

**PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED DIAMOND MINING
PERMIT APPLICATION NEAR KIMBERLEY, SOL PLAATJIES MUNICIPALITY, NORTHERN CAPE
PROVINCE.**

Registration No: NC 30/5/1/3/2/10698 MP

Compiled for:

OBODO PTY LTD

24 Brockman Place, Beaconsfield,
Kimberley,
8301

12 May 2018

Prepared by:

BANZAI ENVIRONMENTAL (PTY) LTD

Declaration of Independence

General declaration:

- I, Elize Butler, declare that –
- I act as the independent Palaeontologist 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 favourable 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 favourable 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 from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence 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

CONTACT PERSON:

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Email: elizebutler002@gmail.com

SIGNATURE:

A handwritten signature in black ink, appearing to read 'Elize Butler', with a period at the end.

The Palaeontological Impact Assessment report has been compiled taking into account the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Table 1:Nema Requirements

NEMA Regs (2014) - Appendix 6	Relevant section in report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page ii of Report – Contact details and company and Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii-iii
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 4 – Objective
(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 9 – Impacts
d) the date, duration and season of the site investigation and the relevance of the season to the outcome of the assessment;	Desktop Study
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 7 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 alternatives;	Section 1, Section 5
g) an identification of any areas to be avoided, including buffers;	N/A
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
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1.– Assumptions and Limitation
j) a description of the findings and potential implications of	Section 10

such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	
k) any mitigation measures for inclusion in the EMPr;	Section 1, Section 10
l) any conditions for inclusion in the environmental authorisation;	N/A
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
n) a reasoned opinion- i. as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and 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;	Saction1, Section 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable.
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable. To date not comments regarding heritage resources that require input from a specialist have been raised.
q) any other information requested by the competent authority.	Not applicable.
2) Where a government notice <i>gazetted</i> 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.	Refer to section 2 and 3 compliance with SAHRA guidelines

EXECUTIVE SUMMARY

Obodo Pty Ltd has been appointed to assist with a mining permit application of a diamond mine development on a portion of the farm Waterfall 133, Richie, Sol Plaatjie Local Municipality, Frances Baard District Municipality, Northern Cape Province. The National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), states that a Palaeontological Impact Assessment (PIA) is key to detect the presence of fossil material within the planned development footprint. This Impact Assessment is thus necessary to evaluate the effect of the construction on the palaeontological resources.

The proposed mining development is underlain by the Makwassie Formation (Platberg Group; Ventersdorp Supergroup) as well Quaternary deposits of the Kalahari Group. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Makwassie Formation is moderate and that of the Kalahari deposits low. **It is therefore considered that the mining permit application near Kinberley, Northern Cape Province is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.** Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the **Chance Find Protocol** must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (preferably *in situ*) and the ECO ought to alert SAHRA so that appropriate mitigation (*e.g.* documented and collection) can be undertaken by a professional palaeontologist.

The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

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1 INTRODUCTION

Obodo Pty Ltd has been appointed to assist with a mining permit application of a diamond mine development on a portion of the farm Waterfall 133, Richie, Sol Plaatjie Local Municipality, Frances Baard District Municipality, Northern Cape Province. The proposed application area was previously mined/disturbed and the new development will utilize only a small area (5 ha) of the property .

The mining activities will focus on dolomite, alluvial and, if required, target the kimberlite with the hope that the identified area on the farm could be efficiently mined to produce products of economic value.

It is planned that a rotary diamond plant will use a 16 feet rotary pan . It is estimated that the rotary pan will use 17 000 liters of water per hour and will be running for 8 hours a day with water usage estimated at 720 000 liters per week. Mining activities may change the subsurface flow of surface water through dewatering activities, but loss of run-off to the Vaal River is not anticipated.

The proposed mining will include the following:

