

**CULTURAL HERITAGE IMPACT ASSESSMENT OF
THE PROPOSED MALANDENI MUD TRACK
UPGRADE, OKHAHLAMBA MUNICIPALITY,
BERGVILLE, KWAZULU-NATAL.**



For: Hanslab (PTY) Ltd

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Declaration of Consultants independence

Frans Prins is an independent consultant to Hanslab (PTY) Ltd 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 1836 in this part of the country
IRON AGE	Early Iron Age AD 200 - AD 1000 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 Middle Stone Age 250 000 - 25 000 BP Late Stone Age 30 000 - until c. AD 200

EXECUTIVE SUMMARY

A cultural heritage survey of the proposed Malandeni Mud Track Upgrade, Okhahlamba Local Municipality near Bergville, identified no archaeological or other heritage sites on the footprint. There is no archaeological reason why the development may not proceed as planned. However, a very high palaeontological sensitivity is allocated to the entire 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. Attention is drawn to the South African National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act (Act No. 4 of 2008) which requires that operations that expose fossil material as well as graves and archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

1 BACKGROUND INFORMATION ON THE PROJECT

The consultant was approached by Hanslab (PTY) Ltd to conduct a heritage impact assessment (HIA) of the proposed Malandeni Mud Track upgrade near Bergville, Okhahlamba Local Municipality in northern KwaZulu-Natal. According to the National Heritage Resources Act, 1999 (NHRA) (Act No. 25 of 1999), the heritage resources of South Africa include:

- a. places, buildings, structures and equipment of cultural significance;
- b. places to which oral traditions are attached or which are associated with living heritage;
- c. historical settlements and townscapes;
- d. landscapes and natural features of cultural significance;
- e. geological sites of scientific or cultural importance;
- f. archaeological and palaeontological sites;
- g. graves and burial grounds, including-
 - i. ancestral graves;
 - ii. royal graves and graves of traditional leaders;
 - iii. graves of victims of conflict;
 - iv. graves of individuals designated by the Minister by notice in the Gazette;
 - v. historical graves and cemeteries; and
 - vi. other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- h. sites of significance relating to the history of slavery in South Africa;

- i. movable objects, including-
- i. objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- ii. objects to which oral traditions are attached or which are associated with living heritage;
- iii. ethnographic art and objects;
- iv. military objects;
- v. objects of decorative or fine art;
- vi. objects of scientific or technological interest; and
- vii. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

The newly promulgated KwaZulu-Natal Heritage Act (Act No. 4 of 2008) also makes specific mention to rock art and archaeological sites.

It is furthermore stated that:

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

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

(3) 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.

(4) No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.

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

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

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

(i)

archaeological objects;

(ii)

palaeontological material;

(iii)

ecofacts;

(iv)

objects related to battlefield sites;

(v)

material cultural artefacts; or

(vi)

meteorites.

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

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

(a)

any category of archaeological object;

(b)

any palaeontological material;

(c)

any ecofact;

(d)

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

(e)

any material cultural artefact; or

(f) any meteorite.

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

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

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

This study aims to identify and assess the significance of any heritage and archaeological resources occurring on the site. Based on the significance, the impact of the development on the heritage resources would be determined. Then appropriate actions to reduce the impact on the heritage resources would be put forward. In terms of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of:

- a. its importance in the community, or pattern of South Africa's history;
- b. its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- c. its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- d. its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- e. its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f. its importance in demonstrating a high degree of creative or technical achievement at a particular period;

- g. its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h. its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- i. sites of significance relating to the history of slavery in South Africa.

Table 1. Background information

Consultants:	Active Heritage cc Hanslab (PTY) Ltd
Type of development:	Proposed Road Upgrade of the Malandeni Mud Track near Bergville (Figs 1 & 2).
Rezoning or subdivision:	n.a
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 (Act No. 4 of 2008)

1.1. Details of the area surveyed:

Footprint: The KZN Department of Transport (Applicant), proposes to upgrade the existing Malandeni mud track to a type 7 A gravel road. The proposed upgrade will be approximately 1.57 km in length, 6m wide with a 20m road reserve as per the Department of Transport standard dimensions for a type 7A gravel road. The upgrade will take place in Bergville, located in the Okhahlamba local municipality. The mud track traverses three water courses.

Water Course 1 (28°43'20.68"S, 29°0'21.88"E) (Fig 4) has an existing slab structure.

Water Course 2 (28°43'40.14"S, 29°0'23.47"E) (Fig 5) the applicant proposes to construct a slab structure approximately 18m in length and 7.5m in width.

Water Course 3 (28°43'51.65"S, 29°0'25.56"E) the applicant proposes to construct a 600mm pipe culvert.

The GPS coordinates for the proposed road upgrade are:

Start: 28°43'7.53"S 29°0'28.45"E

Middle: 28°43'31.41"S 29°0'22.02"E

End: 28°43'55.96"S 29°0'27.72"E

Current land use: The footprint is situated in the foothills of the northern Drakensberg in a communal area. It is a mud track (Fig 2) flanked by rural homesteads in parts as well as disturbed veld. Soil erosion and evidence for overgrazing is evident in the greater the project area. The area is inhabited by the amaNgwane, a Zulu-speaking people, who has been living in the foothills of the Northern Drakensberg since about 1860 AD. Some of the residents practise small-scale subsistence farming. The area falls within the buffer zone of the Maloti Drakensberg World Heritage Site. The area is especially sensitive in terms of rock art although no sandstone outcrops with potential rock art occurrences is situated within 150m from the existing mud track.

