



PALAEONTOLOGICAL  
IMPACT ASSESSMENT

GLEN EWAN PRIVATE  
SCHOOL

EASTERN CAPE  
PROVINCE

2022

COMPILED FOR:  
isi-Xwiba Consulting 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.

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Ltd

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**SIGNATURE:**



The Palaeontological Impact Assessment (PIA) 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: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended).*

<b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>	<b>The relevant section in the report</b>
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 vita	Section 2 – refer to <b>Appendix A</b>
(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 – 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 1;10 and 11
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1;9 & 11
(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 Approach and Methodology
(f) details of an assessment of the specifically 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;10 & 11



<b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>	<b>The relevant section in the report</b>
(g) An identification of any areas to be avoided, including buffers	Section 1 & 11
(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
(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 such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 11
(k) Any mitigation measures for inclusion in the EMPr	Section 1 and 11
(l) Any conditions for inclusion in the environmental authorisation	Section 1 and 11
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 1 and 11
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 11
(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 11



<b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>	<b>The relevant section in the report</b>
(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 of any comments that were received during any consultation process	Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) process.
(q) Any other information requested by the competent authority.	Not applicable
(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

Banzai Environmental was appointed by isi-Xwiba Consulting CC to conduct the Palaeontological Impact Assessment (PIA) to assess the establishment of the Glen Ewan Private School, on Portion 13 of the Farm Weltevreedden No 176, Queenstown District, Enoch Mgijima Local Municipality in the Eastern Cape Province. In accordance with the National Environmental Management Act 107 of 1998 (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the Palaeontological Heritage and to mitigate possible damage to fossil resources.

The proposed development is underlain by Quaternary alluvium as well as the Burgersdorp Formation (Tarkastad Subgroup, Beaufort Group, Karoo Supergroup). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of Quaternary alluvium is moderate while that of the Burgersdorp Formation is Very High. Due to the Very High Sensitivity a site visit was triggered.

A site-specific field survey of the development footprint was conducted on foot on 7 July 2022. No visible evidence of fossiliferous outcrops was found. For this reason, an overall low palaeontological sensitivity is allocated to the development footprint. The construction of the development may thus be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, if significant fossil remains or plant 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 ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager 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](http://www.sahra.org.za)) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.



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## 1 INTRODUCTION

The following information was provided by isi-Xwiba Consulting CC

The David Osborne Family Trust intends the construction of a private school on the land described as Portion 13 of the Farm Weltevreden No 176, situated in the Queenstown District, Enoch Mgijima Local Municipality, Eastern Cape Province (**Figure 1-2**).

The property is 25,2450 ha in extent and is currently zoned as “Agriculture”. Water sources consist of three (3) boreholes.

The property is located outside of the defined Municipal *Urban Edge*, but according to the EMLM Local Spatial Development Framework, the property is within an area designated as a Special Management Area, which would allow for the development of guest houses, life-style properties, and eco-estates etc. providing that applications for conversion of the current agricultural zoning comply with environmental and other legislative requirements (**Figure 3-4**).

The total development footprint is 6.9822 ha. Development will follow a phased approach with:

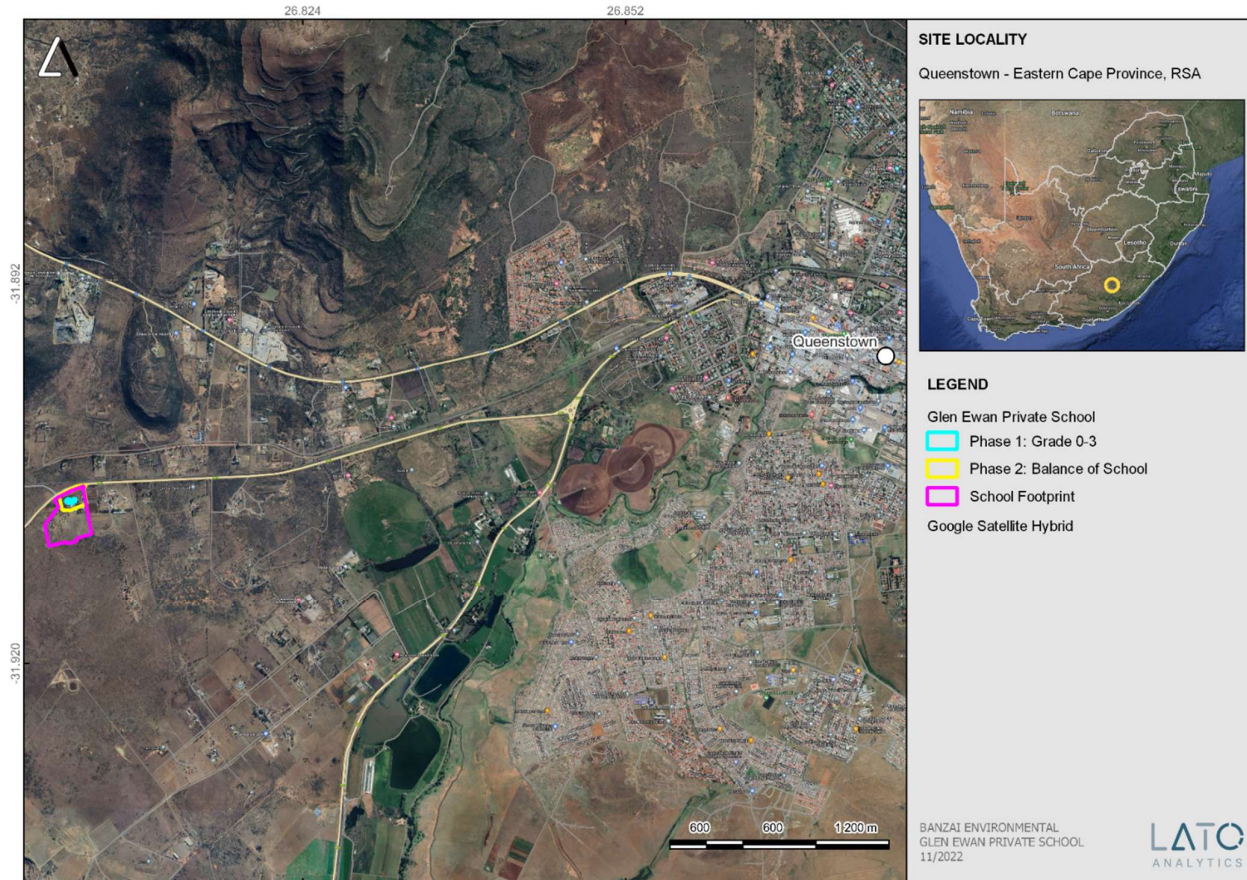
- (i) Phase 1 being the construction of school facilities for Grade 0 to Grade 3 students. The construction footprint is 1 955 m<sup>2</sup> and the target date for the start of classes is January 2023, thus construction ideally needs to commence in August 2022
- (ii) Phase 2 encompasses the development of the remainder of the buildings for Grades up to Grade 12 on a footprint of 30 303 m<sup>2</sup> and the development of sports field on an area of 37 564 m<sup>2</sup>
- (iii) The existing farm house and buildings will be used for staff accommodation

As the Phase 1 development footprint is <1 ha in extent approval is sought to commence this phase without following an EIA process. DEDEAT have requested a site sensitivity verification report based on the on-line screening report in order to guide their decision.

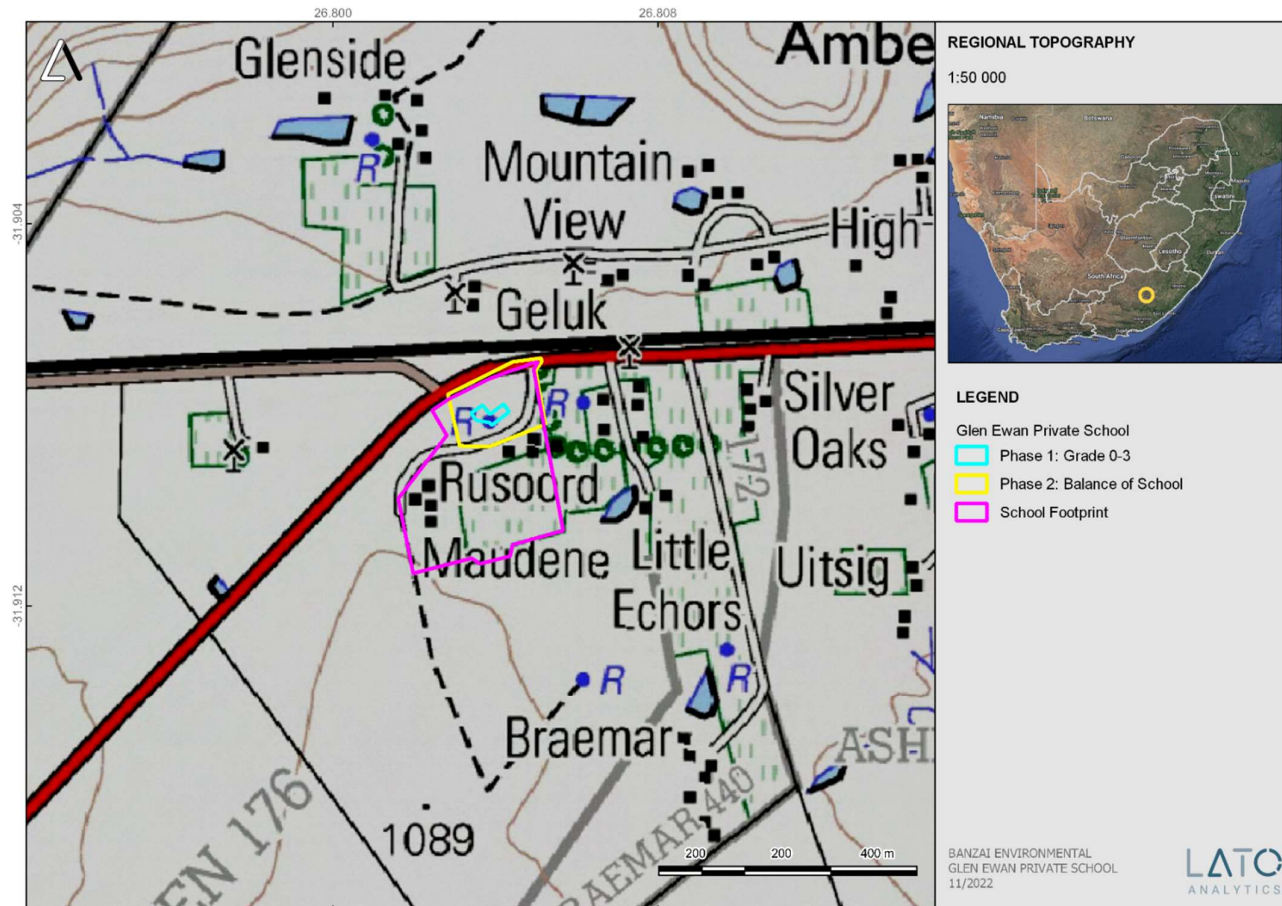
Phase 2 will be subject to an EIA process.

## 2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This study has been conducted by Mrs Elize Butler. She has conducted approximately 400 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-eight years. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.



**Figure 1:** Aerial image of the proposed Glen Ewan Private School on Portion 13 of the Farm Weltevreden No 176, in the Queenstown District, Enoch Mgijima Local Municipality, Eastern Cape The proposed development is indicated in yellow.



**Figure 2:** Locality Map of the proposed Glen Ewan Private School on Portion 13 of the Farm Weltevreden No 176, in the Queenstown District in the Enoch Mjijima Local Municipality, Eastern Cape indicated in purple.