Chemical Storage

Diesel Storage

Domestic Waste Facility

Excavations

Oil storage facility

Roads to trenches and processing Plant

Slimes dam will be established

Stock Pile

Temporary Dump Site

Water pipeline of undetermined length but less than 10 Km

Invasive Activities will be limited to the digging of trenches

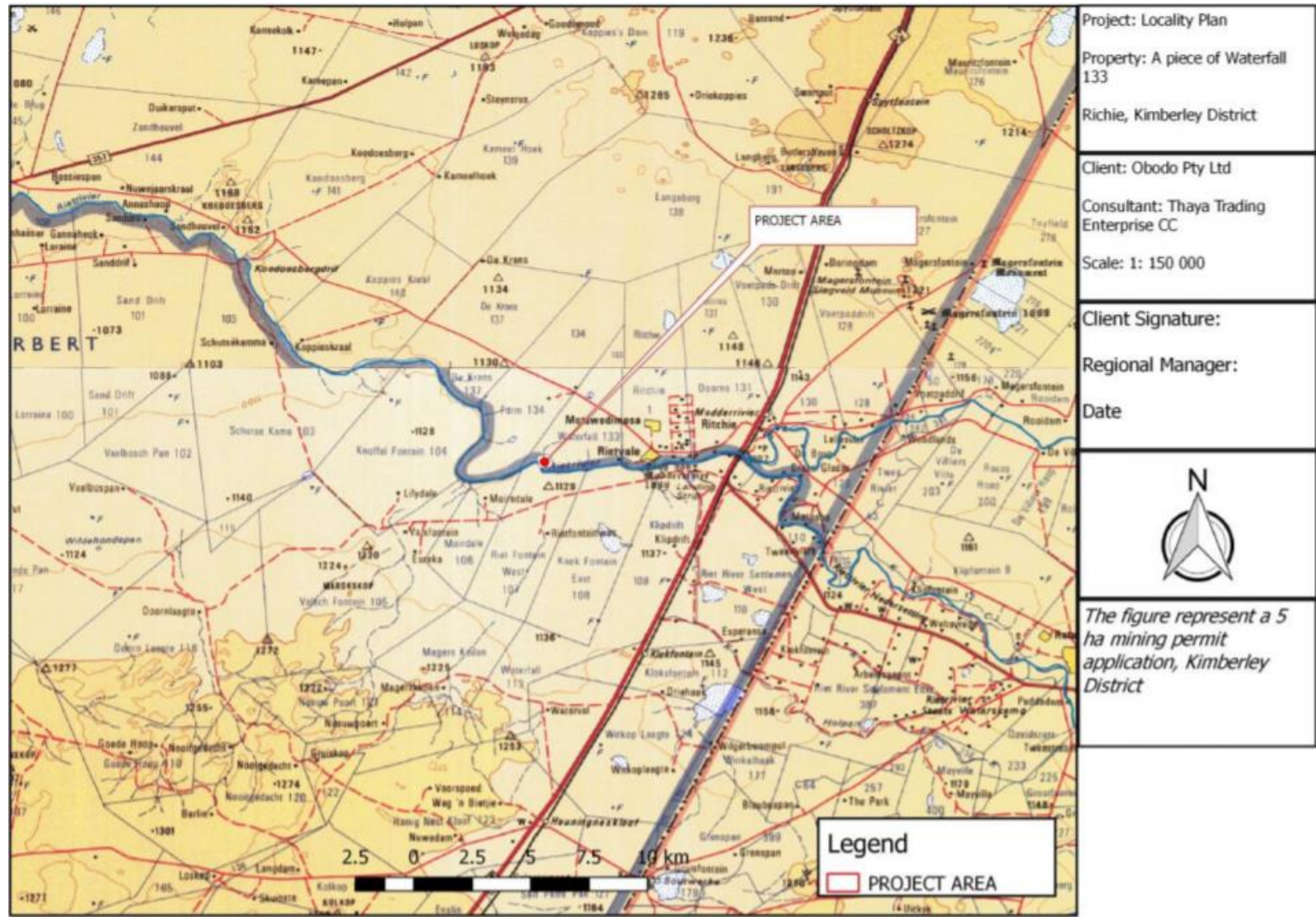


Figure 1: Map of the proposed mining development on a portion of Waterfall 133, Richie, Sol Plaatjie Municipality, Northern Cape Province. Map provided by Obodo.

