

PALAEONTOLOGICAL DESKTOP
ASSESSMENT

PROSPECTING RIGHT
APPLICATION NEAR
VENTERSDORP IN THE
NORTH WEST PROVINCE

REF: NC30/5/1/1/2/13702PR.

JULY 2022

COMPILED FOR: MILNEX CC



Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application.
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct.
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.



Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT:

Banzai Environmental (Pty) Ltd

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SIGNATURE:



This Palaeontological Impact Assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: NEMA Table

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A
(ii) The expertise of that person to compile a specialist report including a curriculum vitae	Section 2 – refer to Appendix A
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Methods and TOR
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Desktop Assessment
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 4 Approach and Methodology
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;	Section 1 and 9
(g) An identification of any areas to be avoided, including buffers	Section 5 No buffers or areas of sensitivity identified
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5 – Geological and Palaeontological history



Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4.1 – Assumptions and Limitation
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 9
(k) Any mitigation measures for inclusion in the EMPr	Section 10
(l) Any conditions for inclusion in the environmental authorisation	Section 10
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 9
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 and 9
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A
(p) A summary and copies if any comments that were received during any consultation process	N/A
(q) Any other information requested by the competent authority.	N/A
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 3 compliance with SAHRA guidelines



EXECUTIVE SUMMARY

Milnex CC commissioned Banzai Environmental to conduct the Palaeontological Desktop Assessment (PDA) to evaluate the proposed prospecting right application for the prospecting of diamonds alluvial (DA), diamonds general (D), diamonds (DIA), and gold ore, as well as associated infrastructure, structure, and earthworks, on the remaining extent of portions 2 and 9, 7, 8, and 12 (part of portions 2 and 9) of the Farm Rooipoort 202 & Portion 11 (portion of Portion 1) & Portion 15 (portion of Portion 11) of the Farm Wildfontein 201. This PIA is required to confirm whether fossil material may potentially be present in the planned development area and to assess the potential impact of the proposed development on the local palaeontological heritage in order to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA).

The proposed development is underlain by the Allanridge and Bothaville Formations, as well as the Rietgat Formation (Platberg Group, Ventersdorp Supergroup), with a small portion of Quaternary alluvium in the south of the development. The South African Heritage Resources Information System's (SAHRIS) PalaeoMap indicates that the Bothaville Formation has a Moderate Palaeontological Sensitivity, while the Allanridge Formation and Quaternary alluvium have a Low Palaeontological Sensitivity. The DEA Screening Report indicates a Medium Palaeontology Theme Sensitivity and the updated geology indicates that the development is underlain by the Allanridge, Bothaville and Rietgat Formations.

The proposed development has been assigned a Low Palaeontological Significance, and since the entire development footprint is not deemed sensitive in terms of palaeontological heritage, the project's construction and operation may be approved.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation (recording and collection) can be carry out by a paleontologist.

It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of fossils.



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Curriculum Vitae Elize Butler



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GLOSSARY OF TERMS

Fossil

Mineralized bones of vertebrate and invertebrate animals, as well as plants. A trace fossil is the traces of animals/plants preserved in stone.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act No 25 of 1999).

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures, and equipment of cultural significance.
- places to which oral traditions are attached or which are associated with living heritage.
- historical settlements and townscapes.
- landscapes and natural features of cultural significance.
- geological sites of scientific or cultural importance.
- archaeological and palaeontological sites.
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past (other than fossil fuels or fossiliferous rock intended for industrial use) and any site which comprises of fossilised remains or traces of past life.



LIST OF ABBREVIATIONS

BA	Basic Assessment
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
CA	National Competent Authority
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
HIA	Heritage Impact Assessment
Ma	Millions of years ago
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PIA	Palaeontological Impact Assessment
PSSA	Palaeontological Society of South Africa
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
S&EIA	Scoping & Environmental Impact Assessment
ToR	Terms of Reference



1 INTRODUCTION

Milnex CC was employed by CTN Mining (Pty) Ltd in order to complete the Scoping and EIA process for the proposed prospecting of diamonds alluvial (DA), diamonds general (D), diamonds (DIA), and gold ore, along with associated infrastructure, structure, and earthworks, on the remaining extent of portions 2 and 9, 7, 8, and 12 (portion of portion 9) of the Farm Rooipoort 202, as well as portions 11 (portion of portion 1) and Portion 15 (portion of Portion 11) of the Farm Wildfontein 201. Banzai Environment was in turn appointed to conduct the Palaeontological Desktop Assessment for this project (Figure 1-2).

