Proposed development of the Maphutha – Witkop 400KV powerline within the Sekhukhune and Capricorn District Municipalities, Limpopo Province

DESKTOP STUDY
PALAEONTOLOGY

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11 November 2018

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1. Executive Summary

The study area covers an extensive area that transects several different geological regions each with different palaeontological characteristics. Part of the proposed lines also cross the Bushveld Complex that is of no palaeontological concern.

Although no fossils have been reported from the study area most of the sedimentary rocks (Wolkberg Group, Malmani Subgroup, Black Reef Formation, Pretoria Group, Clarens Formation) and Quaternary sediments are potentially fossiliferous.

A palaeontologist should be appointed to do a pre-construction surface survey along the chosen route where it traverses the rocks of Malmani Subgroup. A second visit is also necessary after construction has begun so that the exposed bedrock of the Malmani Subgroup is surveyed as well.

The ECO should take responsibility of monitoring the excavations. If a significant find is made the procedure stipulated under Procedure for Chance Palaeontological Finds (p.16) should be followed, which includes the safeguarding of the exposed fossils and the contacting of a palaeontologist for further advice.

The Red Line is preferable to the Blue Line if it is imperative for the developers to minimize the impact of development on the palaeontological heritage. This is mainly due to the extent of the area that transects the dolomites of the Malmani Subgroup that has a Very High Palaeosensivity.

2. Introduction

The palaeontological heritage of South Africa is unsurpassed and can only be described in superlatives. The South African palaeontological record gives us insight in *i.a.* the origin of life, dinosaurs and humans. Fossils are also used to identify rock strata and determine the geological context of the geological formations and the chronostratigraphy of Southern Africa.

Some of the oldest evidence of life on Earth came from the rocks at Barberton which contain fossilized bacteria. Stromatolites in the dolomitic regions in South Africa were formed by shallow marine mats of cyanobacteria. The cyanobacteria, which were some of the first photosynthesising organisms, provided most of the oxygen in our atmosphere.

The first evidence of tectonic plate movement was discovered after studying the distribution of Karoo-age fossils in South Africa and other continents and subcontinents such as India, Antarctica, South America and Australia. Fossils are also used to study evolutionary relationships, sedimentary processes and palaeoenvironments.

South Africa is probably best known palaeontologically for having more than half of all the hominin specimens in the world, the greatest variety of hominins in a country and the longest record of continuous hominin occupation in the world.

The Heritage Act of South Africa stipulates that fossils and fossil sites may not be altered or destroyed. The purpose of this document is to detail the probability of finding fossils in the study area which may be impacted by the proposed development.

3. Terms of reference for the report

According to the South African Heritage Resources Act (Act 25 of 1999) (Republic of South Africa, 1999), certain clauses are relevant to palaeontological aspects for a terrain suitability assessment.

- **Subsection 35(4)** No person may, without a permit issued by the responsible heritage resources authority-
- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- (c) trade in, sell for private gain, export or attempt to export from the republic any category of archaeological or palaeontological material or object, or any meteorite; or
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist with the detection or recovery of metals or archaeological material or objects, or use such equipment for the recovery of meteorites.
- **Subsection 35(5)** When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedures in terms of section 38 has been followed, it may-
- (a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
- (b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
- (c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
- (d) recover the costs of such investigation form the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

South Africa’s unique and non-renewable palaeontological heritage is protected in terms of the NHRA. According to this act, heritage resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

As areas are developed and landscapes are modified, heritage resources, including palaeontological resources, are threatened. As such, both the environmental and heritage legislation require that development activities must be preceded by an assessment of the impact undertaken by qualified professionals. Palaeontological Impact Assessments (PIAs) are specialist reports that form part of the wider heritage component of:

- Heritage Impact Assessments (HIAs) called for in terms of Section 38 of the National Heritage Resources Act, Act No. 25, 1999 by a heritage resources authority.
- Environmental Impact Assessment process as required in terms of other legislation listed in s. 38(8) of NHRA;
- Environmental Management Plans (EMPs) required by the Department of Mineral Resources.

