FIRST PHASE CULTURAL HERITAGE IMPACT ASSESSMENT OF THE PROPOSED UPGRADE OF THE EXISTING GOMOLA MUD TRACK (L3299) TO A TYPE 7A GRAVEL ROAD, WITH ASSOCIATED STRUCTURES, ALONG THE ROUTE NEAR LADYSMITH, KWAZULU-NATAL.

For: Hanslab (Pty) Ltd

Frans E Prins, MA (Archaeology)
P.O. Box 947
Howick
3290

06/08/2017

Cell: 0834739657
E-mail: activeheritage@gmail.com
Fax: 0867636380

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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 upgrade of the Gomola Road near Ladysmith, KwaZulu-Natal identified no heritage sites on the footprint. There is no reason from a heritage perspective why the development may not proceed as planned. The area is also not part of any known cultural landscape. However, 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 or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

The Paleontological study reports that no significant fossils are expected before deep excavation (>1.5m) are done, but if fossils are recorded during excavations, it 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 High Palaeontological Sensitivity is allocated to the study area underlain by the Volksrust Formation. A Phase 1 PIA document is recommended if fossils are recorded during the initial excavations for foundations deeper than 1.5m.
- Dolerite will not contain fossils, but from recent work in the area, the author is convinced of the presence of sediments of the Masotcheni Formation, that can contain highly significant fossils.
- If fossils are recorded, a revised "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.

1 BACKGROUND INFORMATION ON THE PROJECT

The consultant was approached by Hanslab (Pty) Ltd to conduct a heritage impact assessment (HIA) of the existing Gomola Road near Ladysmith. 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 for Hanslab (Pty) Ltd
Type of development:	The KZN Department of Transport (DOT) proposes to upgrade the existing Gomola mud track (Figs 4 & 5) to a type 7A gravel road. The upgraded local road will be approximately 1.1km in length, 6 m width and 20 m road reserve which conforms to DOT standards for a local road upgrades. The upgrade will take place in the Driefontein area in Ladysmith under the Alfred Duma Local Municipality, administered by the UThukela District Municipality. The upgrade of the track will allow for improved access to dwellings and schools in the vicinity of the area, whilst minimizing erosion and surface run-off along the track as a result of poor storm water management. The mud track transverses a water crossings/drainage line, therefore the applicant proposes to construct a pipe culvert structure within the crossing point to allow for the natural flow of water within the channel.
Rezoning or subdivision:	Rezoning
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:

The upgrade will take place in the Driefontein area in Ladysmith under the Alfred Duma Local Municipality, administered by the UThukela District Municipality (Figs 1 & 2). The GPS coordinates for the proposed road upgrade are:

Start: S 28°21´50.19˝ E 29°44´24.74˝
End: S 28°21´50.19˝ E 29°43´57.41˝

The upgrade of the track will allow for improved access to dwellings, while minimizing erosion and surface run-off along the track as a result of poor storm water management. The proposed upgrade of the mud track traverses a watercourse (channel1) which necessitates the need for an appropriate structure to be constructed at the existing

crossing point. The GPS coordinates for the existing crossing point are: 28°21'44.82" S 29°44'6.06" E (Fig 2).

2 BACKGROUND TO ARCHAEOLOGICAL HISTORY OF AREA

Portions of the greater Ladysmith area have been systematically surveyed for archaeological heritage sites in the past. These were mostly conducted by archaeologists attached to the KwaZulu-Natal Museum as well as by Amafa staff. Sixty one sites are recorded in the data base of the KwaZulu-Natal Museum. These include five Early Stone Age sites, five Middle Stone Age sites, six Later Stone Age sites, three rock art sites (two rock paintings and one rock engraving), and eleven Later Iron Age sites and twenty historical period Nguni homesteads. The majority of the Later Iron Age and historical period Nguni homesteads are demarcated by characteristic stone walling. Stone walling and graves related to the Anglo-Boer War period of 1899-1901 are also abundant in the area. Ten sites are recorded in the Natal Museum data base but many more sites belonging to this period should occur in the greater Ladysmith area. The project area has not been systematically surveyed in the past and no heritage sites are known from the footprint. However, various Later Iron Age sites occur approximately 10km to the east, west and south of the study area (Fig 3).