2 BACKGROUND TO ARCHAEOLOGICAL HISTORY OF AREA

The greater Drakensberg area is well endowed with cultural heritage, including various wilderness areas within and outside the formal protected area network. Although most literature refers to this heritage mainly in terms of San rock art, the region also contains other categories of cultural heritage features representative of various cultures and time-periods. The cultural heritage of the Drakensberg is diverse and highly fragile. Cultural heritage, unlike natural heritage, is non-renewable and irreplaceable. Once damaged, it is gone forever. San rock paintings and associated Later Stone Age sites, as well as the palaeontology of the area, are unique and have global significance. The remaining categories, however, certainly have national, provincial, and regional significance. The area has had several different cultural groups associated with it, from the San to the southern Sotho, the Zulu-speaking and Xhosa-speaking groups, and, more recently, the Griqua and Anglo-Boer descendants. Each of these groups has its own unique cultural expressions and has related in various ways to the others. These differences are found in the building styles of homes, their way of life as they interact with their environment, traditional dress, and so on. In addition, there are a number of living heritage values

associated with all of these groups, many of which are unknown or poorly recorded. The following section is a more detailed description of the various cultural heritage features.

2.1 The Early Stone Age

The occurrence of Early Stone Age tools such as hand axes in areas below the 1 800 m contour suggests that the first inhabitants of the area predated modern humans by at least 800 000 years. Sites belonging to this period in the Drakensberg are mostly characterised by a few surface scatters and individual stone tools – usually in the close vicinity of water. They were most probably manufactured by *Homo erectus*, a predecessor of modern humans.

2.2 The Middle Stone Age

Anatomically modern people (*Homo sapiens sapiens*) with a very different economic strategy and more sophisticated stone tool kits moved into the area about 200 000 years ago. Archaeological assemblages left behind by these people have been termed Middle Stone Age. Not only were these societies more effective hunters than their predecessors but Middle Stone Age sites elsewhere in southern Africa also provide convincing evidence for some of the earliest symbolic behaviour in the world. It was Middle Stone Age people from southern and eastern Africa who left the continent roughly between 80 000 – 60 000 years ago to populate the rest of the world. Middle Stone Age sites in the Drakensberg region occur in both Lesotho and South Africa. Sites occur as surface scatters as well as deep cave deposits. Prime archaeological deposits, however, occur in the Eastern Cape and Free State sections of the region. Archaeological excavations at Strathalan Cave in the Eastern Cape Province indicate that the Middle Stone Age persisted in the Eastern Cape Drakensberg until around 22 000 years ago (Mitchell 2002).

2.3 The Later Stone Age

The stone tool assemblages belonging to the immediate ancestors of the San or Bushmen have been termed Later Stone Age. Later Stone Age tools are generally much smaller

but also more diversified than the earlier tool kits. It was during this period that the bow and arrow was used extensively, and societies exploited their environments distinctly more intensively and effectively. Literally hundreds of Later Stone Age sites prevail in the Drakensberg region. In addition, most of the rock art in the region was created by the San. The earliest evidence for Later Stone Age occupation of the Maloti Drakensberg comes from Sehonghong Cave in south eastern Lesotho and from Strathalan Cave in the Eastern Cape section of the region. Here a specific Later Stone Age period called the Robberg Industry has been dated to approximately 20 000 years ago. In contrast, evidence from Good Hope shelter 1 near the bottom of Sani Pass suggests that the earliest archaeological evidence for San people in the KwaZulu-Natal portion of the Drakensberg dates back to approximately 8 000 years ago. Whereas most parts of the Maloti Drakensberg were only seasonally occupied by San hunter gatherers for the larger part of the last 20 000 years, the situation started to change during the latter part of the Holocene around 5 000 years ago. This was compounded by the arrival of immigrant black farmers in the region soon after 1600 AD and European colonialism around 1834 AD (Wright & Mazel 2007). During the historical period, the Maloti Drakensberg and adjacent mountainous areas became the last stronghold for various southern San groups such as the Baroa, //Xegwi, !Ga!ne, //Kx'au, and //Ku//ke. Their Later Stone Age way of life finally came to an end during the late 19th century. San descendants still live in the area but for all practical purposes have assimilated with their more powerful neighbours. Many place names within the region still retained their original San pronunciations such as the Inxu, Sehonghong, Qomoqomong and Qhoasing rivers, and the Qeme, Qhuqhu, Qhalasi, and Qholaqhoe mountains. Approximately 1 300 Later Stone Age sites are known within the South African side of the Drakensberg.