HIAs are intended to ensure that all heritage resources are protected, and where it is not possible to preserve them in situ, appropriate mitigation measures are applied. An HIA is a comprehensive study that comprises a palaeontological, archaeological, built environment, living heritage, etc specialist studies. Palaeontologists must acknowledge this and ensure that they collaborate with other heritage practitioners. Where palaeontologists are engaged for the entire HIA, they must refer heritage components for which they do not have expertise on to appropriate specialists. Where they are engaged specifically for the palaeontology, they must draw the attention of environmental consultants and developers to the need for assessment of other aspects of heritage. In this sense, Palaeontological Impact Assessments that are part of Heritage Impact Assessments are similar to specialist reports that form part of the EIA reports. The standards and procedures discussed here are therefore meant to guide the conduct of PIAs and specialists undertaking such studies must adhere to them. The process of assessment for the palaeontological (PIA) specialist components of heritage impact assessments, involves:

Scoping stage in line with regulation 28 of the National Environmental Management Act (No. 107 of 1998) Regulations on Environmental Impact Assessment. This involves an **initial assessment** where the specialist evaluates the scope of the project (based, for example, on NID/BIDs) and advises on the form and extent of the assessment process. At this stage the palaeontologist may also decide to compile a **Letter of Recommendation for Exemption from further Palaeontological Studies**. This letter will state that there is little or no likelihood that any significant fossil resources will be impacted by the development. This letter should present a reasoned case for exemption, supported by consultation of the relevant geological maps and key literature.

A **Palaeontological Desktop Study** – the palaeontologist will investigate available resources (geological maps, scientific literature, previous impact assessment reports, institutional fossil collections, satellite images or aerial photos

, etc) to inform an assessment of fossil heritage and/or exposure of potentially fossiliferous rocks within the study area. A Desktop studies will conclude whether a further field assessment is warranted or not. Where further studies are required, the desktop study would normally be an integral part of a field assessment of relevant palaeontological resources.

A **Phase 1 Palaeontological Impact Assessment** is generally warranted where rock units of high palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large-scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed project area is unknown. In the recommendations of Phase 1, the specialist will inform whether further monitoring and mitigation are necessary. The Phase 1 should identify the rock units and significant fossil heritage resources present, or by inference likely to be present, within the study area, assess the palaeontological significance of these rock units, fossil sites or other fossil heritage, comment on the impact of the development on palaeontological heritage resources and make recommendations for their mitigation or conservation, or for any further specialist studies that are required in order to adequately assess the nature, distribution and conservation value of palaeontological resources within the study area.

A **Phase 2 Palaeontological Mitigation** involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or the recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before Phase 2 may be implemented.

A **‘Phase 3’ Palaeontological Site Conservation and Management Plan** may be required in cases where the site is so important that development will not be allowed, or where development is to co-exist with the resource. Developers may be required to enhance the value of the sites retained on their properties with appropriate interpretive material or displays as a way of promoting access of such resources to the public.

The assessment reports will be assessed by the relevant heritage resources authority, and depending on which piece of legislation triggered the study, a response will be given in the form of a Review Comment or Record of Decision (ROD). In the case of PIAs that are part of EIAs or EMPs, the heritage resources authority will issue a comment or a record of decision that may be forwarded to the consultant or developer, relevant government department or heritage practitioner and where feasible to all three.

