

**CULTURAL HERITAGE IMPACT ASSESSMENT OF
THE PROPOSED L20 EXTENSION GELUKSBURG
AREA, OKAHLAMBA LOCAL MUNICIPALITY,
KWAZULU-NATAL.**



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TABLE OF CONTENTS

1	BACKGROUND INFORMATION ON THE PROJECT	2
2	BACKGROUND TO ARCHAEOLOGICAL HISTORY OF AREA	7
2.1.1	THE EARLY STONE AGE	8
	Living Heritage – Wilderness	13
3	BACKGROUND INFORMATION OF THE SURVEY	15
3.1	Methodology	15
3.2	Restrictions encountered during the survey	16
3.2.1	Visibility	16
3.2.2	Disturbance	16
3.3	Details of equipment used in the survey	16
4	DESCRIPTION OF SITES AND MATERIAL OBSERVED.....	17
4.1	Locational data	17
4.2	Description of the general area surveyed	17
4.3	Dating the findings	18
5	STATEMENT OF SIGNIFICANCE (HERITAGE VALUE)	18
5.1	Field Rating.....	18
6	RECOMMENDATIONS	19
7	MAPS AND PHOTOGRAPHS	20
9	REFERENCES	23
APPENDIX 1.....		23

LIST OF TABLES

Table 1.	Background information.....	5
Table 2.	Evaluation and statement of significance.....	17
Table 3.	Field rating and recommended grading of sites (SAHRA 2005)	18

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 L20 extension in the Geluksburg area, Okahlamba Local Municipality identified no archaeological and historical sites (including graves) on the footprint. There is no reason, from a general heritage and archaeological perspective, why the development may not proceed as planned. However, the paleontological study indicates that a Very High Palaeontological sensitivity is retained for the sections of the proposed road development that is underlain by shale and sandstone of the Normandien Formation. Although highly weathered, fossils might be recorded during the initial phase of construction.

- A Professional Palaeontologist must be appointed to inspect the site during the on-going weeks of excavation for the infrastructure and a “Chance Find Protocol” document (CFP, included with this report) must be updated on a monthly basis. If fossils are recorded, a suitably qualified palaeontologist must be appointed to inspect all areas where excavation of deeper than 1,5m is made into sediments of Normandien Formation and a protocol for the chance find of fossils must then be developed and discussed with the contractor on site.
- These recommendations must be included in the EMP of this project. 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 archaeological, historical and paleontological remains should cease immediately, pending evaluation by the provincial heritage agency.

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

1 BACKGROUND INFORMATION ON THE PROJECT

Active Heritage cc was approached by Nankhoo Engineers to conduct a heritage impact assessment (HIA) of the proposed extension of the L20 in the Geluksburg area. Dr Groenewald, an Amafa accredited palaeontologist, was sub-contracted by Active Heritage cc to conduct the palaeontological component of the study (Appendix 1).

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 paleontological 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 (Mr Frans Prins) for Nankhoo Engineers. Dr Gideon Groenewald was sub-consulted by Active Heritage cc to conduct the paleontological component of the heritage study.
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Type of development:	<p>The KZN Department of Transport (Applicant) proposes to extend the existing L20 road to meet D364. The proposed road will be 10 km in length, 6 m in width and will have a 20m road reserve. The existing portion of the road is 6.5 km long and the Department proposes to extend the road by a further 10 km. The proposed route transverses a number of drainage lines therefore the Department proposes to construct pipe culvert structures to allow for the continual natural flow of water.</p> <p>Two alternative designs for the pipe culvert structures have been outlined below and will be assessed within the BAR:</p> <ul style="list-style-type: none"> ▯ Alternative 1: Precast concrete pipe culvert and associated headwalls; ▯ Alternative 2: Concrete piped culvert with stone pitched/ gabion headwalls.
Rezoning or subdivision:	n.a
Terms of reference	To carry out a Heritage Impact Assessment (including a Paleontological 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 Department of Transport (DOT) proposes to extend the existing L20 road. The extension will be approximately 10 km, width of 6m and a road reserve of 20m in order to conform to the DOT type 7A gravel road standards. The proposed road extension will require the construction of pipe culvert structures within the drainage lines to allow for natural flow of the water. There are no site alternatives for the position of the pipe culvert structure, as the road transverses the drainage lines at the existing crossing points. Following the site visit it was evident that there has been a significant amount of erosion surrounding the proposed project area, which has led to the deepening of the drainage lines, which in turn, will lead to further erosion in the long term if not dealt with accordingly.

The GPS coordinates of the pipe culverts are as follows:

Start point: S 28°29'24.10" E 29°22'47.43"

End Point: S 28°28'15.40" E 29°19'03.28"

The GPS coordinates of the proposed culvert structures are as follows:

S 28°28'16.65" E 29°22'16.03"

S 28°28'15.02" E 29°22'16.76"

S 28°27'21.80" E 29°20'06.19"

S 28°27'22.24" E 29°19'54.99"

S 28°27'30.93" E 29°19'51.56"

S 28°27'34.40" E 29°19'50.57"

Current land use: The footprint is situated in the foothills of the northern Drakensberg overlooking the small village of Geluksburg in the distance. It is situated in a communal area but there are very few homesteads situated in the near vicinity of the existing mud track. Most of the area is characterised by degraded grasslands. Soil erosion and evidence for overgrazing is evident in the greater the project area (Fig 3). The area is inhabited by a mixture of amaNgwane, a Zulu-speaking people, and Southern Sotho speaking people. The inhabitants of the area are small scale subsistence farmers.

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.

2.1.1 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.

2.1.2 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).