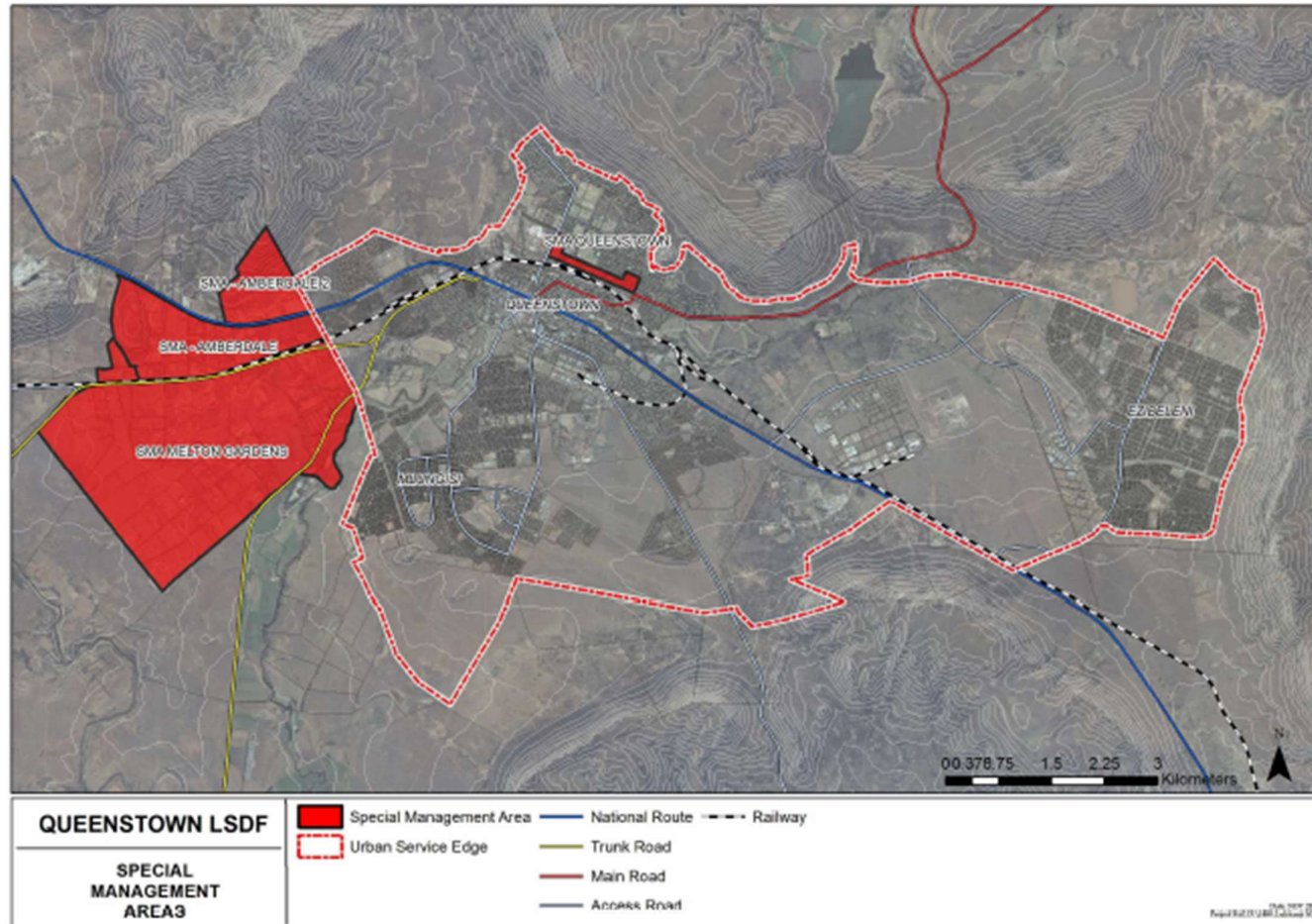


Figure 3: Special Management area 3

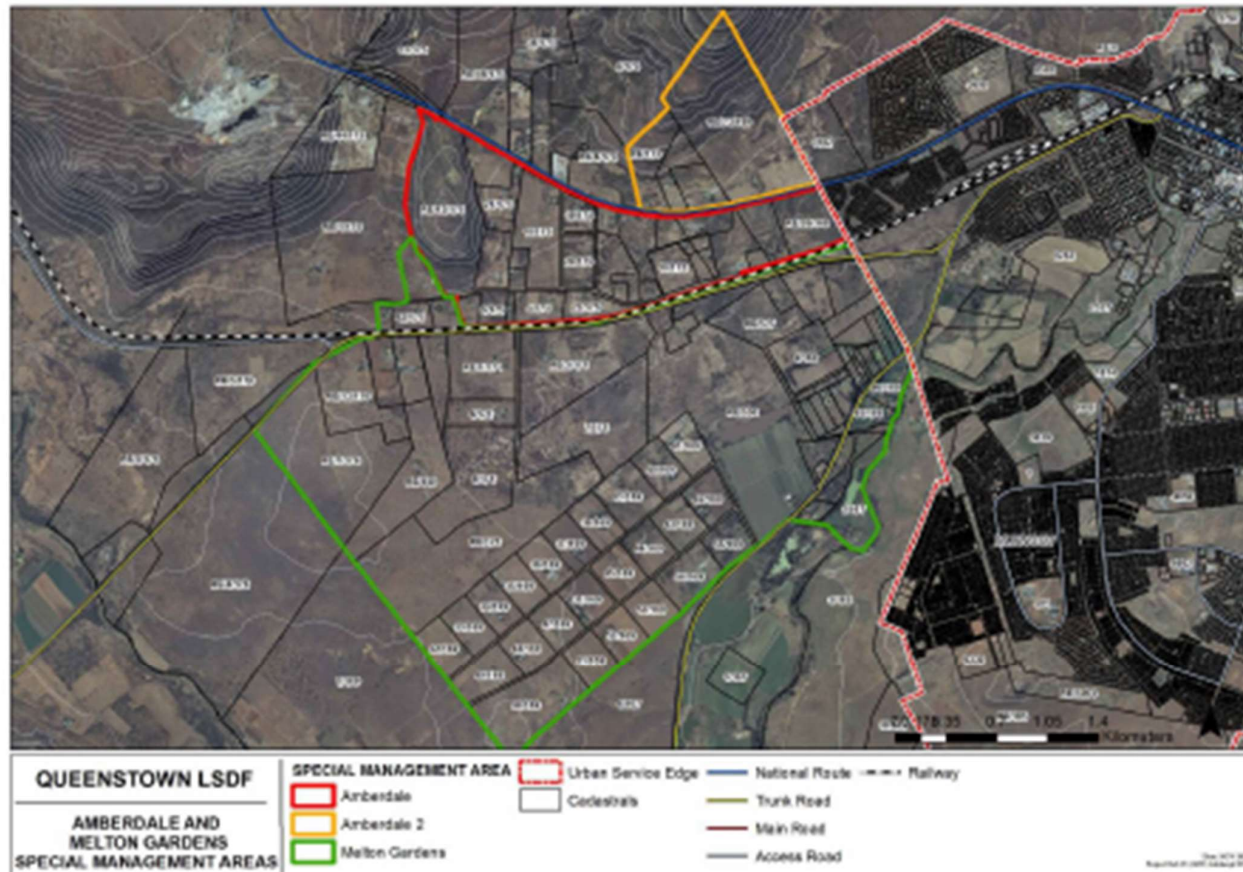


Figure 4: Amberdale and Melton Gardens Special Management Areas.



### 3 LEGAL MANDATE AND PURPOSE OF THE REPORT

National Environmental Management Act (NEMA)

Environmental Impact Assessment (EIA) Regulations GN R. 324, GN R. 325 and GN R. 327 promulgated in terms of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended, identify certain activities, which “could have a substantial detrimental effect on the environment”. These listed activities require environmental authorisation from the competent authority, the Department Economic Development, Environmental Affairs & Tourism (DEDEAT), prior to commencing any development. The list of possible activities to be evaluated are as follows: Number and date of the relevant Government Notice Listing Notice Activity Number(s)

In terms of the relevant Government Notice

GN 327 dated 7th April 2017 1 12, 27, 28 & 67

GN 324 dated 7th April 2017 3 14 & 26

Accordingly, the proposed project will require the submission of a Basic Assessment Report (BAR) and Environmental Management Programme (EMPr) as outlined as outlined in GN R. 326 being the Amendments to the Environmental Impact Assessment Regulations, 2014 as amended. The objectives of the BAR process and EMPr are set out hereunder.

Basic Assessment Report (BAR) - The objective of the BAR is to through a consultative process—

- (a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) Identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) Describe the need and desirability of the proposed alternatives;
- (d) Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focus on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine—
  - (i) The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
  - (ii) The degree to which these impacts—
    - (aa) can be reversed;
    - (bb) may cause irreplaceable loss of resources; and
    - (cc) can be avoided, managed or mitigated; and
  - (e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
    - (i) Identify and motivate a preferred site, activity and technology alternative;
    - (ii) Identify suitable measures to avoid, manage or mitigate identified impacts; and
    - (iii) Identify residual risks that need to be managed and monitored.





Environmental Management Programme (EMPr) – The EMPr sets out the description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including—

- (i) Planning and design;
- (ii) Pre-construction activities;
- (iii) Construction activities;
- (iv) Rehabilitation of the environment after construction and where applicable post closure; and where relevant, operation activities

*Table 2: Description of NEMA Listed Activities that may be considered*

GN No.	Listing Notice	Activity	Description of Activity
327	1	12	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse where the definition of a watercourse includes a wetland
327 (2017)	1	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation where the impact footprint is on an area of 12.3220 ha
327 (2017)	1	28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) <del>will occur inside an urban area, where the total land to be</del> developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare and the impact footprint will



			not exceed 12.3320 ha
327 (2017)	1	67	Phased activities for all activities- (i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices
324 (2017)	3	14	The development of— (ii) infrastructure or structures with a physical footprint of 10 m <sup>2</sup> or more, where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse In the Eastern Cape. Outside urban areas: <del>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</del> <del>(bb) National Protected Area Expansion Strategy Focus areas;</del> <del>(cc) World Heritage Sites;</del> <del>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</del> <del>(ee) Sites or areas identified in terms of an international Convention;</del> (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; <del>(gg) Core areas in biosphere reserves;</del> <del>(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve</del>



324 (2017)	3	26	Phased activities for all activities— i. listed in this Notice and as it applies to a specific geographical area, which commenced on or after the effective date of this Notice; or ii. similarly listed in any of the previous NEMA notices, and as it applies to a specific geographical area, which commenced on or after the effective date of such previous NEMA Notices— where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold
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### 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”**.

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 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 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 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 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36



- Heritage Resources Management – Section 38

MPRDA Regulations of 2014

Environmental reports to be compiled for application of mining right – Regulation 48

- Contents of scoping report – Regulation 49
- Contents of environmental impact assessment report – Regulation 50
- Environmental management programme – Regulation 51
- Environmental management plan – Regulation 52

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 the following comprehensive and legally compatible PIA report have 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 m<sup>2</sup> 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 m<sup>2</sup> in extent.
- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.



## 4 OBJECTIVE

The aim of a Palaeontological Impact Assessment (PIA) is to decrease the effect of the development on potential fossils at the development site.

According to the “SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports” the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the formations; 3) to clarify the **impact** on fossil heritage; and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development and c) the quantity of bedrock removed.

When the development footprint has a moderate to high palaeontological sensitivity a field-based assessment is necessary. The desktop and the field survey of the exposed rock determine the impact significance of the planned development and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase while the excavations will change the current topography and destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

Mitigation usually precede construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. Preceding excavation of any fossils a permit from SAHRA must be obtained and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact as possible because our knowledge of local palaeontological heritage may be increased

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/kml's) 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** 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 PALAEOLOGICAL HISTORY

The geology of the Glen Ewan Private School in the Eastern Cape is depicted on the 1:250 000 Queenstown 3126 (1986) Geological Map (Council of Geosciences, Pretoria) (**Figure 5, Table 2-3**). The Project is underlain by Quaternary alluvium (yellow, single bird figure) as well as the Burgersdorp Formation (Trk=green with red lines) (Upper Beaufort Group, Karoo Supergroup). Recent Shape files produced by the Council of Geosciences (Pretoria) indicates that the proposed project is underlain by the Tarkastad Subgroup (**Figure 6**). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of Quaternary alluvium is Moderate while the that of the Burgersdorp Formation is Very High (Almond and Pether, 2009; Almond *et al.*, 2013).

The Late Caenozoic alluvium deposits overlying the Karoo Supergroup bedrocks may contain local concentrations of fossil assemblages resembling modern animals. These fossil assemblages may comprise of mammalian teeth, bones and horn corns, reptile skeletons and fragments of ostrich eggs. Microfossils, non-marine mollusc shells are also known. Plant material such as foliage, wood, pollens and peats are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria and rhizoliths (MacRae 1999, Brink *et al.* 1999, Brink & Rossouw 2000, Churchill *et al.* 2000, Partridge & Scott 2000). Fossils from this time are found in ancient or present drainage lines and may include pan and vlei deposits as well as terrace gravels. Colluvial sediments present in the development area are most probably represented by the Pleistocene to Holocene Masotcheni Formation (not mapped individually on the geological map but present on hillslopes overlying the Burgersdorp Formation and uncovered in erosion gullies). Fossils from this Formation includes stone artefacts from the Early to Middle Stone age and reworked petrified wood.



The Quaternary deposits reveal palaeoclimatic changes in the different geological formations (Hunter et al., 2006). The climatic fluctuations in the Cenozoic Era were responsible for the formation of most geomorphologic features in southern Africa (Maud, 2012). Various warming and cooling events occurred in the Cenozoic but climatic changes during the Quaternary, specifically the last 1.8 Ma, were the most drastic relative to all climate variations in the past (Barnosky, 2005). Climate in the Quaternary were drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth et al., 2004).

The largest portion of the development is underlain by the Burgersdorp Formation of the Tarkastad Subgroup (Karoo Supergroup). The Tarkastad Subgroup comprises of a lower Katberg and upper Burgersdorp Formation (Trk=green with red lines) (**Figure 7**). The Burgersdorp Formation is the youngest stratigraphic unit of the Permo-Triassic Beaufort Group in the main Karoo Basin and contain continental fossil biota from the Early to Middle Triassic (Olenekian-Anisian age). This Formation is paraconformably overlain by the Molteno and Elliot Formations of the Stormberg Group. The Burgersdorp formation is rich in mudrocks and is 900-1000 m thick in its southern outcrop area near Queenstown (Johnson *et al.* 2006). Kitching (1995) found that the type area near Queenstown was about 600m thick. The sandstones of this Subgroup are moderately sorted, fine to medium grained, crossbedded, horizontally laminated and ripple cross laminated. The sandstones vary in colour from pale olive or greenish grey tabular subarkose sandstones. The mudstones are horizontally laminated or structureless horizontally laminated, thick to medium bedded. These mudstones are minor green to red in colour. Thin mudstone beds occur, with red mudstone beds growing in abundance towards the upper border of the formation as it is grading into the Burgersdorp Formation (Johnson, 1976; Johnson et al. 2006). The Burgersdorp Formation is mostly argillaceous and can be interpreted as a meandering fluvial to lacustrine deposit (Johnson et al, 2006; Groenewald, 1996).

The Burgersdorp Formation comprise of the *Cynognathus Assemblage Zone (CAZ, Figure 8)*. The biostratigraphy and lithostratigraphy for the *Cynognathus Assemblage Zone* have been revised by Hancox et al (2020). This Assemblage Zone (AZ) is underlain by the *Lystrosaurus declivis* AZ and is at the base of the overlying Molteno Formation of the Stormberg Group. This Formation is characterized by the presence of the cynodont *Cynognathus* throughout the Zone (**Figure 9**). The CAZ is about 650m thick in the southeast of the basin thinning towards the north where it is only about 50m thick. The CAZ is divided in three subdivisions namely the lower Langbergia-Garjainia Subzone; a middle Trirachodon-Kannemeyeria Subzone (**Figure 8**) and an upper Cricodon-Ufudocyclops Subzone (**Figure 10**). The basal contact is where the first appearance of *Langbergia modisei* and *Cynognathus crateronotus*. occurs. The upper limit of the *Cynognathus AZ* is not defined and is unconformably terminated by the overlying Molteno Formation.