The San were the owners of the land for almost 30 000 years but the local demography started to change soon after 2000 years ago when the first Bantu-speaking farmers crossed the Limpopo River and arrived in South Africa. Around 800 years ago, if not earlier, Bantu-speaking farmers also settled in the greater Ladysmith area. Although some of the sites constructed by these African farmers consisted of stone walling not all of them were made from stone. Sites located elsewhere in the KwaZulu-Natal Midlands show that many settlements just consisted of wattle and daub structures. These Later Iron Age sites were most probably inhabited by Nguni-speaking groups such as the amaBhele and others (Bryant 1965). However, by 1820 the original African farmers were dispersed from this area due to the expansionistic policies of the Zulu Kingdom of King Shaka. Many individuals of former chiefdoms in the area became bandits and oral tradition suggests that cannibalism may also have been practised by some of these groups. African refugee groups and individuals were given permission to settle in the area by the British colonial authorities after 1845 where most of them became farm labourers. After the Anglo-Zulu

war of 1879 and the Bambatha Rebellion of 1911 many of the African people in the study area adopted a Zulu ethnic identity.

European settlement of the area started soon after 1838 when the first Voortrekker settlers marked out large farms in the area. However, most of these farms were abandoned in the 1840's when Natal became a British colony only to be reoccupied again by British immigrants. Nevertheless, a group of Dutch farmers declared an independent republic in 1847 on the banks of the Klip River and called it the Klip River Republic with Andries Spies as commandant. This pocket republic only survived for a few months before British authority over the area was declared. The British planned a town as an administrative centre for the Klip River District, proclaiming it on 20 June 1850 and called it Ladysmith. Ladysmith became world famous during the Anglo-Boer War of 1899-1901 when it was besieged by Boers from 2 November 1899 until 28 February 1900. Ghandi, Smuts and Churchill are figures of international significance who were also present during the siege of Ladysmith. During the 118 day long siege the stone Town Hall sustained considerable damage. It has since been restored to the original vision of the architects. Located next to the Town Hall the building housing the Siege Museum was erected in 1884. It was used as a rations post for civilians. The Museum displays relics from the time of the siege, including documents, uniforms and firearms. Several of the most celebrated battles of the war were fought around Ladysmith. These include the Battles of Elandslaagte, Spionkop, Wagon Hill, Caesars Camp, Lombards Kop and Umbulwana Hill. These battle field sites as well as associated graves and buildings of the era are proclaimed heritage sites and are protected by provincial heritage legislation (Derwent 2006).

2.1 Short History of the Siege of Ladysmith

As war with the Boer republics appeared likely in June 1899, the War Office in Britain dispatched a total of 15,000 troops to Natal, expecting that if war broke out they would be capable of defending the colony until reinforcements could be mobilized and sent to South Africa by steamship. Some of these troops were diverted while returning to Britain from India, others were sent from garrisons in the Mediterranean and elsewhere. Lieutenant General Sir George White was appointed to command this enlarged force. White was 64 years old and suffered from a leg injury incurred in a riding accident. Having served mainly in India, he had little previous experience of South Africa.

Contrary to the advice of several British officials such as Sir Alfred Milner, the High Commissioner for Southern Africa, the Boer governments were not over-awed by the despatch of British troops to Natal. Instead, they regarded it as evidence of Britain's determination to seize control of the Boer republics. The Transvaal government under President Paul Kruger considered launching an attack in September, but President Steyn of the Orange Free State, who would later become the spiritual heart of the Boer resistance, dissuaded them for several weeks while he tried to act as intermediary. With the complete breakdown in negotiations, both republics declared war and attacked on 12 October.

A total of 21,000 Boers advanced into Natal from all sides. White had been advised to deploy his force far back, well clear of the area of northern Natal known as the "Natal Triangle", a wedge of land lying between the two Boer republics. Instead, White deployed his forces around the garrison town of Ladysmith, with a detachment even further forward at Dundee. The entire British force could concentrate only after fighting two battles at Talana Hill and Elandslaagte. As the Boers surrounded Ladysmith, White ordered a sortie by his entire force to capture the Boer artillery. The result was the disastrous Battle of Ladysmith, in which the British were driven back into the town having lost 1,200 men killed, wounded or captured.