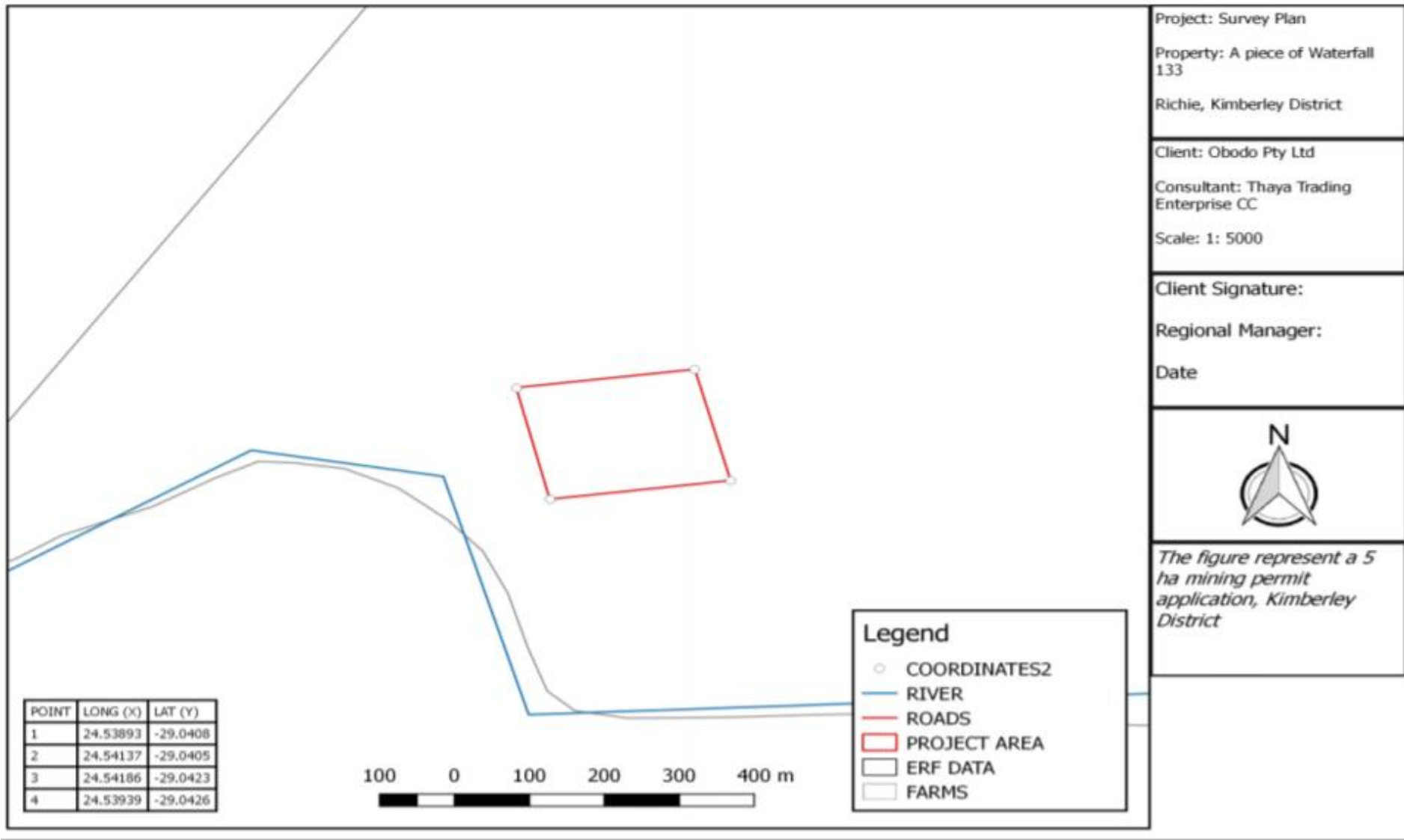


Figure 2: Proposed mining development. Map provided by Obodo.