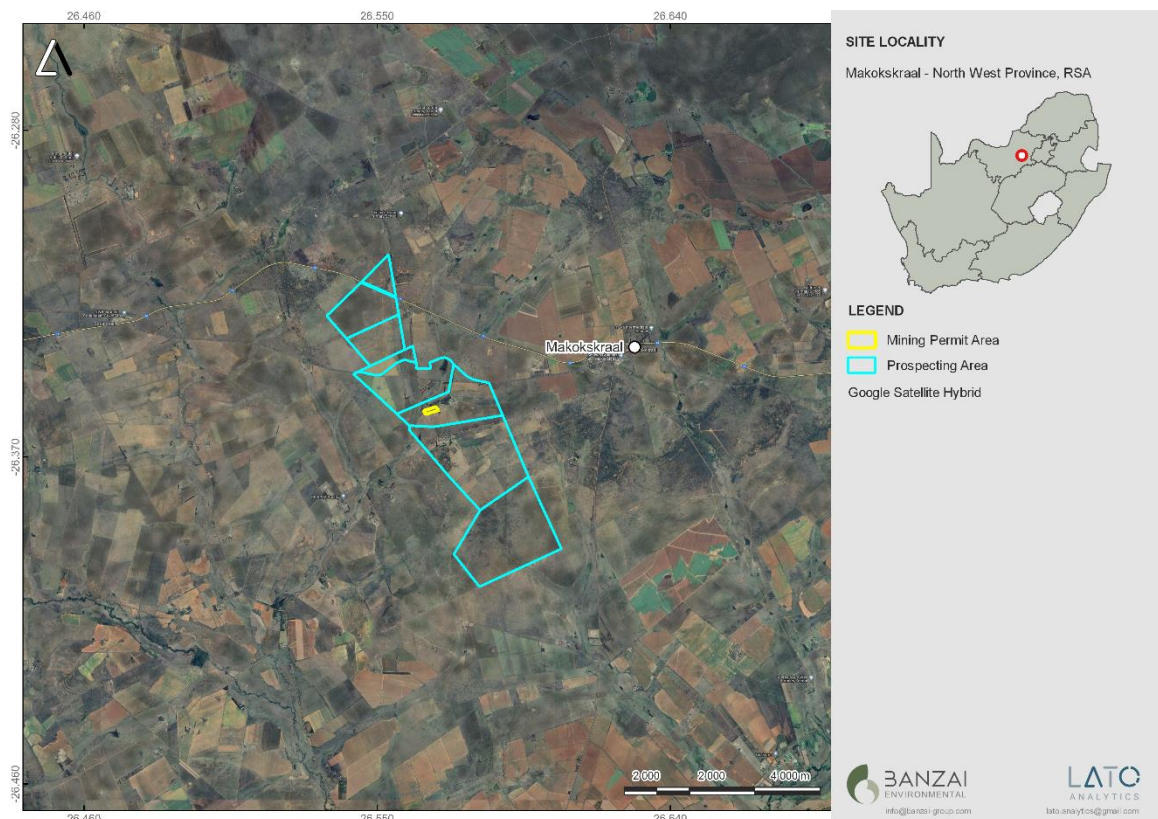


Figure 1: Location of the proposed prospecting application for diamonds alluvial (DA), diamonds general (D), diamonds (DIA), and gold ore, along with associated infrastructure, structure, and earthworks, on the remaining extent of portions 2 and 9, 7, 8, and 12 (portion of portion 9) of the Farm Rooipoort 202, as well as portions 11 (portion of portion 1) and Portion 15 (portion of Portion 11) of the Farm Wildfontein 201.



nature. This property makes diamonds appealing not only in jewelry but also in high-tech cutting, grinding, and polishing instruments (South African Chamber of Mines, 12:2016).

Despite the fact that South Africa has been engaged in diamond mining for nearly 150 years, the Chamber of Mines claims that the industry is still far from being exhausted. Kimberlites in old, vertically dipping volcanic pipes, the majority of which were found close to the city of Kimberley and were first suitable to open-cast, are the main sources of all of South Africa's diamonds. Economic expansion - With an estimated value of R20.3 trillion, South Africa's total reserves continue to be among the most valuable in the world. According to estimates, the nation's mining industry ranks as the fifth-largest in the world in terms of GDP value. Due to the fact that South Africa's economy is based on the mining of gold and diamonds, the industry contributes significantly to foreign exchange earnings, with gold making up more than one-third of exports. The nation's diamond business ranked fourth globally in 2009.

A major driver of economic activity, job creation, and foreign exchange profits, mining is a pillar of the economy. The socioeconomic development of South Africa depends heavily on mining and related industries.

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Mrs. Elize Butler conducted the current study. For developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga, she has completed almost 300 palaeontological impact assessments. She has an MSc (*cum laude*) in Zoology with a focus in Palaeontology from the University of the Free State in South Africa, and she has more than 30 years of experience in the field. She has knowledge of finding, collecting, and curating fossils. She began conducting PIAs in 2014 and has been a member of the Palaeontological Society of South Africa (PSSA) since 2006.

3 LEGISLATION

3.1 National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens"**.

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act No. 107 of 1998



- National Heritage Resources Act (NHRA) Act No. 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act No. 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act No. 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act No. 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

The NEMA (No. 107 of 1998) states that an integrated EMP should (23:2 (b)) “...*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*”.

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies a comprehensive and legally compatible PIA report has been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length.
- the construction of a bridge or similar structure exceeding 50 m in length.
- any development or other activity which will change the character of a site—
 - exceeding 5 000 m² in extent; or
 - involving three or more existing erven or subdivisions thereof; or
 - involving three or more erven or divisions thereof which have been consolidated within the past five years; or



- o the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority or
- o the re-zoning of a site exceeding 10 000 m² in extent or

any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4 METHODS AND TERMS OF REFERENCE

This PDA assesses the development's potential impact on the fossil heritage. This Palaeontological Assessment is part of the HIA Report. The PIA's goals are to: 1) identify the palaeontological significance of the rock formations in the footprint; 2) evaluate the palaeontological magnitude of the formations; 3) clarify the impact on fossil heritage; and 4) make recommendations for how the developer might protect and minimize potential harm to fossil heritage, according to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports".

Calculations of the palaeontological state of each rock segment and the potential impact of development on fossil history take into account the palaeontological status of the rocks, the type of development, and the amount of bedrock removed.

