

**PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE
PROPOSED DEVELOPMENT OF WAREHOUSING, SALES
AND TRUCK FACILITIES NEAR ESTCOURT, KWAZULU-
NATAL PROVINCE.**

For:

NEMAI CONSULTING

DATE: 13 April 2014

By

GIDEON GROENEWALD

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by Nema Consulting to undertake a desktop survey, assessing the potential palaeontological impact of the proposed development of a warehousing, sales and truck facility close to Estcourt in the KwaZulu-Natal Province.

This report forms part of the Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint of the project.

In preparing a palaeontological desktop study the potential fossiliferous rock units (groups, formations etc.) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature and previous palaeontological impact studies in the same region.

The proposed warehousing, sales and truck facility is located near Estcourt, KwaZulu-Natal Province. Commaro Investment cc represented by Mr Moosa Suleman proposes to construct a facility of approximately 19 hectares on Portion 220 of the farm Wagondrift No 798. The site is located at GPS coordinates 29° 02' 51.09"S; 29° 53' 55.57"E.

The study area is underlain by Permian aged rocks of the Estcourt Formation, Adelaide Subgroup, Beaufort Group of the Karoo Supergroup and Jurassic aged dolerite. The site of the development is specifically underlain by sedimentary rocks of the Estcourt Formation.

The Estcourt Formation is well known for rich assemblages of plant fossils, mainly *Glossopteris*, *Phyllothea* and other flora including ferns, clubmosses, liverworts and true mosses. Vertebrate fossils from the *Dicynodont* and *Lystrosaurus* Assemblage Zones have also been described from the Adelaide Subgroup in this part of KwaZulu-Natal, whilst Insect remains have been recorded from several localities.

The study area is underlain by sediments of the Permian aged Estcourt Formation. Due to the deep weathering of the Estcourt Formation sediments and relatively thick soil layers, fossils will only be present in areas where the surface deposits have been disturbed or eroded to expose sediments of the Estcourt Formation. For this reason, a Moderate Palaeontological Sensitivity rating is allocated to the site and a Phase I PIA must be done to record the presence of fossils in the sedimentary sequence exposed in the erosion dongas on site. The site must also be inspected for the presence of fossils in the sedimentary bedrock, after removal of the topsoil.

Recommendations:

1. The EAP and ECO must be informed of the fact that fossils might be present in all eroded and disturbed areas and where the topsoil have been or will be removed to expose shale and mudstone of the Estcourt Formation.
2. A professional palaeontologist must be appointed to investigate the exposed outcrops of Estcourt Formation sediments and to record any fossil finds in the development site (Phase I PIA report) immediately before and during initial removal of topsoil to record and remove fossils according to SAHRA/AMAFSA specification, and to record fossil finds as part of the Phase I PIA.

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1. INTRODUCTION

1.1. Background

Gideon Groenewald was appointed by Nema Consulting to undertake a desktop survey, assessing the potential palaeontological impact of the proposed development of a warehousing, sales and truck facility close to Estcourt in the KwaZulu-Natal Province.

This report forms part of the Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint of the project.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

1.2. Aims and Methodology

Following the *"SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports"* the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

In preparing a palaeontological desktop study the potential fossiliferous rock units (groups, formations etc.) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature and previous palaeontological impact studies in the same region.

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1.1 below.

Table 1.1 Palaeontological Sensitivity Analysis Outcome Classification

Sensitivity	Description
Low Sensitivity	Areas where a negligible impact on the fossil heritage is likely. This category is reserved largely for areas underlain by igneous rocks. However, development in fossil bearing strata with shallow excavations or with deep soils or weathered bedrock can also form part of this category.
Moderate Sensitivity	Areas where fossil bearing rock units are present but fossil finds are localised or within thin or scattered sub-units. Pending the nature and scale of the proposed development the chances of finding fossils are moderate. A field-based assessment by a professional palaeontologist is usually warranted.
High Sensitivity	Areas where fossil bearing rock units are present with a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops and the chances of finding fossils during a field-based assessment by a professional palaeontologist are very high. Palaeontological mitigation measures need to be incorporated into the Environmental Management Plan

1.3. Scope and Limitations of the Desktop Study

The study will include: i) an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units; ii) a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports; iii) data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged) and iv) where feasible, location and examination of any fossil collections from the study area (e.g. museums).

The key assumption for this scoping study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs alone, without ground-truthing. There is also an inadequate database for fossil heritage for much of the RSA, due to the small number of professional palaeontologists carrying out fieldwork in RSA. Most development study areas have never been surveyed by a palaeontologist.

These factors may have a major influence on the assessment of the fossil heritage significance of a given development and without supporting field assessments may lead to either:

- an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium etc.).

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed warehousing, sales and truck facility is located near Estcourt, KwaZulu-Natal Province. Commaro Investment cc represented by Mr Moosa Suleman proposes to construct a facility of approximately 19 hectares on Portion 220 of the farm Wagondrift No 798. The site is located at GPS coordinates 29° 02' 51.09"S; 29° 53' 55.57"E (Figure 2.1).



Figure 2.1 Locality of the proposed warehouse, sales and truck facility

The proposed development will include the following:

- Warehousing for the purpose of commercial and light industrial activities;
- Offices for businesses;
- Truck facilities (these may include storage, maintenance and sale of these vehicles);
- Parking areas for vehicles;
- Above ground fuel storage facility (less than 80m³);
- Overnight truck resting areas with sleeping facilities for truck drivers,
- Associated infrastructure for service provision (i.e. water, sewer, stormwater, electricity and waste); and
- Access roads.