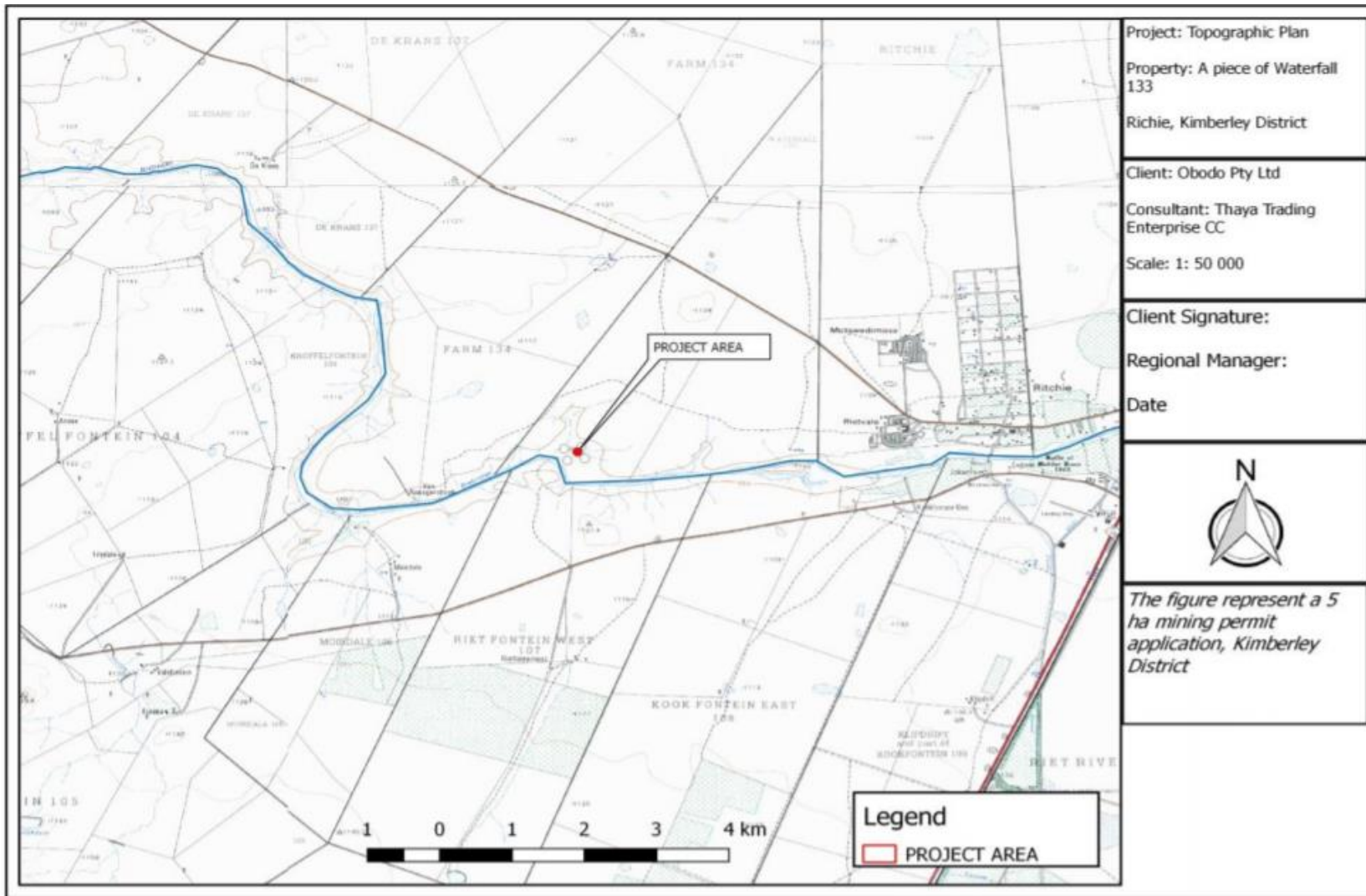


Figure 3: Extract of the 2924 BA topographical map indicating the location of the proposed mining development on a portion of Waterfall 133, Richie, near Kimberley, Sol Plaatjie Municipality, Northern Cape Province. Map provided by Obodobo .

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-four years. She has extensive experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 13 years. She has been conducting PIAs since 2014.

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 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**”.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA. Palaeontological resources 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 DIA 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
- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- 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 OBJECTIVE

The objective of a Palaeontological Impact Assessment (PIA) is to determine the impact of the development on potential palaeontological material at the site.

According to the “SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports” the aims of the PIA are: 1) to **identify** the palaeontological status of the exposed as well as rock formations just below the surface in the development footprint 2) to estimate the **palaeontological importance** of the formations 3) to determine the **impact** on fossil heritage; and 4) to recommend how the developer ought to protect or mitigate damage to fossil heritage.

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;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps
- Provide Palaeontological and geological history of the affected area.
- Identification sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of 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
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

5 GEOLOGICAL AND PALAEOONTOLOGICAL HERITAGE

The proposed development is underlain by the Makwassie Formation (Platberg Group, Ventersdorp Supergroup) as well as Quaternary Kalahari deposits.

Note that three different geological maps were used in this desktop study namely the QGIS map utilizing the Council for Geoscience shapefiles (Figure 5), the 1: 250 000, 2724 Kimberley (1993) Geological Map (Council for Geoscience) (Figure 6); as well as the SAHRIS PalaeoMap (Figure 7). The geological formations indicated on the different maps differ and thus all the relevant geological sediments will be discussed.

A series of four basins developed between 3000 and 2100 Million years ago (Mya), after the stabilization of the Kaapvaal Craton. The **Ventersdorp Supergroup** was the second last of these basins that developed and provides an exceptional volcano-sedimentary supracrustal record. This Supergroup is thus an example of a Large Igneous Province (LIP). In the Kaapvaal Craton, Ventersdorp Supergroup is the largest and most widespread sequence of volcanic rocks.

The Ventersdorp Supergroup consists of two Groups namely Klippriversberg Group at the base that is overlain by the Platberg Group, which is in turn followed by the sedimentary Bothaville Formation and the Volcanic Allanridge Formation (Van Der Westhuizen, 2006).

The Makwassie Formation, present in the development footprint, consists mainly of acid lavas (mostly quartz porphyry), ash flows, and subordinate sediments with minor limestones and cherts present in the upper portion of the succession.

Palaeontological heritage of the **Ventersdorp Supergroup** include lacustrine stromatolites. Microfossils could be present as well, as they have been recorded from sediments of the Platberg Group in the Northern Free State. Cherts could contain organic-walled microfossils. Borehole cores have been taken from this Supergroup and Stromatolites have been recorded (Figure 4).