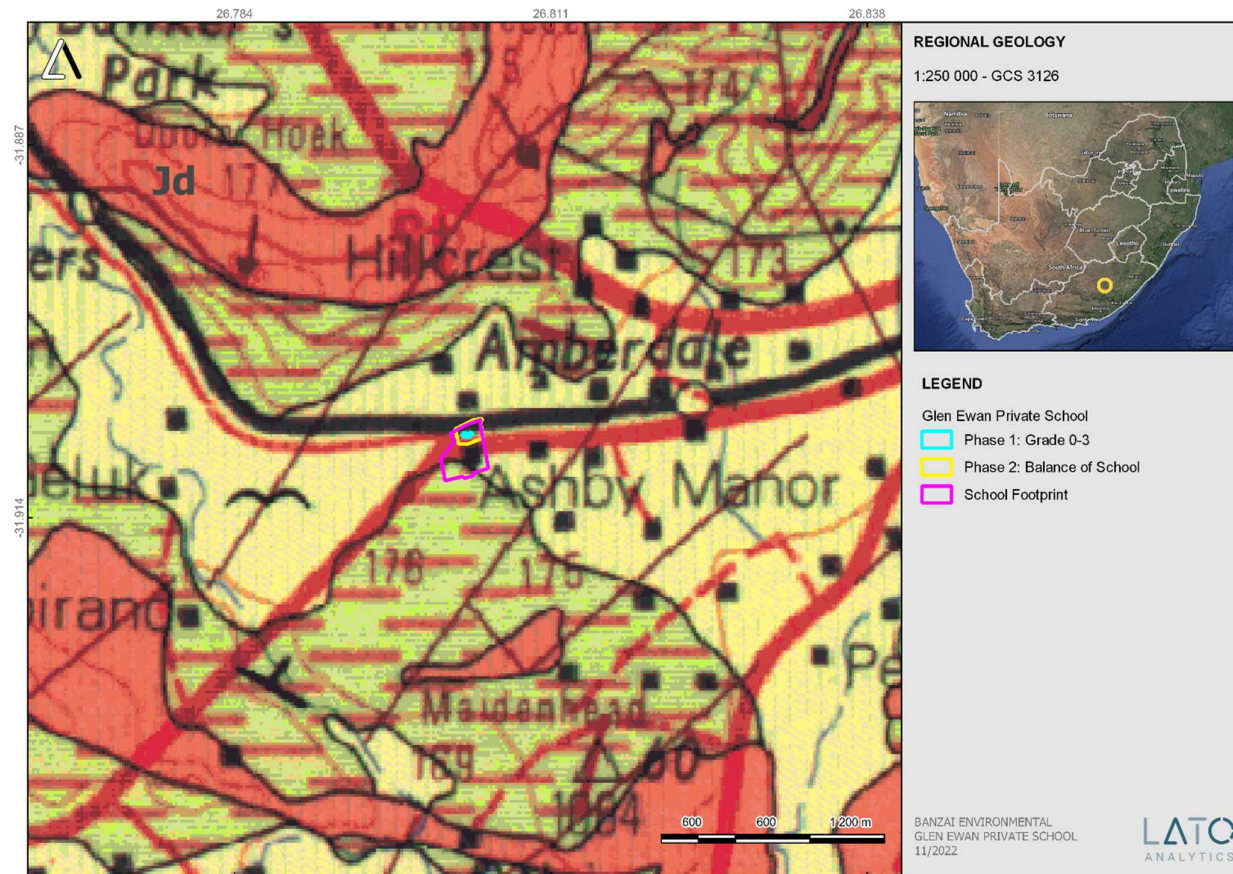
Biotas of the Burgersdorp Formation include freshwater vertebrate fauna and several fish groups have been described namely lungfish, coelacanths and sharks. Reptiles include the distant relatives of the dinosaurs namely the primitive archosaurs and crocodile-like erythrosuchids. Therapsid fauna comprise of the small to medium sized therocephalian carnivores and herbivores as well as dicynodonts



(*Kannemeyeria*) and advanced cynodonts (*Diademodon*) (Anderson and Anderson, 1985; Kitching, 1995; Bamford, 2004; Abdala et al., 2005; Rubidge, 2005; Neveling et al., 2005; Abdala and Smith, 2009).

A low diversity of plants has also been uncovered in the Burgersdorp Formation and include *Dicroidium*, conifers, ginkgos, cycads, ferns, lycophytes, and gymnospermous fossil woods.

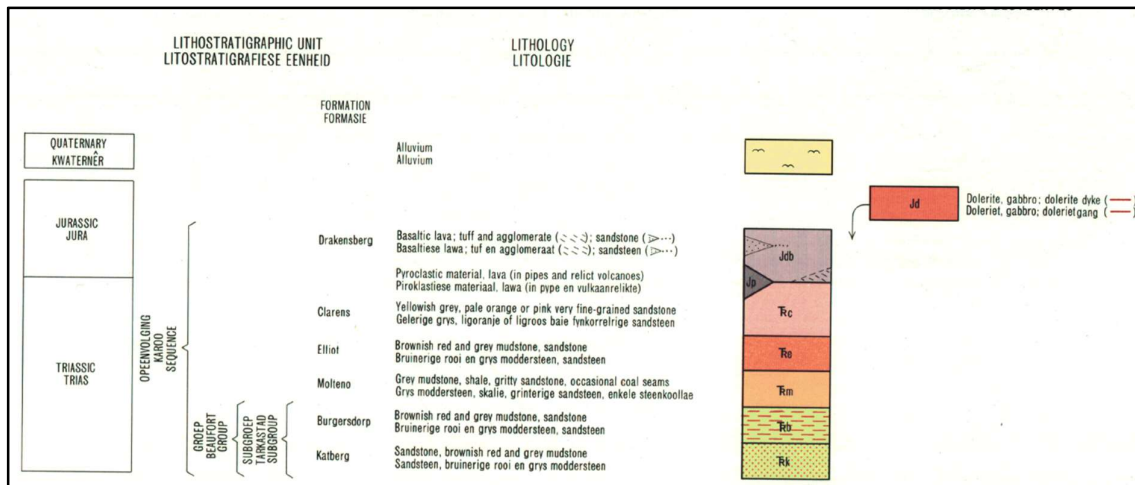


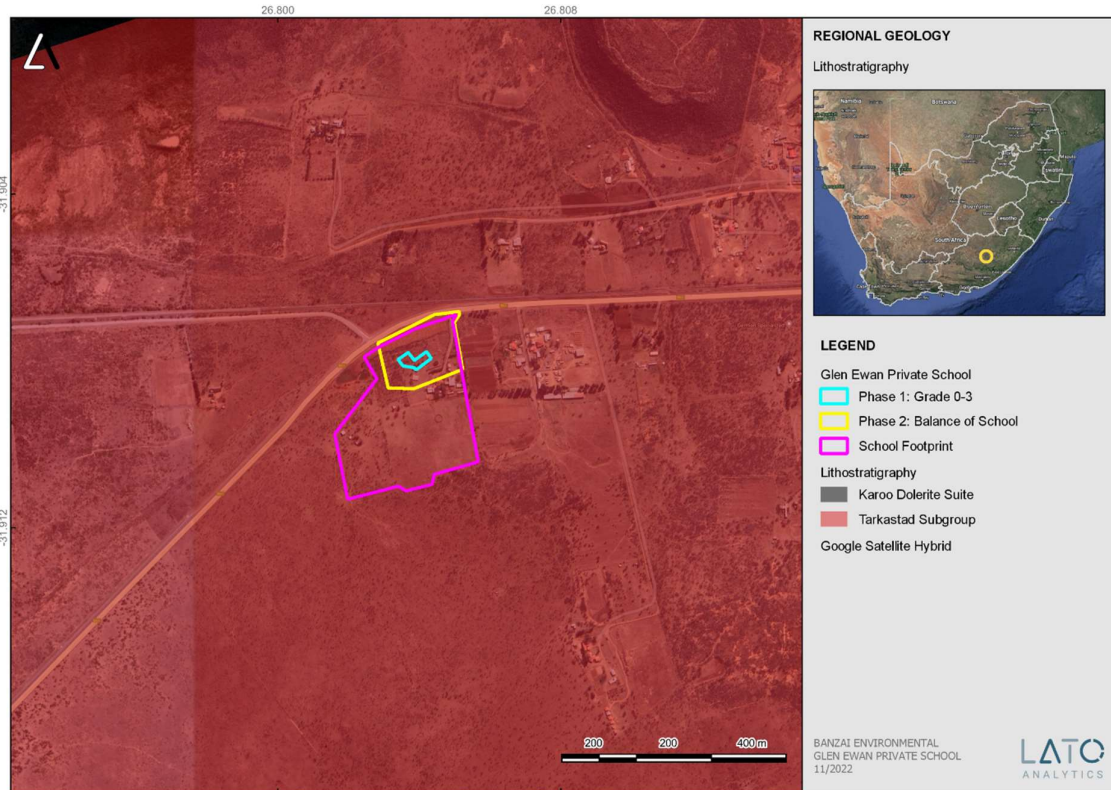


**Figure 5:** Extract of the 1:250 000 Queenstown 3126 Geological Map (1982) (Council of Geoscience, Pretoria) indicating the Glen Ewan Private School development in blue. The proposed development is underlain by Quaternary alluvium as well as the Burgersdorp Formation (Tarkastad Subgroup, Beaufort Group, Karoo Supergroup).



Table 3: Legend to Map and short explanation of the development and surrounding sediments (Modified from the 1:250 000 Queenstown 3126 Geological Map (1982) (Council of Geoscience, Pretoria)





**Figure 6:** Shape files compiled by the Council of Geosciences (Pretoria) indicates that the proposed Glen Ewan Private School development in the Eastern Cape is underlain by the Tarkastad Subgroup (Beaufort Group, Karoo Supergroup).

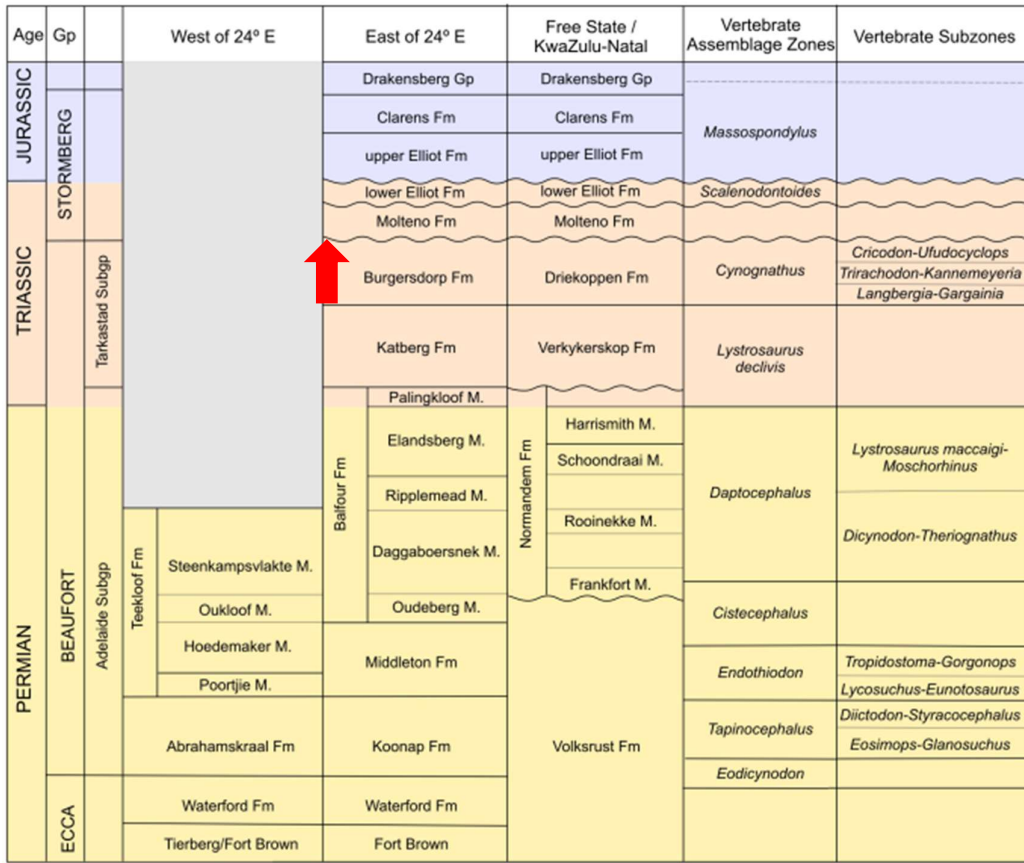
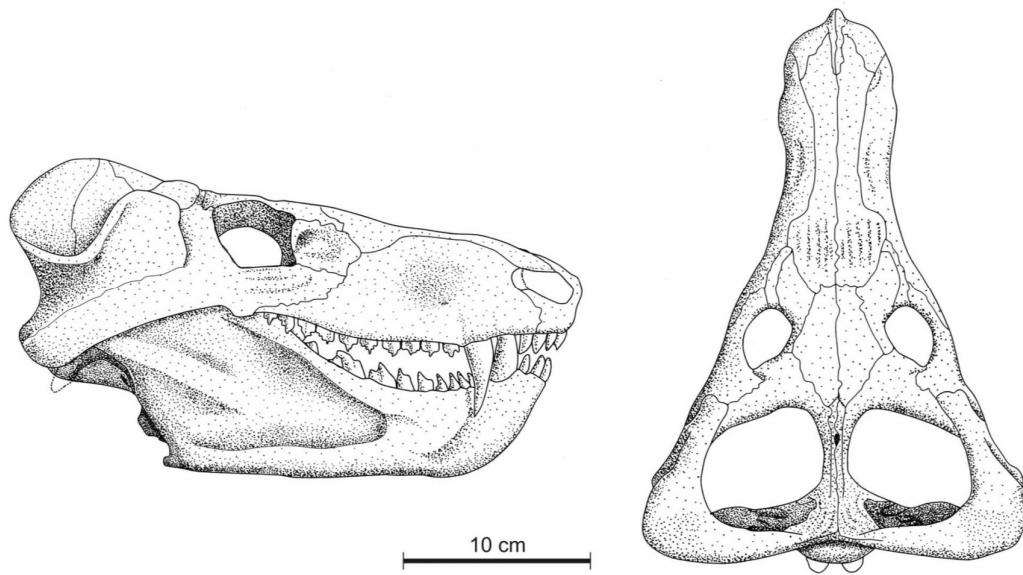