2.4 Rock Paintings

The Maloti Drakensberg region is particularly well known for the occurrence of some of the finest and most complex prehistoric rock paintings in the world. Depictions of humans dominate, although finely executed animals such as eland and rhebuck are common. Some of the art is executed in various colours and in detailed precision that almost renders it a three dimensional aspect. Most researchers support the theory developed by Professor David Lewis-Williams and his colleagues that the figures represent trance induced visions during San religious rites (Lewis-Williams 2003). According to some researchers, the

celebrated Rosetta Panel at Game Pass Shelter, situated approximately 20km to the south of the study area, holds the key to our understanding of all San rock art in the sub-Saharan region of Africa. However, this interpretation is not supported by all rock art researchers. Notable deviations from this approach have been developed by Anne Solomon, and more recently by Thomas Dowson. The Maloti Drakensberg is also one of the areas with the highest density of prehistoric rock art in the world and certainly contains the highest concentration of prehistoric art south of the Sahara in Africa. Although the scientific dating of these paintings is still under researched, recent research suggests that the oldest paintings may date to approximately 4000 years ago (Wright & Mazel 2007). This is much older than previously thought. The chronological uniqueness of the art, however, is not so much in its antiquity as in the fact that the Maloti Drakensberg was the last area in Africa south of the Zambezi River where the San rock art tradition was still actively practised. Paintings at two sites in the southern portion of the region were created as recently as 1920 (Prins 2009). The communal areas of amaNgwane and amaZizi that is part of the greater Okhombe area contains approximately 300 rock painting sites. These are similar in style and context to the better known art of the Maloti Drakensberg World Heritage Site.

2.5 Iron Age Sites

Around 2 000 years ago the southern African demographic landscape was transformed with the arrival of the first Bantu-speaking agriculturists in the sub-region. These subsistence farmers lived for the most part in the lower altitude, wooded areas of the eastern seaboard. Around 1250 AD certain agriculturists started occupying the higher altitude, grassland areas. Sites belonging to this period in KwaZulu-Natal are referred to as Moor Park settlements and they typically occupy hill tops with a low stone walling effect. Although none occur within the designated Maloti-Drakensberg project area, they can be found at the fringes, at an altitude of approximately 1 200-1 400 m. By 1600 AD, groups such as the amaZizi reached the foothills of the northern Drakensberg near Winterton (Wright and Mazel 2007). Various splinter groups of the amaZizi left KwaZulu Natal and also settled in parts of Lesotho where, over time, they adopted a Sotho identity. The baPhuti of south eastern Lesotho are perhaps the best known of these early immigrants. By the early 1700s various other Sotho and Nguni-speaking groups moved into the area and established chieftaincies in those areas below the 1 800 m contour. Impressive Iron

Age sites belonging to this period and built in typical Sotho-style occur near Harrismith and Phuthaditjhaba in the Eastern Free State. Nguni-style sites of this period have also been found in KwaZulu-Natal and the Eastern Cape parts of the Drakensberg. The expansion of the Zulu kingdom around 1818 had a major impact on Iron Age settlement in the region. Various chieftaincies were attacked, and their routed remnants typically traversed the Maloti Drakensberg region in search of better settlement elsewhere. Bandits often hid out in the mountains, and a number allegedly practised cannibalism. Perhaps the most significant development during this period was the founding of the Southern Sotho nation under King Moshoeshoe I. Various sites in Lesotho belong to this period – some of them, like Thaba Bosiu, are typically mountain strongholds. Almost 2 000 Iron-Age sites have been identified in the Maloti Drakensberg region, and most occur in altitudes lower than 1 800 m contour. Some sites belonging to the ancestors of the amaZizi and amaNgwane, the present ethnic groups to live in the study area, have been recorded in the nearby Didima Nature Reserve in the south and near Bergville (Maggs 1987). In fact, there is evidence for Later Iron Age occupation in the foothills of the northern Drakensberg, in the near vicinity of the study area, from about 1400 AD (Huffman 2007).

2.6 The Historical period

The historical period spans the era of colonialism that started around 1830 AD when the first missionaries and Dutch immigrants arrived from the Cape Colony in the Maloti Drakensberg region. Sites associated with Voortrekker settlement of the area occur in the eastern Free State and the northern portion of KwaZulu-Natal near Winterton and Bergville. For the most part, these were the places where laagers were formed (with very low archaeological visibility) and old farmsteads with associated grave yards. A particular site worth mentioning is Kerkenberg near Oliviershoek Pass, where Debora Retief painted the initials of her father on a rock before the trekkers descended into KwaZulu Natal. In Lesotho, the rebellion by Chief Moorosi and the resultant action by the Cape Colony government at the southern tip of the country left footprints of forts and associated graves at Moyeni Camp, Fort Hartley, Cutting Camp, and Mount Moorosi. The most important structure relating to the history of Bushman raids is most probably Forth Nottingham, in KwaZulu-Natal, which was built around 1852. Various historical mission stations founded in the mid to late 1800s such as those at Morija and St James in Lesotho and Emmaus,

Reichenau, and Mariazell in South Africa, are still in active use. The Ongeluksnek Pass in the Eastern Cape is intimately associated with the epic trek of the Griqua people in 1861, led by Adam Kok. The area associated with the first native uprising against the British colonial government, by the celebrated Hlubi chief Langalibalele in 1873, is at Giants Castle Nature Reserve in the uKhahlamba Drakensberg Park World Heritage Site. Various battle sites associated with the Basotho Wars between the Boer Republic of the Orange Free State and the Sotho Kingdom of Moshoeshoe I are to be found in the eastern Free State and adjacent parts of Lesotho. Sites belonging to the period of the Anglo-Boer War (1898-1901) abound in the eastern Free State portion of the project area. These are typically areas where skirmishes took place or where ammunition was destroyed. A few rock engravings belonging to the Anglo-Boer War period have been documented from the Golden Gate Highland Park. However, thorough research is still required to ascertain the meaning and value of these engravings. Many historical sites can be categorised as belonging to the “built environment” as defined in heritage legislation. These are the physical remnants and traces of historical settlements that underpin the cultural value and meaning of the surrounding communities.