The Provisional DFFE Screening Tool, the SAHRIS Palaeosensitivity map, all Palaeontological Impact Assessment reports for the same area, Google Earth images, topographical and geological maps, as well as academic articles about specimens from the development area and Assemblage Zones, are all used to create scoping reports.

When the development footprint has a moderate to high palaeontological sensitivity, a field-based assessment is necessary. A desktop or field assessment of the exposed rock is used to evaluate the significance of the proposed development's impact, and recommendations for more research or mitigation are made. Excavations for the project often only take place during the building phase, changing the terrain and destroying or permanently encasing fossils at or below the ground surface. Then, access to Fossil Heritage will no longer be available for academic study.

When doing a site investigation, a palaeontologist examines the local development as well as the quantity and variety of fossils found there. This can be demonstrated by looking at representative fossiliferous rock exposures (most igneous and metamorphic rocks are not fossiliferous, whereas sedimentary rocks contain fossil heritage). Examined rock exposures frequently contain a sizeable portion of the stratigraphic unit, which is primarily made up of recently exposed (unweathered) rock. These exposures may be man-made (such as quarries, open building excavations, even railway and



road cuttings) or natural (such as cliffs, and dongas as well as rocky outcrops along stream or river banks). It is usual practice for palaeontologists to record well-preserved fossils (GPS, and stratigraphic data) during field assessment examinations.

Although mitigation is often done prior to construction, it may take place if potentially fossiliferous bedrock is revealed. Fossil collection and documentation are examples of mitigation. A permit from SAHRA must be obtained before beginning any fossil excavation, and the material must be stored at an authorized facility. When mitigation is properly used, it is possible to have a positive impact by raising awareness of the palaeontological past of the area.

By physically evaluating bedrock outcrops to determine their lithology and fossil richness and crisscrossing the development footprint, one can assess an area's fossil potential. Because the presence of fossils at the surface is so unexpected, an average sample size of the region is investigated. To be clear, however, the lack of fossils in a development footprint does not automatically suggest that there is no palaeontologically important material present on the site (on or below the ground surface).

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Describe of the proposed project and provide information regarding the developer and consultant who commissioned the study;
- Describe location of the proposed development and provide geological and topographical maps
- Provide palaeontological and geological history of the affected area;
- Identify sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluate the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
 - a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.



- b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
- c. **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
 - Fair assessment of alternatives (infrastructure alternatives have been provided);
 - Recommend mitigation measures to minimise the impact of the proposed development; and
 - Detail the implications of specialist findings for the proposed development (such as permits, licenses etc).

4.1 Assumptions and Limitations

The geology of the area is the focal point of geological maps, and the sheet explanations of the Geological Maps were not intended to focus on palaeontological heritage. Many inaccessible areas of South Africa have never been examined by palaeontologists, and data is typically dependent solely on aerial pictures. Locality and geological information in museums and university databases is out of date, and data acquired in the past is not always adequately documented.

Comparable Assemblage Zones in other places are also used to provide information on the existence of fossils in areas that have not before been recorded. When similar Assemblage Zones and geological formations are used for Desktop studies, it is commonly assumed that exposed fossil exists within the footprint. As a result, a field assessment will improve the accuracy of the desktop evaluation.

5 GEOLOGICAL AND PALAEOONTOLOGICAL HISTORY

The proposed Prospecting Right Application is depicted on the 2626 West-Rand (1986) Geological map (Council of Geoscience, Pretoria) (**Figure 3, Table 2**). According to this map the proposed development is underlain by the Allanridge Formation (Va, dark green) and the Bothaville Formation (Vb, green), as well as the Rietgat Formation (V-Rt, pale green, Platberg Group, Ventersdorp Supergroup), with a small portion of Quaternary alluvium (yellow single bird figure) in the south of the development. The Bothaville Formation has a Moderate Palaeontological Sensitivity, while the Allanridge Formation and Quaternary alluvium have a Low Palaeontological Sensitivity, according to the South African Heritage Resources Information System's PalaeoMap (**Figure 4**). The suggested location is classified as having a Medium Palaeontology Theme Sensitivity in the DEA Screening



Report, as seen in **Figure 5**. Updated geology (Council for Geosciences, Pretoria) indicates that the research region is underlain by the Rietgat, Bothaville, and Allanridge Formations (**Figure 6**).

On the Kaapvaal Craton, four basins formed between 3000 and 2100 million years ago. The third basin to form, the Ventersdorp Supergroup, has a remarkable volcano-sedimentary supracrustal record. The largest and most widespread sequence of volcanic rocks in the Kaapvaal Craton is known as the Ventersdorp Supergroup.

The North West Province, Northern Cape Province, as well as Gauteng and southern Botswana, have the best exposures of the Ventersdorp Supergroup. The oldest formation in this Supergroup is the Klipriviersberg Group, which is followed by the Platberg Group, the sedimentary Bothaville Formation (Rb), and the volcanic Allanridge Formation (Ra), which is the uppermost Ventersdorp unit and youngest Formation. Porphyritic lava, dark-green amygdaloidal lava, and pyroclastic rocks make up the majority of the Allanridge Formation. Basaltic andesites make up the lava, which is about 2700 million years old. It is unknown if the Allanridge Formation contains any fossils.