2.1.3. 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 later part of the Holocene around 5 000 years ago. This was compounded by the arrival of immigrant black farmers in the region soon after 1600 AD and European colonialism around 1834 AD (Wright & Mazel 2007). During the historical period, the Maloti Drakensberg and adjacent mountainous areas became the last stronghold for various southern San groups such as the Baroa, //Xegwi, !Ga!ne, //Kx'au, and //Ku//ke. Their Later Stone Age way of life finally came to an end during the late 19th century. San descendants still live in the area but for all practical purposes have assimilated with their more powerful neighbours. Many place names within the region still retained their original San pronunciations such as the Inxu, Sehonghong, Qomoqomong and Qhoasing rivers, and the Qeme, Qhuqhu, Qhalasi, and Qholaqhoe mountains. Approximately 1 300 Later Stone Age sites are known within the South African side of the Drakensberg.

2.1.4. 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 Ukhahlamba Drakensberg World Heritage Site.

2.1.5. 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).

2.1.6. 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 Fort 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.

2.1.7. 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.

2.1.8. 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.

2.1.9. 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 paleontological 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/Ge 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 Moshoeshoe 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. The far majority of these are rock art sites but some are also shelters with Later Stone Age deposits. The Driel Shelter that was excavated by archaeologists from the then Natal Museum in the 1980's is situated

approximately 10km 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 16 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. The well-known Businghata rock art site is situated approximately 10km from the study area. Lesser known rock art sites occur approximately 8km from the footprint. However, none of these known heritage sites occur in the immediate vicinity of the footprint nor will they be impacted-upon by the proposed development.

A ground survey following standard and accepted archaeological procedures was conducted. The footprint was walked by foot. Particular attention was paid to locate modern graves as modern homesteads occur in the near vicinity of the proposed road upgrade.

The paleontological component of the survey is discussed in Appendix 1.

3.2 Restrictions encountered during the survey

3.2.1 Visibility

Visibility during the site visit was good.

3.2.2 Disturbance.

No disturbance of any archaeological and historical sites has been observed. However, the palaeontologist reported the exposure of fossil material including weathered deposits that are paleontologically sensitive (Appendix 1).

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: Geluksburg and Bergville

4.2 Description of the general area surveyed

Although important archaeological sites, including rock art, Iron Age, and historical sites occur in the adjacent areas as well as in the nearby Maloti Drakensberg World Heritage Site, including the adjacent buffer zone area (Fig 1), none were recorded in the actual footprint. No graves were observed within 1km from the proposed road development. The area is also not part of any known cultural landscape (Table 2).

However, the palaeontologist reported that a Very High Palaeontological sensitivity is retained for the sections of the proposed road development that is underlain by shale and sandstone of the Normandien Formation. Although highly weathered, fossils might be recorded during the initial phase of construction (Appendix 1).

Table 2. Evaluation and statement of significance.

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.	Potential paleontological significance.
3.	Research/scientific significance – Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.	Potential paleontological significance.

4.	Scientific significance – Importance in demonstrating the principal characteristics of a particular class of South Africa's cultural places/objects.	Potential paleontological significance
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 archaeological and historical findings

Not applicable, as no archaeological and historical sites occur on the footprint.

5 STATEMENT OF SIGNIFICANCE FOR ARCAEOLOGICAL AND HISTORICAL SITES (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 archaeological and historical 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 upgrading of the L20 may take place from a general heritage perspective as no archaeological and historical heritage sites are threatened by the proposed development. The area is also not part of any known cultural landscape with no known living heritage values. However, the footprint is significant in terms of paleontological sensitivity (Appendix 1). Although highly weathered, fossils might be recorded during the initial phase of construction.

- A Professional Palaeontologist must be appointed to inspect the site during the on-going weeks of excavation for the infrastructure and a “Chance Find Protocol” document (CFP, included with this report) must be updated on a monthly basis. If fossils are recorded, a suitably qualified palaeontologist must be appointed to inspect all areas where excavation of deeper than 1,5m is made into sediments of Normandien Formation and a protocol for the chance find of fossils must then be developed and discussed with the contractor on site.
- These recommendations must be included in the EMP of this project.

It should, however, be pointed out that the KwaZulu-Natal Heritage Act requires that operations exposing archaeological, historical, and paleontological residues should cease immediately pending an evaluation by the heritage authorities.