The Boers then proceeded to surround Ladysmith and cut the railway link to Durban. Major General French and his Chief of Staff, Major Douglas Haig escaped on the last train to leave, which was riddled with bullets. The town was then besieged for 118 days. White knew that large reinforcements were arriving, and could communicate with British units south of the Tugela River by searchlight and heliograph. He expected relief soon. Meanwhile, his troops carried out several raids and sorties to sabotage Boer artillery.

Louis Botha commanded the Boer detachment which first raided Southern Natal, and then dug in north of the Tugela to hold off the relief force. On 15 December, the first relief attempt was defeated at the Battle of Colenso. Temporarily unnerved, the relief force commander, General Redvers Henry Buller, suggested that White either break out or destroy his stores and ammunition and surrender. White could not break out because his horses and draught animals were weak from lack of grazing and forage, but also refused to surrender.

On Christmas Day 1899, the Boers fired into Ladysmith a carrier shell without fuse, which contained a Christmas pudding, two Union Flags and the message "compliments of the season". The shell is still kept in the museum at Ladysmith. A drive around Ladysmith and the surrounding hills will reveal many gravesites and memorials to the fallen soldiers on both sides (Lewis 1999).

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. In addition, the archaeological database of the KwaZulu-Natal Museum was consulted. Although the greater Ladysmith area is rich in archaeological and heritage sites none are listed for the footprint.

The study area was visited on the 11 May 2017. A ground survey following standard and accepted archaeological procedures was conducted. A transect of 50m on either side of the centre of the existing mud track was surveyed.

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 heritage sites have 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
Town: Ladysmith
Municipality: Alfred Duma Local Municipality

4.2 Description of the general area surveyed

Although the greater Ladysmith area is rich in archaeological and other heritage sites none were recorded on the actual footprint. Historical period sites relating to the Voortrekker era (1830's), Anglo-Zulu War (1879) and the Anglo-Boer War period of 1899-1901 do occur abundantly in the greater Ladysmith area but none of those listed on national and provincial data bases occur less than 10km from the footprint (Fig 3). Particular care was taken to locate grave sites but none are situated closer than 50m to the proposed road upgrade (Fig 6). The proposed road upgrade is also not part of any known cultural landscape (Table 2).

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 on footprint but greater area contains many sites
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 upgrade of the existing Gomola Road may proceed from a heritage perspective as no heritage and/or archaeological sites are threatened by the proposed development. The footprint is also not part of any known cultural landscape. 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.