The Kameeldoorns-, Goedgenoeg-, Makwassie-, and Rietgat Formations are the four subgroups of the Platberg Group. These formations are composed of heterogeneous rock types, including felsic and mafic volcanics as well as chemical and traditional sediments. These rocks were deposited in graben development's linear vault troughs (Visser et al., 1975–1976; Buck, 1980). These earlier andesitic terranes underlie the deep intermontane grabens, which produced alluvial fan deposits as well as debris and scree flow zones. Ooids and stromatolites accumulated in these fine-grained chemical and terrigenous sediments under lacustrine conditions (Buck, 1980). Over time, fluvial processes took over, leading to the broad progression of alluvial fans throughout basins. Across the basin, the thickness of the Rietgat Formation's alternating sedimentary and volcanic strata varies.

The Vaal and Orange Rivers both include quaternary alluvial gravels, also referred to as high level gravels. The mining of diamonds has been linked to these gravels (De Wit et al., 2000). Although the Quaternary Formations' fossil assemblages are widespread and typically limited in diversity, they are highly sensitive from a paleontological standpoint. These fossils depict terrestrial plants and animals that resemble living organisms today. Bivalves, diatoms, gastropod shells, ostracods, and trace fossils are all included in fossil assemblages. Late Cenozoic calcrete may contain teeth, horn cores, and bones from mammals. Along with trace fossils like termite and insect burrows and animal trackways, turtle remains have also been found. Where the depositional environments were wetter in the past, amphibian and crocodile skeletons have been discovered.

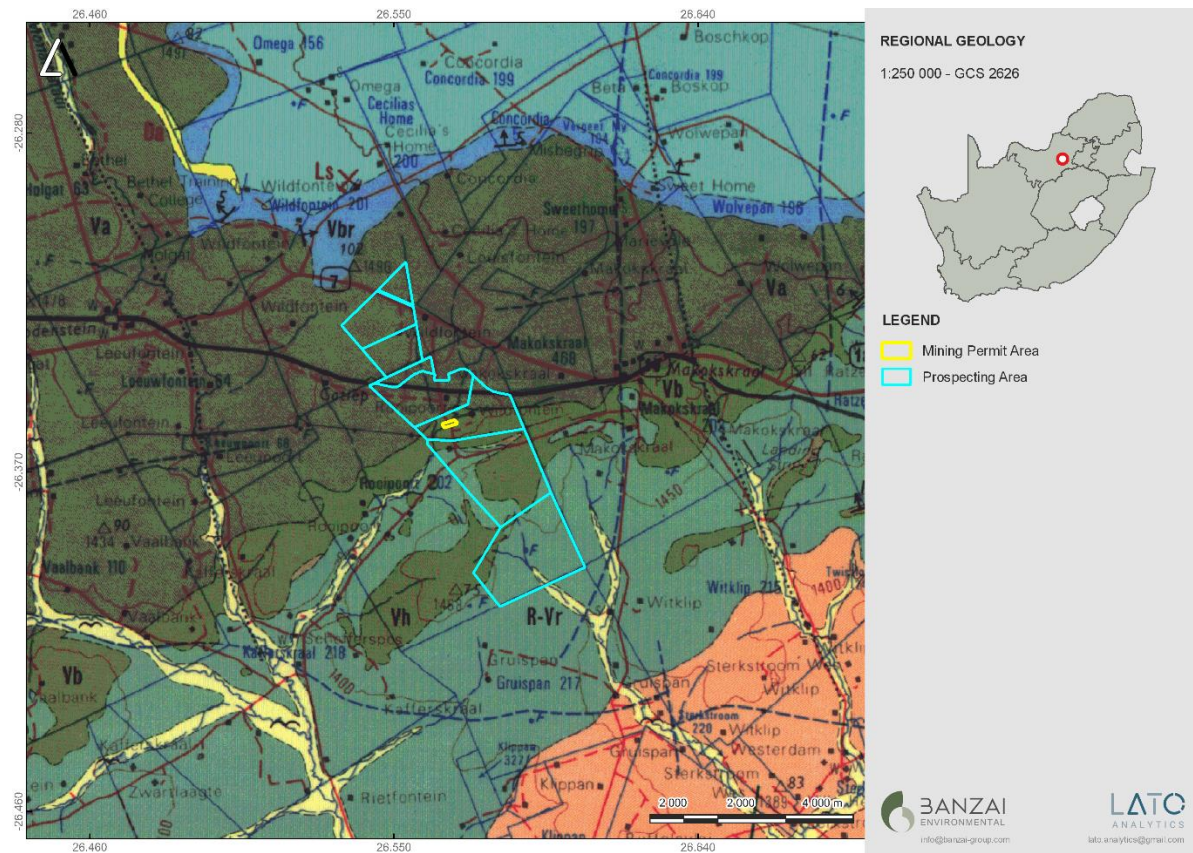


Figure 3: Extract of the 1:250 000 West Rand 2626 Geological map (1986) (Council of Geoscience, Pretoria) indicates that the study area is underlain by the Allanridge (Va, dark green), and Bothaville (Vb, green) Formations as well as the Rietgat Formation (R-Vt, pale green) of the Platberg Group (Ventersdorp Supergroup), with a small portion in the south underlain by Quaternary alluvium (yellow, single bird figure).