4. Details of study site and the type of assessment:

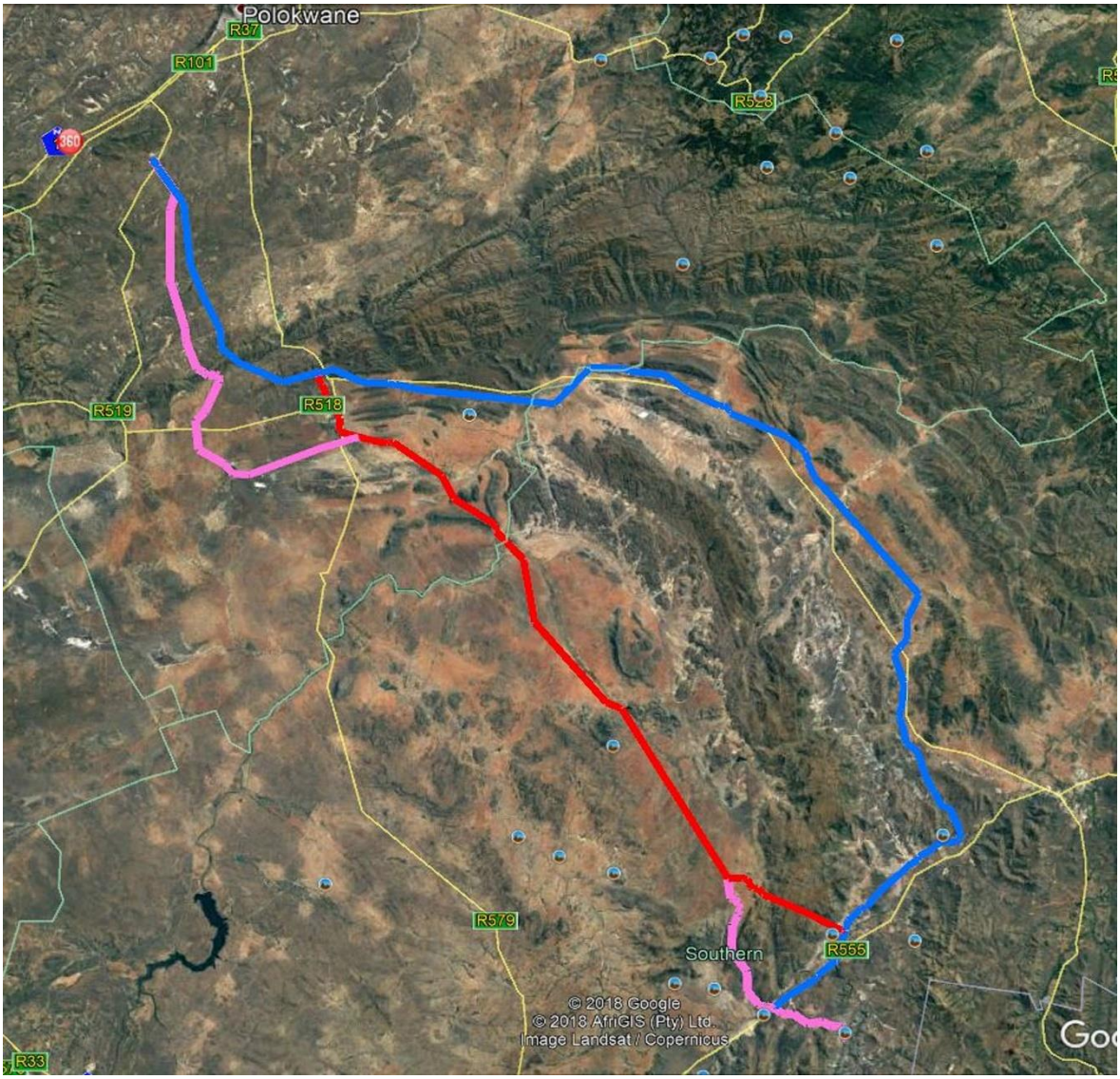
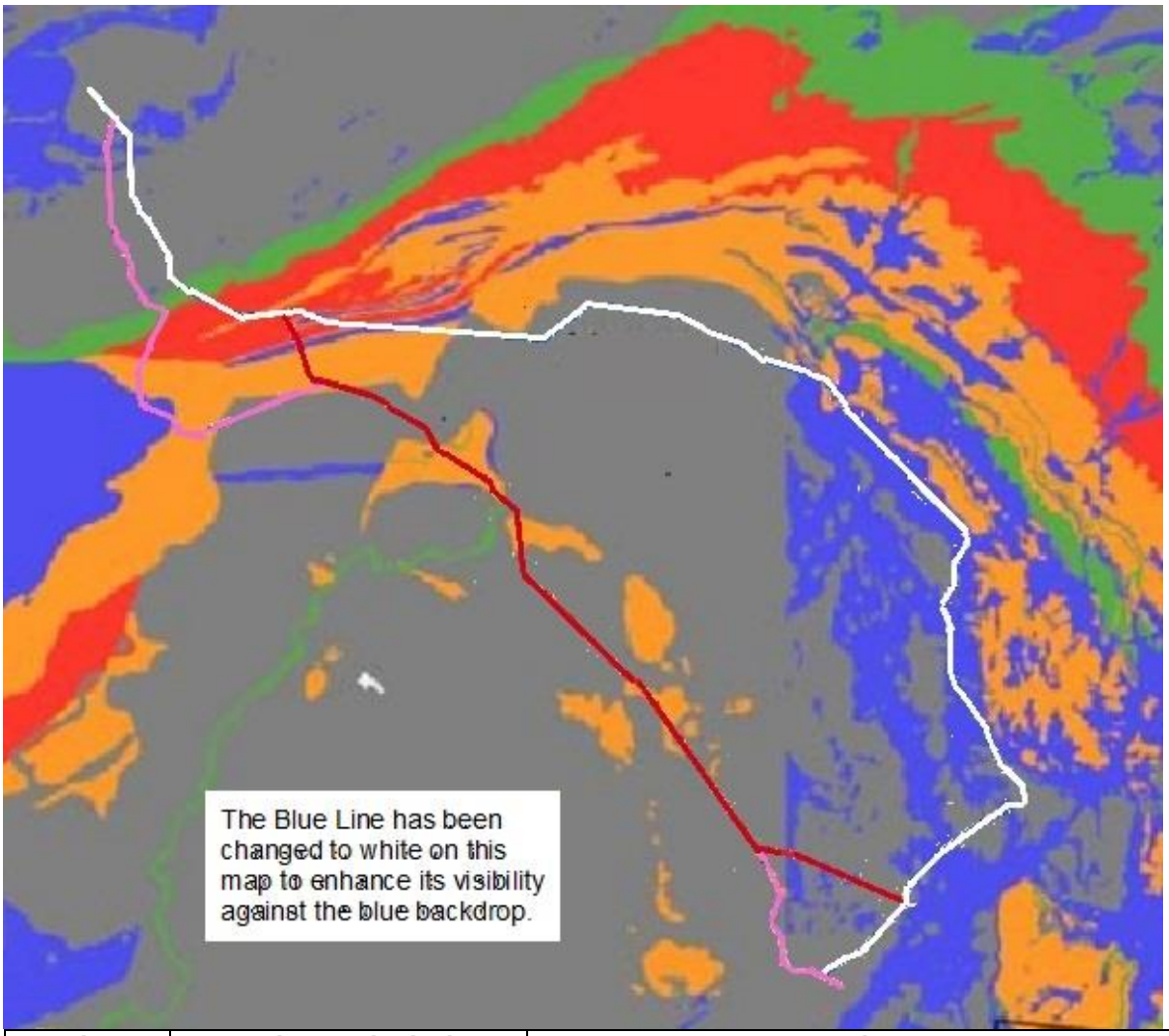


