

R22 UPGRADE-EAST, HLUHLUWE, KWAZULU- NATAL: DESK-TOP PIA

FOR

**Suvritha Ramphal
JG AFRIKA**

by

**Dr Alan Smith
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Declaration of Independence

This report has been compiled by Dr Alan Smith (Pr. Sc. Nat.) of Alan Smith Consulting, Durban. The views expressed in this report are entirely those of the author, if not then the source has been duly acknowledged. No other interest was displayed during the decision making process for the Project.

Specialist: Dr Alan Smith

Signature:

A handwritten signature in black ink, appearing to be 'AS', written over a light blue horizontal line.

EXECUTIVE SUMMARY

Alan Smith was asked by Suvritha Ramphal of JG AFRIKA to conduct a Desk-Top Palaeontological Impact Assessment for the R22-West upgrade near Hluhluwe, KwaZulu-Natal.

Cretaceous sedimentary rocks of the Zululand Group underlie the proposed R22-East highway upgrade. These rocks are very likely to contain fossils. The country rock is coded red by Sahriss and requires a “Paleontological Field Visit”.

A pre excavation field visit is unlikely to yield anything due to weathering and loose sand covering the rock. A field visit should take place but after excavation and pre-cladding. A “Chance Find Protocol” (Appendix 1) has been incorporated into this document to cover any finds when a paleontologist is not on site. This “Chance Find Protocol” MUST be incorporated into the EMPr.

ACRONYMS

BA:	Basic Assessment
EDTEA:	(Department of) Economic Development, Tourism and Environmental Affairs
HIA:	Heritage Impact Assessment
PIA;	Palaeontological Impact Assessment
SAHRA:	South African Heritage Resource Agency
SAHRIS:	South African Heritage Resources Information System

1. TERMS OF REFERENCE

Dr Alan Smith was requested by Suvritha Ramphal of JG AFRIKA to conduct a Desk-Top PIA for the R22-West upgrade near Hluhluwe, KwaZulu-Natal. (Figure 1). This report is to meet the requirements of the National Environmental Management Act (Act 107 of 1998) [as amended] Environmental Impact Assessment (EIA) regulations, Appendix 6.



Figure 1: Location Map showing the area of the proposed R22-East upgrade (boxed), Hluhluwe, KwaZulu-Natal. Image source: Google Earth.

2. SCOPE AND PURPOSE OF REPORT

The intention is to upgrade the R22 (East Section), Hluhluwe, KZN (Figure 1). The Palaeosensitivity Impact Assessment process is a means of identifying any significant palaeontological material before development begins, so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This “Desk Top PIA” indicates the way forward for the Palaeontological Process. It recommends a palaeontological Field Visit. Any further palaeontological work required will be dictated by the results of the field

visit. Depending upon the outcome the requirements of this palaeontological process will allow the competent authority to grant or refuse authorisation.

The “Protocol for Palaeontological Finds” (attached to this report) should be incorporated into the EMPr should the go ahead of this project be granted.

3. METHODOLOGY

Geological maps, a literature review and personal experience (see Appendix 2) were used in this desk-top PIA research.

4. GEOLOGY

The proposed R22 Upgrade-East project is underlain by the Cretaceous-aged Zululand Group (St Lucia 1:250 000 Geological Map; 2732) which is dated at 86.5-83.5 Million years (Ma) (MacMillan, 2003). The rock is very weathered and forms a flat featureless plain with little outcrop.

5. PALAEOONTOLOGY

The palaeosensitivity underlying the proposed R22-West upgrade site is illustrated in Figure 2, and the palaeosensitivity coding explained in Table 1. This area comprises Cretaceous-aged rocks, which are coded red.



Figure 2: Palaeosensitivity of the R22-East, Hluhluwe area upgrade (boxed). The region covered is coded red (see Table 1 for colour code explanation).

Table 1: Summary of SAHRIS categories

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	None	Letter of Exemption required

CRETACEOUS ROCKS

The R22-West upgrade location is underlain by the Zululand Group St Lucia (2723) 1: 250 000 Geological Map. These rocks are composed of diamictite, gravel and shale beds 5 to 100 cm thick. The beds are penetrated by the trace fossil *Ophiomorpha*. *Thalassinoides* track traces are also common on bed tops. Most noticeably, the Zululand Group is associated with ammonites (Figure 3).



Figure 3: Sample of Ammonites and the mollusc *Trigonia* (bottom right) which could be found on the R22-West Upgrade Site.

The basal Makatini Formation is characterized by abundant fossil woods. These are associated with the matrix-supported conglomerates (diamictites). Two types of woods are observed:

- Trunks with hollow interior sections (by far the most common) and

- Trunks with very prominent tree rings.

The trunks with tree rings may be *protoatherospermoxylon renneiei* (Klinger and Kennedy, 1980). The hollow trunk type (unknown variety) is characteristically very long and thin (up to 30m length) whereas the solid trunk type tends to be wider, shorter and branched (Smith et al., 2018). The Makatini Formation is also characterized by numerous marine mollusc fossils such as ammonites, clams and gastropods (du Toit, 1954). Sharks teeth are common within the Cretaceous (Figure 4). These are small and never longer than a1.5cm.



Figure 4: Sharks tooth preserved in the Mzamba Formation (Photo L. Guastella) which is correlated with the Zululand Group.