Algal growth structures, also known as "Stromatolites", are fossil structures described from the dolomites of the Transvaal Supergroup (Figure 3). Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-based life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.



Figure 4: Example of a well preserved stromatolite from the Archaean Era.

Almond & Pether 2008, allocated a low significance to the Kalahari Group because fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. In the past palaeontologists did not focus on Cenozoic superficial deposits although they sometimes comprise of significant fossil biotas.

The **Cenozoic Kalahari Group** (Ca 65 – 2.5 million years old (Ma) is the most widespread body of terrestrial sediments in southern Africa. The Cenozoic sands and calcretes of the Kalahari Group range in thickness from a few metres to more than 180m (Partridge et al., 2006). The youngest formation of the Kalahari group is the Gordonian Formation which is generally termed Kalahari sand and comprises of red aeolian sands that covers most of the Kalahari Group sediments. The pan sediments of the area originated from the Gordonian Formation and contains white to brown fine grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters. Quaternary alluvium, aeolian sands, surface limestone, silcrete, and terrace gravels are also included in the Kalahari Group (Kent 1980

The fossil assemblages of the Kalahari are generally very low in diversity, and occur over a wide range and thus the palaeontological diversity of this Group is low. These fossils represent terrestrial plants and animals with a close resemblance to living forms and include trace fossils, ostracods, bivalves, gastropod shells, diatoms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils.

