

# PALAEONTOLOGICAL SPECIALIST STUDY

In terms of Section 38(8) of the NHRA

**Proposed land clearance of Portion 8 of the Farm Stuurmans kop 55 and portion 125 of the Farm Quacha 49, near Patensie, Eastern Cape.**



**Prepared by**

**Dewald Wilken**

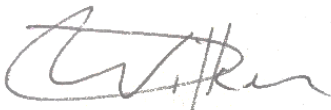
August 2022

## THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I, **Dewald Wilken**, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 (as amended) and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No. R. 326) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 14 of GN No. R. 326.

**Signed**



**Name**

**Dewald Wilken**

**Date**

**2 August 2022**

## EXECUTIVE SUMMARY

A palaeontological Impact assessment was requested for the proposed bush clearance of Portion 8 of the Farm Stuurmans kop 55 and portion 125 of the Farm Quacha 49 for the purpose of citrus farming. A palaeontological Impact assessment was conducted to comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

The area is underlain by the Lime Bank Formation and the Kleinrivier Formation of the Gamtoos Group, and the Kirkwood Formation of the Uitenhage Group. The Kleinrivier and Lime Bank Formations are devoid of significant fossils. The Kirkwood formation is very rich in fossils. However, since bush clearing for a citrus orchard is the only activity planned, and no excavation or construction is planned, it is highly unlikely that any significant fossils will be found, damaged, or lost. The planned activity can proceed. In the unlikely situation of fossil material being found, a Chance Fossil Find Procedure is added to the back of this document.

With the low likelihood of finding fossils, and the absence of excavation or construction during the bush clearing and citrus planting, the project may proceed. If any fossil material should be uncovered during bush clearing the Chance Fossil Find Procedure at the end of this document should be followed.

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## 1. Introduction

### 1.1 Background Information on Project

A palaeontological Impact assessment was requested for the proposed bush clearance of Portion 8 of the farm Stuurmans kop 55 and portion 125 of the farm Quacha 49, near Patensie for the purpose of establishing a citrus orchard. A palaeontological Impact assessment was conducted to comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). The screening report for an environmental authorisation as required by the 2014 NEMA EIA regulations indicated the proposed site environmental sensitivity to be very high.

Stuurmans kop and Quacha is located about 3km NW of Patensie, in the Eastern Cape as seen in Figure 1. The Farm is underlain by the Kirkwood Formation of the Uitenhage Group, and the Lime Bank Formation of the Gamtoos Group. (Figure 3).



Figure 1 Google Earth© satellite image of Stuurmans kop and Quacha in relation to Patensie, where bush clearing is proposed for the purpose of establishing a citrus orchard.



Figure 2 Palaeo-sensitivity Map. Indicating High fossil sensitivity underlying the study area in the Eastern Cape.

## 2. Study approach

This PIA report provides a record of the inferred palaeontological heritage resources within the study area. The identified resources have been assessed to evaluate their heritage significance in terms of the grading system outlined in Section 3 of the NHRA (Act 25 of 1999). Recommendations for specialist palaeontological mitigation are made where this is considered necessary. The report is based on (1) a review of the relevant scientific literature, including previous palaeontological impact assessments in the broader study region (*e.g.* Almond 2011, 2013), (2) published geological maps and accompanying sheet explanations (*e.g.* Toerien, D.K. (1984)). A Site Sensitivity Verification was conducted on 30 July 2022.



### 3. Geological and Paleontological context of the study area

The following section will provide a basic review of the relevant geology and palaeontology in the study area, as summarised in Table 1.