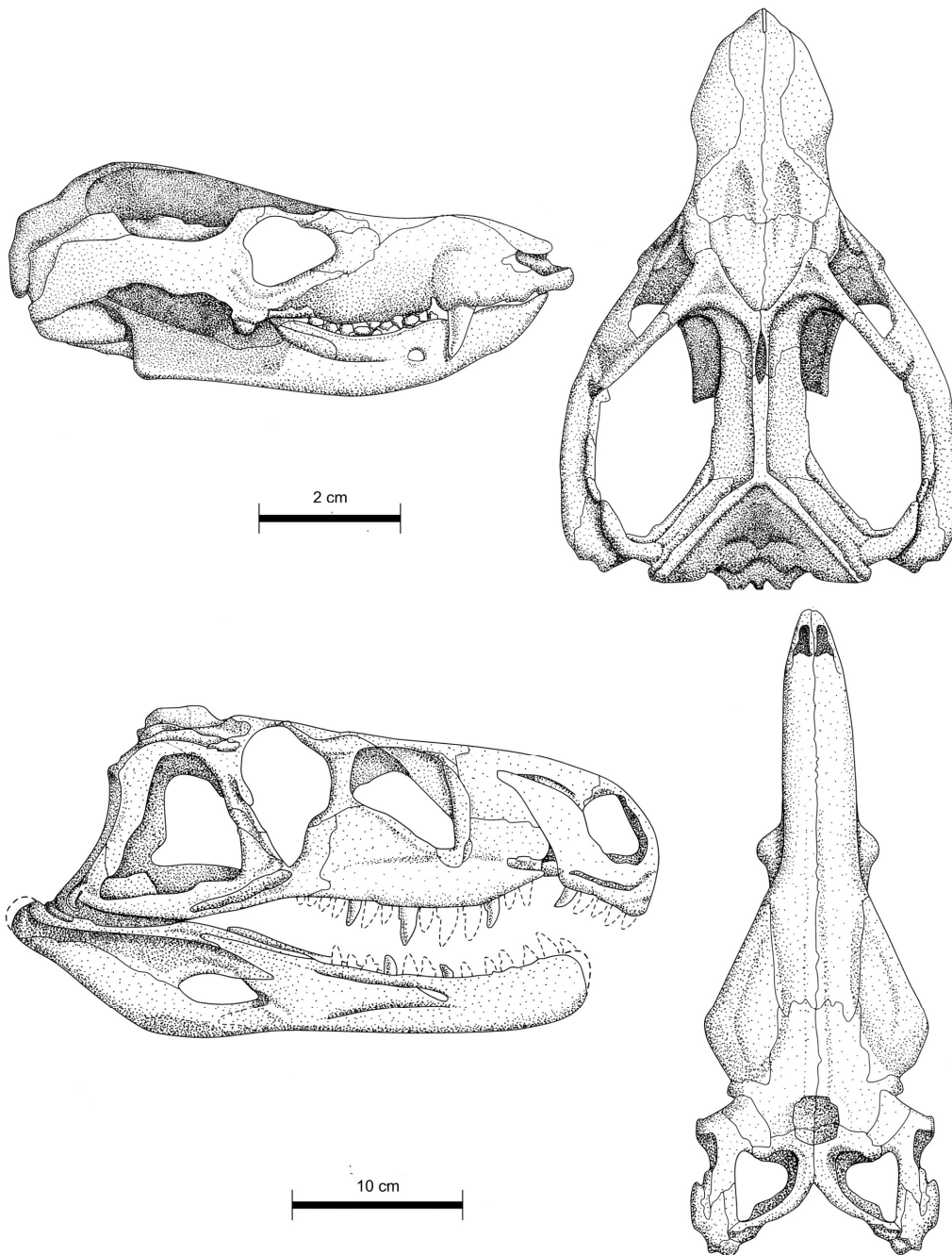
Figure 7: Vertebrate biozonation range chart for the Main Karoo Basin of South Africa.

Solid lines indicate known ranges, dotted lines indicate suspected but not confirmed ranges, single dot represents the stratigraphic position of the taxa that have only been recovered from a single bed. Wavy lines indicate unconformities. (PLYCSR=Pelycosauria and MAMMFMES+Mammaliaformes. Gp=group, Subgp=Subgroup, Fm=Formation, M=Member. The proposed cemetery development is indicated by the red arrow.

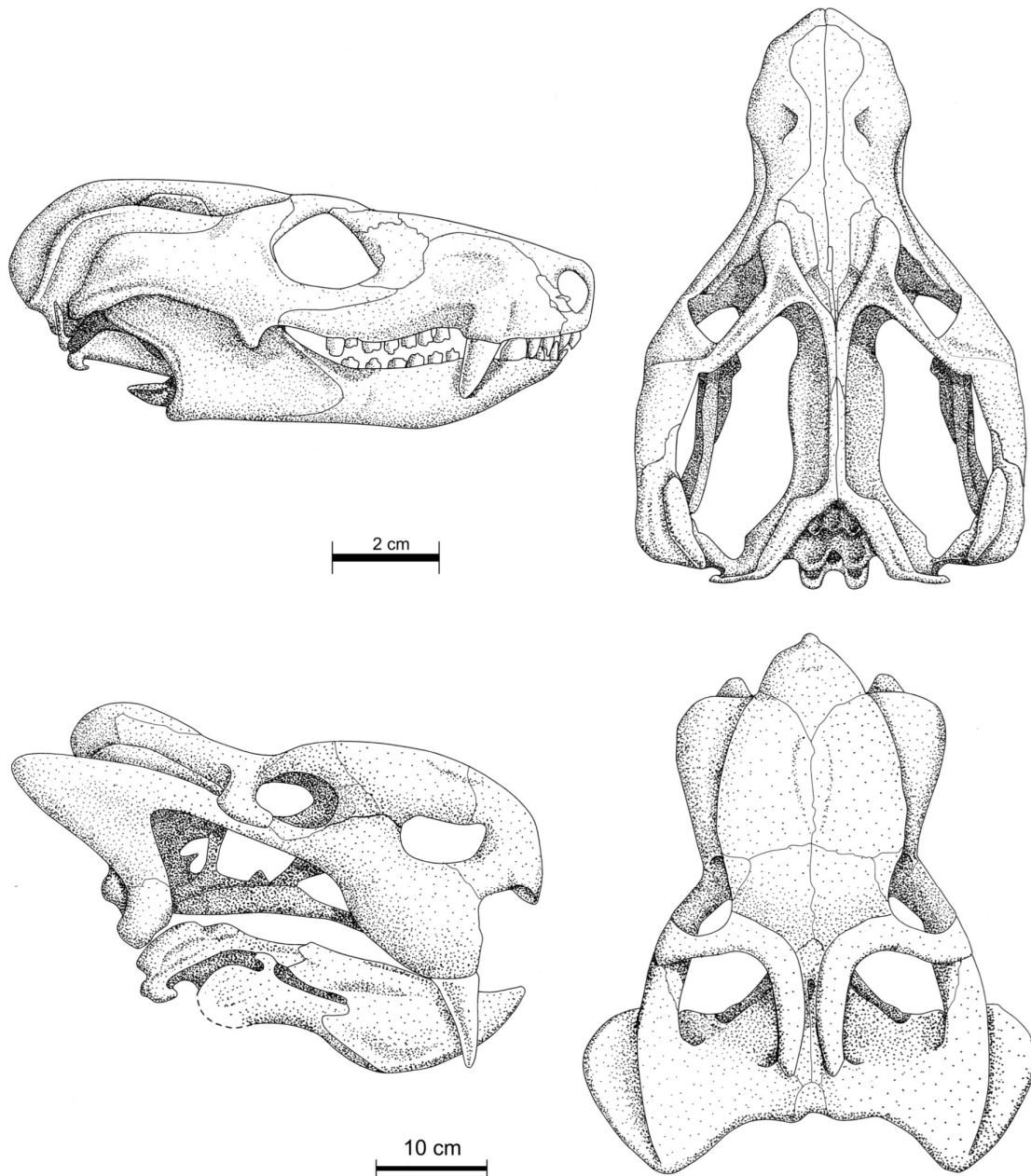




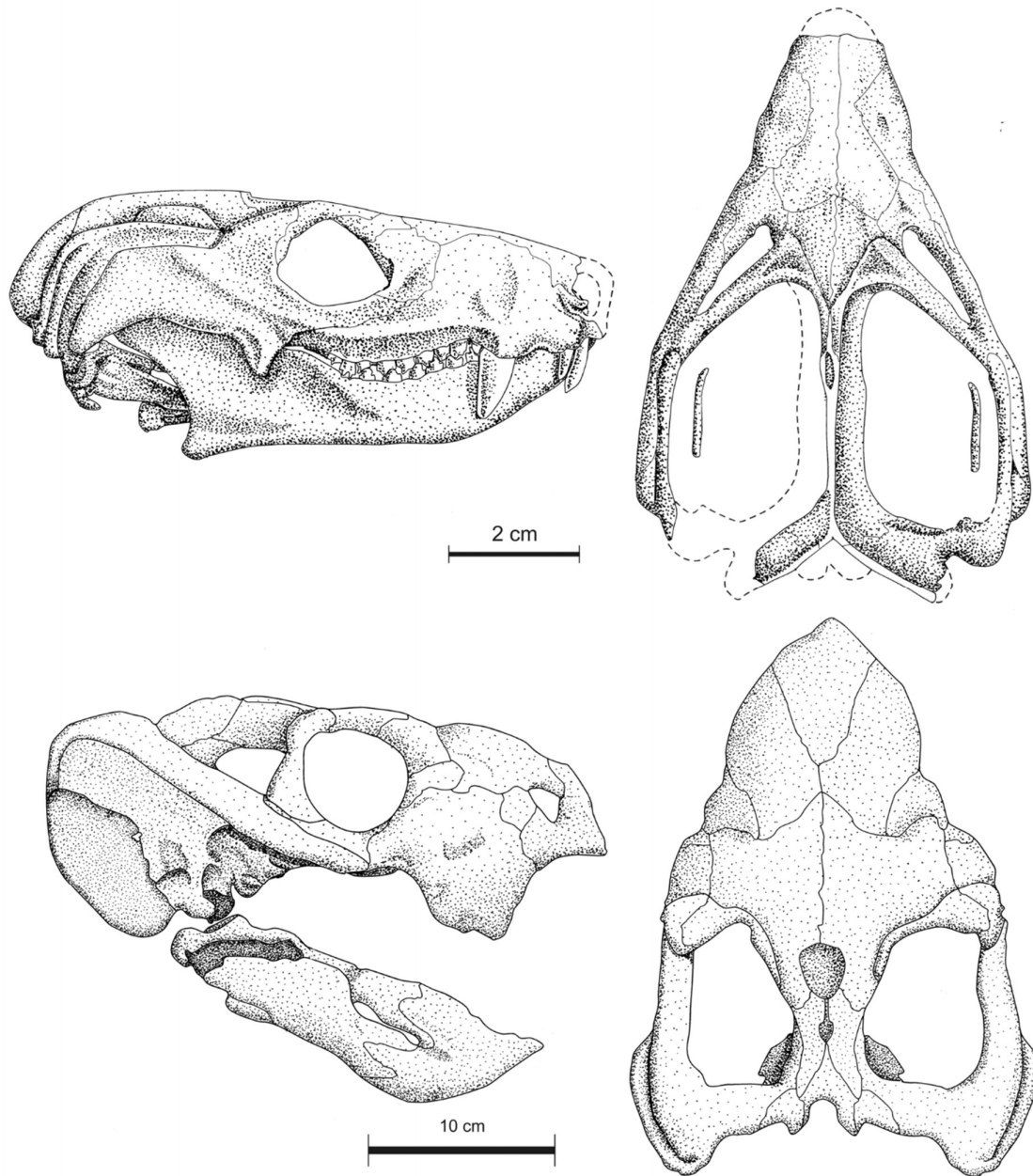
**Figure 8:** Illustration of the index taxon of the Cynognathus Assemblage Zone, *Cynognathus crateronotus*, in lateral and dorsal views (Image taken from Hancox., et al., 2020)



**Figure 9:** Illustration of the index taxa of the Langbergia-Garjainia Subzone in dorsal and lateral view. (top) *Langbergia modisei* (bottom) *Garjainia prima* (Image taken from Hancox., et al., 2020).

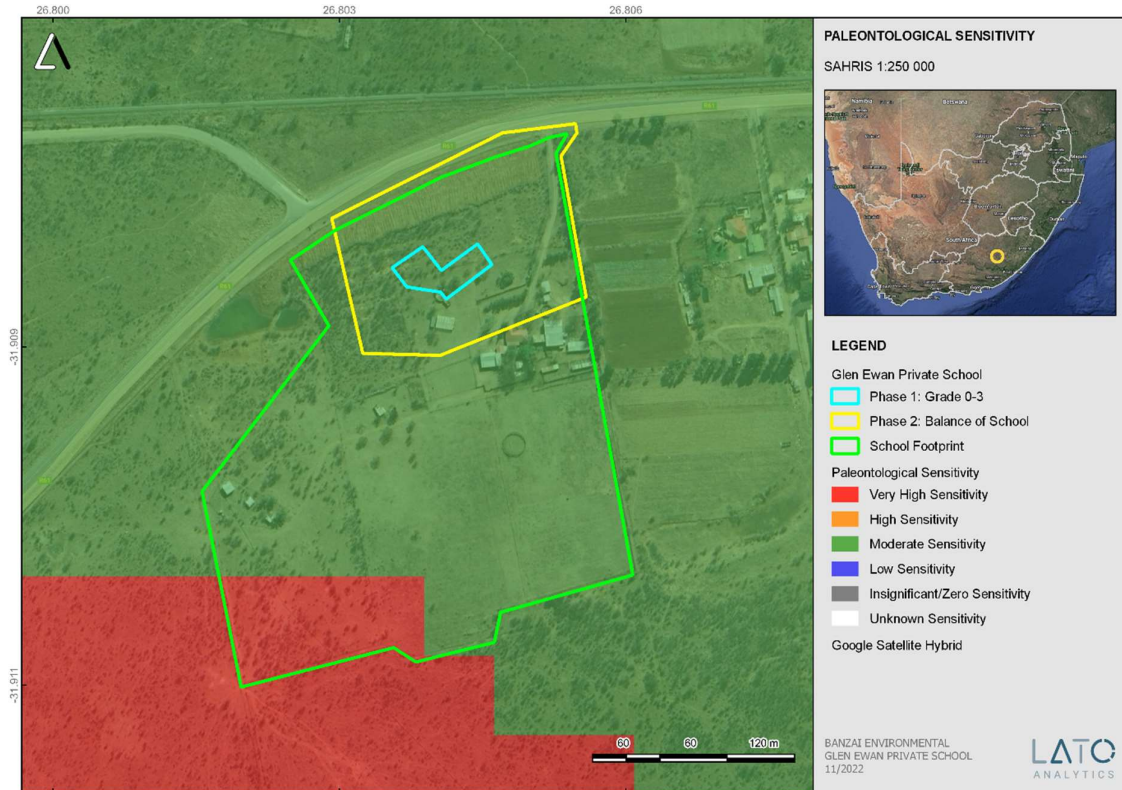


**Figure 10:** Illustration of the index taxa of the *Trirachodon-Kannemeyeria* Subzone in dorsal and lateral view. (top) *Trirachodon berryii*; (bottom) *Kannemeyeria simocephalus* (Image taken from Hancox., et al., 2020).



**Figure 11:** Illustration of the index taxa of the *Cricodon-Ufudocyclops* Subzone in dorsal and lateral view. (top) *Cricodon metabolus*; (bottom) *Ufudocyclops mukaneli*. (Image taken from Hancox., et al., 2020).





**Figure 12:** Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences). Proposed development is indicated in yellow. According to the SAHRIS Palaeosensitivity map the proposed development is underlain by sediments with a Very High (red), and Moderate (green) Palaeontological Significance.