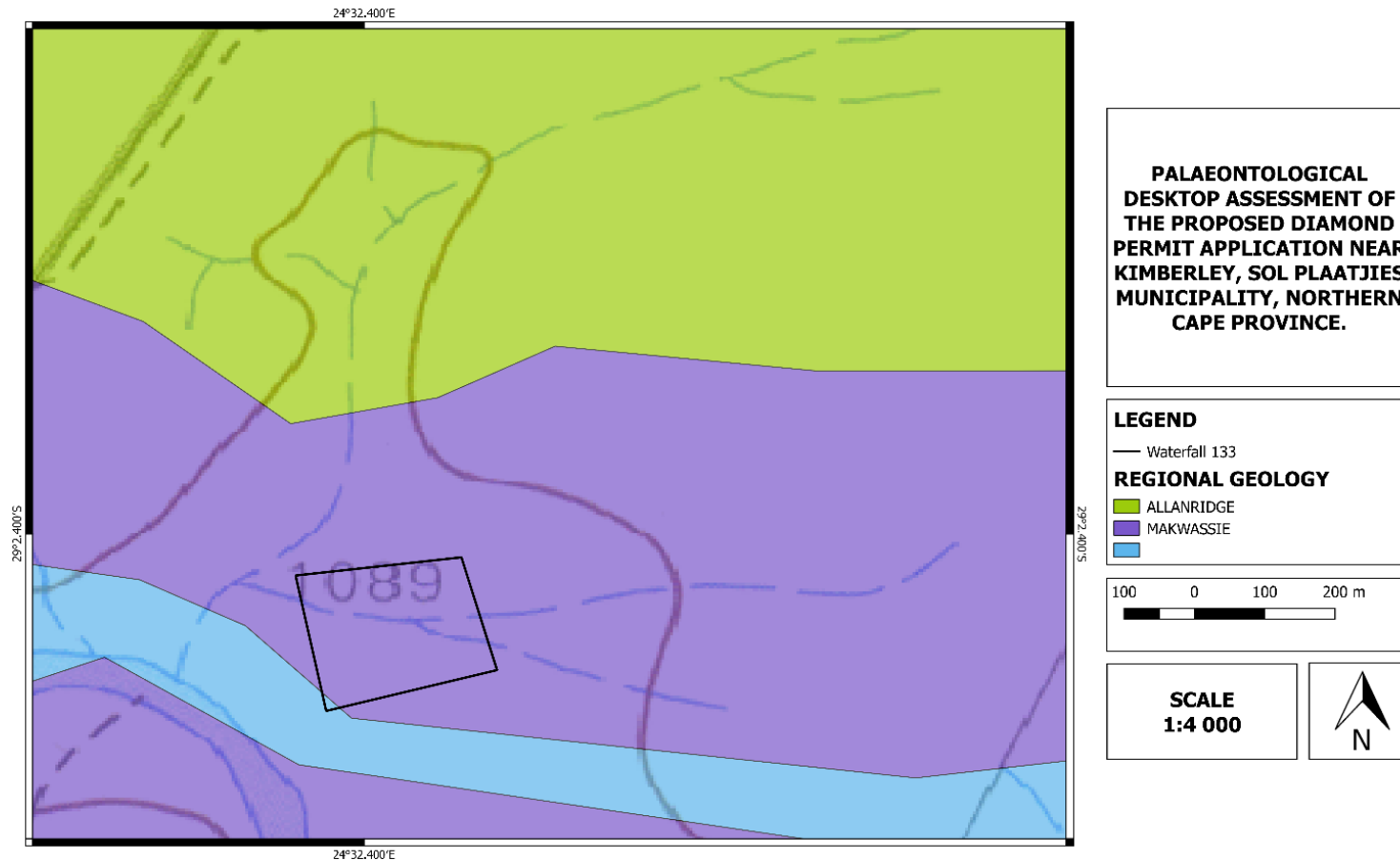


Figure 5: Surface geology of the proposed mining development on a portion of Waterfall 133, Richie, Sol Plaatjie Municipality, Northern Cape Province. The proposed development is underlain by the Makwassie Formation of the Platberg Group and Ventersdorp Supergroup as well as Quaternary Deposits. Map drawn QGIS Desktop 2.18.18

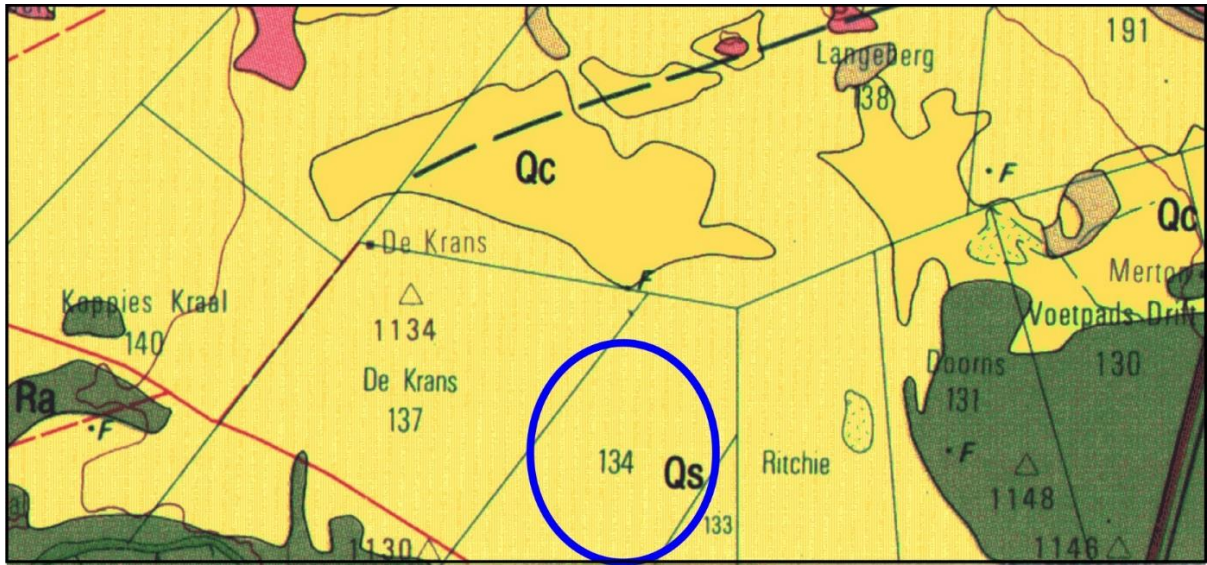


Figure 6: Extract of the 1: 250 000 2824 Kimberly Geological Map (Council for Geosciences, Pretoria) indicating the approximate location of the *proposed mining development on a portion of Waterfall 133, Ritchie, Sol Plaatjie Municipality, Northern Cape Province.*

Legend to Map and short explanation

Qs – Red to grey-coloured wind-blown sand.

Mining activities

Kimberlite pipe (◊)