2.7 Graves

There are various grave sites belonging to different periods and cultural associations in the Drakensberg region. Perhaps the most famous sites are those belonging to the southern Sotho royalty at Botha Bothe in Lesotho; the grave of Nkosi Langalibalele at Giants Castle; KwaZulu Natal graves associated with the royalty of the amaZizi and amaNgwane near Bergville, KwaZulu-Natal; the grave of Adam Kok at Matatiele, Eastern Cape; and various graves in the Free State belonging to the Voortrekker and Anglo-Boer War periods. Interestingly, graves belonging to the prehistoric San inhabitants of the area are markedly absent or, as yet, have not been identified by researchers.

2.8 The Living Heritage

The living heritage of the Drakensberg area is varied and as yet little understood. Yet preliminary investigations by the Maloti Drakensberg Project (Anderson 2007) indicate that certain areas, including sites in communal areas close to Underberg, are still frequented by local communities who afford them ritual or sacred significance. Such locales may

include archaeological sites with a living heritage component or natural features such as mountains, forests, boulders, caves, pools, or waterfalls with cultural significance. Living heritage is not only site-specific but also relates to oral history, indigenous knowledge systems, and indigenous languages, practices, and beliefs. Oral history specifically is a rich resource that has been passed down the generations and provides diverse narratives and interpretations concerning places of historical significance. It also provides a window on community perspectives regarding heritage resources, including indigenous names for sites and plant and animal species – all of which are imbued with cultural meaning.

Indigenous Knowledge Systems (IKS) constitute an integral component of local knowledge, at grass roots level, often associated with traditional methods of land management and use. In this regard, IKS can enhance conservation and sustainable management of cultural heritage to which communities may relate. Conservation should provide an enabling environment for communities to continue with the tradition of transmitting knowledge and skills and of safeguarding their cultural heritage. Traditional ceremonies still performed in the larger Drakensberg region include the *Bale* initiation schools among certain southern Sotho groups, the *amemulo* (coming of age) ceremonies among the amaNgwane, in the near vicinity of the study area, the *Nkubelwana* (planting of the first seed) among Zulu-speakers, rainmaking, and various ceremonies associated with the veneration of the ancestors. Six indigenous languages are still spoken in the area, including siBhaca, which was believed to be almost extinct.

Two broad categories of site-specific living heritage sites have been identified:

- Sites of national significance of which nine have been identified in the SA portion of the MDTFCA. These include rock art sites, sandstone shelters without any archaeological remains but used extensively as pilgrimage sites, two sacred forests, and three sacred mountains. All of these sites are frequented by indigenous groups as part of an annual pilgrimage.
- Sites of local significance include various pools, waterfalls, hot springs, kaolin and red ochre deposits, and boulders afforded special significance by traditional healers and sectarian Christian groupings. Seventeen such sites have been identified in the larger Drakensberg area.

Living Heritage – Wilderness

Areas least influenced by human activities are often said to be representative of a “pristine” landscape. Such areas are recognised by the IUCN. In the context of the Drakensberg,

only the Maloti Drakensberg World Heritage Site has any proclaimed wilderness areas, making up about 48% of the Park. In this regard, a specific wilderness management plan has been produced for the World Heritage site, with the express aim of retaining the integrity of these wilderness areas. In terms of the South African National Environmental Management: Protected Areas Act (no 57 of 2003), a wilderness area is defined as *“an area designatedfor the purpose of retaining an intrinsically wild appearance and character, or capable of being restored to such and which is undeveloped and roadless, without permanent improvements or human habitation”*.

In addition, wilderness can be considered as a value of a given area and in this regard can be defined as a *“...largely undeveloped and intrinsically wild character of the area in vast wilderness areas that provide outstanding opportunities to experience solitude and for spiritual renewal”* (EKZNW 2006). There are a number of stakeholders promoting the concept of wilderness, including the Wilderness Action Group and the Wilderness Foundation. From a cultural heritage perspective, the concept is more akin to a western inspired ideal than an academic reality. In this sense the concept of wilderness, as an area where visitors may experience and enjoy pristine nature removed from anthropogenic influence and pollution, is therefore a western expression of living heritage. The wilderness notion, however, finds expression also in the indigenous concepts of cultural landscapes which are usually natural areas with profound cultural significance.

