAL SIGNIFICANCE/VULNERABILITY OF ROCK UNITS** | |
|---|---|
| The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of Almond et al (2008) and Groenewald et al., (2014) | |
| **RED** | Very High Palaeontological sensitivity/vulnerability. Development will most likely have a very significant impact on the Palaeontological Heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and phase II PIA (rescue of fossils during construction ) as well as application for collection and destruction permit compulsory. |

| | |
|---|---|
| **ORANGE** | High Palaeontological sensitivity/vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and phase I Palaeontological Impact Assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects. |
| **GREEN** | Moderate Palaeontological sensitivity/vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the Palaeontological Heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and phase I PIA (ground proofing of desktop survey) compulsory. |
| **BLUE** | Low Palaeontological sensitivity/vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units. Fossils of micro-bacteria are extremely important for our understanding of the development of Life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of Life in the region. Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. Collection of a representative sample of potential fossiliferous material recommended. At least a Desktop Survey and “Chance Find Protocol” is compulsory. The Chance Find Protocol must be included in the EMPr for the project. |

| | |
|---|---|
| **GREY** | Very Low Palaeontological sensitivity/vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during implacement of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits. At least a Desktop Survey and "Chance Find Protocol" document is compulsory. The Chance Find Protocol must be included in the EMPr of the project. |

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, palaeontological mitigation measures must be incorporated into the Environmental Management Plan. All projects falling on Low to Very Low Palaeontological sensitivity geology must be discussed in a Phase 1 or a Chance Find Protocol document that must form part of the EMPr of the project.

**Scope and Limitations of the Desktop Study**

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

The key assumption for this scoping study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs

alone, without ground-truthing. There is also an inadequate database for fossil heritage for much of the RSA, due to the small number of professional palaeontologists carrying out fieldwork in RSA and the Kingdom of Lesotho. Most development study areas have never been surveyed by a palaeontologist.

These factors may have a major influence on the assessment of the fossil heritage significance of a given development and without supporting field assessments may lead to either:

- an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by weathering, or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium etc.).

### *12.1.3 Locality and Proposed Development*

The Mthaleni 2 Ext Road Development is situated to the north of Tugela Ferry in the rural parts of KwaZulu-Natal (Figure 2). The development falls in undulating terrain underlain by clayey soils of mainly deeply weathered Permian aged Vryheid Formation sandstone, shale and Jurassic aged dolerite.

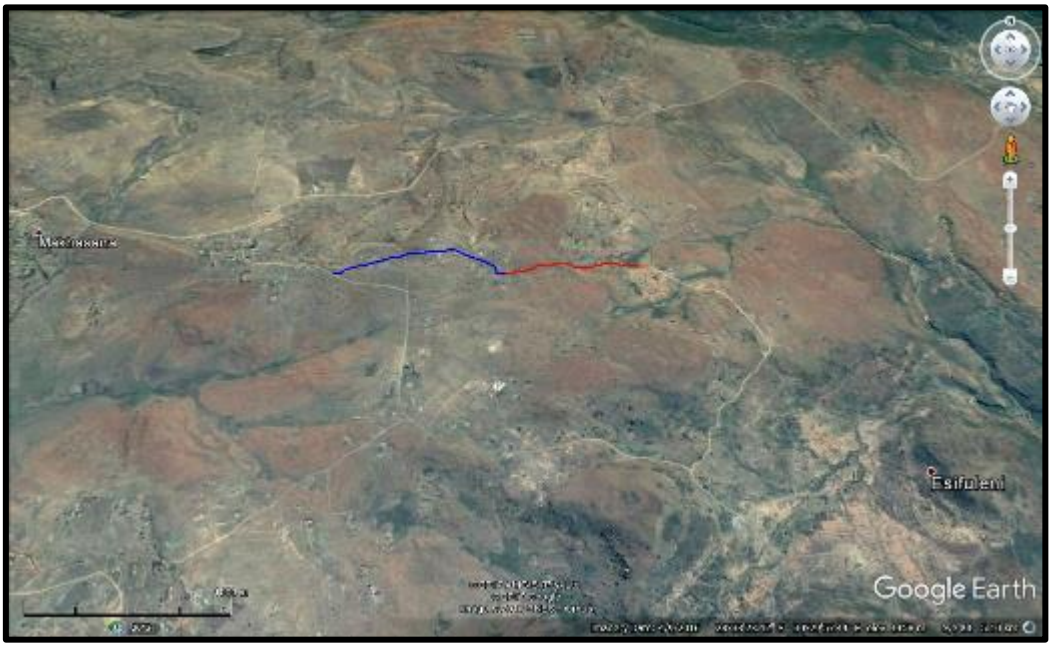


**Figure 2 Locality of the Mthaleni 2 Ext Road development in KwaZulu-Natal**

## 13 GEOLOGY

The site of the development falls mainly on Permian aged shale and sandstone of the Vryheid Formation of the Ecca Group and a small sections underlain by Jurassic dolerite of the Karoo Supergroup (Figure 3).