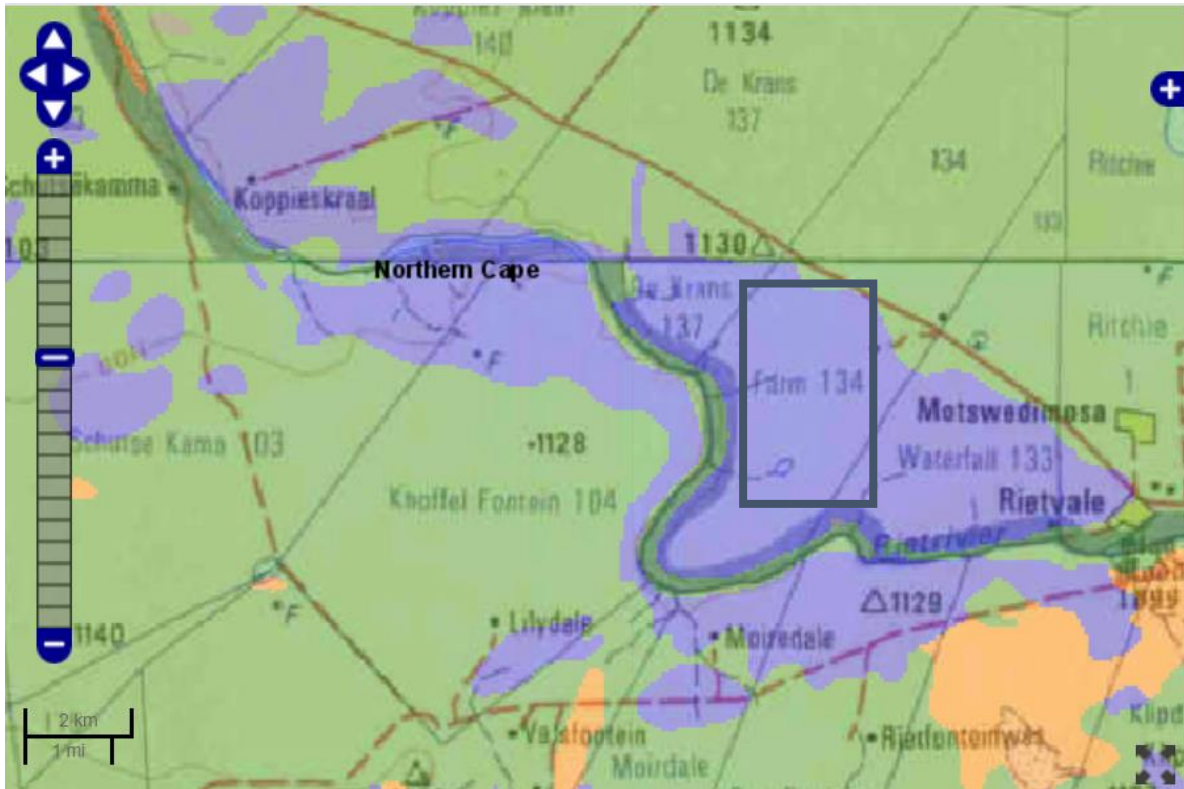


Figure 7: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences). Approximate location of the proposed development is indicated in black

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.

According to the SAHRIS palaeosensitivity map (Figure 7) there is very little chance of finding fossils in this area. This is in contradiction with the tables on the SAHRIS web page where the *Ventersdorp Supergroup* is allocated a moderate Palaeontological Sensitivity.

6 GEOGRAPHICAL LOCATION OF THE SITE

The proposed development is located on a 5 ha portion of farm Waterfall 133, approximately 35 km south of Kimberley

- -29.0408S 24.53893E
- -29.0405S 24.54137E
- -29.0423S 24.54186E
- -29.0426S 24.53939E

7 METHODS

A desktop study was conducted to evaluate the possible risk to palaeontological heritage (this includes fossils as well as trace fossils) in the proposed development area. In compiling the desktop report aerial photos, Google Earth 2018, topographical and geological maps and other reports from the same area as well as the author's experience were used to assess the proposed development footprint. No consultations were undertaken for this Impact Assessment.

7.1 Assumptions and limitations

The accuracy of Desktop Palaeontological Assessment is reduced by several factors which may include the following: the databases of institutions are not always up to date and relevant locality and geological information were not accurately documented in the past. Various remote areas of South Africa have not been assessed by palaeontologists and data is based on aerial photographs alone. Geological maps concentrate on the geology of an area and the sheet explanations were never intended to focus on palaeontological heritage.

Similar Assemblage Zones, but in different areas is used to provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological formations and Assemblage Zones generally **assume** that exposed fossil heritage is present within the development area. The accuracy of the Palaeontological Impact Assessment is thus improved considerably by conducting a field-assessment.

8 ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- The Palaeosensitivity Map from the SAHRIS website.
- 1:250 000 2824 Kimberly Geological Map

- 1: 50 000 Topographical map 2924 BA
- Coordinates was provided by Obodo Pty Ltd
- BAR and EMP for the development provided by Obodo
- Other Impact Studies in the same area is listed in the references and include Almond 2017a;b ; Bamford, 2017; Fourie, 2018, Groenewald 2013, 2014.

9 IMPACT ASSESSMENT METHODOLOGY

- i) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;**

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision).

The criteria used to assess the significance of the impacts are discussed below. The criteria used to assess the significance of the impacts are shown in the table below. The limits were defined in relation to mining characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered.