2.9 Palaeontology

Given its nature, palaeontology should be a component of geology and biodiversity. Nevertheless, the present heritage legislation in South Africa also covers palaeontology. In fact, the heritage management procedures relating to palaeontology are almost identical to those of archaeology. The palaeontological history of the Maloti Drakensberg area is fascinating as it tells the story of the super southern continent called Gondwanaland and its associated fauna and flora preserved today as fossils (McCarthy & Rubidge 2005). Fossils and footprints belonging to various periods from around 270 million years ago to around 180 million years ago have been recorded and collected in the geological layers beneath the basalts. These layers, amongst other interesting facts, provide evidence of the greatest mass extinction of species in the world around 251 million years ago towards

the end of the Permian period. Some species survived this extinction as attested by abundant fossils of certain species such as *Lystrosaurus* found deep in the Triassic period layers. Many of these occurrences can be found within a 10km radius from the study area. Whereas the majority of fossilized remains in the area are *therapsids* (mammal-like reptiles, ancestors of most mammal species today), the Maloti Drakensberg also harbours evidence of some of the earliest dinosaurs in the world. Footprints belonging to these early dinosaurs appear in various localities in the Molteno formations of both Lesotho and South Africa. The most celebrated palaeontological site occurs in the Golden Gate Highlands National Park. Here the earliest known dinosaur eggs in the world and a near intact embryo of an average sized dinosaur, i.e. *Massospondylus*, were located by scientists some thirty years ago. These early eggs, dated to almost 200 million years ago, are almost 100 million years older than other known dinosaur nest egg sites in the world. In adjacent Lesotho the Qomoqomong Dinosaur footprint and museum site has been developed for tourism purposes. The endemic turkey size dinosaur *Lesothosaurus* is known from various localities within Lesotho.

Summary

The cultural heritage of the greater Drakensberg region (including the Bergville area) is rich, diverse, and fragile. The area contains a high density of prehistoric rock art that parallels the well-known Upper-Palaeolithic rock art of Western Europe in artistic execution and symbolism. In addition, it harbours a rich and diverse record of palaeontological fossils that, for the most part, pre-date the Jurassic period of popular imagination. The mountains are also the heartland of the *Difaqane* – a period of tribal turmoil that developed as a direct response to the expansion of the Zulu state of Shaka in the 1820s. Many Iron Age sites in the area belong to this period, including significant sites associated with the founding of the Basotho Kingdom under King Moshoeshe I. It was also the area traversed by some of the most dramatic diasporas documented in southern African history, including the Great Trek of the Voortrekkers, The Griqua trek via Ongeluksnek, the wanderings of the amaHlubi, amaNgwane, amaZizi, and amaBhaca tribal entities, and the lesser-known but equally dramatic trek of the //Xegwi San in 1879 – the last rock artists of the region. Sites related to these historical events abound in the Drakensberg and are windows into a significant period of the history and culture of southern Africa. That some of these cultural expressions are still alive is witnessed by the

occurrence of significant living heritage sites in the region. Most of these are used as sites of pilgrimage by visitors from South Africa, Lesotho, and even further abroad.

3 BACKGROUND INFORMATION OF THE SURVEY

3.1 Methodology

A desktop study was conducted of the SAHRA inventory of heritage sites as reflected on the SAHRIS website. Unfortunately this database is incomplete and of only limited use. In addition, the archaeological database of the KwaZulu-Natal Museum was consulted. This data base indicated more than 300 heritage sites in the northern Drakensberg in the close vicinity of the study area (Fig 1). The far majority of these are rock art sites but some are also shelters with Later Stone Age deposits. Many of these were covered by water with the construction of the nearby Woodstock Dam in the 1970's. The Driel Shelter that was excavated by archaeologists from the then Natal Museum in the 1980's is situated approximately 4km from the study area (Wright & Mazel 2007). The well-known Mgoduyanuka Iron Age settlement that was also excavated in the early 1980's (Huffman 2007) is located approximately 12 km from the study area. A study of aerial photographs of the area shows numerous Later Iron Age stone walled features in the greater Bergville area.

A ground survey following standard and accepted archaeological procedures was conducted on the 25 October 2017. The footprint was walked by foot. Local residents encountered in the study area was interviewed regarding the potential occurrence of any heritage sites along the track. An area of 50m was surveyed on both sides of the existing mud track. Particular attention was paid to locate modern graves at homesteads situated in the near vicinity of the track.

A desktop palaeontological impact assessment was conducted by Dr Gideon Groenewald. The results of this study is reported in Appendix 2.

3.2 Restrictions encountered during the survey

3.2.1 Visibility

Visibility during the site visit was good.

3.2.2 Disturbance.

The area is disturbed with evidence for overgrazing and soil erosion in parts. However, no disturbance of any heritage sites has been observed.

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

Municipality: Okhahlamba Local Municipality and uThukela District Municipality

Towns: Bergville

4.2 Description of the general area surveyed

Although important archaeological sites occur in the adjacent Maloti Drakensberg World Heritage Site, including the buffer zone area, none were recorded on the actual footprint. Some isolated homesteads occur adjacent to the mud track. However, none of these had any associated graves or other heritage features (Fig 6). No graves were observed within 100m from the proposed road upgrade. These observations was also supported by the views of local community members whom the consultant approached in this regard. No rock art or other archaeological sites were observed in an area of 60m surveyed on both sides of the mud track. The footprint is not part of any known cultural landscape (Table 2).

Table 2. Evaluation and statement of significance of heritage sites on the footprint.

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.

4.3 Dating the findings

Not applicable, as no heritage sites occur on the footprint.

5 STATEMENT OF SIGNIFICANCE (HERITAGE VALUE)

5.1 Field Rating

The SAHRA system of field rating (Table 3) does not apply in this study as no heritage sites occur on the footprint.