7 MAPS AND PHOTOGRAPHS

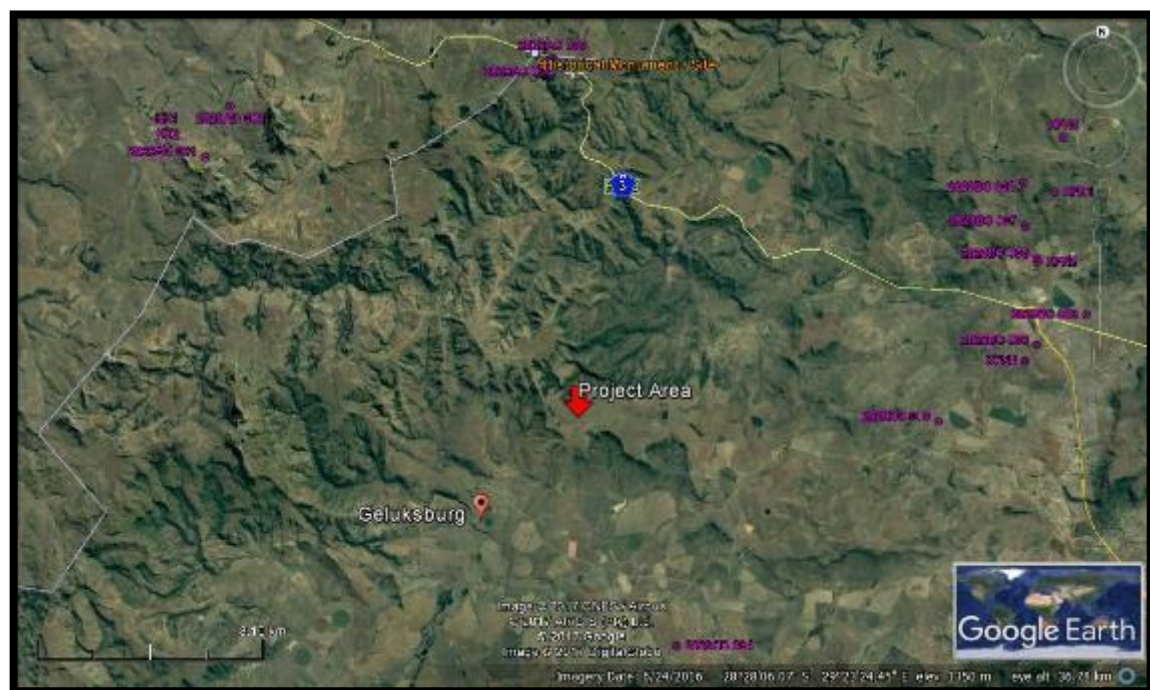


Figure 1. Google Aerial Imagery showing the location of the project area Geluksburg. The purple and yellow polygons indicate the distribution of known heritage sites in the greater Geluksburg area.

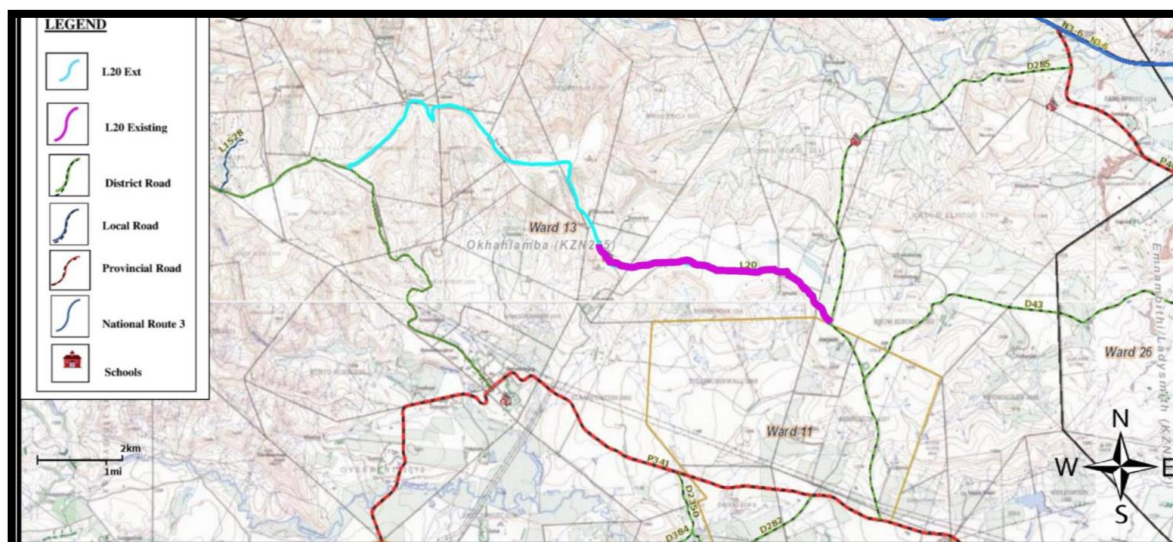


Figure 2. Map showing the locality of the L20 (Source: Hanslab).

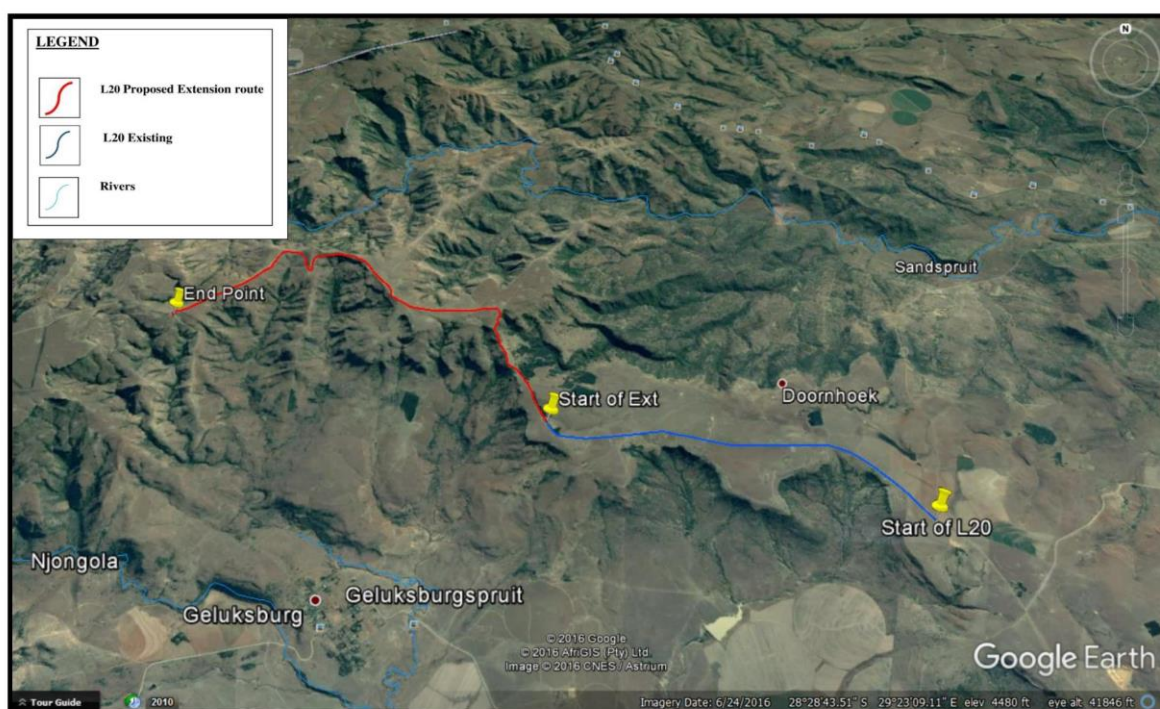


Figure 3. Google aerial imagery showing the location of the L20 near Geluksburg (Source: Hanslab).