7 MAPS AND PHOTOGRAPHS

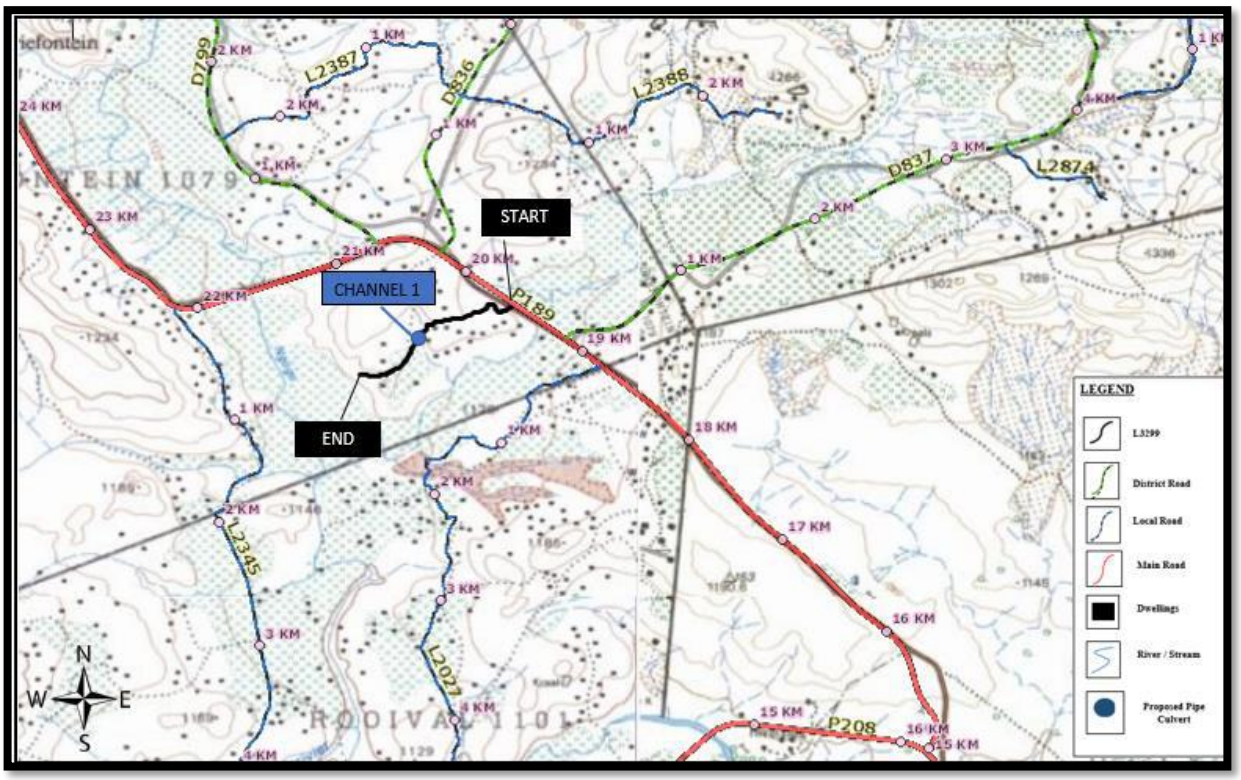

Figure 1. Locality Map of the Project Area (Source: Hanslab).

Figure 2. Map of the proposed route (Source: Hanslab).

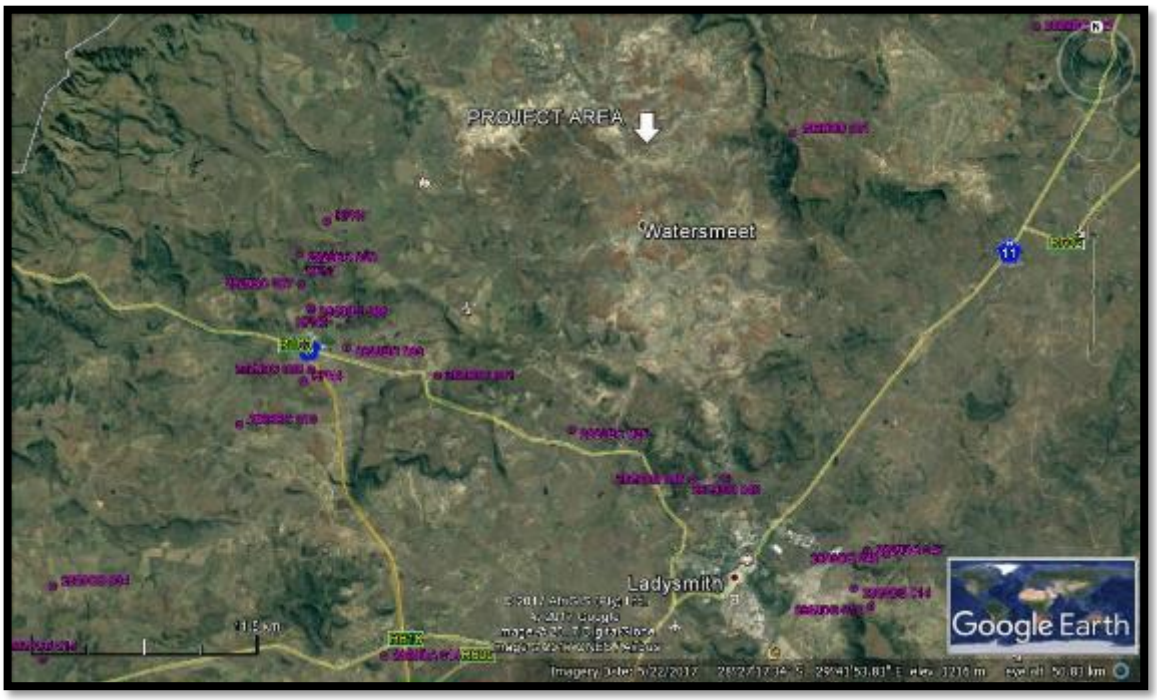

Figure 3. Distribution of known archaeological sites (purple polygons) in the greater area.