6. CONCLUSIONS

Fossils are likely to be present but are unlikely to be found during a pre-excavation palaeontological field trip.

It is recommended that a Paleontological Field Visit be undertaken, post road excavation and pre-road cladding. The results of this investigation will dictate any further palaeontological processes required.

This report contains a protocol for chance palaeontological finds (Appendix 1), should a paleontologist not be on site. This must be incorporated into the EMPR.

7. REFERENCES

du Toit, A.L., 1954. The Geology of South Africa, 3rd Ed, Edinburgh, Oliver and Boyd, 611pp

Klinger, H.C. and Kennedy, W.J., 1980. The uMzamba Formation at its type section, uMzamba estuary (Pondoland, Transkei), the ammonite content and palaeogeographical distribution. *Annals of the South African Museum*, 81, 207-222.

McMillan, I. K., 2003. Foraminiferally defined biostratigraphic episodes and sedimentation pattern of the Cretaceous drift succession (Early Barremian to Late Maastrichtian) in seven basins on the South African and southern Namibian continental margin. *South African Journal of Science*, 99, 537-76.

Smith AM; Guastella, LA; Botes, ZA, 2018. Submarine mass flow channels as an underlying control for headland-bound embayments, southeast African coastline. *South African Journal of Geology*, 121.3, 227-236

St Lucia (2723) 1: 250 000 Geological Map. Government Printer, Pretoria.

Appendix 1: CHANCE FIND PROTOCOL

This Chance Find Protocol must be included in the site EMPr.

If any fossils are found, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- Images must be captured and sent to a competent geologist
- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.
- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labeled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

Functional responsibilities of the Developer

1. At full cost to the project, and guided by the appointed Palaeontological Specialist, ensure that a representative archive of palaeontological samples and other records is assembled to characterize the palaeontological occurrences affected by the excavation operation.
2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas.
3. Facilitate systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by described and measured geological

sections, and by providing aid in the surveying of positions where significant fossils are found.

4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as “normal” fossil finds.

5. Provide covered, dry storage for samples and facilities for a work area for sorting, labeling and boxing/bagging samples.

6. Costs of basic curation and storage until collected. Documentary record of palaeontological occurrences must be done.

7. The contractor will, in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which appropriate information regarding plans for excavations and work schedules must be indicated on the plan of the excavation sites. This must be done in conjunction with the appointed specialist.

8. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period.

9. Locations of samples and measured sections are to be pegged, and routinely and accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any “significant fossils” are recorded during the time of excavation.

Appendix 2: DETAILS OF SPECIALIST

Dr Alan Smith

Private Consultant: *Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban, 4091*

&

Honorary Research Fellow: *Discipline of Geology, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Durban.*

Role: Specialist Palaeontological Report production

Expertise of the specialist: Dr Alan Smith: CV (short)

Dr Alan Smith Pr. Sc. Nat., I.A.H.S.

MSc in palaeontology: The Stromatolites of Etosha Pan. (University of KwaZulu-Natal).

Alan has published 9 refereed journal articles on “Stromatolites” with another accepted for publication and a further paper under review. Several others are in preparation.

Alan is part of the **Epstromnet** international collaboration on extant microbialites/ stromatolites. This project receives some sponsorship from the United Kingdom's Natural Environment Research Council (NERC). This international project includes the following universities: Essex (UK), Ulster (UK), University of Wollongong, NSW, Australia, Nelson Mandela Bay, Rhodes, Witwatersrand and KwaZulu-Natal (SA) and the SA Geosciences Council.

PhD in Geology (University of KwaZulu-Natal), Expert in the Eccu Group in northern KZN.

Other scientific research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits and volcanology.

Alan's experience includes understanding Earth Surface Processes and hazards they pose.

Alan has published in both national and international, peer-reviewed journals. He has published + 50 journal articles with +680 citations (detailed CV available on request).

Alan has attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in palaeontological research.

Alan has been writing Palaeontological Reports since 2014. Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhokuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Fieldwork PIA: Mpungoze water supply scheme, Empangeni. Client: Enviropo.
- Fieldwork PIA: Helpmekaar Dam. Client: Afzelia environmental consultants.
- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropo.
- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.
- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Rooilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.



forestry, fisheries & the environment

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SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

R22 UPGRADE-EAST, HLUHLUWE, KWAZULU-NATAL: DESKTOP PIA

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.dffe.gov.za/documents/forms>.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with 'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020', where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	PIA
Specialist Company Name	Alan Smith Consulting
Specialist Name	Dr Alan Smith
Specialist Identity Number	5104185121089
Specialist Qualifications:	PHD
Professional affiliation/registration:	Pr. Sc. Nat. reg. no. 400122/03
Physical address:	29 Browns Grove, Sherwood, Durban
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SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Alan Smith declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, 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 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;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Alan Smith Consulting

Name of Company:

09 Jul 2025

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Alan Smith _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

Alan Smith Consulting

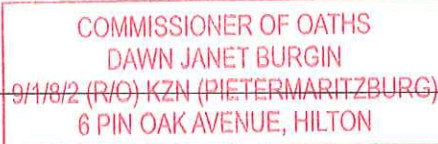
Name of Company

09 July 2025

Date



Signature of the Commissioner of Oaths



09 Jul 2025

Date