Figure 4. View over the project area: no archaeological or historical sites occur in the immediate environs of the proposed road upgrade.



Figure 5. Although there is evidence for erosion on the existing track no archaeological and historical sites has been exposed or are disturbed.

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APPENDIX 1

PHASE 1 PALAEONTOLOGICAL ASSESSMENT AND "CHANCE FIND PROTOCOL" FOR THE PROPOSED UPGRADING AND EXTENSION OF THE L20 ROAD, OKHAHLAMBA LOCAL MUNICIPALITY, UTHUKELA DISTRICT

MUNICIPALITY, KWAZULU-NATAL PROVINCE

FOR

HIA CONSULTANTS
ACTIVE HERITAGE

DATE: 8 JULY 2017

By

Gideon Groenewald

Cell: 078 713 6377

• EXECUTIVE SUMMARY

Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Assessment Survey, for the proposed upgrading and extension of the L20 Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province.

The purpose of this Phase 1 Palaeontological Impact Assessment is to identify exposed and potential Palaeontological Heritage on the site of the proposed development, to assess the impact the development may have on this resource, and to make recommendations as to how this impact might be mitigated. The field survey indicated the requirement of a "Chance Find Protocol" that will be included in this Phase 1 PIA report.

• 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. In accordance with Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

The development site for the proposed upgrading and extension of the L20 Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by Permian to Triassic aged sedimentary rocks of the Normandien Formation of the Beaufort Group and Jurassic aged igneous dolerite of the Drakensberg Group, Karoo Supergroup.

Significant trace, plant and vertebrate fossils were observed during the field investigation in areas associated with the development of the road. The potential for finding significant fossils in any excavation into sediments of the Normandien Formation is Very High. Significant new fossils were observed during the field assessment (Table 2). If fossils are observed during construction, the HIA consultant must be notified and the fossils collected by a suitably qualified palaeontologist. No fossils will be associated with areas underlain by dolerite.

It is recommended that:

The EAP and ECO must be informed of the fact that a Very High Palaeontological sensitivity is retained for the sections of the development that is underlain by shale and sandstone of the Normandien Formation. Although highly weathered, fossils might be recorded during the initial phase of construction.

significant fossils is expected after the start of excavations for foundations.

The allocated team members at the community must be introduced to Palaeontological material that is likely to be found on site. A once-off information session with the Palaeontological specialist must be arranged, to present a simple and understandable (preferably audio-visual presentation in an “interpreted voice”) of the majority of the contractual workers on site during the initial site visit that must form part of the EMPr for the project.

This “Chance Find Protocol” must be included into the EMPr of the project and a reasonable budget must be allocated to ensure compliance with the legal responsibility of the developer in terms of the proper conservation of and storage of Palaeontological Heritage.

The AMAFA and SAHRA must be informed of the content of this “Chance Find Protocol” and EMPr arrangements by the EAP or the developer, for final approval of the ROD documentation during the EIA process.

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• TABLE OF CONTENTS

• EXECUTIVE SUMMARY	26
• <i>Legal Requirements</i>	26
• CHANCE FIND PROTOCOL FOR PALAEONTOLOGICAL HERITAGE	27
• TABLE OF CONTENT	29
• INTRODUCTION	31
• <i>Legal Requirements</i>	31
• <i>Aims and Methodology</i>	32
• <i>Scope and Limitations of the Phase 1 Investigation</i>	34
• <i>Locality and Proposed Development</i>	35
• GEOLOGY	35
• Karoo Supergroup,	36
• Beaufort Group	36
• <i>Adelaide Subgroup (Pa) Normandien Formation</i>	36
• Dolerite (Jd)	36
• PALAEONTOLOGY	37
• Karoo Supergroup	37
• Beaufort Group	37
• <i>Adelaide Subgroup (Pa) Normandien Formation</i>	37
• Dolerite	38
• PRELIMINARY ASSESSMENT RESULTS	38
• FIELD INVESTIGATIONS	38
• PALAEONTOLOGICAL IMPACT AND MITIGATION	45
• CONCLUSION	45
• CHANCE FIND PROTOCOL FOR PALAEONTOLOGICAL HERITAGE	47
• Mitigation for Excavation Impact on Palaeontological Heritage Resources	47
Mitigation Measures Normally Encountered	47
Functional responsibilities of the Developer/Implementing Agent	48
<i>Documentary record of palaeontological occurrences</i>	48
Functional responsibilities of the appointed Palaeontologist	49
Exposure of palaeontological material	50
• CONCLUSION	50
• REFERENCES	52
• QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR	53
• DECLARATION OF INDEPENDENCE	53

TABLE OF FIGURES

Figure 1 Locality of the L20 road and extension	31
Figure 2 Geology of the L20 route and extension. Most of the route is underlain by rocks of the Normandien Formation (Pa) and a very small part by dolerite (do)	36
Figure 3 GPS localities of photographic observations in the study area (see Table 2)	39
Figure 4 Palaeontological sensitivity of the rock formations along the upgrade and extension of the L20 road. For colour coding see Table 1	45

LIST OF TABLES

Table 1 Palaeontological sensitivity analysis outcome classification	33
Table 2 Localities of observations of Palaeontological interest associated with the Project	39

• INTRODUCTION

Gideon Groenewald was appointed to undertake a Phase 1 Palaeontological Assessment Survey, for the proposed upgrading and extension of the L20 Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province (Figure 1).