Figure 1: Google Earth photo of the study site

The study area covers an extensive section of the Limpopo Province and extends over the Sekhukhune and Capricorn District Municipalities.

This is mostly a rural area of the province and the main economic activities that are evident in this area is farming (commercial and subsistence) and mining. It is also a water scarce region with little infrastructure.



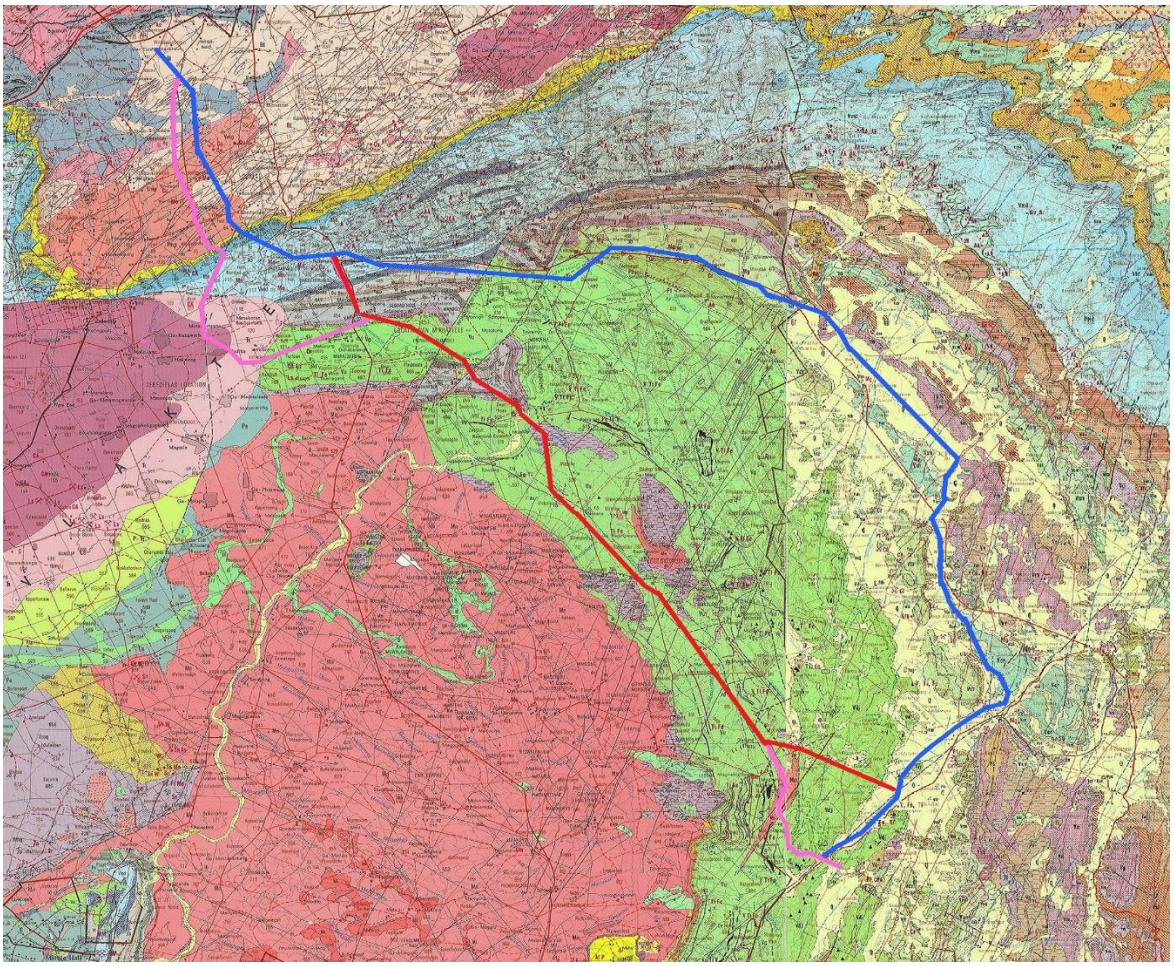
Colour	Palaeontological Significance	Action
RED	VERY HIGH	Field assessment and protocol for finds are required.
ORANGE	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely.
GREEN	MODERATE	Desktop study is required.
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required.
GREY	INSIGNIFICANT / ZERO	No palaeontological studies are required.

Figure 2: Palaeosensitivity map of the study site and surroundings (SAHRA, 2018)

The proposed development will take place in an area between Polokwane and Steelpoort that is mostly used for farming and mining (see Fig. 1). According to the South African Heritage Resources Agency (SAHRA) the study site consists of areas that vary from having a Very High, to High to Moderate, to Low, to Insignificant Palaeontological Sensitivity (see Fig. 2).

The relevant literature and geological maps for the study site in which the development is proposed to take place, have been studied for a Desktop Report.

5. Geological setting of the study site



The study sites in the study area are indicated by the blue, red and pink lines.

Figure 3: Geology of the study site and surroundings. Adapted from the 2428 NYLSTROOM 1:250 000 Geology Map (western section of the combined map) (Council for Geoscience, 1978) and the 2430 PILGRIM'S REST 1:250 000 Geology Map (eastern section of the combined map) (Council for Geoscience, 1986)

The proposed lines cover a wide range of different geological regions ranging from basal granite, to rocks of the Bushveld Complex, the Transvaal Supergroup, the Karoo Supergroup to Quaternary deposits (see Fig. 3).