Figure 4. View of the existing Gomola Road. No heritage sites occur adjacent to the track.

Figure 4. The existing Gomola Road.

Figure 5. Although some contemporary homesteads are situated adjacent to the proposed road upgrade the consultant did not locate any associated graves within 50m from the footprint.

9 REFERENCES

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APPENDIX 1

DESKTOP PALAEONTOLOGICAL ASSESSMENT AND "CHANCE FIND PROTOCOL" FOR THE PROPOSED UPGRADING AND EXTENSION OF THE L3299 (GOMOLA) ROAD, EMNAMBITHI/LADYSMITH LOCAL MUNICIPALITY, UTHUKELA DISTRICT MUNICIPALITY, KWAZULU-NATAL PROVINCE.

FOR

Active Heritage

DATE: 8 August 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 L3299 (Gomola) Road, Emnambithi/Ladysmith Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province.

10.1.1 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 to palaeontological heritage within the development footprint.

The development site applicable to the application for the proposed Upgrading and Extension of the L3299 (Gomola) Road, Emnambithi/Ladysmith Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by shales of the Volksrust Formation, Ecca Group and dolerite of the Karoo Supergroup.

No significant fossils are expected before deep excavation (>1.5m) are done, but if fossils are recorded during excavations, it 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 High Palaeontological Sensitivity is allocated to the study area underlain by the Volksrust Formation. A Phase 1 PIA document is recommended if fossils are recorded during the initial excavations for foundations deeper than 1.5m.
- Dolerite will not contain fossils, but from recent work in the area, the author is convinced of the presence of sediments of the Masotcheni Formation, that can contain highly significant fossils.
- If fossils are recorded, a revised "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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11 CHANCE FIND PROTOCOL FOR PALAEONTOLOGICAL HERITAGE

It is essential that the appointed palaeontologist, in consultation with the Project Manager of the excavation works and L3299 (Gomola) Road Projects, develop a short-term strategy for the recovery of significant fossils during the excavation operation.

The development site for the proposed Upgrading and Extension of the L3299 (Gomola) Road, Emnambithi/Ladysmith Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by shales of the Volksrust Formation, Ecca Group and dolerite of the Karoo Supergroup with Highly sensitive sediments, that might contain significant fossils. No fossils are expected in the dolerite, but the "Chance Find" of fossils in overburden, called the Masotcheni Formation is high.

Fossils were recorded during the first site studies in these rock formations. The potential for finding significant micro-fossils mostly as trace or vertebrate fossils, in any excavation into sediments of the Volksrust Formation, is always high and the cooperation of the entire team at Gomola Road Upgrading 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, but significant Quaternary aged fossils can be present in the alluvial cover on these geological formations.

It is recommended that:

- The EAP and ECO must be informed of the fact that a High Palaeontological Sensitivity was allocated to a small part of the development and due to the highly weathered nature of the material, significant fossils is only expected after the start of excavations for road 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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13 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 L3299 (Gomola) Road, Emnambithi/Ladysmith Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province (Figure 1).

13.1.1 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 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.

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

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

Scope and Limitations of the Desktop Study

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

The key assumption for this scoping study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs alone, without ground-truthing. There is also an inadequate database for fossil heritage for much of the RSA, due to the small number of professional palaeontologists carrying out fieldwork in RSA and the Kingdom of Lesotho. Most development study areas have never been surveyed by a palaeontologist.

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

- an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by weathering, or are

buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium etc.).

13.1.3 Locality and Proposed Development

The L3299 Gomola Road Development is situated to the north of Ladysmith in the rural parts of KwaZulu-Natal. The development falls in undulation terrain underlain by clayey soils of mainly weathered Volksrust Formation shale and dolerite.