The colors on the PalaeoMap indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.



Table 4: Palaeontological Sensitivity (SAHRIS)

Colour	Sensitivity	Required Action
<b>RED</b>	<b>VERY HIGH</b>	<b>Field assessment and protocol for finds is required</b>
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
<b>GREEN</b>	<b>MODERATE</b>	<b>Desktop study is required</b>
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 <sup>1</sup> will continue to populate the map.

## 6 GEOGRAPHICAL LOCATION OF THE SITE

The proposed development is located on Portion 13 of the Farm Weltevreden No 176, in the Queenstown District, Enoch Mgijima Local Municipality, Eastern Cape Province. The study area is situated south of the R61 about 8km from Queenstown centre. (Figure 1-2).

Table 5: GPS coordinates

	Farm/ Erf No	Portion	Property Type	Latitude	Longitude
Weltevreden	176	0	Farm	31°55'2.24S	26°47'42.56E
Weltevreden	176	7	Potion	31°54'50.71S	26°48'7.58E
Weltevreden	176	17	Potion	31°54'24.78S	26°48'16.6E
Weltevreden	176	13	Potion	31°54'36.27S	26°48'13.06E
Weltevreden	176	7	Potion	31°54'37.76S	26°47'54.05E
Weltevreden	176	24	Potion	31°54'40.59S	26°47'52.73E
Weltevreden	176	8	Potion	31°54'32.37S	26°48'22.72E
Weltevreden	176	16	Potion	31°54'36.69S	26°47'57.9E

## 7 METHODS

The aim of a desktop study is to evaluate the possible risk to palaeontological heritage in the proposed development. This includes all trace fossils as well as all fossils in the proposed footprint. All possible information

<sup>1</sup> South African Heritage Resources Agency



is consulted to compile a desktop study, and this includes the following: all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical as well as geological maps.

### 7.1 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Areas with similar Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment and thus this study has been commissioned.

## 8 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 isi-Xwiba Consulting CC
- 1:250 000 Queenstown 3126 Geological Map (1982) (Council of Geoscience, Pretoria).





## 9 SITE VISIT

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 9 July 2022. The study area is flat without any rocky outcrops.



**Figure 13:** General view of the study area reveals grassy vegetation as well as trees.



**Figure 14:** *Vegetation clearance next to the R61 indicates the absence of outcrops*

## 10 ASSESSMENT METHODOLOGY

### 10.1 Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed activity. Different impacts need to be evaluated in terms of their significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national, or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 4.1.

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 total number of points scored for each impact indicates the level of significance of the impact.





## 10.2 Impact Rating System

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 project phases:

- planning
- construction
- operation
- 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 6: The rating system*

<b>NATURE</b>		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
<b>GEOGRAPHICAL EXTENT</b>		
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.
<b>PROBABILITY</b>		
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).
<b>DURATION</b>		
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.
<b>INTENSITY/ MAGNITUDE</b>		
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.
<b>REVERSIBILITY</b>		
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.
<b>IRREPLACEABLE LOSS OF RESOURCES</b>		
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.
<b>CUMULATIVE EFFECT</b>		





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: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

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 effects.
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(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity



Table 7: Summary of Impacts

Impacts	Extent	Duration	Magnitude	Reversibility	Irreplaceable loss	Cumulative effect	Impact
	Site	Permanent	Low	Irreversible	Complete	Medium	
Pre-mitigation	1	4	3	4	4	3	48
Post mitigation	1	4	1	4	4	3	16

## 11 FINDINGS AND RECOMMENDATIONS

The proposed development is underlain by Quaternary alluvium as well as the Burgersdorp Formation (Tarkastad Subgroup, Beaufort Group, Karoo Supergroup). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of Quaternary alluvium is moderate while that of the Burgersdorp Formation is Very High. Due to the Very High Sensitivity a site visit was triggered.

A site-specific field survey of the development footprint was conducted on foot on 7 July 2022. No visible evidence of fossiliferous outcrops was found. For this reason, an overall low palaeontological sensitivity is allocated to the development footprint. The construction of the development may thus be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, if significant fossil remains or plant 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 ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager 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](http://www.sahra.org.za)) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

### 11.1 Chance finds protocol



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 Site Officer (ESO) or site manager 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 ESO, 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.

The following procedure will only be followed if fossils are uncovered during the excavation phase of the development.

### 11.2 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”**.

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.

A fossil is the naturally preserved remains (or traces thereof) of plants or animals embedded in rock. These organisms lived 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 Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding 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 ESO or site manager. The ESO or site manager 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](http://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 ESO (or 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.
- If the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO. 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 the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

## 12 BIBLIOGRAPHY

Abdala, F., Dias-da-Silva, S. and Cisneros, J.C., 2002. First record of non-mammalian cynodonts (Therapsida) in the Sanga do Cabral Formation (Early Triassic) of southern Brazil. *Palaeontologia africana*, 38, 93-98.

Abdala, F., Hancox, P.J., Neveling, J., 2005. Cynodonts from the uppermost Burgersdorp Formation, South Africa, and their bearing on the biostratigraphic subdivision and correlation of the Triassic Cynognathus Assemblage Zone. *J. Vertebr. Paleontol.*

Almond, J.E. & Pether, J. 2009. Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc., Cape Town.

Almond, J., Pether, J, and Groenewald, G. 2013. South African National Fossil Sensitivity Map. SAHRA and Council for Geosciences.

Bordy, E.M., Sztanó, O., Rubidge, B.S. and Bumby, A., 2011. Early Triassic vertebrate burrows from the Katberg Formation of the south-western Karoo Basin, South Africa. *Lethaia*, 44, 33-45.

Bordy, EM., Orsolya Sztanó, Akhil Rampersadh, Almond, J, Choiniere, J.N., 2019. Vertebrate scratch traces from the Middle Triassic Burgersdorp Formation of the main Karoo Basin, South Africa: Sedimentological and ichnological assessment, *Journal of African Earth Sciences*, Volume 160, 2019, 103594,ISSN 1464-343X, <https://doi.org/10.1016/j.jafrearsci.2019.103594>.

Botha, J., Huttenlocker, A.K., Smith, R.M.H., Prevec, R., Viglietti, P. and Modesto, S., 2020. New geochemical and palaeontological data from the Permo-Triassic boundary in the South African Karoo Basin test the synchrony



- of terrestrial and marine extinctions. *Palaeogeography, Palaeoclimatology, Palaeoecology*. DOI: 10.1016/j.palaeo.2019.109467
- Botha., J., 2020. Biostratigraphy of the *Lystrosaurus declivis* Assemblage Zone (Beaufort Group, Karoo Supergroup), South Africa. *South African Journal of Geology*: 123(2):207-216.
- Botha-Brink, J., 2017. Burrowing in *Lystrosaurus*: preadaptation to a post-extinction environment? *Journal of Vertebrate Paleontology*, 37, (5): e1365080.
- Du Toit, A.L., 1917. The geology of part of the Transkei. Explanation of Cape Sheet 27 (Maclear – Umtata). Geological Survey of South Africa, 32pp.
- Du Toit, A.L., 1918. The zones of the Karoo System and their distribution. *Proceedings of the Geological Society of South Africa*, 21, 17-37.
- Duncan, R.A., Hooper, P.R., Rehacek, J., Marsh J.S. and Duncan, A.R., 1997. The timing and duration of the Karoo igneous event, southern Gondwana. *Journal of Geophysical Research*, 102, 18127-18138.
- Eales, H.V., Marsh, J.S. and Cox, K.G. (1984). The Karoo Igneous Province: an introduction. In: Erlank, A.J. (Ed.), *Petrogenesis of the Volcanic Rocks of the Karoo Province*. Spec. Publ. Geol. Soc. S. Afr., 13, 1–26
- Gastaldo, R.A., Adendorff, R., Bamford, M., Labandeira, C.C., Neveling, J. & Sims, H. 2005. Taphonomic trends of macrofloral assemblages across the Permian – Triassic boundary, Karoo Basin, South Africa. *Palaios* 20, 479-497.
- Gastaldo, R.A., Kamo, S.L., Neveling, J., Geissman, W., Looy, C.V. and Martini, A.M., 2020. The base of the *Lystrosaurus* Assemblage Zone, Karoo Basin, predates the end-Permian marine extinction. *Nature Communications* 11, 1428. doi.org/10.1038/s41467-020-15243-7
- GROENEWALD G. H. 1990. Gebruik van paleontologie in litostratigrafiese korrelasie in die Beaufort Groep, Karoo Opeenvolging van Suid-Afrika. *Palaeontologia africana* 27, 21-30.
- Groenewald, G.H. and Kitching, J.W., 1995. Biostratigraphy of the *Lystrosaurus* Assemblage Zone. *South African Committee for Stratigraphy. Biostratigraphic Series* 1, 35-39.
- Hancox, P.J., Neveling, J., and Rubidge, B.A. 2020. Biostratigraphy of the *Cynognathus* Assemblage Zone (Beaufort Group, Karoo Supergroup), South Africa. . *South African Journal of Geology*, 123(2)217-238. doi:10.25131/sajg.123.0016
- Hunter, D.R., Johnson, M.R., Anhaeusser, C. R. and Thomas, R.J. 2006. Introduction. (*In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (Eds), The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria, 585-604.)
- JOHNSON, M.R., 1989. Paleogeographic significance of the oriented calcareous concretions in the Triassic Katberg Formation, South Africa. *J. Sed. Petrol.*, 59,1008-1010.
- Johnson, M.R., Van Vuuren, C.J., Visser, J.N.J., Cole, D.I., De V. Wickens, H., Christie, A.D.M., Roberts, D.L. & Brandl, G. 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The geology of South Africa*, pp. 461-499. Geological Society of South Africa, Marshalltown.
- Kent, L. E., 1980. Part 1: Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia and the Republics of Bophuthatswana, Transkei and Venda. SACS, Council for Geosciences, Stratigraphy of South Africa. 1980. *South African Committee for Stratigraphy. Handbook* 8, Part 1, pp 690.



- Keyser, A.W. & Smith, R.M.H. 1977-78. Vertebrate biozonation of the Beaufort Group with special reference to the Western Karoo Basin. *Annals of the Geological Survey of South Africa* 12: 1-36.
- Keyser, A.W., 1979. A review of the biozonation of the Beaufort Group in the Karoo basin of South Africa. *Geological Society of South Africa, Abstracts 1979 Geological Congress 2*, 13-31.
- Kitching, J.W. 1977. The distribution of the Karoo vertebrate fauna, with special reference to certain genera and the bearing of this distribution on the zoning of the Beaufort beds. *Memoirs of the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand, No. 1*, 133 pp (incl. 15 pls).
- Kitching, J.W., 1970. A short review of the Beaufort zoning in South Africa. In: S.H. Haughton (Editor), *I.U.G.S., 2nd Gondwana Symposium Proceedings and Papers*, 309-312.
- Kitching, J.W., 1977. The distribution of the Karoo vertebrate fauna. *Bernard Price Institute for Palaeontological Research Memoir 1*, 1-131.
- Kitching, J.W., Collinson, J.W., Elliot, D.H. and Colbert, E.H., 1972. Lystrosaurus Zone (Triassic) fauna from Antarctica. *Science*, 175, 524-527.
- MACRAE, C. 1999. Life etched in stone. *Fossils of South Africa*. 305 pp. The Geological Society of South Africa, Johannesburg.
- Marchetti, L., Klein, H., Buchwitz, M., Ronchi, A., Smith, R.M.H., De Klerk, E., Sciscio, L. and Groenewald, G., 2019. Ichnoassociations of Permian and Triassic tetrapod footprints in the Karoo Basin of South Africa. *Gondwana Research* 72,139-168.
- MAUD, R. 2012. Macroscale Geomorphic Evolution. (*In* Holmes, P. and Meadows, M. *Southern Africa Geomorphology, New trends and new directions*. Bloemfontein: Sun Press. p. 7- 21)
- Maud, R. 2012. Macroscale Geomorphic Evolution. (*In* Holmes, P. and Meadows, M. *Southern Africa Geomorphology, New trends and new directions*. Bloemfontein: Sun Press. p. 7- 21)
- McCarthy, T and Rubidge, B. 2005. *The Story of Earth Life: A southern African perspective on a 4.6-billionyear journey*. Struik. Pp 333.
- Michaelsen, P., 2002. Mass extinction of peat-forming plants and the effect on fluvial styles across the Permian-Triassic boundary, northern Bowen Basin, Australia, *Palaeogeography Palaeoclimatology Palaeoecology*, 179, 173-188.
- Neveling, J., 2004. Stratigraphic and sedimentological investigation of the contact between the Lystrosaurus and Cynognathus Assemblage Zones (Beaufort Group: Karoo Supergroup). *Council for Geoscience Bulletin* 137, 1-165.
- Neveling, J., Hancox, P.J. and Rubidge, B.S., 2004. Biostratigraphy of the lower Burgersdorp Formation (Beaufort Group; Karoo Supergroup) of South Africa – implications for the stratigraphic ranges of Early Triassic tetrapods. *Palaeontologia africana*, 41, 81-87.
- Nicolas, M.V.M., 2007. Tetrapod Biodiversity through the Permo Triassic Beaufort Group (Karoo Supergroup) of South Africa. Unpublished PhD thesis, University of the Witwatersrand, Johannesburg. 356pp
- NORMAN, N. and WHITFIELD, G., 2006. *Geological Journeys*. De Beers, Struik, Pp 1-320.
- NORMAN, N. 2013. *Geology off the beaten track: exploring South Africa's hidden treasures*. De Beers, Struik, Pp 1-256.