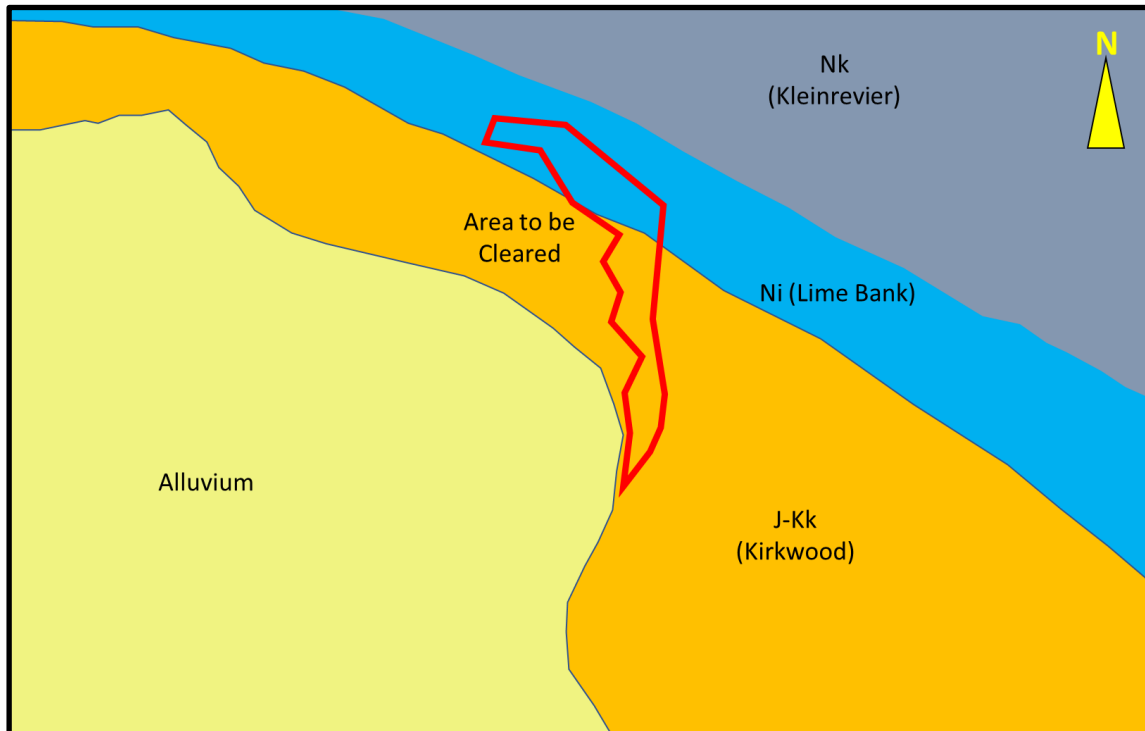


Figure 3 Geologic map of Portion 8 of the Farm Stuurmans kop 55 and portion 125 of the Farm Quacha 49, where bush clearing is proposed for the purpose of establishing a Citrus orchard. Nk – Klein Revier, Ni – Lime Bank, J-Kk – Kirkwood, and modern Alluvium. The whole area to be cleared is underlain by the Kirkwood Formation, and Lime Bank Formation. (Adapted from Toerien, (1984))

Table 1 Explanation of symbols in Figure 3.

Symbol	Group	Formation	Lithology	Approximate Age	Palaeontology
			Alluvium	Recent	N/A
J-Kk	Uitenhage	Kirkwood	Sandstone, silt stone, mudstone.	Late Jurassic to Early Cretaceous	Theropods, Ornithopods, Sauropods, Paranthodon, Ankylosaur, Rhynchocephalia, Amber, Wood, Ferns
Ni	Gamtoos	Lime Bank	lime	Late Ediacaran	Potential stromatolites
Nk	Gamtoos	Klein Rivier	Phylitic greywacke, limestone, grit and arkose. Siliclastic sediments	Late Ediacaran	Organic-walled microfossils, Vendobionts

### 3.1. Uitenhage Group - Kirkwood Formation

The Kirkwood Formation is of high importance for palaeontology. It is one of the few fossil bearing beds of the Early Cretaceous and might fill a gap in the terrestrial Mesozoic fossil record. It is very well known for the “Wood Beds” containing large amounts of fossil flora such as conifers, cycads and ferns. It has provided evidence of four taxonomically distinct groups of sauropod as seen in Figure 4.

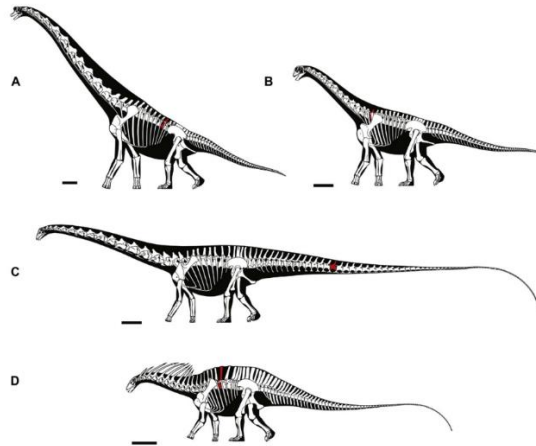


Figure 4 Sauropod diversity present within the Kirkwood Formation. A - after *Giraffatitan*; B - after *Camarasaurus*, C - after *Diplodocus*; and D – after *Amargasaurus*

The Kirkwood Formation has yielded Theropod, (most likely incertae sedis as seen in Figure 5), Ornithopod, frogs, turtles, Sphenodontids, crocodiles and some mammalian bones.