These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The significance of the impacts was calculated by using the following formula:

(Severity + Spacial Scope + Duration) x Probability weighting

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts. These include roads and hauling, excavations, temporary waste dumping, topsoil storage, mine residue deposit dam, plant and processing area, temporary office, workshops and ablution facilities, water tanks, diesel tanks, pipeline, other temporary buildings, etc.

Significance of impacts is defined as follows:

No Impact – There will be no impact on the system or any of its parts.

Very Low – Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low – Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Medium – Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

High – Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Very High – Of the highest order possible within the bounds of impacts which could occur. There would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted.

Table 7:

Weight	Severity	Spatial Scope	Duration
1	Insignificant/non-harmful	Activity specific/No effect/Controlled	Immediate (0 – 6 months)
2	Minimal / potentially harmful	Slight permanent deviation / on-site	Short term / construction (6 months- 1 yr)
3	Medium / slightly harmful	Immediate surroundings / local / outside mine area	Life of operation
4	High / Critical / Serious	Regional effect	Decommissioning
5	Catastrophic / major	National/ Severe environmental damage	Residual
6	Disastrous	Trans boundary effects	Residual

Table 8:

Weight Number		1	2	3	4	5
Frequency						
Probability	Frequency of Impact	Highly unlikely	Rare	Low likelihood	Probable/possible	Certain

					e	
		Practical ly impossi ble	Conceivable but very unlikely	Only remotel y possible	Unusua l but possibl e	Definite
	Frequen cy of Activity	Annually or less	6 monthly/tempor arily	Infreque nt	Life of operati on	Life of operati on

Table 9:

CONSEQUENCE (Severity + Spatial Scope + Duration)															
PROBABILITY (Frequency of activity + frequency of impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 10

Colour Code	Significance Rating	Value	Negative Impact Management Strategy	Positive Impact Management Strategy
	VERY HIGH	126 – 150	Improve current	Maintain current

			management	management
	HIGH	101 – 125	Improve current management	Maintain current management
	MEDIUM – HIGH	76 – 100	Improve current management	Maintain current management
	LOW – MEDIUM	51 – 75	Improve current management	Maintain current management
	VERY LOW	26 – 50	Improve current management	Maintain current management
		1 - 25	Improve current management	Maintain current management

9.1 SUMMARY OF IMPACT TABLES

The proposed development is underlain by the Makwassie Formation (Platberg Group, Ventersdorp Supergroup) as well as Quaternary Kalahari deposits. The Palaeontological Sensitivity of the Makwassie formation is moderate while that of the Kalahari is Low. The severity of the impacts is rated as medium. The impacts will only have an effect on the development site. The expected duration of the impact is assessed as potentially permanent to long term. Impacts on palaeontological heritage will only occur during the construction phase but are regarded as having a low possibility.

10 FINDINGS AND RECOMMENDATIONS

The proposed mining development is underlain by the Makwassie Formation (Platberg Group; Ventersdorp Supergroup) as well as Quaternary deposits of the Kalahari Group. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Makwassie Formation is moderate. **It is therefore considered that the Mining permit application near near Kinberley, Northern Cape Province is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.** Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the **Chance Find Protocol** must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (preferably *in situ*) and the ECO ought to alert SAHRA so that appropriate mitigation (e.g. documented and collection) can be undertaken by a professional palaeontologist.

The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

11 CHANCE FINDS PROTOCOL

A following procedure will only be followed in the event that fossils are uncovered during excavation.

11.1 LEGISLATION

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act 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**”.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, 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.

11.2 BACKGROUND

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

11.3 INTRODUCTION

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Control Officer (ECO) of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ECO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

11.4 CHANCE FIND PROCEDURE

- If a chance find is made the person responsible for the find must immediately **stop working** and all work must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO or site manager. The ECO

must report the find to the relevant Heritage Agency (South African Heritage Research Agency, 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). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.

- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

Upon receipt of the preliminary report, the Heritage Agency will inform the ECO (site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency has issued the written authorization, the developer may continue with the development.

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Appendix: 1: CV

ELIZE BUTLER

PROFESSION: Palaeontologist
YEARS' EXPERIENCE: 25 years in Palaeontology

EDUCATION: B.Sc Botany and Zoology, 1988
University of the Orange Free State

B.Sc (Hons) Zoology, 1991
University of the Orange Free State

Management Course, 1991
University of the Orange Free State

M. Sc. *Cum laude* (Zoology), 2009
University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

Registered as a PhD fellow at the Zoology Department of the UFS

2013 to current

Dissertation title: A new gorgonopsian from the uppermost *Daptocephalus Assemblage Zone*, in the Karoo Basin of South Africa

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–currently

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