Table 3. 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 Road Upgrade of the Malandeni Mud track may take place from a heritage perspective (excluding palaeontology) as no heritage sites or graves are threatened by the proposed development. It should, however, be pointed out that the KwaZulu-Natal Heritage Act requires that operations exposing archaeological and historical residues should cease immediately pending an evaluation by the heritage authorities. It is possible that “invisible” graves occur on the property. Should any of these, including those younger than 60 years, be exposed during the construction phase then all operations should also cease and the heritage consultant or provincial heritage agency be contacted for further evaluation (see Appendix 1).

In terms of the desktop palaeontological assessment it is proposed that:

- The EAP and ECO must be informed of the fact that a Very High Palaeontological Sensitivity is allocated to the entire study. A Phase 1 PIA document and “Chance Find Protocol” is essential during the first month of excavation for road foundations deeper than 1.5m.
- If 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 (Appendix 2).

MAPS AND PHOTOGRAPHS

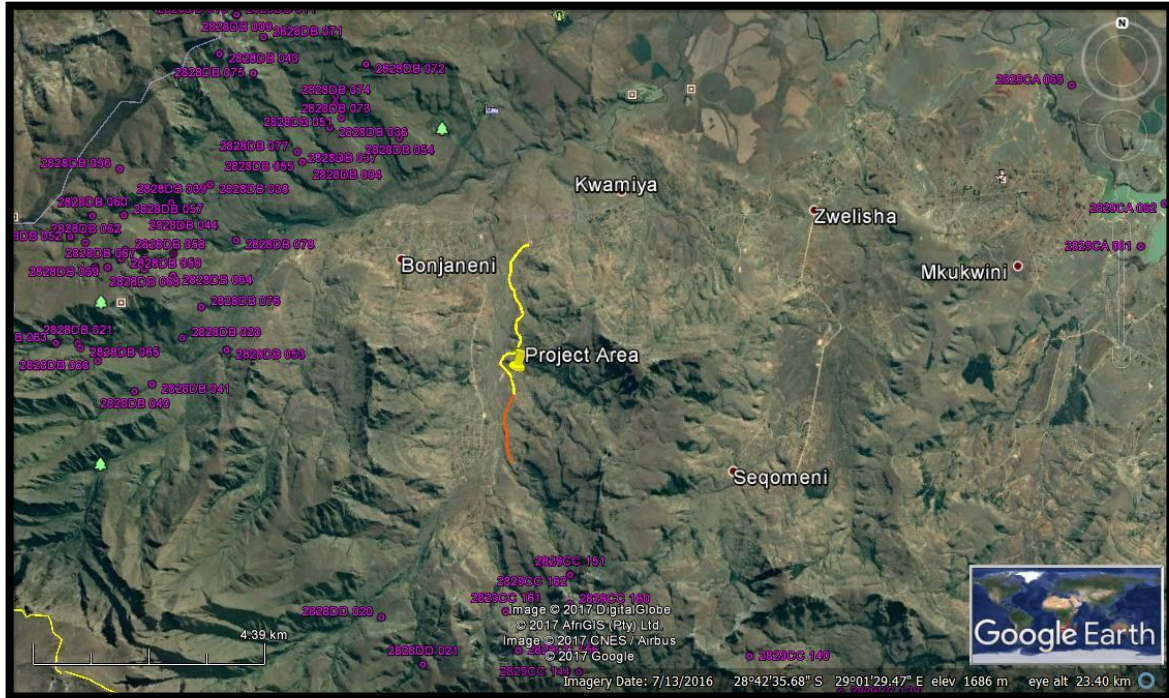


Figure 1. Google aerial photograph showing the locality of the project area (Malandeni Mud Track) near Bergville. The purple polygons indicate the locality of known heritage sites in the greater area.



Figure 2. Google aerial photograph showing the locality of the proposed Malandeni Mud Track Upgrade Extension.



Figure 3. The existing Malandeni Mud Track



Figure 4. Watercourse 1



Figure 5. Watercourse 2



Figure 6. Although some contemporary homesteads are situated on the footprint none had associated graves.



Figure 7. Sandstone shelter located approximately 200m from the proposed mud track. No rock art or other archaeological material occur in this area.

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APPENDIX 1

RELOCATION OF GRAVES

Burial grounds and graves are dealt with in Article 36 of the NHR Act, no 25 of 1999. Below follows a broad summary of how to deal with grave in the event of proposed development.

- If the graves are younger than 60 years, an undertaker can be contracted to deal with the exhumation and reburial. This will include public participation, organising cemeteries, coffins, etc. They need permits and have their own requirements that must be adhered to.
- If the graves are older than 60 years old or of undetermined age, an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. This is a requirement by law.

Once it has been decided to relocate particular graves, the following steps should be taken:

- Notices of the intention to relocate the graves need to be put up at the burial site for a period of 60 days. This should contain information where communities and family members can contact the developer/archaeologist/public-relations officer/undertaker. All information pertaining to the identification of the graves needs to be documented for the application of a SAHRA permit. The notices need to be in at least 3 languages, English, and two other languages. This is a requirement by law.
- Notices of the intention needs to be placed in at least two local newspapers and have the same information as the above point. This is a requirement by law.
- Local radio stations can also be used to try contact family members. This is not required by law, but is helpful in trying to contact family members.
- During this time (60 days) a suitable cemetery need to be identified close to the development area or otherwise one specified by the family of the deceased.
- An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account. This is a requirement by law.
- Once the 60 days has passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement

by law.