- Rubidge B.S., 1995 Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Stratigraphy Biostratigraphic Series 1: 1-46 Pretoria South African Committee for Stratigraphy and Biostratigraphy
- Rubidge, B., Cooper, A.K. & Netterberg, I. 2010. A new GIS-based biozone map of the Beaufort Group (Karoo Supergroup), South Africa. *Palaeontologia Africana* 45, 1-5.
- Rubidge, B.S. (Ed.) 1995. Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Biostratigraphy, Biostratigraphic Series No. 1., 46 pp. Council for Geoscience, Pretoria.
- SG 2.2 SAHRA APMHOB Guidelines, 2012. Minimum standards for palaeontological components of Heritage Impact Assessment Reports, Pp 1-15.
- Smith R.M.H., 1990. A review of stratigraphy and sedimentary environments in the Karoo Basin of South Africa. *Journal of African Earth Sciences*, 10, 117-137
- Smith, R., Rubidge, B. & Van Der Walt, M. 2012. Therapsid biodiversity patterns and paleoenvironments of the Karoo Basin, South Africa. Chapter 2 pp. 30-62 in Chinsamy-Turan, A. (Ed.) *Forerunners of mammals. Radiation, histology, biology.* xv + 330 pp. Indiana University Press, Bloomington & Indianapolis.
- Smith, R.M.H., Rubidge, B.S. and van der Walt, M., 2012. Therapsid biodiversity patterns and paleoenvironments of the Karoo Basin, South Africa. In: A. Chinsamy (Editor), *The forerunners of mammals: radiation, histology and biology.* Indiana University Press, Bloomington, 31-62.
- Smith, R.M.H., Rubidge, B.S., Day, M.O., Botha; J. 2020. Introduction to the tetrapod biozonation of the Karoo Supergroup. *South African Journal of Geology* 123 (2): 131–140. Doi: <https://doi.org/10.25131/sajg.123.0009>.
- Smith., R.M.H., B.S. Rubidge, M.O. Day, J. Botha; 2020. Introduction to the tetrapod biozonation of the Karoo Supergroup. *South African Journal of Geology* 123 (2): 131–140. doi: <https://doi.org/10.25131/sajg.123.0009>.
- Viglietti P.A., Smith R.M.H. and Compton J.S., 2013. Origin and palaeoenvironmental significance of *Lystrosaurus* bonebeds in the earliest Triassic Karoo Basin, South Africa. *Palaeogeography, Palaeoecology, Palaeoclimatology*, 392, 9-21.
- Viglietti P.A., 2020. The *Daptocephalus* Assemblage Zone (Lopingian), South Africa: A proposed biostratigraphy based on a new compilation of stratigraphic ranges. *South African Journal of Geology* 123 (2): 191-206. DOI: 10.1016/j.jafrearsci.2015.10.011





**APPENDIX A**

**ELIZE BUTLER**

**CURRICULUM VITAE**

**ELIZE BUTLER**

**PROFESSION:** Palaeontologist

**YEARS' EXPERIENCE:** 29 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

**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

#### TECHNICAL REPORTS

**Butler, E. 2014.** Palaeontological Impact Assessment of the proposed development of private dwellings on portion 5 of farm 304 Matjesfontein Keurboomstrand, Knysna District, Western Cape Province. Bloemfontein.

**Butler, E. 2014.** Palaeontological Impact Assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province. 2014. Bloemfontein.

**Butler, E. 2015.** Palaeontological impact assessment of the proposed consolidation, re-division, and development of 250 serviced erven in Nieu-Bethesda, Camdeboo local municipality, Eastern Cape. Bloemfontein.

**Butler, E. 2015.** Palaeontological impact assessment of the proposed mixed land developments at Rooikraal 454, Vrede, Free State. Bloemfontein.

**Butler, E. 2015.** Palaeontological exemption report of the proposed truck stop development at Palmiet 585, Vrede, Free State. Bloemfontein.

**Butler, E. 2015.** Palaeontological impact assessment of the proposed Orange Grove 3500 residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape. Bloemfontein.

**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Gonubie residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape Province. Bloemfontein.

**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Ficksburg raw water pipeline. Bloemfontein.

**Butler, E. 2015.** Palaeontological Heritage Impact Assessment report on the establishment of the 65 mw Majuba Solar Photovoltaic facility and associated infrastructure on portion 1, 2 and 6 of the farm Witkoppies 81 HS, Mpumalanga Province. Bloemfontein.



**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed township establishment on the remainder of portion 6 and 7 of the farm Sunnyside 2620, Bloemfontein, Mangaung metropolitan municipality, Free State, Bloemfontein.

**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Woodhouse 1 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Woodhouse 2 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Orkney solar energy farm and associated infrastructure on the remaining extent of Portions 7 and 21 of the farm Wolvehuis 114, near Orkney, North West Province. Bloemfontein.

**Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoort concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoort, Northern Cape. Prepared for Savannah Environmental. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed Woodhouse 1 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed Woodhouse 2 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

**Butler, E. 2016.** Proposed 132kV overhead power line and switchyard station for the authorised Solis Power 1 CSP project near Upington, Northern Cape. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed Senqu Pedestrian Bridges in Ward 5 of Senqu Local Municipality, Eastern Cape Province. Bloemfontein.

**Butler, E. 2016.** Recommendation from further Palaeontological Studies: Proposed Construction of the Modderfontein Filling Station on Erf 28 Portion 30, Founders Hill, City of Johannesburg, Gauteng Province. Bloemfontein.



**Butler, E. 2016.** Recommendation from further Palaeontological Studies: Proposed Construction of the Modikwa Filling Station on a Portion of Portion 2 of Mooihoek 255 Kt, Greater Tubatse Local Municipality, Limpopo Province. Bloemfontein.

**Butler, E. 2016.** Recommendation from further Palaeontological Studies: Proposed Construction of the Heidedal filling station on Erf 16603, Heidedal Extension 24, Mangaung Local Municipality, Bloemfontein, Free State Province. Bloemfontein.

**Butler, E. 2016.** Recommended Exemption from further Palaeontological studies: Proposed Construction of the Gunstfontein Switching Station, 132kv Overhead Power Line (Single or Double Circuit) and ancillary infrastructure for the Gunstfontein Wind Farm Near Sutherland, Northern Cape Province. Savannah South Africa. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed Galla Hills Quarry on the remainder of the farm Roode Krantz 203, in the Lukhanji Municipality, division of Queenstown, Eastern Cape Province. Bloemfontein.

**Butler, E. 2016.** Chris Hani District Municipality Cluster 9 water backlog project phases 3a and 3b: Palaeontology inspection at Tsomo WTW. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoot concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoot, Northern Cape. Savannah South Africa. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed upgrading of the main road MR450 (R335) from Motherwell to Addo within the Nelson Mandela Bay Municipality and Sunday's River valley Local Municipality, Eastern Cape Province. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment construction of the proposed Metals Industrial Cluster and associated infrastructure near Kuruman, Northern Cape Province. Savannah South Africa. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment for the proposed construction of up to a 132kv power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces. PGS Heritage. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment of the proposed development of two burrow pits (DR02625 and DR02614) in the Enoch Mgijima Municipality, Chris Hani District, Eastern Cape.

**Butler, E. 2016.** Ezibeleni waste Buy-Back Centre (near Queenstown), Enoch Mgijima Local Municipality, Eastern Cape. Bloemfontein.

**Butler, E. 2016.** Palaeontological Impact Assessment for the proposed construction of two 5 Mw Solar Photovoltaic Power Plants on Farm Wildebeestkuil 59 and Farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.



**Butler, E. 2016.** Palaeontological Impact Assessment for the proposed development of four Leeuwberg Wind farms and basic assessments for the associated grid connection near Loeriesfontein, Northern Cape Province. Bloemfontein.

**Butler, E. 2016.** Palaeontological impact assessment for the proposed Aggeneys south prospecting right project, Northern Cape Province. Bloemfontein.

**Butler, E. 2016.** Palaeontological impact assessment of the proposed Motuoane Ladysmith Exploration right application, KwaZulu Natal. Bloemfontein.

**Butler, E. 2016.** Palaeontological impact assessment for the proposed construction of two 5 MW solar photovoltaic power plants on farm Wildebeestkuil 59 and farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.

**Butler, E. 2016:** Palaeontological desktop assessment of the establishment of the proposed residential and mixed-use development on the remainder of portion 7 and portion 898 of the farm Knopjeslaagte 385 Ir, located near Centurion within the Tshwane Metropolitan Municipality of Gauteng Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological impact assessment for the proposed development of a new cemetery, near Kathu, Gamagara local municipality and John Taolo Gaetsewe district municipality, Northern Cape. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of The Proposed Development of The New Open Cast Mining Operations on The Remaining Portions Of 6, 7, 8 And 10 Of the Farm Kwaggafontein 8 In the Carolina Magisterial District, Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the Proposed Development of a Wastewater Treatment Works at Lanseria, Gauteng Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Scoping Report for the Proposed Construction of a Warehouse and Associated Infrastructure at Perseverance in Port Elizabeth, Eastern Cape Province.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the Proposed Establishment of a Diesel Farm and a Haul Road for the Tshipi Borwa mine Near Hotazel, In the John Taolo Gaetsewe District Municipality in the Northern Cape Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the Proposed Changes to Operations at the UMK Mine near Hotazel, In the John Taolo Gaetsewe District Municipality in the Northern Cape Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment for the Development of the Proposed Ventersburg Project-An Underground Mining Operation near Ventersburg and Henneman, Free State Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological desktop assessment of the proposed development of a 3000 MW combined cycle gas turbine (CCGT) in Richards Bay, Kwazulu-Natal. Bloemfontein.



**Butler, E. 2017.** Palaeontological Impact Assessment for the Development of the Proposed Revalidation of the lapsed General Plans for Elliotdale, Mbhashe Local Municipality. Bloemfontein.

**Butler, E. 2017.** Palaeontological assessment of the proposed development of a 3000 MW Combined Cycle Gas Turbine (CCGT) in Richards Bay, Kwazulu-Natal. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed development of the new open cast mining operations on the remaining portions of 6, 7, 8 and 10 of the farm Kwaggafontein 8 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed mining of the farm Zandvoort 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed Lanseria outfall sewer pipeline in Johannesburg, Gauteng Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed development of open pit mining at Pit 36W (New Pit) and 62E (Dishaba) Amandelbult Mine Complex, Thabazimbi, Limpopo Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological impact assessment of the proposed development of the sport precinct and associated infrastructure at Merrifield Preparatory school and college, Amathole Municipality, East London. PGS Heritage. Bloemfontein.

**Butler, E. 2017.** Palaeontological impact assessment of the proposed construction of the Lehae training and fire station, Lenasia, Gauteng Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed development of the new open cast mining operations of the Impunzi mine in the Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the construction of the proposed Viljoenskroon Munic 132 KV line, Vierfontein substation and related projects. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed rehabilitation of 5 ownerless asbestos mines. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed development of the Lephale coal and power project, Lephale, Limpopo Province, Republic of South Africa. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed construction of a 132KV powerline from the Tweespruit distribution substation (in the Mantsopa local municipality) to the Driedorp rural substation (within the Naledi local municipality), Free State province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed development of the new coal-fired power plant and associated infrastructure near Makhado, Limpopo Province. Bloemfontein.





**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed construction of a Photovoltaic Solar Power station near Collett substation, Middelburg, Eastern Cape. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment for the proposed township establishment of 2000 residential sites with supporting amenities on a portion of farm 826 in Botshabelo West, Mangaung Metro, Free State Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed prospecting right project without bulk sampling, in the Koa Valley, Northern Cape Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed Aroams prospecting right project, without bulk sampling, near Aggeneys, Northern Cape Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed Belvior aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.

**Butler, E. 2017.** PIA site visit and report of the proposed Galla Hills Quarry on the remainder of the farm Roode Krantz 203, in the Lukhanji Municipality, division of Queenstown, Eastern Cape Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed construction of Tina Falls Hydropower and associated power lines near Cumbu, Mthlontlo Local Municipality, Eastern Cape. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed construction of the Mangaung Gariep Water Augmentation Project. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed Belvoir aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed construction of the Melkspruit-Rouxville 132KV Power line. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed development of a railway siding on a Portion of portion 41 of the farm Rustfontein 109 is, Govan Mbeki local municipality, Gert Sibande district municipality, Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed consolidation of the proposed Ilima Colliery in the Albert Luthuli local municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed extension of the Kareerand Tailings Storage Facility, associated borrow pits as well as a storm water drainage channel in the Vaal River near Stilfontein, North West Province. Bloemfontein.



**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed construction of a filling station and associated facilities on the Erf 6279, district municipality of John Taolo Gaetsewe District, Ga-Segonyana Local Municipality Northern Cape. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed of the Lephhalale Coal and Power Project, Lephhalale, Limpopo Province, Republic of South Africa. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed Overvaal Trust PV Facility, Buffelspoort, North West Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed development of the H<sub>2</sub> Energy Power Station and associated infrastructure on Portions 21; 22 And 23 of the farm Hartebeestspruit in the Thembisile Hani Local Municipality, Nkangala District near Kwamhlanga, Mpumalanga Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed upgrade of the Sandriver Canal and Klippan Pump station in Welkom, Free State Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed upgrade of the 132kv and 11kv power line into a dual circuit above ground power line feeding into the Urania substation in Welkom, Free State Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.

**Butler, E. 2017.** Palaeontological Impact Assessment of the proposed diamonds alluvial & diamonds general prospecting right application near Christiana on the remaining extent of portion 1 of the farm Kaffraria 314, registration division HO, North West Province. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Hartebeesfontein, near Panbult, Mpumalanga. Bloemfontein.

**Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Rustplaas near Piet Retief, Mpumalanga. Bloemfontein.

**Butler, E. 2018.** Palaeontological Impact Assessment for the Proposed Landfill Site in Luckhoff, Letsemeng Local Municipality, Xhariep District, Free State. Bloemfontein.

**Butler, E. 2018.** Palaeontological Impact Assessment of the proposed development of the new Mutsho coal-fired power plant and associated infrastructure near Makhado, Limpopo Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Impact Assessment of the authorisation and amendment processes for Manangu mine near Delmas, Victor Khanye local municipality, Mpumalanga. Bloemfontein.

**Butler, E. 2018.** Palaeontological Desktop Assessment for the proposed Mashishing township establishment in Mashishing (Lydenburg), Mpumalanga Province. Bloemfontein.



**Butler, E. 2018.** Palaeontological Desktop Assessment for the Proposed Mlonzi Estate Development near Lusikisiki, Ngquza Hill Local Municipality, Eastern Cape. Bloemfontein.

**Butler, E. 2018.** Palaeontological Phase 1 Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.

**Butler, E. 2018.** Palaeontological Desktop Assessment for the proposed electricity expansion project and Sekgame Switching Station at the Sishen Mine, Northern Cape Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological field assessment of the proposed construction of the Zonnebloem Switching Station (132/22kV) and two loop-in loop-out power lines (132kV) in the Mpumalanga Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Field Assessment for the proposed re-alignment and de-commissioning of the Firham-Platrand 88kv Powerline, near Standerton, Lekwa Local Municipality, Mpumalanga province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Desktop Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

**Butler, E. 2018.** Palaeontological field Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

**Butler, E. 2018.** Palaeontological desktop assessment of the proposed Mookodi – Mahikeng 400kV line, North West Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Desktop Assessment for the proposed Thornhill Housing Project, Ndlambe Municipality, Port Alfred, Eastern Cape Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological desktop assessment of the proposed housing development on portion 237 of farm Hartebeestpoort 328. Bloemfontein.