Table 2: Legend of the 1:250 000 West-Rand 2626 Geological map (1986) (Council of Geoscience).
Pretoria)

		GROEP GROUP	SUBGROEP SUBGROUP	FORMASIE FORMATION					
KWATERNÊR TERSIER					Alluvium Alluvium				
				Qs	Qs Grondbedekking Soil cover				
				Qw	Qw Eoliese sand Aeolian sand				
				Qg	Qg Gruis, plek-plek diamanthoudend Gravel, diamondiferous in places				
				Qc	Qc Kalkreet Calcrete				
QUATERNARY TERTIARY	SUPERGROEP VENTERSDORP SUPERGROUP	PLATBERG	KLIPRIVIERSBERG (Rk)	Allanridge	Va Basaltiese amandelhoudende lava Basaltic amygdaloidal lava				
				Bothaville	Vb Kwartsiet, grouwak, konglomeraat Quartzite, greywacke, conglomerate				
				Rietgat (R-Vr)	R-Vr Amandelhoudende lava, agglomeraat, tuf Amygdaloidal lava, agglomerate, tuff				
				Makwassie (Rm)	Rm Kwartsveldspaatporfier Quartz-feldspar porphyry				
				Goedgenoeg (Rgb)*	Rgb Basaltiese amandelhoudende lava Basaltic amygdaloidal lava				
				Kameeldoorns (R-Vk)	R-Vk Breksie, konglomeraat (); grouwak, skalie, kalksteen, tuf () Breccia, conglomerate (); greywacke, shale, limestone, tuff ()				
				Alberton (Ra)	Ra Veldspaatporfier Feldspar porphyry				
				Westonaria (Rw)	Rw				

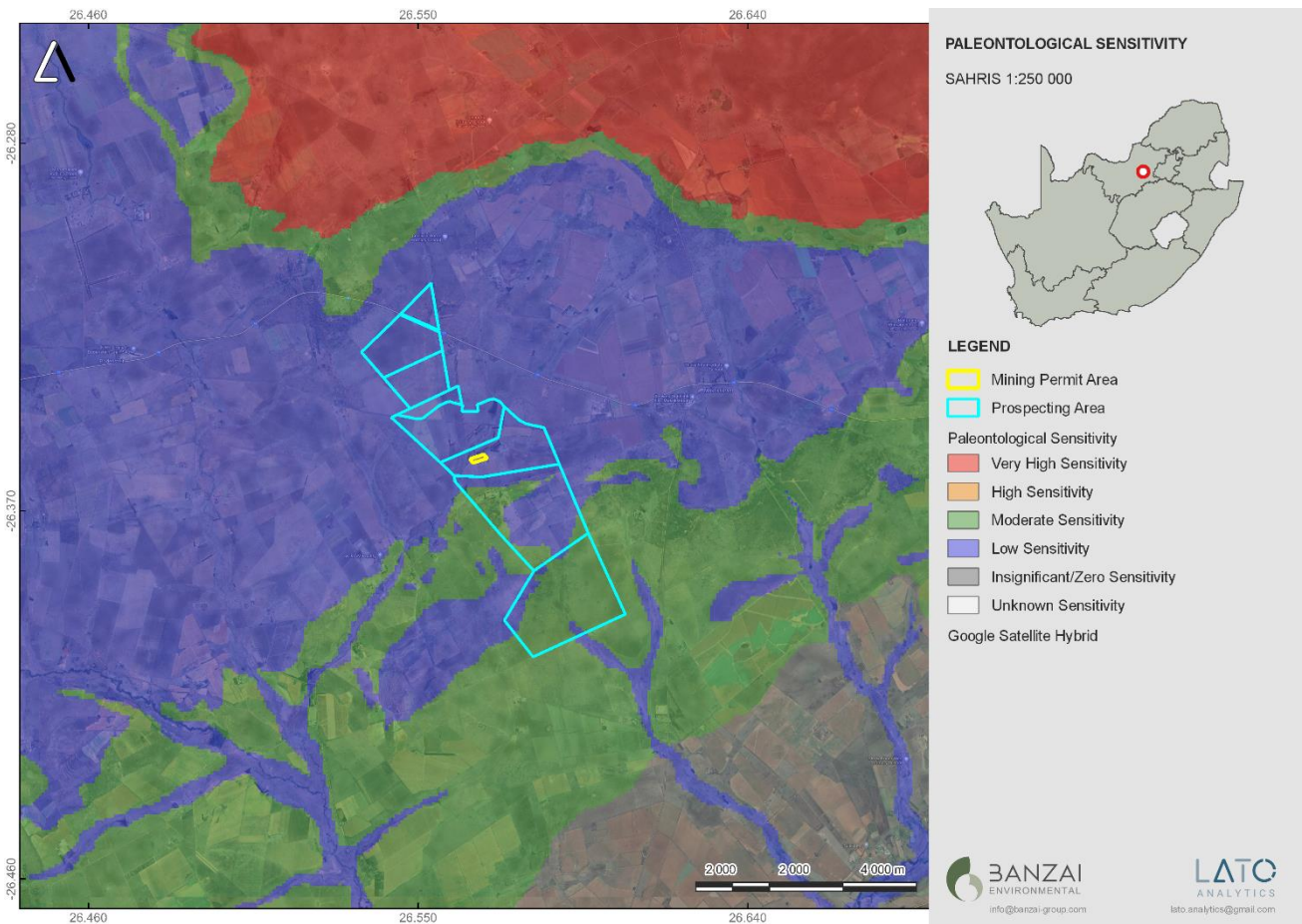


Figure 4: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating that the proposed development is underlain by sediments with a Moderate (green) and Low (blue) Palaeontological Sensitivity.