Figure 1 Locality of the L20 road and extension

The purpose of this Phase 1 Palaeontological Impact Assessment is to identify exposed and potential Palaeontological Heritage on the site of the proposed development, to assess the impact the development may have on this resource, and to make recommendations as to how this impact might be mitigated. The field survey indicated the requirement of a “Chance Find Protocol” that will be included in this Phase 1 PIA report.

• 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. In accordance with Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

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

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

- **Aims and Methodology**

A Phase 1 investigation is often the last 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 the field investigation a preliminary assessment (desktop study) of the topography and geology of the study area was made using appropriate 1:250 000 geological maps (2828 Harrismith) in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc) were identified within the study area and the known fossil heritage within each rock unit was inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

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

The likely impact of the proposed development on local fossil heritage 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

extent of 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, 2009) (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) recommended.
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 larger alluvium deposits. At least one site visit by a competent palaeontologist is compulsory. Collection of a representative sample of potential fossiliferous material is recommended.
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 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 one site visit by a suitably qualified palaeontologist is recommended.

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, palaeontological mitigation measures should be incorporated into the Environmental Management Plan.

- **Scope and Limitations of the Phase 1 Investigation**

The scope of a phase 1 Investigation includes:

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

- where feasible, location and examination of any fossil collections from the study area (e.g. museums).
- an on-site investigation to assess the identified palaeontological sensitive areas within the development footprint/study area rather than formal palaeontological collection. The investigation focussed on the bedrock exposure where excavations would most probably require palaeontological monitoring.

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

- **Locality and Proposed Development**

The L20 road and proposed extension is situated north of the town Geluksburg in the Okhahlamba Local Municipality, Uthukela District Municipality in KwaZulu-Natal Province (Figure 1).

The proposed project includes the widening of the existing track and resurfacing of the road, with extensive excavations needed in the steeper parts of the existing track. It is assumed that excavations will exceed 1.5m and that road foundations will require excavation into bedrock of the Normandien Formation (Adelaide Subgroup (Pa)).

- **GEOLOGY**

The study area is underlain by Permian aged sedimentary rocks of the Beaufort Group as well as Jurassic aged dolerite of the Karoo Supergroup. (Figure 2).

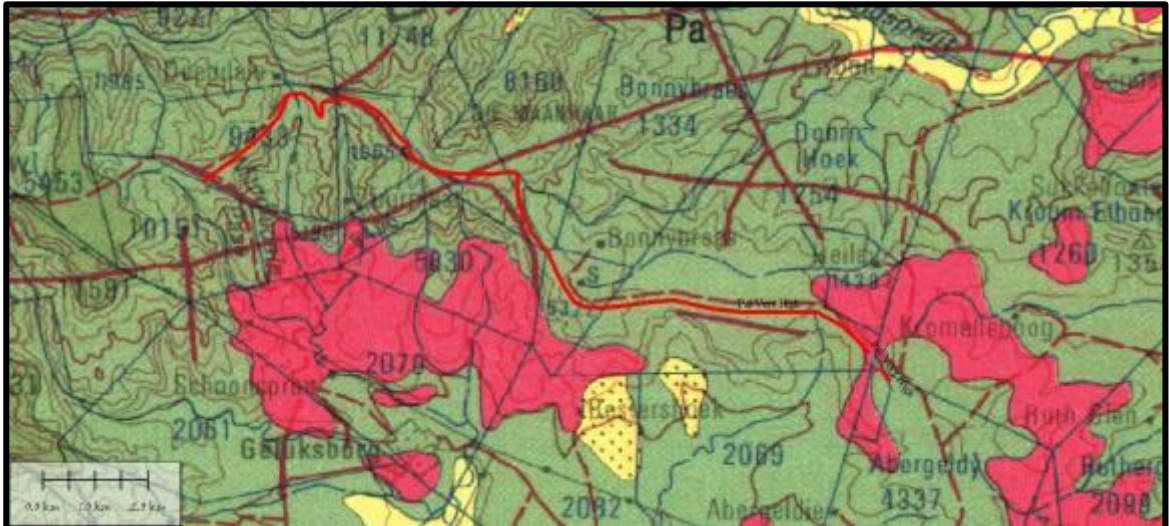


Figure 2 Geology of the L20 route and extension. Most of the route is underlain by rocks of the Normandien Formation (Pa) and a very small part by dolerite (do)

- Karoo Supergroup,
- Beaufort Group
- **Adelaide Subgroup (Pa) Normandien Formation**

The Permian to Traissic aged Normandien Formation (also mapped as the Adelaide Subgroup [Pa] on old versions of 1:250 000 sheets of South Africa) underlies almost the entire study area (Figure 2) with a very small part of the study area underlain by dolerite. The Normandien 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 et al, 2014 and Groenewald 2016). The study area is a very good example of the transgressive geology of the Beaufort Group in the KwaZulu-Natal Province.

- **Dolerite (Jd)**

Jurassic aged dolerite dykes and sills represent a volcanic episode that occurred during the breakup of Gondwanaland.

- **PALAEONTOLOGY**
- **Karoo Supergroup**
- **Beaufort Group**
- **Adelaide Subgroup (Pa) Normandien Formation**

The Permian to Triassic Normandien Formation (**Pa** in Figure 2) is Internationally known for the wealth of trace, plant and vertebrate fossils that are present in this Very Highly sensitive Palaeontological Zone of South Africa. The Formation is home to the Glossopteris Assemblage of plants (Table 2), the Daptocephalus and Lystrosaurus Assemblage Zones of Vertebrates (Table 2) as well as well-known trace fossils, including casts of vertebrate burrows (Table 2) (Groenewald 1990; Groenewald, 2012 and Groenewald et al 2014; Groenewald, 2016).

The most famous vertebrate fossils belong to the Daptocephalus (formally known as the Dicynodon Assemblage Zone) as well as the Lystrosaurus Assemblage Zones (Figure 3) with good examples of fossil skulls discovered during the present investigation (Table 2).