- Once the permit has been received, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any items found in the grave

APPENDIX 2

**DESKTOP PALAEOLOGICAL
ASSESSMENT FOR THE PROPOSED
UPGRADING AND EXTENSION OF THE
MALANDENI ROAD, OKHAHLAMBA LOCAL
MUNICIPALITY, UTHUKELA 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 Malandeni Road, Okhahlamba Local Municipality, Uthukela 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 Malandeni Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by shales and sandstone of the Normandien Formation, the Tarkastad Subgroup and 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 the entire 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 Malandeni Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province (Figure 1).



Figure 1 Locality of the Malandeni 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 is made using appropriate 1:250 000 geological maps (2828 Harrismith) in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc) are 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

	<p>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.</p>
<p style="text-align: center;">GREY</p>	<p>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 emplacement 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.</p>

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 Malandeni Road Development is situated to the south of Bergville in the rural parts of KwaZulu-Natal. The development falls in undulating terrain underlain by clayey soils of mainly deeply weathered Normandien Formation sandstone and shale, red coloured mudstone and sandstone of the Tarkastad Subgroup and dolerite.



Figure 2 Locality of the Malandeni Road upgrade in the Bergville area

13 GEOLOGY

The site of the development falls mainly on Permian aged shale and sandstone of the Normandien Formation and a small section underlain by Jurassic dolerite (Figure 3).

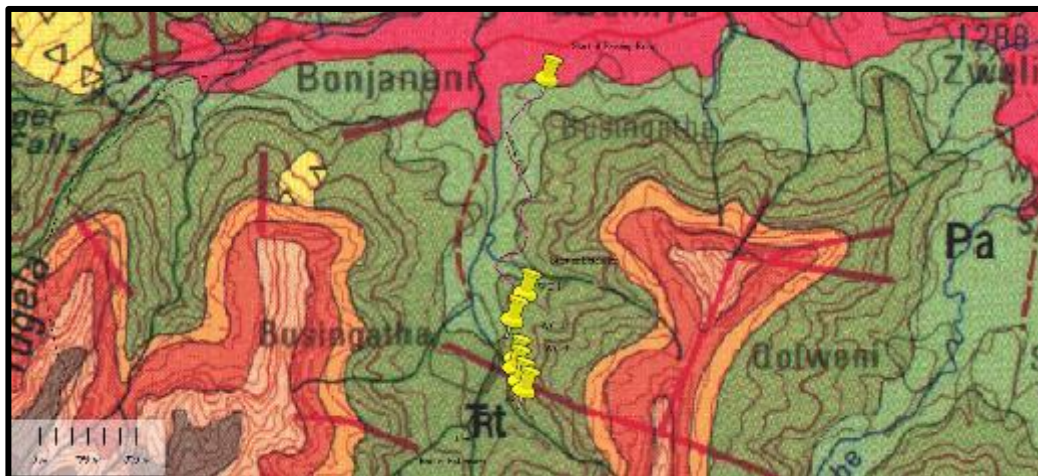


Figure 3 Geology of the study area for the Malandeni Road upgrade. Normandien Formation (Pa) and Tarkastad Subgroup (Trt)

14 KAROO SUPERGROUP

14.1 Beaufort Group

14.1.1 Adelaide Subgroup (Pa) [Estcourt Formation (Pe) pre 2015] Normandien Formation (Pn, post 2015)]

The Permian to Triassic aged Normandien Formation (also mapped as the Adelaide Subgroup [Pa] and Estcourt Formation [Pe] on older versions of 1:250 000 sheets of South Africa) underlies most of the study area (Figure 3). The Formation consists of a series of fluvial sandstone and mudstone, representing the first influx of fluvial sediments into a dominantly deltaic environment of the upper Ecca Group (Groenewald 1990; 1996; Johnson et al, 2009; Groenewald, 2012; Groenewald et al, 2014 and Groenewald 2016).

The Normandien Formation has been subdivided into distinctive Members by Groenewald (1990) but these members were not mapped in the study area. The most distinguishable upper, brightly colored and red mudstone Member, named the Harrismith Member (Johnson et al 2009) forms the upper part of the Normandien Formation and can be correlated with the Palingkloof Member of the Balfour Formation of the Adelaide Subgroup in the southern part of the Karoo Basin (Groenewald, 1996; Johnson et al, 2009).

14.1.2 Tarkastad Subgroup (Trt)

14.1.2.1 Katberg Formation (Not distinguished in 1:250 000 scale maps)

The Katberg Formation is defined by a dominance of fine-grained sandstone with subordinate red mudstone (Groenewald, 1996; Johnson et al, 2009) and represent influx of fluvial sandstone via braided rivers in the southern Karoo Basin during the Triassic.

14.1.2.2 Burgersdorp Formation (Driekoppen Formation on some maps)

The Burgersdorp Formation is predominantly a red mudstone unit representing a distal fluvial meandering river environment as well as lacustrine environment in the study area during the Triassic.