Figure 4: Detail of the geology of the paleontologically highly sensitive northern part of the study site and surroundings. Adapted from the 2428 NYLSTROOM 1:250 000 Geology Map (Council for Geoscience, 1978)

GEOLOGICAL LEGEND

	Lithology	Stratigraphy			Age
Sedimentary Rocks					
J	Sandstone (also includes volcanic rocks)	Letaba Formation	Karoo Supergroup		Jurassic
Tr	Fine-grained red to cream sandstone	Clarens Formation			Triassic
Vlq	Sandstone, greywacke, arkose, orthoquartzite, micaceous siltstone, feldspathic sandstone	Mackekaan Formation	Pretoria Group	Transvaal Supergroup	Vaalian
Vm	Quartzite	Magaliesburg Formation			
Vsi	Hornfels, carbonaceous and calcareous shale, limestone, quartzite	Silverton Formation			
	Quartzite, hornfels, sandy shale, conglomerate	Undifferentiated			
Vt	Shale, hornfels, subordinate schist Nooitgedacht Quartzite Member	Timeball Hill Formation			
Vd	Limestone, dolomite, chert, shale, quartzite, diamictite, hornfels and conglomerate	Duitschland Formation	Chuniespoort Group		
Vmd	Dolomite, chert, limestone, chert breccia with interbedded shale, sandstone and quartzite	Malmani Subgroup			
Vbr	Quartzite, shale, sandstone (also includes volcanic rocks)	Black Reef Formation			
Vw	Sandy and tuffaceous shale, quartzite, feldspathic quartzite, mudstone, arkose, grit, conglomerate (also includes volcanic rocks)	Wolkberg Group			Randian ?
Igneous Rocks					
Mn	Coarse-grained grey to pink granite	Nebo granite	Lebowa Granite Suite of the Bushveld Complex		Vaalian
Vg	Gabbro, norite, anorthosite	Main Zone	Rustenburg Layered Suite of the Bushveld Complex		
Vmg	Medium to coarse grained pink and red granite with pegmatite; subordinate grey granite and granophyre	Meinhardskraal granite			Swazian
Rt	Fine to medium-grained grey and pink biotite granite with relics of migmatite and banded biotite granite- gneiss	Turfloop granite			

6. Palaeontological potential of the study site

6.1 Quaternary deposits

Quaternary deposits (**Q** on the combined geology map) in the form of alluvium and scree occur in the eastern part of the study site and the largest part of the southern half of the blue line runs over these deposits. Quaternary to Recent alluvium (on the combined geology map) is usually associated with rivers.

The mismatch between the palaeosensitivity areas and the geological and sedimentary units that appears as a vertical line on the palaeosensitivity map (Fig.2) and the combined geology map (Fig. 3) is due to different teams of geologists mapping these sections at different times (2428 NYLSTROOM 1:250 000 Geology Map (1978) and the 2430 PILGRIM'S REST 1:250 000 Geology Map (1986)). The underlying geological formations took priority in the compilation of the Nylstroom geology map; whereas in contrast, the superficial Quaternary deposits overlying hard rock features were captured in the Pilgrim's Rest geology map. This implies that there are Quaternary deposits to the west of this artificial vertical line that were not mapped which would change the palaeosensitivity categorisation for that region. There is obviously also a reasonable chance of discovering fossils in the Quaternary deposits in this section in spite of most of it not being mapped.

There is a low likelihood that the Quaternary deposits of the study site will contain fossils. Elsewhere rare fossils of root casts, burrows, ostrich egg shells, mollusc shells, isolated bones, root casts, burrows and termitaria were found in deposits of this age (Almond & Pether 2008) and the possibility of finding similar fossils in the study site cannot be excluded.

6.2 Karoo Supergroup

The Karoo Supergroup in the study area is represented by fine-grained red to cream sandstone of the Clarens Formation (Ŧr on the geology maps) and the sequence of sandstone and volcanic rocks that constitute the Letaba Formation. The southwestern portion of the upper Pink Line runs over the Karoo Supergroup (see Figs. 3 & 4). Although fossils have not been reported from the Karoo Supergroup in this area, the possibility of discovering fossils in the rocks of the Clarens Formation, which is indicated as having a High Palaeontological Importance (see Fig. 2), should not be excluded. Thecodont, early dinosaur and early mammal fossils are amongst those that have been discovered in Clarens Formation exposures elsewhere in the country (Macrae, 1999).

6.3 Transvaal Supergroup

The Transvaal Supergroup is represented by rocks of the Chuniespoort and Pretoria Groups in the study area (Eriksson *et al*. 2009).