**Butler, E. 2018.** Palaeontological desktop assessment of the proposed New Age Chicken layer facility located on holding 75 Endicott near Springs in Gauteng. Bloemfontein.

**Butler, E. 2018** Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological field assessment of the proposed development of the Wildealskloof mixed use development near Bloemfontein, Free State Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Field Assessment of the proposed Megamor Extension, East London. Bloemfontein

**Butler, E. 2018.** Palaeontological Impact Assessment of the proposed diamonds Alluvial & Diamonds General Prospecting Right Application near Christiana on the Remaining Extent of Portion 1 of the Farm Kaffraria 314, Registration Division HO, North West Province. Bloemfontein.



**Butler, E. 2018.** Palaeontological Impact Assessment of the proposed construction of a new 11kV (1.3km) Power Line to supply electricity to a cell tower on farm 215 near Delportshoop in the Northern Cape. Bloemfontein.

**Butler, E. 2018.** Palaeontological Field Assessment of the proposed construction of a new 22 kV single wood pole structure power line to the proposed MTN tower, near Britstown, Northern Cape Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Exemption Letter for the proposed reclamation and reprocessing of the City Deep Dumps in Johannesburg, Gauteng Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Exemption letter for the proposed reclamation and reprocessing of the City Deep Dumps and Rooikraal Tailings Facility in Johannesburg, Gauteng Province. Bloemfontein.

**Butler, E. 2018.** Proposed Kalabasfontein Mine Extension project, near Bethal, Govan Mbeki District Municipality, Mpumalanga. Bloemfontein.

**Butler, E. 2018.** Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological Desktop Assessment of the proposed Mookodi – Mahikeng 400kV Line, North West Province. Bloemfontein.

**Butler, E. 2018.** Environmental Impact Assessment (EIA) for the Proposed 325mw Rondekop Wind Energy Facility between Matjiesfontein and Sutherland in the Northern Cape Province.

**Butler, E. 2018.** Palaeontological Impact Assessment of the proposed construction of the Tooverberg Wind Energy Facility, and associated grid connection near Touws River in the Western Cape Province. Bloemfontein.

**Butler, E. 2018.** Palaeontological impact assessment of the proposed Kalabasfontein Mining Right Application, near Bethal, Mpumalanga.

**Butler, E., 2019.** Palaeontological Desktop Assessment of the proposed Westrand Strengthening Project Phase II.

**Butler, E., 2019.** Palaeontological Field Assessment for the proposed Sirius 3 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province

**Butler, E., 2019.** Palaeontological Field Assessment for the proposed Sirius 4 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province

**Butler, E., 2019.** Palaeontological Field Assessment for Heuningspruit PV 1 Solar Energy Facility near Koppies, Ngwathe Local Municipality, Free State Province.

**Butler, E., 2019.** Palaeontological Field Assessment for the Moeding Solar Grid Connection, North West Province.



**Butler, E., 2019.** Recommended Exemption from further Palaeontological studies for the Proposed Agricultural Development on Farms 1763, 2372 And 2363, Kakamas South Settlement, Kai! Garib Municipality, Mgcawu District Municipality, Northern Cape Province.

**Butler, E., 2019.** Recommended Exemption from further Palaeontological studies: of Proposed Agricultural Development, Plot 1178, Kakamas South Settlement, Kai! Garib Municipality

**Butler, E., 2019.** Palaeontological Desktop Assessment for the Proposed Waste Rock Dump Project at Tshipi Borwa Mine, near Hotazel, Northern Cape Province:

**Butler, E., 2019.** Palaeontological Exemption Letter for the proposed DMS Upgrade Project at the Sishen Mine, Gamagara Local Municipality, Northern Cape Province

**Butler, E., 2019.** Palaeontological Desktop Assessment of the proposed Integrated Environmental Authorisation process for the proposed Der Brochen Amendment project, near Groblershoop, Limpopo

Butler, E., 2019. Palaeontological Desktop Assessment of the proposed updated Environmental Management Programme (EMPr) for the Assmang (Pty) Ltd Black Rock Mining Operations, Hotazel, Northern Cape

**Butler, E., 2019.** Palaeontological Desktop Assessment of the proposed Kriel Power Station Lime Plant Upgrade, Mpumalanga Province

**Butler, E., 2019.** Palaeontological Impact Assessment for the proposed Kangala Extension Project Near Delmas, Mpumalanga Province.

**Butler, E., 2019.** Palaeontological Desktop Assessment for the proposed construction of an iron/steel smelter at the Botshabelo Industrial area within the Mangaung Metropolitan Municipality, Free State Province.

**Butler, E., 2019.** Recommended Exemption from further Palaeontological studies for the proposed agricultural development on farms 1763, 2372 and 2363, Kakamas South settlement, Kai! Garib Municipality, Mgcawu District Municipality, Northern Cape Province.

**Butler, E., 2019.** Recommended Exemption from further Palaeontological Studies for Proposed formalisation of Gamakor and Noodkamp low-cost Housing Development, Keimoes, Gordonia Rd, Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

**Butler, E., 2019.** Recommended Exemption from further Palaeontological Studies for proposed formalisation of Blaauwskop Low-Cost Housing Development, Kenhardt Road, Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

**Butler, E., 2019.** Palaeontological Desktop Assessment of the proposed mining permit application for the removal of diamonds alluvial and diamonds kimberlite near Windsorton on a certain portion of Farm Zoelen's Laagte 158, Registration Division: Barkly Wes, Northern Cape Province.

**Butler, E., 2019.** Palaeontological Desktop Assessment of the proposed Vedanta Housing Development, Pella Mission 39, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.



- Butler, E., 2019.** Palaeontological Desktop Assessment for The Proposed 920 KWP Groenheuwel Solar Plant Near Augrabies, Northern Cape Province
- Butler, E., 2019.** Palaeontological Desktop Assessment for the establishment of a Super Fines Storage Facility at Amandelbult Mine, Near Thabazimbi, Limpopo Province
- Butler, E., 2019.** Palaeontological Impact Assessment for the proposed Sace Lifex Project, Near Emalahleni, Mpumalanga Province
- Butler, E., 2019.** Palaeontological Desktop Assessment for the proposed Rehau Fort Jackson Warehouse Extension, East London
- Butler, E., 2019.** Palaeontological Desktop Assessment for the proposed Environmental Authorisation Amendment for moving 3 Km of the Merensky-Kameni 132KV Powerline
- Butler, E., 2019.** Palaeontological Impact Assessment for the proposed Umsobomvu Solar PV Energy Facilities, Northern and Eastern Cape
- Butler, E., 2019.** Palaeontological Desktop Assessment for six proposed Black Mountain Mining Prospecting Right Applications, without Bulk Sampling, in the Northern Cape.
- Butler, E., 2019.** Palaeontological field Assessment of the Filling Station (Rietvlei Extension 6) on the Remaining Portion of Portion 1 of the Farm Witkoppies 393JR east of the Rietvleidam Nature Reserve, City of Tshwane, Gauteng
- Butler, E., 2019.** Palaeontological Desktop Assessment of The Proposed Upgrade of The Vaal Gamagara Regional Water Supply Scheme: Phase 2 And Groundwater Abstraction
- Butler, E., 2019.** Palaeontological Desktop Assessment of The Expansion of The Jan Kempdorp Cemetery on Portion 43 Of Farm Guldenskat 36-Hn, Northern Cape Province
- Butler, E., 2019.** Palaeontological Desktop Assessment of the Proposed Residential Development on Portion 42 Of Farm Geldunskat No 36 In Jan Kempdorp, Phokwane Local Municipality, Northern Cape Province
- Butler, E., 2019.** Palaeontological Impact Assessment of the proposed new Township Development, Lethabo Park, on Remainder of Farm Roodepan No 70, Erf 17725 And Erf 15089, Roodepan Kimberley, Sol Plaatjies Local Municipality, Frances Baard District Municipality, Northern Cape
- Butler, E., 2019.** Palaeontological Protocol for Finds for the proposed 16m WH Battery Storage System in Steinkopf, Northern Cape Province
- Butler, E., 2019.** Palaeontological Exemption Letter of the proposed 4.5WH Battery Storage System near Midway-Pofadder, Northern Cape Province
- Butler, E., 2019.** Palaeontological Exemption Letter of the proposed 2.5ml Process Water Reservoir at Gloria Mine, Black Rock, Hotazel, Northern Cape





**Butler, E.,** 2019. Palaeontological Desktop Assessment for the Establishment of a Super Fines Storage Facility at Gloria Mine, Black Rock Mine Operations, Hotazel, Northern Cape:

**Butler, E.,** 2019. Palaeontological Desktop Assessment for the Proposed New Railway Bridge, and Rail Line Between Hotazel and the Gloria Mine, Northern Cape Province

**Butler, E.,** 2019. Palaeontological Exemption Letter of The Proposed Mixed Use Commercial Development on Portion 17 of Farm Boegoeberg Settlement Number 48, !Kheis Local Municipality in The Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment of the Proposed Diamond Mining Permit Application Near Kimberley, Sol Plaatjies Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment of the Proposed Diamonds (Alluvial, General & In Kimberlite) Prospecting Right Application near Postmasburg, Registration Division; Hay, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment of the proposed diamonds (alluvial, general & in kimberlite) prospecting right application near Kimberley, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Phase 1 Impact Assessment of the proposed upgrade of the Vaal Gamagara regional water supply scheme: Phase 2 and groundwater abstraction. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment of the proposed seepage interception drains at Duvha Power Station, Emalahleni Municipality, Mpumalanga Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment letter for the Proposed PV Solar Facility at the Heineken Sedibeng Brewery, near Vereeniging, Gauteng. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Phase 1 Assessment for the Proposed PV Solar Facility at the Heineken Sedibeng Brewery, near Vereeniging, Gauteng. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological field Assessment for the Proposed Upgrade of the Kolomela Mining Operations, Tsantsabane Local Municipality, Siyanda District Municipality, Northern Cape Province, Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment of the proposed feldspar prospecting rights and mining application on portion 4 and 5 of the farm Rozynen 104, Kakamas South, Kai! Garib Municipality, Zf Mgcawu District Municipality, Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E.,** 2019. Palaeontological Phase 1 Field Assessment of the proposed Summerpride Residential Development and Associated Infrastructure on Erf 107, Buffalo City Municipality, East London. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Impact Assessment for the proposed re-commission of the Old Balgay Colliery near Dundee, KwaZulu Natal.

**Butler, E.,** 2019. Palaeontological Phase 1 Impact Assessment for the Proposed Re-Commission of the Old Balgay Colliery near Dundee, KwaZulu Natal. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment for the Proposed Environmental Authorisation and Amendment Processes for Elandsfontein Colliery. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Impact Assessment and Protocol for Finds of a Proposed New Quarry on Portion 9 (of 6) of the farm Mimosa Glen 885, Bloemfontein, Free State Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Impact Assessment and Protocol for Finds of a proposed development on Portion 9 and 10 of the Farm Mimosa Glen 885, Bloemfontein, Free State Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Exemption Letter for the proposed residential development on the Remainder of Portion 1 of the Farm Strathearn 2154 in the Magisterial District of Bloemfontein, Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Field Assessment for the Proposed Nigel Gas Transmission Pipeline Project in the Nigel Area of the Ekurhuleni Metropolitan Municipality, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment for five Proposed Black Mountain Mining Prospecting Right Applications, Without Bulk Sampling, in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.** 2019. Palaeontological Desktop Assessment for the Proposed Environmental Authorisation and an Integrated Water Use Licence Application for the Reclamation of the Marievale Tailings Storage Facilities, Ekurhuleni Metropolitan Municipality - Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Impact Assessment for the Proposed Sace Lifex Project, near Emalahleni, Mpumalanga Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Desktop Assessment for the proposed Golfview Colliery near Ermelo, Msukaligwa Local Municipality, Mpumalanga Province