Table 3: Palaeontological Sensitivity

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	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
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

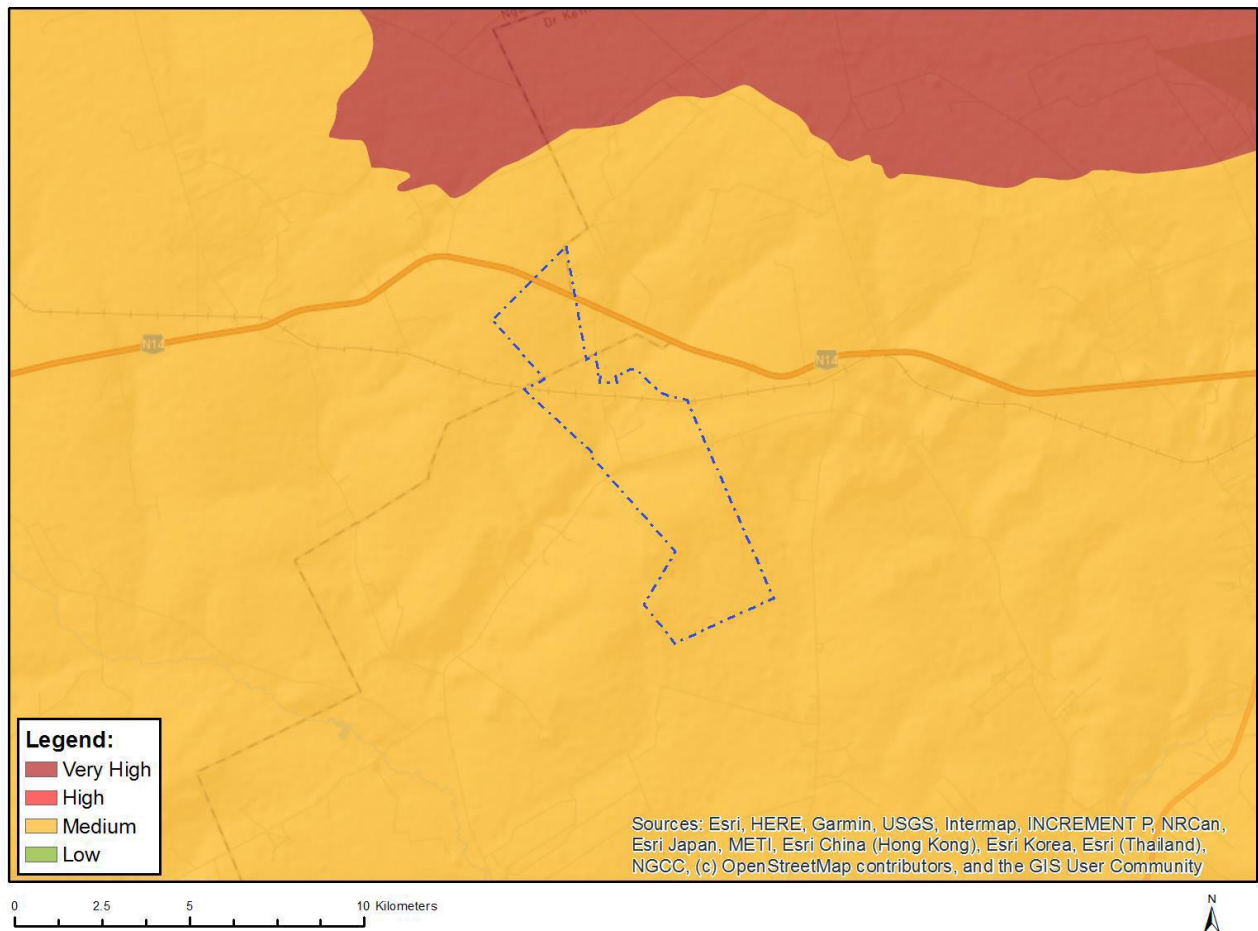


Figure 5: Palaeontological Sensitivity generated by the National Environmental Web-Based Screening indicating the Medium Palaeontological Sensitivity of the proposed development.