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



Figure 3 Palaeontological reconstruction of a possible scene from the Permian and Early Triassic environments in the study area

- **Dolerite**

Due to its igneous character dolerite will not contain fossils.

- **PRELIMINARY ASSESSMENT RESULTS**

The palaeontological sensitivity was predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity was predicted as very highly significant, due to the potential abundance of Permian to Triassic aged fossils in the Beaufort Group. Dolerite will not contain any significant fossil remains.

- **FIELD INVESTIGATIONS**

Dr Gideon Groenewald, experienced fieldworker, and student assistant Mr Thabiso Mahlambi, visited the site of the proposed upgrading and extension of the L20 Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province on Saturday 8th July 2017. The topography of the area is undulating, albeit falling in the rugged foot slopes of the Drakensberg Escarpment north of Geluksburg, with dolerite sills dominating the middle ground. The general landscape is dominated by gentle crests, steep cliff faces, steep middle slopes and extensive foot slopes ending in a well-defined valley floors, of the local streams and the main rivers of the area. The study area comprises a linear construction and development site cuts the topography and follows the topography where the local roads will cut the streams. The area is mostly overgrown with remains of fire-climax grass species with a very high percentage of increasers indicating extensive grazing by cattle after regular burning of the veld to try and increase the palatability of the grass during the beginning of the growing season. This practice should be discouraged at all cost, but does not form part of the terms of reference for the Palaeontological Impact Assessment. The author will refrain from any further comments regarding this aspect accept commenting that gabions must be constructed in dongas starting to develop in areas underlain by Normandien Formation shale. The neglect of urgent measures to cure the erosion of highly expansive and dispersive soils on this Formation (clearly visible in areas where huge (tens of meters in diameter) sinkholes are busy developing, will lead to extensive tunnelling and sudden development of huge dongas that will be extremely counter-productive in the long term planning of this project.

Field investigation confirmed that excavations for the new development will expose siltstone and sandy mudstone of the Normandien Formation as well as

dolerite, whilst most of the areas underlain by the dolerite will expose deep red clay-rich deposits.





Detailed observations were recorded in the area that will be developed and observations were recorded photographically at specific GPS points (Figure 5&6 and Table 2). Table 2 also provides some photographic evidence of the kind of fossils expected in deep (>1.5m) excavations.











Table 3 Localities of observations of Palaeontological interest associated with the Project





Figure 3 GPS localities of photographic observations in the study area (see Table 2)





Photo	(GPS station) Coordinates	Comments	Photographic Record
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1	(GPS GHGWbzi1) 29° 1.485'S 29° 47.224'E (Not in the study area but close by)	Vertebrate remains in Normandien Formation mudstone close to the study area. Fossils are associated with the Daptocephalus Assemblage Zone (previously known as the Dicynodon Assemblage Zone)	
2	(GPS 17210) 28° 28.654'S 29° 19.374'E	Plant remains of Glossopteris Assemblage in the Normandien Formation, associated with some coal beds	
3	(16010) 28° 30.307'S 29° 26.084'E	Deep soil on crests of plateau formed on mudstone and sandstone of the lower part of the Normandien Formation. Excavations of deeper than 1.5m might expose significant fossils.	
4	(16110) 28° 30.010'S 29° 25.868'E	Deeply weathered mudstone of the Normandien Formation. No fossils observed.	

5	(16210) 28° 29.606'S 29° 24.864'E	Deep soil on mudstone of the Normandien Formation. No fossils observed.	
6	(16310) 28° 29.489'S 29° 23.755'E	Deep Avalon and Hutton soils on weathered sandstone and mudstone of the Normandien Formation. Deep excavation (>1.5m) might expose significant fossils.	
7	(16410) 28° 29.525'S 29° 23.463'E	Deep Clovelly and Avalon soils with no outcrop expected. No fossils observed.	
8	(16510) 28° 29.479'S 29° 22.837'E	Deeply weathered mudstone of the Normandien Formation. No fossils observed. Deep (>1.5m) excavations can expose fossils.	

9	(16610) 28° 29.390'S 29° 22.777'E	Shallow Mispha soils on mudstone and siltstone of the Normandien Formation. No fossils observed during this investigation. Deep (>1.5m) excavation might expose fossils.	
10	(16710) 28° 29.134'S 29° 22.652'E	Shallow Mispha soils on weathered siltstone of the Normandien Formation. No fossils observed during this investigation. Deep (>1.5m) excavation will expose significant fossils.	
11	(16810) 28° 29.058'S 29° 22.623'E	Deep Avalon soils on weathered sandy mudstone of the Normandien Formation. No fossils observed. Fossils expected in deep (>1.5m) excavations.	
12	(16910) 28° 28.836'S 29° 22.477'E	The spectacular setting of the L20 road upgrade development will most probably have a very high impact on Palaeontological Heritage. Excavation for road foundations and other infrastructure that exceeds 1.5m must be subjected to inspection as prescribed in the "Chance Find Protocol".	

13	(17010) 28° 28.805'S 29° 22.440'E	Exposure of sandy mudstone of the Normandien Formation with a very high likelihood of finding plant fossils in deep excavations as indicated at GPS site 17210 above in this table.	
14	(17110) 28° 28.774'S 29° 22.404'E	Exposure of sandy mudstone of the Normandien Formation with a very high likelihood of finding plant fossils in deep excavations as indicated at GPS site 17210 above in this table. This formation is well-known for the high number of fossils belonging to the Daptocephalus Assemblage Zone it contains (see first photograph in this table)	
15	(17210) 28° 28.654'S 29° 19.374'E	Thinly bedded highly Fossiliferous mudstone with thin coal beds in the Normandien Formation. Deep (>1.5m) excavations will expose these coal beds and plant fossils of the Glossopteris Assemblage.	
16	(17310) 28° 28.226'S 29° 19.028'E	Deep sandy Avalon soils on sandstone (Schoondraai Member of Groenewald, 1990) of the Normandien Formation. Deep (>1.5m) excavations will expose fossils of the Daptocephalus Assemblage Zone and fossil trees.	