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 PALAEOLOGY

16 KAROO SUPERGROUP

16.1.1 Adelaide Subgroup (Pa) [Estcourt Formation (Pe)] Normandien Formation

The Permian to Triassic Normandien Formation (**Pa** in Figure 3) is internationally known for the wealth of trace, plant and vertebrate fossils that is present in this Very Highly sensitive Palaeontological Zone of South Africa. The study area falls in the Permian Extinction time-zone (252 million years ago) in South Africa and the Formation is home to the *Glossopteris* Assemblage of plants, the *Daptocephalus* and *Lystrosaurus* Assemblage Zones of Vertebrates as well as well-known trace fossils, including casts of

vertebrate burrows (MacRae, 1999; McCarthy and Rubidge, 2005, Johnson et al 2009; Groenewald, 2012 and Groenewald et al 2014; Groenewald, 2016; Viglietti et al., 2010).

The most famous vertebrate fossils belong to the *Daptocephalus* (formally known as the *Dicynodon* Assemblage Zone) as well as the *Lystrosaurus* Assemblage Zones (Figure 4) with good examples of fossil bones and well preserved skulls.

Very well preserved remains of insect wings are known from the nearby town of Estcourt (Van Dijk, Johnson et al, 2009), and it will be very significant if some of these unique fossils can be discovered during excavations of foundations and trenches for this project.

Well-preserved petrified wood and other plant fossils were recorded in the vicinity of the study area and these fossils contribute significantly to our understanding of the palaeo-environments that existed during the Late Permian, beginning of the Triassic periods in this part of the Karoo Basin (McCarthy and Rubidge, 2005).

The Harrismith Member is very well known for the presence of extremely well-preserved remains of vertebrates belonging to the *Lystrosaurus* Assemblage Zone over the entire outcrop area of this unit in the Karoo Basin of South Africa (Johnson et al, 2009). The



Figure 4 Schematic representation of the palaeo-environment of the study area (*after Metcalfe, www.pixy.co.za)

remains of *Lystrosaurus* sp were discovered at two sites that can be associated with this Project.

16.1.2 Tarkastad Subgroup (Trt)

The Triassic aged Tarkastad Subgroup is well-known for the significant finds of fossils from both the *Lystrosaurus* as well as the *Cynognathus* Assemblage Zones in the Karoo Basin.

The lower Katberg Formation is known for the presence of *Lystrosaurus* fossils, the survivors of the Permian extinction event. In some cases casts of vertebrate burrows have been recorded with well-preserved examples of reptiles and amphibians in the same petrified burrow.

The upper Burgersdorp Formation is known for the presence of significant finds of animals from the *Cynognathus* Assemblage Zone, including the interesting discovery of vertebrate burrows with *Trirachodon* (Groenewald, et al., 2001).

16.2 Dolerite

Due to its igneous character dolerite will not contain fossils.

17 PALAEOLOGICAL 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 Normandien Formation, the Tarkastad Subgroup and dolerite.

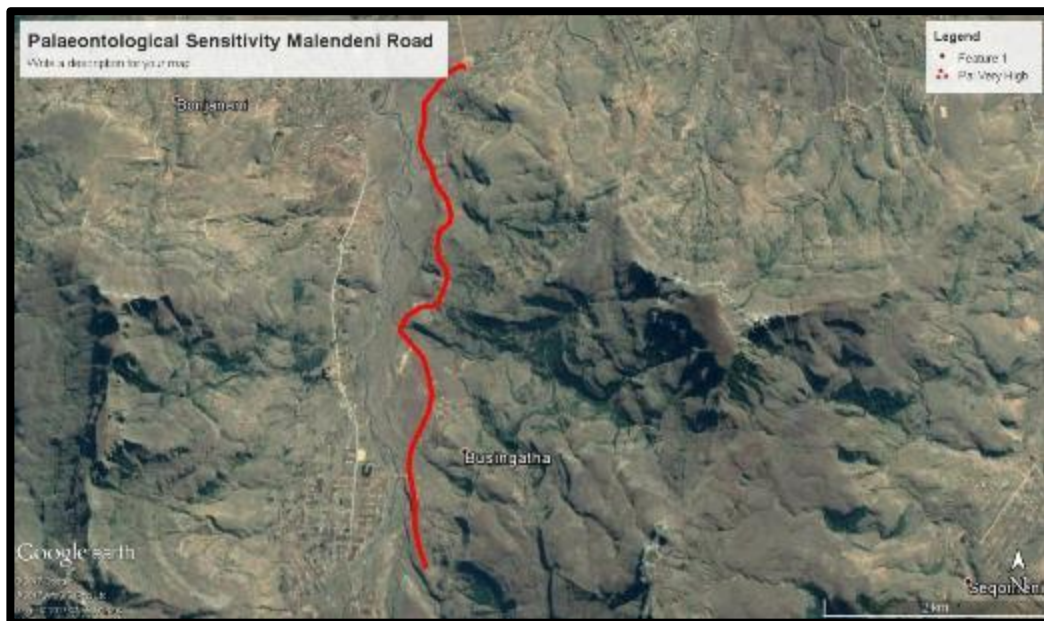


Figure 5 Palaeontological sensitivity of the road upgrade site at Malandeni Road. The entire site is Very Highly sensitive for Palaeontological Heritage

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 Normandien Formation as well as the Tarkastad Subgroup (Figure 3). 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 ecosystems. 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 Normandien Formation and Tarkastad Subgroup. 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 Malandeni Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by shales and sandstone of the Normandien Formation, the Tarkastad Subgroup and 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 the entire 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.



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