Figure 5 *Incertae sedis*

### 3.2. Gamtoos – Lime Bank Formation and Klein Rivier Formation

These two Formations consist of Phyllitic greywacke and limestone, with subordinate “Grit” and arkose. The Gamtoos Group is thought to represent carbonate and siliciclastic shelf depositions, followed by upward coarsening alluvial-fan deposits which grade into shallow marine sediment.

Potential stromatolites, Organic-walled microfossils, and Vendobionts have been found in these Formations. However, the Formation is not seen as valuable for palaeontological heritage.



#### 4. Assessment of Impact of the Development

The area is underlain by the Lime Bank Formation and the Kleinrivier Formation of the Gamtoos Group, and the Kirkwood Formation of the Uitenhage Group. The Lime Bank and Kleinrivier Formation does not contain significant fossil assemblages. The Kirkwood Formation is an extremely sensitive formation as it is the most fossil rich formation of Late-Jurassic to Early-Cretaceous age in South Africa. Since bush clearing for the purpose of establishing an orchard is the only activity planned on this site, and no excavation or construction is planned, it is, although possible, unlikely that any significant fossils will be found, damaged, or lost.

Table 2: Impact Assessment Criteria

Criteria	Category	Explanation
Overall Nature	<i>N/A</i>	Fossil find is unlikely
Type	<i>Direct</i>	The development will directly impact these resources
Extent	<i>Site</i>	Impact is limited to the area to be cleared
Duration	<i>N/A</i>	Fossil find is unlikely
Severity	<i>N/A</i>	Fossil find is unlikely
Reversibility	<i>N/A</i>	Fossil find is unlikely
Irreplaceable Loss	<i>N/A</i>	Fossil find is unlikely. Impact will remain negligible if the Chance Fossil Find Procedure is followed in the case of any fossil finds.
Probability	<i>low</i>	Fossil find is unlikely
Mitigation Potential	<i>High</i>	If the Chance Fossil Find Procedure is followed in the case of any fossil finds.
Impact Significance	<i>Negligible</i>	Fossil find is unlikely

## 5. Assumptions and Uncertainties

Based on the palaeontological record and the geology of the area, it is assumed that the Lime Bank and Kleinrivier Formation are practically devoid of significant fossils and the Kirkwood Formation, although fossil rich, is too deeply covered by a Clay layer in the area to be uncovered by bush clearing.

## 6. Conclusion and Recommendations

The area is underlain by the Lime Bank Formation and the Kleinrivier Formation of the Gamtoos Group, and the Kirkwood Formation of the Uitenhage Group. The Kleinrivier and Lime Bank Formations are devoid of significant fossils. The Kirkwood formation is very rich in fossils. However, since bush clearing for a citrus orchard is the only activity planned, and no excavation or construction is planned, it is unlikely that any significant fossils will be found, damaged, or lost. There is a very small chance that fossils could be unearthed during bush clearance. For this reason, a Chance Fossil Find Procedure will be added to the end of this document. The planned activity can proceed.

Should important new fossil remains be found the finder should alert ECPHRA (*i.e.* The Eastern Cape Provincial Heritage Resources Authority. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; smokhanya@ecphra.org.za) as soon as possible. This is so that appropriate action can be taken in good time by a professional palaeontologist at the developer's expense. Palaeontological mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as of associated geological data (*e.g.* stratigraphy, sedimentology, taphonomy). The palaeontologist concerned with mitigation work will need a valid fossil collection permit from ECPHRA and any material collected would have to be curated in an approved depository (*e.g.* museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies recently developed by SAHRA (2013). These recommendations are summarised in tabular form in Appendix 1 (Chance Fossil Finds Procedure) and should be incorporated into the Environmental Management Programme (EMPr) for the proposed development.

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## **Appendix 1**

# **Chance Fossil Finds Procedure**

(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)

### **Introduction**

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

### **Training**

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO. It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

### **Actions to be taken**

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material. Once a workman notices possible fossil material, he/she should report this to the ECO or site agent.

**Procedure to follow if it is likely that the material identified is a fossil:**

- The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found;
- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
  - The date
  - A description of the discovery
  - A description of the fossil and its context (e.g. position and depth of find)
  - Where and how the find has been stored
  - Photographs to accompany the preliminary report (the more the better):
  - A scale must be used
  - Photos of location from several angles
  - Photos of vertical section should be provided
  - Digital images of hole showing vertical section (side);
  - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- Exposed finds must be stabilised where they are unstable and the site capped, e.g., with a plastic sheet or sandbags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collected with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove all the fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed.

FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	Lat:	Long:
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	Digital image of vertical section (side)	
	Fossil from different angles	
	Wider context of the find	
Wider context of the find. Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		