17	(17410) 28° 28.177'S 29° 19.133'E	Deep sandy Avalon soils on sandstone (Schoondraai Member of Groenewald, 1990) of the Normandien Formation. Deep (>1.5m) excavations will expose fossils of the Daptocephalus Assemblage Zone and fossil trees.	
18	(1752) 28° 27.795'S 29° 19.640'E	Deep sandy Avalon soils on sandstone (Schoondraai Member of Groenewald, 1990) of the Normandien Formation. Deep (>1.5m) excavations will expose fossils of the Daptocephalus Assemblage Zone and fossil trees.	
19	(1761) 28° 27.729'S 29° 19.699'E	Sandstone outcrops of the Schoondraai Member (Groenewald 1990) of the Normandien Formation. Deep (>1.5m) excavation can expose plant fossils and spectacular fossils of trees can be present in this rock formation.	
20	(1771) 28° 28.236'S 29° 18.189'E	Red coloured mudstone of the upper Normandien Formation (Harrismith Member of Groenewald, 1990). This mudstone rich member is the northern equivalent of the Palingkloof Member of the Beaufort Group in the southern part of the Karoo Basin and abundant vertebrate fossils of the Lystrosaurus Assemblage Zone have been described from this unit in the Karoo Basin.	

• PALAEOONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews as well as information gathered during the field investigation (Figure 4).



Figure 4 Palaeontological sensitivity of the rock formations along the upgrade and extension of the L20 road. For colour coding see Table 1

The field investigation confirmed that the study area is underlain by deeply weathered sediments of the Normandien Formation as well as deeply weathered dolerite.

The excavations for the construction of the infrastructure for this development can expose some sediments of Very Highly sensitive geological formations and some sites revealed some moderately preserved remains of plant fossils. A small part of the excavation might expose expected dolerite that will not contain any fossils.

• CONCLUSION

The development site for the proposed upgrading and extension of the L20 Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by Permian to Triassic aged sedimentary rocks of the Normandien Formation of the Beaufort Group and Jurassic aged igneous dolerite of the Drakensberg Group, Karoo Supergroup.

Significant trace, plant and vertebrate fossils were observed during the field investigation in areas associated with the development of the road. The potential

for finding significant fossils in any excavation into sediments of the Normandien and Formation is Very High. Significant new fossils were observed during the field assessment (Table 2). If fossils are observed during construction, the HIA consultant must be notified and the fossils collected by a suitably qualified palaeontologist. No fossils will be associated with areas underlain by dolerite.

It is recommended that:

The EAP and ECO must be informed of the fact that a Very High Palaeontological sensitivity is retained for the sections of the development that is underlain by shale and sandstone of the Normandien Formation. Although highly weathered, fossils might be recorded during the initial phase of construction.

A Professional Palaeontologist must be appointed to inspect the site during the on-going weeks of excavation for the infrastructure and a “Chance Find Protocol” document (CFP, included with this report) must be updated on a monthly basis. If fossils are recorded, a suitably qualified palaeontologist must be appointed to inspect all areas where excavation of deeper than 1,5m is made into sediments of Normandien Formation and a protocol for the chance find of fossils must then be developed and discussed with the contractor on site.

These recommendations must be included in the EMP of this project.

- **CHANCE FIND PROTOCOL FOR PALAEONTOLOGICAL HERITAGE**

- **Mitigation for Excavation Impact on Palaeontological Heritage Resources**

It is essential that the appointed palaeontologist, in consultation with the Project Manager of the excavation works, develop a short-term strategy for the recovery of significant fossils during the excavation operation. As part of such a strategy, the discussions with the palaeontologist must include:

- Initially, and at least for the *duration of excavation*, visits to the site at least once, to ensure recording of all potentially significant fossil strata.
- Determine a short-term strategy and budget for the recording of significant fossils. This Strategy is simply an oral agreement on when the site is to be inspected and what the finds are that might be recorded. The site visit must include an introduction session with all the managers of the Project Team, including training of the ECO and site managers by the appointed palaeontologist, to basically train people to know what to look out for in terms of fossil heritage on site.
- In the case of any unusual structures, the Palaeontologist must be notified, and a site visit must be arranged at the earliest possible time with the Palaeontologist. In the case of the ECO or the Site Manager becoming aware of suspicious looking material that might be a “Significant Find”, the construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues. Significant finds were recorded during the first site inspection (Phase 1 PIA, 8 July 2017 by GH Groenewald).

Mitigation Measures Normally Encountered

1. Mitigation of palaeontological material must begin as soon as possible and preferably when “trial excavation” takes place. The appointed specialists must acquaint themselves with the operation and determine feasible mitigation strategies.

2. A plan for systematic sampling, recording, preliminary sorting and storage of palaeontological and sedimentological samples will be developed during the early stages of the project, in collaboration with the Evolutionary Studies Institute (ESI) at WITS University, which is the closest Institute to the site. If appropriate, the University of KwaZulu-Natal might be asked for their involvement in this project.

3. Mitigation will involve an attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be

processed (sorted, sub-sampled, labelled, boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

Functional responsibilities of the Developer/Implementing Agent

1. Ensuring, at their cost, that a representative archive of palaeontological samples and other records is assembled to characterise the palaeontological occurrences affected by the excavation operation.