6.3.1 Pretoria Group

Sandstone, greywacke, arkose, orthoquartzite, micaceous siltstone, feldspathic sandstone constitute the Mackekaan Formation (**Vlq** on the geology maps). This formation overlies unconformably the quartzite of the Magaliesburg Formation (**Vm** on the geology maps) in the study area. The Magaliesburg Formation overlies the hornfels, carbonaceous and calcareous shale, limestone, quartzite of the Silverton Formation (**Vsi** on the geology maps) which overlies the quartzite, hornfels, sandy shale and conglomerate which constitute the undifferentiated unit of the Pretoria Group which can be correlated with the Daspoort, Strubenkop and Dwaalheuwel Formations elsewhere. Shale, hornfels and subordinate schist constitute the Timeball Hill Formation (**Vt** on the geology maps) in the study area. The Nooitgedacht Quartzite Member forms part of this geological unit.

The Pretoria Group sedimentary units are considered to be of High Palaeontological Importance (see Fig. 2). Microbial mat structures are often found in the shales of the Magaliesburg Formation (Eriksson *et al*. 2007). Stomatolites are common in the Silverton, Timeball Hill and Daspoort Formations (Groenewald, 2014).

6.3.2 Chuniespoort Group

The Chuniespoort Group in the study area is represented by the Duitschland Formation and the Malmani Subgroup (Eriksson *et al*, 2009).

The Duitschland Formation (**Vd** on the geology maps) consists of limestone, dolomite, chert, shale, quartzite, diamictite, hornfels and conglomerate. It overlies the Malmani Subgroup (**Vmd** on the geology maps) that consists of dolomite, chert, limestone, chert breccia with interbedded shale, sandstone and quartzite.

The Chuniespoort Group is considered to have a Very High Palaeontological Sensitivity and importance (see Fig. 2). These rocks contain stromatolites and in some areas prehistoric cave-fills occur. The cave breccia may also contain up many thousands of Plio-Pleistocene fossils including those of hominins (Macrae,1999).

Some examples of this are the dolomite caves in the Cradle of Humankind and those in Makopane's Valley near Makopane. Stromatolites are well known in the dolomitic regions of Limpopo and Mpumalanga and the chances are high that stromatolites will be encountered in this region along the transects of all three of the proposed lines (see Fig. 4).

6.4 Black Reef Formation and Wolkberg Group

The Black Reef Formation (**Vbr** on the geology maps) consists of quartzite, shale, sandstone and volcanic rocks. Stromatolitic carbonates are found in this formation (Groenewald, 2014).

The Wolkberg Group (**Vw** on the geology maps) consists of sandy and tuffaceous shale, quartzite, feldspathic quartzite, mudstone, arkose, grit, conglomerate and volcanic rocks. This unit may contain stromatolites (Groenewald, 2014).

These two units are considered to have a Moderate Palaeontological Sensitivity (see Fig. 2).

6.5 Bushveld Complex

A large part of the proposed lines runs over the Bushveld Igneous Complex that is of no palaeontological concern. The Main Zone of the Rustenburg Layered Suite (**Vg** on the geology maps) underlies the largest part of the Red Line and the central part of the Blue Line (see Fig. 3).

References:

Almond, J.E. & Pether, J. (2008) Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp.

Council for Geoscience (1978) 2428 NYLSTROOM 1:250 000 Geology Map.

Council for Geoscience (1986) 2430 PILGRIM'S REST 1:250 000 Geology Map.

Erikkson, P.G.; Porada, H.; Banerjee, S.; Bouougri, E.; Sarkar, S. & Bumby, A.J. (2007) Mat-destruction features. In: Schieber, J., Bose, P.K., Eriksson, P.G., Banerjee, S., Sarkar, S., Altermann, W. and Catuneanu, O. (Eds.) *Atlas of microbial mat features preserved within the clastic rock record*, p. 76-105. Elsevier.

Eriksson, P.G.; Altermann, W. & Hartzer, F.J. (2009) The Transvaal Supergroup and its precursors. In: Johnson, M.R.; Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The geology of South Africa*. Geological Society of South Africa, Marshalltown.

Groenewald, G. (2014) Palaeontological Heritage of Limpopo, SAHRA Palaeotechnical Report.