Figure 1 Locality of the Gomola Road upgrade project

14 GEOLOGY

The site of the development falls mainly on Permian aged shale of the Volksrust Formation and a very large section underlain by Jurassic dolerite (Figure 2).

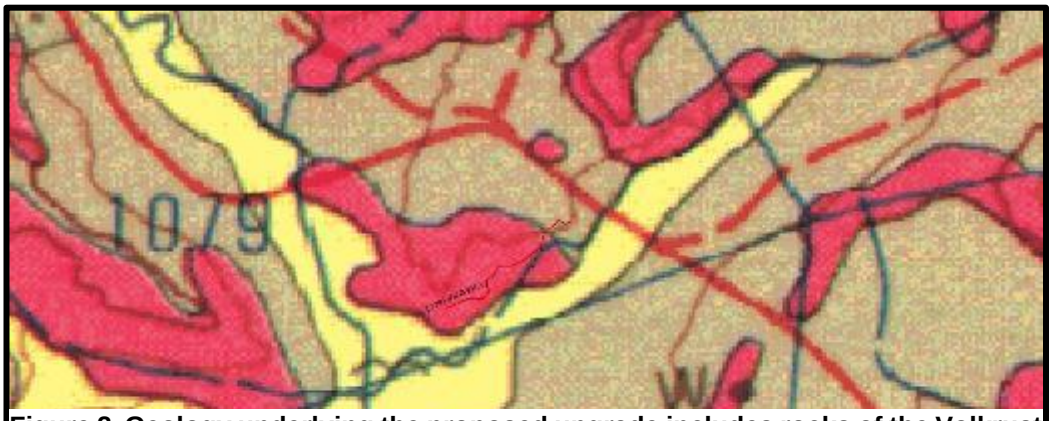

Figure 2 Geology underlying the proposed upgrade includes rocks of the Volkrust Formation (grey) and dolerite (pink). Site indicated as a thin red line on the map

15 KAROO SUPERGROUP

15.1 Ecca Group, Voksrust Formation

During the migration of Gondwanaland to the towards the equator, thick clay and silt beds were laid down in a large sea that occupied the Karoo Basin, leading to the deposition of the **Ecca Group**. The upper part of the Ecca Group, comprises a thick unit of marine shale. The sediments, deposited in deep water 250 million years ago, are present as dark coloured Permian aged shales of the **Volksrust Formation**. The shales are easily weathered and often present slope stability problems (Johnson et al, 2009). Only a minor part of the development falls on this rock group (Figure 2).

15.2 Dolerite

A very large part of the study area falls on Jurassic aged dolerite (Figure 2) which was intruded into the Karoo Basin area during the breaking up of Gondwanaland.

16 PALAEONTOLOGY

17 KAROO SUPERGROUP

17.1.1 Ecca Group, Volksrust Formation

Vertebrate fossils are generally absent from the Voksrust Formation but trace fossils and unique invertebrate fossils have been recorded from the upper layers of the Voksrust Formation by several authors (Groenewald, 2012).

The bivalve *Megadesmus* is described from the Late Permian Volksrust Shale Formation in the north-eastern Karoo Basin, South Africa (Groenewald 2012). This is the first reported discovery of this genus in Africa. The fossil is large, 9 cm dorsally and 8.4 cm laterally, and both valves are articulated indicating minimum transport after death. The bivalve was encased in interbedded siltstone-shale that constitutes the distal sediments of a prograding delta at the Beaufort –Ecca Group boundary. *Megadesmus* is known from other continents (Australia, India, Siberia, South America and Tasmania) where its presence indicates exclusively marine conditions. The implication for the northeastern Karoo Basin during the Late Permian is that a marine enclave still existed in this geographic area and that terrestrial conditions did not yet prevail as in the southern basin region (Groenewald, 2012).

Due to the deep weathering of rocks in the study area, fossils will only exposed in excavations that exceeds 1.5m.