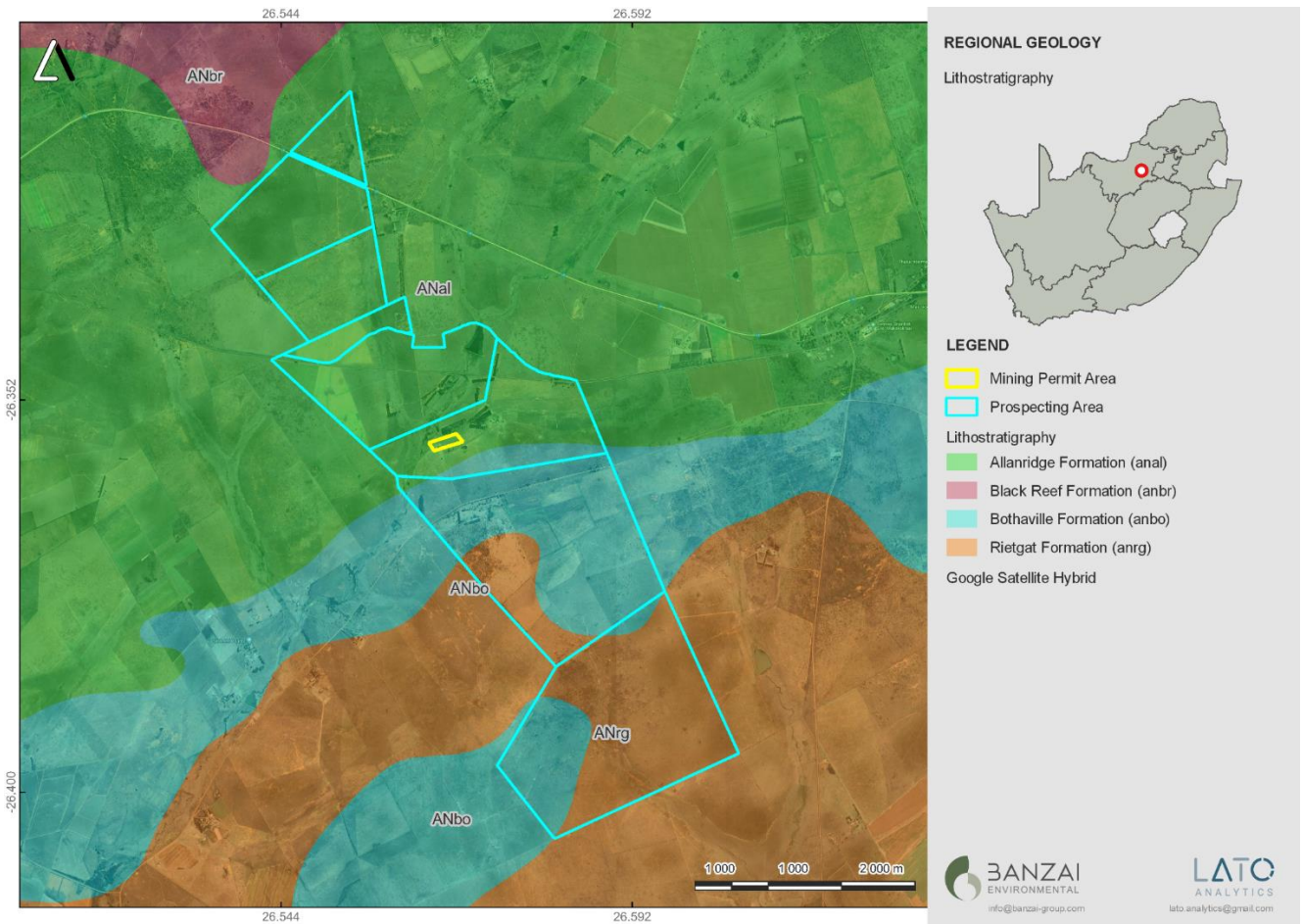


Figure 6: Updated geology (Council for Geosciences, Pretoria) indicates that the study area is underlain by the Allanridge, Bothaville Formations as well as the Rietgat Formation (Platberg Group, Ventersdorp Supergroup).



6 GEOGRAPHICAL LOCATION OF THE SITE

The property is located 30km west of Ventersdorp in the North-West Province in the Ditsobotla Local Municipality & JB Marks local Municipality Ngaka Modiri Molema District Municipality & Kenneth Kaunda District Municipality

Table 4: Farm coordinates

Farm Name:	<p>1. The remaining extent of portion 2 of the farm Rooipoort 202</p> <p>Registration Division: IP Title Deed: T87584/2011 Extent: 192.3419 hectares</p> <p>2. Portion 7 of the farm Rooipoort 202</p> <p>Registration Division: IP Title Deed: T87584/2011 Extent: 584.6958 hectares</p> <p>3. Portion 8 of the farm Rooipoort 202</p> <p>Registration Division: IP Title Deed: T15111/2011 Extent: 584.6984 hectares</p> <p>4. Remainder of portion 9 of the farm Rooipoort 202</p> <p>Registration Division: IP Title Deed: T87584 Extent: 300.5928 hectares</p> <p>5. A certain portion of portion 12 (portion of portion 9) of the farm Rooipoort 202 – excluding a mining permit application of 4.7711 hectares</p> <p>Registration Division: IP Title Deed: T63215/1989 Extent: 279.0137 hectares (283.7848 hectares – 4.7711 hectares)</p> <p>6. Portion 11 (portion of portion 1) of the farm Wildfontein 201</p> <p>Registration Division: IP Title Deed: T42624/2013 Extent: 280.4187 hectares</p> <p>7. Portion 15 (portion of portion 11) of the farm Wildfontein 201</p> <p>Registration Division: IP Title Deed: T42624/2013 Extent: 148.2985 hectares</p>
Application area (Ha)	2223, 7093 hectares



Magisterial district:	Ditsobotla Local Municipality & JB Marks local Municipality Ngaka Modiri Molema District Municipality & Kenneth Kaunda District Municipality
Registration division:	IP
Distance and direction from nearest town	30km west of Ventersdorp
21 digit Surveyor General Code for each farm portion	TOIP00000000020200002 TOIP00000000020200007 TOIP00000000020200009 TOIP00000000020200012 TOIP00000000020100011 TOIP00000000020100015 TOIP00000000020200008
Minerals:	Diamonds Alluvial (DA) Diamonds General (D) Diamonds (DIA) Gold Ore

7 ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984).
- A Google Earth map with polygons of the proposed development was obtained from Milnex cc.
- 1: 250 000 West Rand 2626 Geological Map (1986) (Council of Geosciences, Pretoria)
- Updated Geology produced by the Council of Geosciences (Pretoria).
- Palaeosensitivity map on SAHRIS website.
- The National Environmental Web-based Screening Tool.