**Figure 3 Geology of the Mthaleni 2 Ext Road Area. Vryheid Formation (Pv; grey) and dolerite (Jdo; pink) sills.**

## 14 KAROO SUPERGROUP

### 14.1 Ecca Group

#### *14.1.1 Vryheid Formation (Pv)*

The Permian aged Vryheid Formation overlies the deep water Pietermaritzburg Formation and is dominantly a coarse-grained sandstone with inter bedded dark coloured shale and coal beds. The Formation is interpreted as a near-shore sandbar and in some cases deltaic deposit into the ancient Ecca sea, that existed in this part of Gondwanaland (Johnson et al, 2009).

### 14.2 Dolerite

A small part of the study area falls on Jurassic aged dolerite which was intruded into the Karoo Basin area during the breaking up of Gondwanaland.

## 15 PALAEONTOLOGY

## 16 KAROO SUPERGROUP

#### *16.1.1 Vryheid Formation (Pv)*

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., Lidgetonnia 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 (Catuneanu et al 2005).

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).

### 16.2 Dolerite

Due to its igneous character dolerite will not contain fossils.

## 17 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 desktop investigation. The desktop investigation confirms that the study area is underlain by relatively deep (>2m) clay soil associated with the Vryheid Formation and dolerite.


**Figure 4 Palaeontological sensitivity of the study area associated with the Mthaleni 2 Ext Road development**

The excavations for the construction of the infrastructure for this development will most likely expose important fossil rich deposits. Although significant fossils might be present in dongas on the site before excavation, it is proposed that a Phase 1 PIA be done during excavation on site. Due to the deep weathering it is highly unlikely that all the potential fossils will be exposed **before** deep (>1.5m) excavations into the Vryheid Formation (Figure 4). It is therefore advisable to postpone the Phase 1 study as well as the compilation of a "Chance Find Protocol" document until the first week of construction on this site. No fossils will be present in areas underlain by dolerite.

Recording of fossils will contribute significantly to our understanding of previous eco-systems. A Phase 1 PIA, done by a suitably qualified palaeontologist during the initial stages of construction, is essential. It is Highly likely that fossils will be recorded during the excavation of road foundations into the Vryheid Formation of the Ecca Group. The palaeontologist must visit the site **during the first month of excavation** for at least five (5) days to compile a "Chance Find Protocol" document. This recommendation must form part of the EMPr for this project and be presented for approval by AMAFA, before the final ROD for the EIA process can be requested from the competent Authority for the EIA process.

## 18 CONCLUSION

The development site applicable to the application for the Upgrading and Extension of the Mthaleni 2 Ext Road, Msinga Local Municipality, Umzinyathi District Municipality, Kwazulu-Natal Province is underlain by shales and sandstone of the Permian aged Vryheid Formation of the Ecca Group and Jurassic aged dolerite.

No significant fossils are expected before deep excavation (>1.5m) are done. It is however highly likely that significant fossils will be recorded during excavations. The recording of fossils will contribute significantly to our knowledge of the Palaeontological Heritage of the KwaZulu-Natal Province.

It is recommended that:

- The EAP and ECO must be informed of the fact that a Very High Palaeontological Sensitivity is allocated to sections of road underlain by the Vryheid Formation in the study area. A Phase 1 PIA document and "Chance Find Protocol" is essential during the **first month** of excavation for road foundations deeper than 1.5m.
- When fossils are recorded, a "Chance Find Protocol" must be prepared by a suitably qualified Palaeontologist and recommendations contained in the Phase 1 PIA must be approved by AMAFA and SAHRA for inclusion in the EMPr of the project.
- These recommendations must be included in the EMPr of this project.

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## 20 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 palaeo-ecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including 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).

## 21 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.

Dr Gideon Groenewald
Geologist