**Butler, E.,** 2019. Palaeontological Desktop Assessment for the Proposed Kangra Maquasa Block C Mining development near Piet Retief, in the Mkhondo Local Municipality within the Gert Sibande District Municipality. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E.,** 2019. Palaeontological Desktop Assessment for the Proposed Amendment of the Kusipongo Underground and Opencast Coal Mine in Support of an Environmental Authorization and Waste Management License Application. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2019. Palaeontological Exemption Letter of the Proposed Mamatwan Mine Section 24g Rectification Application, near Hotazel, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Field Assessment for the Proposed Environmental Authorisation and Amendment Processes for Elandsfontein Colliery. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment for the Proposed Extension of the South African Nuclear Energy Corporation (Necsa) Pipe Storage Facility, Madibeng Local Municipality, North West Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Field Assessment for the Proposed Piggery on Portion 46 of the Farm Brakkefontien 416, Within the Nelson Mandela Bay Municipality, Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological field Assessment for the proposed Rietfontein Housing Project as part of the Rapid Land Release Programme, Gauteng Province Department of Human Settlements, City of Johannesburg Metropolitan Municipality. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment for the Proposed Choje Wind Farm between Grahamstown and Somerset East, Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application for the Prospecting of Diamonds (Alluvial, General & In Kimberlite), Combined with A Waste License Application, Registration Division: Gordonia and Kenhardt, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Impact Assessment for the Proposed Clayville Truck Yard, Ablution Blocks and Wash Bay to be Situated on Portion 55 And 56 Of Erf 1015, Clayville X11, Ekurhuleni Metropolitan Municipality, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment for the Proposed Hartebeesthoek Residential Development. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment for the Proposed Mooiplaats Educational Facility, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Impact Assessment for the Proposed Monument Park Student Housing Establishment. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E.,** 2020. Palaeontological Field Assessment for the Proposed Standerton X10 Residential and Mixed-Use Developments, Lekwa Local Municipality Standerton, Mpumalanga Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Field Assessment for the Rezoning and Subdivision of Portion 6 Of Farm 743, East London. Banzai Environmental (Pty) Ltd, Bloemfontein. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Field Assessment for the Proposed Matla Power Station Reverse Osmosis Plant, Mpumalanga Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application Without Bulk Sampling for the Prospecting of Diamonds Alluvial near Bloemhof on Portion 3 (Portion 1) of the Farm Boschpan 339, the Remaining Extent of Portion 8 (Portion 1), Portion 9 (Portion 1) and Portion 10 (Portion 1) and Portion 17 (Portion 1) of the Farm Panfontein 270, Registration Division: Ho, North West Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application Combined with a Waste Licence Application for the Prospecting of Diamonds Alluvial, Diamonds General and Diamonds near Wolmaransstad on the Remaining Extent, Portion 7 and Portion 8 Of Farm Rooibult 152, Registration Division: HO, North West Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application With Bulk Sampling combined with a Waste Licence Application for the Prospecting of Diamonds Alluvial (Da), Diamonds General (D), Diamonds (Dia) and Diamonds In Kimberlite (Dk) near Prieska On Portion 7, a certain Portion of the Remaining Extent of Portion 9 (Wouter), Portion 11 (De Hoek), Portion 14 (Stofdraai) (Portion of Portion 4), the Remaining Extent of Portion 16 (Portion Of Portion 9) (Wouter) and the Remaining Extent of Portion 18 (Portion of Portion 10) of the Farm Lanyon Vale 376, Registration Division: Hay, Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Area and Mining Permit Area near Ritchie on the Remaining Extent of Portion 3 (Anna's Hoop) of the Farm Zandheuveld 144, Registration Division: Kimberley, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Desktop Assessment of the Proposed Okapi Diamonds (Pty) Ltd Mining Right of Diamonds Alluvial (Da) & Diamonds General (D) Combined with a Waste Licence Application on the Remaining Extent of Portion 9 (Wouter) of the Farm Lanyon Vale 376; Registration Division: Hay; Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E.,** 2020. Palaeontological Field Assessment of the Proposed Prospecting Right Application for the Prospecting of Diamonds (Alluvial & General) between Douglas and Prieska on Portion 12, Remaining Extent of Portion 29 (Portion of Portion 13) and Portion 31 (Portion of Portion 29) on the Farm Reads Drift 74, Registration Division; Herbert, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2020.** Palaeontological Desktop Assessment for the Proposed Mining Permit Application Combined with a Waste License Application for the Mining of Diamonds (Alluvial) Near Schweitzer-Reneke on a certain Portion of Portion 12 (Ptn of Ptn 7) of the Farm Doornhoek 165, Registration Division: HO, North West Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for Black Mountain Koa South Prospecting Right Application, Without Bulk Sampling, in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Impact Assessment of the Proposed AA Bakery Expansion, Sedibeng District Municipality, Gauteng. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the Proposed Boegoeberg Township Expansion,! Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the Proposed Gariep Township Expansion, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the Proposed Groblershoop Township Expansion, !Kheis Local Municipality, Zf Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the Proposed Grootdrink Township Expansion, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Exemption Letter for the Proposed Opwag Township Expansion,! Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Exemption Letter for the Proposed Topline Township Expansion, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the Proposed Wegdraai Township Expansion, !Kheis Local Municipality, Zf Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological field Assessment for the Proposed Establishment of an Emulsion Plant on Erf 1559, Hardustria, Harrismith, Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, 2020.** Part 2 Environmental Authorisation (EA) Amendment Process for the Kudusberg Wind Energy Facility (WEF) near Sutherland, Western and Northern Cape Provinces- Palaeontological Impact Assessment. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2020.** Palaeontological Desktop Assessment Proposed for the Construction and Operation of the Battery Energy Storage System (BESS) and Associated Infrastructure and inclusion of Additional Listed Activities for the Authorised Droogfontein 3 Solar Photovoltaic (PV) Energy Facility Located near Kimberley in the Sol Plaatje Local Municipality, Francis Baard District Municipality, in the Northern Cape Province of South Africa. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Impact Assessment for the Proposed Development of a Cluster of Renewable Energy Facilities between Somerset East and Grahamstown in the Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the Proposed Amaoti Secondary School, Pinetown, eThekweni Metropolitan Municipality KwaZulu Natal. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Proposed an Inland Diesel Depot, Transportation Pipeline and Associated Infrastructure on Portion 5 of the Farm Franshoek No. 1861, Swinburne, Free State Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed erosion control gabion installation at Alpine Heath Resort on the farm Akkerman No 5679 in the Bergville district Kwazulu-Natal. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed Doornkloof Residential development on portion 712 of the farm Doornkloof 391 Jr, City of Tshwane Metropolitan Municipality in Gauteng, South Africa. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the Proposed Expansion of the Square *Kilometre* Array (SKA) Meerkat Project, on the Farms Mey's Dam RE/68, Brak Puts RE /66, Swartfontein RE /496 & Swartfontein 2/496, in the Kareeberg Local Municipality, Pixley Ka Seme District Municipality, and the Farms Los Berg 1/73 & Groot Paardekloof RE /74, in the Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for De Beers Consolidated Mines: Proposed Drilling on Portion 6 of Scholtzfontein 165 and Farm Arnotsdale 175, Herbert District in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for De Beers Consolidated Mines: Proposed Drilling on the Remaining Extent of Biessie Laagte 96, and Portion 2 and 6 of Aasvogel Pan 141, Near Hopetown in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for De Beers Consolidated Mines: Proposed Drilling in the North West Province: on Portions 7 (RE) (of Portion 3), 11, 12 (of Portion 3), 34 (of Portion 30), 35 (of Portion 7) of the Farm Holfontein 147 IO and Portions 1, 2 and the RE) of the Farm Kareeboschbult 76 Ip and Portions 1, 2, 4, 5, 6, (of Portion 3), 7 (of Portion 3), 13, 14, and the Re of the farm Oppaslaagte 100IP





and portions 25 (of Portion 24) and 30 of the farm Slypsteen 102 IP. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the Proposed Expansion of the Cavalier Abattoir on farm Oog Van Boekenhoutskloof of Tweefontein 288 JR, near Cullinan, City of Tshwane Metropolitan Municipality, Gauteng. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Proposed Doornkloof Residential Development on Portion 712 of the Farm Doornkloof 391 JR, City of Tshwane Metropolitan Municipality in Gauteng, South Africa. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed High Density Social Housing Development on part of the Remainder of Portion 171 and part of Portion 306 of the farm Derdepoort 326 JR, City of Tshwane. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Red Rock Mountain Farm activities on Portions 2, 3 and 11 of the Farm Buffelskloof 22, near Calitzdorp in the Western Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Mixed-use Development on a Part of Remainder of Portion 171 and Portion 306 of the farm Derdepoort 326 JR, City of Tshwane. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Proposed Realignment of the D 2809 Provincial Road as well as the Mining Right Application for the Glisa and Paardeplaats Sections of the NBC Colliery (NBC) near Belfast (eMakhazeni), eMakhazeni Local Municipality, Nkangala District Municipality, Mpumalanga Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed construction of Whittlesea Cemetery within Enoch Mgijima Local Municipality area, Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the establishment of a mixed-use development on Portion 0 the of Erf 700, Despatch, Nelson Mandela Bay Municipality, Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed East Orchards Poultry Farm, Delmas/Botleng Transitional Local Council, Mpumalanga. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed East Orchards Poultry Farm, Delmas/Botleng Transitional Local Council, Mpumalanga. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment to assess the proposed Gariep Road upgrade near Groblershoop, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2021.** Palaeontological Impact Assessment for the Ngwedi Solar Plant which forms part of the authorised Paleso Solar Powerplant near Viljoenskroon in the Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Noko Solar Power Plant and power line which forms part of the authorised Paleso Solar Powerplant near Orkney in the North West. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Proposed Power Line as part of the Paleso Solar Power Plant near Viljoenskroon in the Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Thakadu Solar Plant which forms part of the authorised Paleso Solar Powerplant near Viljoenskroon in the Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the proposed Farming Expansions on Portions 50 of the Farm Rooipoort 555 JR, Portion 34 of the Farm Rooipoort 555 JR, Portions 20 and 49 of the Farm Rooipoort 555 JR and Portion 0(RE) of the Farm Oudou Boerdery 626 JR, Tshwane Metropolitan Municipality, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the proposed Saselamani CBD on the Remainder of Tshikundu's Location 262 MT, and the Remainder of Portion 1 of Tshikundu's Location 262 MT, Collins Chabane Local Municipality, Limpopo Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed expansions of the existing Molare Piggery infrastructure and related activities on Portion 0(Re) of the farm Arendsfontein 464 JS, Portion 0(Re) of the farm Wanhoop 443 JS, Portion 0(Re) of the farm Eikeboom 476 JS and Portions 2 & 7 of the farm Klipbank 467 JS within the jurisdiction of the Steve Tshwete Local Municipality, Mpumalanga Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Nchwaning Rail Balloon Turn Outs at Black Rock Mine Operations (BRMO) near Hotazel in the John Taolo Gaetsewe District Municipality in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Black Rock Mining Operations (BRMO) new rail loop and stacker reclaimer Project at Gloria Mine near Hotazel in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2020.** Palaeontological Desktop Assessment for the proposed Nchwaning Rail Balloon Turn Outs at Black Rock Mine Operations (BRMO) near Hotazel in the John Taolo Gaetsewe District Municipality in the Northern Cape.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed utilization of one Borrow Pit for the planned Clarkebury DR08034 Road Upgrade, Engcobo Local Municipality, Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Kappies Kareeboom Prospecting Project on Portion 1 and the Remainder of the farm Kappies Kareeboom 540, the Remainder of Farm 544, Portion 5 of farm 534 and Portion 1 of the farm Putsfontein 616, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Kameel Fontein Prospecting Project on the Remainder of the farm Kameel Fontein 490, a portion of the farm Strydfontein 614 and the farm Soetfontein 606, ZF Mgcawu District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Lewis Prospecting Project on Portions of the Farms Lewis 535, Spence 537, Wright 538, Symthe 566, Bredenkamp 567, Brooks 568, Beaumont 569 and Murray 570, John Taolo Gaetsewe District Municipality in the Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the Construction of the Ganspan Pering 132kV Powerline, Phokwane Local Municipality, Frances Baard District Municipality in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the Longlands Prospecting Project on a Portion of the farm Longlands 350, Frances Baard District Municipality, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed development of 177 new units in the northern section of Mpongo Park in the Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Qhumanco Irrigation Project, Chris Hani District Municipality Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Raphuti Settlement Project on Portions of the Farm Weikrans 539KQ in the Waterberg District Municipality of the Limpopo Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Senqu Rural Project, Joe Gqabi District Municipality, Senqu Local Municipality, in the Eastern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed new Township development on portion of the farm Klipfontein 716 and farm Ceres 626 in Bloemfontein, Mangaung Metropolitan Municipality, Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the ECDOT Borrow Pits and WULA near Sterkspruit, Joe Gqabi District Municipality in the Eastern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed SANRAL Stone Crescent Embankment Stabilisation Works along the N2 on the farm Zyfer Fonteyn 253 (Portion 0, 11 and 12RE) and Palmiet Rivier 305 (Portion 34, 36) near Grahamstown in the Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the Klein Rooipoort Trust Citrus Development, in the Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed Victoria West water augmentation project in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Campbell Sewer, Internal Reticulation, Outfall Sewer Line and Oxidation Ponds, located on ERF 1, Siyancuma Local Municipality in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed Development and Upgrades within the Great Fish River Nature Reserve, Eastern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for proposed Parsons Power Park a portion of Erf 1. within the Nelson Mandela Bay Municipality in the Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the proposed expansion of the farming operations on part of portions 7 and 8 of farm Boerboonkraal 353 in the Greater Tubatse Local Municipality of Sekhukhune District, Limpopo Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment to assess the proposed low-level pedestrian bridge, in Heilbron, Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment to assess the proposed township developments in Hertzogville, Malebogo, in Heilbron, Free State. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment for the proposed construction of Malangazana Bridge on Farm No.64 Nkwenkwana, Engcobo Local Municipality, Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment to assess the proposed Construction of Middelburg Integrated Transport Control Centre on Portion 14 of Farm 81 Division of Middelburg, Chris Hani District Municipality in the Eastern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Desktop Assessment for the Witteberge Sand Mine on the remainder of farm Elandskrag Plaas 269 located in the Magisterial District of Laingsburg and Central Karoo District Municipality in the Western Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2021.** Palaeontological Impact Assessment (PIA) to assess the proposed Agrizone 2, Dube Trade Port in KwaZulu Natal Province. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2021.** Palaeontological Desktop Assessment assessing the proposed Prospecting Right application without bulk sampling for the prospecting of Chrome ore and platinum group metals on the Remaining Extent of the farm Doornspruit 106, Registration Division: HO; North West Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the proposed Ennerdale Extension 2 Township Establishment on the Undeveloped Part of Portion 134 of the Farm Roodepoort 302IQ, City of Johannesburg Metropolitan Municipality, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the Construction of the ESKOM Mesong 400kV Loop-In Loop-Out Project, Ekurhuleni Municipality, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the Proposed Vinci Prospecting Right Application on the Remainder of the Farm Vinci 580, ZF Mgcawu District Municipality, in the Northern Cape Province, Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the proposed Farm 431 Mining Right Application (MRA), near Postmasburg, ZF Mgcawu District Municipality, in the Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Impact Assessment for the Leeuw Braakfontein Colliery Expansion Project (LBC) in the Amajuba District Municipality, KwaZulu-Natal. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the proposed reclamation of the 5L23 TSF in Ekurhuleni, Gauteng Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the Proposed Mogalakwena Mine Infrastructure Expansion (near Mokopane in the Mogalakwena Local Municipality, Limpopo Province). Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment for the proposed 10km Cuprum to Kronos Double Circuit 132kV Line and Associated Infrastructure in Copperton in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Impact Assessment for the proposed Hoekplaas WEF near Victoria West in the Northern Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment (PDA) assessing the proposed Prospecting Right Application without bulk sampling for the Prospecting of Diamonds Alluvial (DA), Diamonds General (D), Diamonds in Kimberlite (DK) & Diamonds (DIA) on the Remaining Extent of the Farm Goede Hoop 547, Remaining Extent of the Farm 548, Remaining Extent of Portion 2 and Portion 3 of the Farm Skeyfontein 536, Registration Division: Hay, Northern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.



**Butler, E., 2022.** Palaeontological Impact Assessment for the proposed extension of Duine Weg Road between Pellsrus and Marina Martinique as well as a Water Use Authorisation (WUA) for the project. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Proposed Mimosa Residential Development and Associated Infrastructure on Fairview Erven, in Gqeberha (Port Elizabeth), Nelson Mandela Bay Metropolitan Municipality, Eastern Cape Province. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Impact Assessment for the Witteberge Sand Mine on the remainder of farm Elandskrag Plaas 269 located in the Magisterial District of Laingsburg and Central Karoo District Municipality in the Western Cape. Banzai Environmental (Pty) Ltd, Bloemfontein.

**Butler, E., 2022.** Palaeontological Desktop Assessment to assess the Palaeontology for the Somkhele Anthracite Mine's Prospecting Right Application, on the Remainder of the Farm Reserve no 3 No 15822 within the uMkhanyakude District Municipality and the Mtubatuba Local Municipality, KwaZulu Natal. Banzai Environmental (Pty) Ltd, Bloemfontein.