8 IMPACT ASSESSMENT METHODOLOGY

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the following project phases:

- Construction.
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:



Table 5: The rating system

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).



2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.

INTENSITY/ MAGNITUDE

Describes the severity of an impact.

1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

REVERSIBILITY



This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.

1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

CUMULATIVE EFFECT

This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.

1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects

SIGNIFICANCE



Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula:

$$(\text{Extent} + \text{probability} + \text{reversibility} + \text{irreplaceability} + \text{duration} + \text{cumulative effect}) \times \text{magnitude/intensity} = X.$$

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

8.1 Summary of Impact Tables

Loss of fossil heritage will be a negative impact. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on



palaeontological heritage during the construction phase could potentially occur and are regarded as having a Low probability. As fossil heritage will be destroyed the impact is irreversible. The significance of the impact occurring will be low.

Table 6: Summary of Impact Tables

	Site	Probability	Duration	Magnitude	Reversibility	Irreplicable Loss	Cumulative Effect	Significance
	1	2	4	1	4	4	2	17

9 FINDINGS AND RECOMMENDATIONS

The proposed development is underlain by the Allanridge and Bothaville Formations, as well as the Rietgat Formation (Platberg Group, Ventersdorp Supergroup), with a small portion of Quaternary alluvium in the south of the development. The South African Heritage Resources Information System's (SAHRIS) PalaeoMap indicates that the Bothaville Formation has a Moderate Palaeontological Sensitivity, while the Allanridge Formation and Quaternary alluvium have a Low Palaeontological Sensitivity. The DEA Screening Report indicates a Medium Palaeontology Theme Sensitivity and the updated geology indicates that the development is underlain by the Allanridge, Bothaville and Rietgat Formations.

The proposed development has been assigned a Low Palaeontological Significance, and since the entire development footprint is not deemed sensitive in terms of palaeontological heritage, the project's construction and operation may be approved.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation (recording and collection) can be carry out by a paleontologist.

It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of fossils.



10 MITIGATION AND EMPR REQUIREMENTS

The naturally preserved remnants (or traces) of plants or animals imbedded in rock are known as fossils. These plants and animals existed millions of years ago in the geologic past. Fossils are incredibly valuable and difficult to replace. It is possible to identify the environmental conditions that occurred in a certain geographical area millions of years ago by analysing fossils.

This fact sheet is intended for construction workers and foremen. It describes what to do if fossil material is discovered accidentally during mining.

It is the responsibility of the project's Environmental Site Officer (ESO) or site manager to train the workers and foremen on **what to do** if a fossil is accidentally discovered. In the absence of the ESO, a member of staff must be designated to be accountable for the effective application of the chance discovery protocol so that the conservation of fossil material is not jeopardized.

If fossils are discovered during excavation, the following method shall be followed.

10.1 Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act No 25 of 1999) (NHRA)**. According to Section 3 of the Act, all Heritage resources include **“all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens”**.

The NHRA protects and owns the state's palaeontological legacy, which is unique and non-renewable. It is consequently the responsibility of the state to manage and protect fossils on behalf of South African citizens. According to Section 35 of the NHRA, palaeontological resources may not be excavated, broken, transferred, or destroyed by any development without previous assessment and a permit from the relevant heritage resources authority.

10.2 Chance Find Procedure

- If a chance find is made, the person responsible for the find must immediately stop working, and all work in the immediate vicinity of the find must stop as well.
- The individual who discovered the item must immediately notify his or her direct supervisor, who must then notify his or her management and the ESO or site manager. The ESO or site manager must notify the relevant Heritage Agency (South African Heritage Resources Agency, SAHRA) of the discovery. (Contact information: SAHRA, 111 Harrington Street, Cape Town, South Africa. PO Box 4637, Cape Town 8000, South Africa. Fax: +27 (0)21 462 4509. Tel: 021 462 4502. Web address: www.sahra.org.za). Photographs of the find from various perspectives, as well as GPS coordinates, must be submitted to the Heritage Agency.



- Within 24 hours of the discovery, a preliminary report must be sent to the Heritage Agency, which must include the following: 1) the date of finding; 2) a description of the discovery; and 3) a description of the fossil and its context (depth and position of the fossil), as well as GPS coordinates.
- Photographs of the discovery (the more the merrier) must be of high quality, in focus, and accompanied by a scale. Photographs of the vertical part (side) where the fossil was discovered are also required.
- Upon receipt of the preliminary report, the Heritage Agency will notify the ESO (or site manager) whether a palaeontologist rescue excavation or collection is required.
- The place must be guarded to prevent future damage. There should be no attempt to remove material from their environment. Stabilize the exposed items and cover them with a plastic sheet or sand bags. The Heritage organization will also be able to advise on the best way to protect the find.
- If the fossil cannot be stabilized, the ESO (site manager) may carefully collect the fossil.
- Once the Heritage Agency has received the written authorization, the developer may continue with the development on the affected area.
- Fossil finds must be placed in tissue paper and in an appropriate box while necessary care must be taken to remove any fossil material from the rescue site.

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APPENDIX A: CURRICULUM VITAE

PROFESSION: Palaeontologist
YEARS' EXPERIENCE: 30 years in Palaeontology
EDUCATION: B.Sc Botany and Zoology, 1988
University of the Orange Free State

B. Sc (Hons) Zoology, 1991
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Management Course, 1991
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M. Sc. *Cum laude* (Zoology), 2009
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Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998–2022

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