Macrae, C. (1999). Life etched in stone. Fossils of South Africa. The Geological Society of South Africa, Johannesburg, 305 pp.

7. Conclusion and recommendations:

The proposed Red Line will have the least impact on the Chuniespoort Group rocks (Very High Palaeosensitivity) compared to the Blue Line (white on the palaeosensitivity map, Fig. 2) and the Pink Line. The impact of the Red Line is much higher on the Pretoria Group rocks (High Palaeosensitivity) than the Blue Line because it cuts across larger sections of the Pretoria Group.

The Blue Line has the greatest impact on Quaternary deposits (Low Palaeosensitivity) of all the lines and in fact runs along most of its course over Quaternary deposits whereas the others do not. This conclusion is however based on the data captured on the current geological maps of which the 2428 NYLSTROOM 1:250 000 Geology Map (Council for Geoscience, 1978) is not as informative with respect to the Quaternary deposits as the 2430 PILGRIM'S REST 1:250 000 Geology Map (Council for Geoscience, 1986). There are Quaternary deposits on the Nylstroom map area that were not mapped and the Red Line will in all probability cross over unmapped Quaternary deposits. In the case of significant finds in these deposits the Chance Find Protocol should be followed.

The Red Line is preferable to the Blue Line if it is imperative for the developers to minimize the impact of development on the palaeontological heritage.

	Wolkberg Black Reef	Chuniespoort Group	Pretoria Group	Clarens Formation	Quaternary Deposits
	Moderate	Very High	High	High	Low
Red Line		*	***		*
Blue Line	*	***	*		***
Pink Line	*	**		**	

Table showing the relative impact of the proposed line on the palaeontological heritage of a particular geological unit (* low, ** medium, *** high)

Due to the Very High Palaeontological sensitivity of the Chuniespoort Group, it is essential that a palaeontologist be appointed to do a surface survey of the route which is finally chosen for development where it transects this geological unit before development commences and after construction has exposed the bedrock.

In the event of significant fossils being discovered in the Quaternary alluvium or scree, the sandstones of the Clarens Formation, the dolomite of the Chuniespoort Group (after the palaeontologist has inspected the terrain) and the sedimentary rocks of the Black Reef Formation or the Wolkberg Group, then the ECO should follow the Chance Find Procedure.

Although disturbed fossils should be collected and stored safely until it can be inspected by a palaeontologist, no attempt should be made to remove such accidentally discovered fossils from the rock by an unqualified person.

PROCEDURE FOR CHANCE PALAEONTOLOGICAL FINDS

Extracted and adapted from the National Heritage Resources Act, 1999 Regulations Reg No. 6820, GN: 548.

The following procedure must be considered in the event that previously unknown fossils or fossil sites are exposed or found during the life of the project:

1. Surface excavations should continuously be monitored by the ECO and any fossil material be unearthed the excavation must be halted.

2. If fossiliferous material has been disturbed during the excavation process it should be put aside to prevent it from being destroyed.

3. The ECO then has to take a GPS reading of the site and take digital pictures of the fossil material and the site from which it came.

4. The ECO then should contact a palaeontologist and supply the palaeontologist with the information (locality and pictures) so that the palaeontologist can assess the importance of the find and make recommendations.

5. If the palaeontologist is convinced that this is a major find an inspection of the site must be scheduled as soon as possible in order to minimise delays to the development.

From the photographs and/or the site visit the palaeontologist will make one of the following recommendations:

a. The material is of no value so development can proceed, or:

b. Fossil material is of some interest and a representative sample should be collected and put aside for further study and to be incorporated into a recognised fossil repository after a permit was obtained from SAHRA for the removal of the fossils, after which the development may proceed, or:

c. The fossils are scientifically important and the palaeontologist must obtain a SAHRA permit to excavate the fossils and take them to a recognised fossil repository, after which the development may proceed.

7. If any fossils are found then a schedule of monitoring will be set up between the developer and palaeontologist in case of further discoveries.

8. Declaration of Independence:

I, Jacobus Francois Durand declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Palaeontological specialist:
Dr JF Durand (Sci. Nat.)
BSc Botany & Zoology (RAU), BSc Zoology (WITS), Museology Dipl. (UP), Higher Education Diploma (RAU), PhD Palaeontology (WITS)