2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas. In the case of this project it is foreseen that vertebrate and plant fossils will be present. *(If trace fossils of Permian age are exposed, it will be very Highly significant and the Palaeontologist will obviously be in close communication with the ECO to act as required by AMAFA/SAHRA without causing undue standing time for the contractors).*

3. “Facilitate” systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by allowing time to describe and measure geological sections, and by providing aid in the surveying of positions where significant fossils are found. *(In the case of this specific development, the likelihood of such finds is very high).*

4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as “normal” fossil finds.

5. Provide covered, dry storage for samples and facilities that is defined as a work area for sorting, labelling and boxing/bagging of samples.

6. Costs of basic curation and storage in the sample archive at the ESI, WITS University (labels, boxes, shelving and, if necessary, specifically-tasked temporary employees).

Documentary record of palaeontological occurrences

1. The contractor will in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which the following information is indicated on the plan in the site office at the excavation site. This must be done in conjunction with the appointed specialist and form part of the on-going revision of the EMPr during the excavation stage of the project:

1.1. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period

1.2 Locations of samples and measured sections are to be pegged, and routinely accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any significant fossils are recorded during the time of excavation. Highly significant information were recorded during the first

site visit and a clearance from the Palaeontologist must be obtained during the site visits as agreed in an upgraded “Chance Find Protocol” during the life time of the excavation phase for this project. The main mode of communication will be e-mail communications.

Functional responsibilities of the appointed Palaeontologist

1. Establishment of a representative collection of fossils and a contextual archive of appropriately documented and sampled palaeoenvironmental and sedimentological geodata in collaboration with the ESI at WITS University and/or The University of KwaZulu-Natal.

2. Undertake an initial evaluation of potentially affected areas and of available exposures in excavations. A short training session of the ECO, or a representative must be arranged with the first site visit to this project.

3. On the basis of the above, and evaluation during the early stages of excavation development, in collaboration with the contractor management team, more detailed practical strategies to deal with the fossils encountered routinely during excavation, as well as the strategies for major finds must briefly be agreed on.

4. Informal on-site training in responses applicable to “normal” fossil finds must be provided for the ECO and environmental staff by the appointed specialist. This step is needed, due to the discovery of significant fossils at the time of the Phase 1 PIA site visit on 8 July 2017.

5. Respond to significant finds and undertake appropriate mitigation.

6. Initially, for the first three months of operation, and only if the ECO indicates significant “strange looking rocks” that might be similar to the fossils indicated to the staff during the information session on the first, visit at least once in two weeks to “touch base” with the monitoring progress. Document interim “normal” finds and undertake an inspection and documentation of new excavation faces. A strategy for further visits during the life of the excavation must be discussed.

7. Transport of material from the site to the ESI, WITS University or the allocated Institution as per AMAFA permit instruction.

8. Reporting on the significance of discoveries, as far as can be preliminarily ascertained. This report is in the public domain and copies of the report must be deposited at ESI, ULZN, AMAFA and the South African Heritage Resources Authority (SAHRA). It must fulfil the reporting standards and data requirements of these bodies.

9. Reasonable participation in publicity and public involvement associated with palaeontological discoveries.

Exposure of palaeontological material

1. In the event of construction exposing new palaeontological material, not regarded as normative/routine as outlined in the initial investigation, such as a major fossil find, the following procedure must be adhered to:

1.1 The appointed specialist or alternates (AMAFA; SAHRA; ESI WITS University, University of KZN) must be notified by the responsible officer (e.g. the ECO or contractor manager), of major or unusual discoveries during excavation, found by the Contractor Staff.

1.2 Should a major *in situ* occurrence be exposed, excavation will immediately cease in that area so that the discovery is not disturbed or altered in any way until the appointed specialist or scientists from the ESI at WITS University, or its designated representatives, have had reasonable opportunity to investigate the find. Such work will be at the expense of the Developer/Implementing Agency.

Significant fossils were observed during the first site visit (Phase 1 PIA of 8 July 2017) and the palaeontologist will only be able to clear the continued excavation on the proviso that the ECO is informed of the expected fossil finds. The ECO must then report all suspicious material to the Palaeontologist via e-mailed photographic information.

• CONCLUSION

The development site for the proposed upgrading and extension of the L20 Road, Okhahlamba Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province, falls on Very Highly significant shale and thin bands of sedimentary rocks (Normandien Formation) No fossils are expected in the dolerite.

Fossils were recorded during the first site studies in these rock formations. The potential for finding significant micro-fossils mostly as trace, plant or vertebrate fossils, in any excavation into sediments of the Normandien Formation, is always extremely high and the cooperation of the entire team at the site is of critical importance. The interest and cooperation of the management team will be highly appreciated and it is essential that the excavation be monitored during the first week of excavation and that this "Chance Find Protocol" be updated on a monthly bases during the life-time of the excavation period for the project. It is essential that the Palaeontologist be notified of the final sign-off of the project date, for final posting of the "Chance Find Protocol" on the SAHRIS Website for record purposes. No fossils will be associated with areas underlain by dolerite.

It is recommended that:

The EAP and ECO must be informed of the fact that a Very High Palaeontological Sensitivity was allocated to the greater part of the development and due to the highly weathered nature of the material, significant fossils is expected after the start of excavations for foundations.

The allocated team members at the community must be introduced to Palaeontological material that is likely to be found on site. A once-off information session with the Palaeontological specialist must be arranged, to present a simple and understandable (preferably audio-visual presentation in an “interpreted voice”) of the majority of the contractual workers on site during the initial site visit that must form part of the EMPr for the project.

This “Chance Find Protocol” must be included into the EMPr of the project and a reasonable budget must be allocated to ensure compliance with the legal responsibility of the developer in terms of the proper conservation of and storage of Palaeontological Heritage.

The AMAFA and SAHRA must be informed of the content of this “Chance Find Protocol” and EMPr arrangements by the EAP or the developer, for final approval of the ROD documentation during the EIA process.

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- **QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR**

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and 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).

- **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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