17.1.2 Karoo Dolerite

Due to its igneous character, Jurassic aged dolerite will not contain fossils. The dolerite indicated on the geological map (2828 Harrismith) might however, be overlain by sediments of the Quaternary aged Masotcheni Formation (now described for much wider spread areas in KZN). Very Highly significant vertebrate fossil remains have now been described from this, previously understudied, formation. The areas underlain by dolerite according to the geological map must therefor be inspected by a suitably qualified geologist to confirm the absence of these sediments in are shown as “dolerite” on the geological maps.

18 PALAEONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews as well as information gathered during the desktop investigation. The desktop investigation confirms that the study area is underlain by relatively deep (>2m) clay soil associated with the Pietermaritzburg Formation and dolerite.

The excavations for the construction of the infrastructure for this development might expose some important shale deposits. Due to the deep weathering it is highly unlikely that any trace fossils will be exposed before deep (>1.5m) excavations into the Volksrust Formation (Figure 4). No fossils will be present in areas underlain by dolerite.

Recording of fossils will contribute significantly to our understanding of previous eco-systems. A Phase 1 PIA, by a suitably qualified palaeontologist, is only recommended if trace fossils are recorded during the initial excavation of trenches into the Volksrust Formation. The "Chance Find Protocol that included in this document and its findings, 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. A site visit to confirm the assumption of this Desktop PIA will be done within the next week or two, but the EAP and HIA specialist can propose immediate implementation of the project (construction can proceed immediately as from 8 August 2017), because the palaeontologist need to vist the site only after exposure of some shale to confirm the fact that trace fossils will be exposed. If the "Chance Find Protocol" (CFP, included into this Desktop Survey) is adhered to, there is no need to delay implementation of the project.

Figure 4 Palaeontological sensitivity of the Gomola Road study area indicates a short area of high sensitivity and most of the area underlain by dolerite. For explanation of colour coding see Table 1.

19 CONCLUSION

The development site applicable to the application for the proposed Upgrading and Extension of the L3299 (Gomola) Road, Emnambithi/Ladysmith Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by shales of the Volksrust Formation, Ecca Group and dolerite of the Karoo Supergroup.

No significant fossils are expected before deep excavation (>1.5m) are done, but if fossils are recorded during excavations, it 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 High Palaeontological Sensitivity is allocated to the study area underlain by the Volksrust Formation. A Phase 1 PIA document is recommended if fossils are recorded during the initial excavations for foundations deeper than 1.5m.
- Dolerite will not contain fossils, but from recent work in the area, the author is convinced of the presence of sediments of the Masotcheni Formation, that can contain highly significant fossils.
- If fossils are recorded, a revised "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.

20 CHANCE FIND PROTOCOL FOR PALAEONTOLOGICAL HERITAGE

20.1 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 and L3299 (Gomola) Road Projects, 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).

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 Implementing Authority

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 relatively high for only a very short distance of the new road upgrade).*

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, made the excavation plan available to the appointed specialist, in which the following information must be 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. If such information are recorded during the first site visit, a clearance from the Palaeontologist must be issued. The clearance will be followed up with subsequent 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.

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, was included in this budget for 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 potential discovery of significant fossils.
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, 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.
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, 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.

21 CONCLUSION

The development site for the proposed Upgrading and Extension of the L3299 (Gomola) Road, Emnambithi/Ladysmith Local Municipality, Uthukela District Municipality, Kwazulu-Natal Province is underlain by shales of the Volksrust Formation, Ecca Group and dolerite of the Karoo Supergroup with Highly sensitive sediments, that might contain significant fossils. No fossils are expected in the dolerite, but the "Chance Find" of fossils in overburden, called the Masotcheni Formation is high.

Fossils were recorded during the first site studies in these rock formations. The potential for finding significant micro-fossils mostly as trace or vertebrate fossils, in any excavation

into sediments of the Volksrust Formation, is always high and the cooperation of the entire team at Gomola Road Upgrading 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, but significant Quaternary aged fossils can be present in the alluvial cover on these geological formations.

It is recommended that:

- The EAP and ECO must be informed of the fact that a High Palaeontological Sensitivity was allocated to a small part of the development and due to the highly weathered nature of the material, significant fossils is only expected after the start of excavations for road 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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23 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).

24 DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

Dr Gideon Groenewald
Geologist