3. GEOLOGY

The study area is underlain by Permian aged rocks of the Estcourt Formation, Adelaide Subgroup, Beaufort Group of the Karoo Supergroup and Jurassic aged dolerite. The site of the development is specifically underlain by sedimentary rocks of the Estcourt Formation (Figure 3.1).

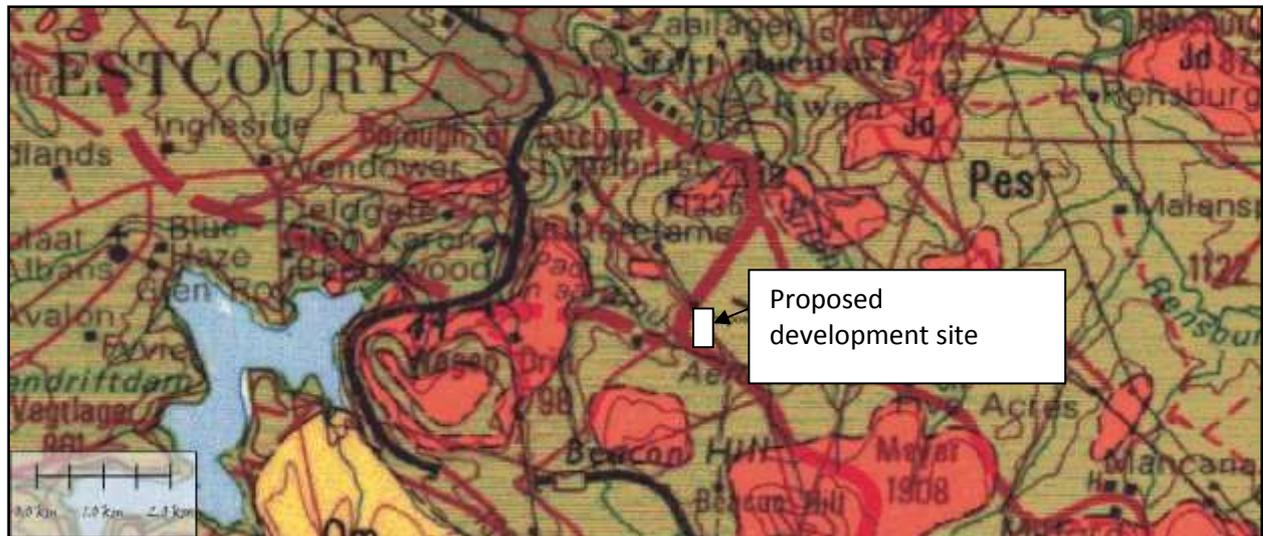


Figure 3.1 Geology of the study area.

Explanation: Pes - Adelaide Subgroup, Estcourt Formation

Jd – Dolerite.

3.1. Estcourt Formation (Pes)

The Estcourt Formation of the Beaufort Group, Karoo Supergroup consists of a sequence of coarse-grained sandstone and dark carbonaceous mudstone, with very thin (cm scale) coal seams in places. The formation is interpreted as deltaic deposit of rivers that entered the Karoo Basin from the east, with extensive flood plains where small coal swamps could develop in meandering river as well as deltaic environments (Johnson et al, 2006).

3.2. Dolerite (Jd)

Jurassic aged dolerite intruded the sedimentary sequence during the breakup of Gondwanaland.

4. PALAEOLOGY AND PALAEOLOGICAL SENSITIVITY OF THE STUDY AREA

4.1. Palaeontology

The Estcourt Formation is well known for rich assemblages of plant fossils, mainly *Glossopteris*, *Phyllothea* and other flora including ferns, clubmosses, liverworts and true mosses (McCarthy and Rubidge, 2005). Vertebrate fossils from the *Dicynodont* and *Lystrosaurus* Assemblage Zones have also been described from the Adelaide Subgroup in this part of KwaZulu-Natal, whilst Insect remains have been recorded from several localities (Groenewald, 2012).

Table 4.1 Palaeontological Significance of Geological Units on Site

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Estcourt Formation	Fluvial and deltaic sandstone and mudstone PERMIAN	<i>Glossopteris</i> plant fossils, trace fossils and <i>Dicynodont</i> and <i>Lystroraurus</i>	Dicynodont and Lystroraurus Assemblage Zones	High sensitivity
Dolerite	Dolerite JURASSIC	None		Not applicable

4.2. Palaeontological Sensitivity

The Permian aged Estcourt Formation contains significant fossils of plants belonging to the *Glossopteris* assemblage as well as vertebrate fossils from the *Dicynodont* and *Lystroraurus* Assemblage Zones. It is therefore likely that fossils will be present in all outcrops on the sites of the development. Plant fossils will most likely also be present in mudstone and shale layers exposed during excavation of foundations for the development. Due to the fact that the areas of the development will be disturbed, fossils might be exposed on the site. Due to the deep weathering and relatively thick soil layers present in the study area, a Moderate Palaeontological Sensitivity rating is allocated to the development site, which might be changed to a High Palaeontological Sensitivity, following a Phase 1 Palaeontological Impact Assessment.



Figure 4.1 Palaeontological sensitivity of the study area

5. CONCLUSION AND RECOMMENDATIONS

The study area is underlain by sediments of the Permian aged Estcourt Formation. Due to the deep weathering of the Estcourt Formation sediments and relatively thick soil layers, fossils will only be present in areas where the surface deposits have been disturbed or eroded to expose sediments of the Estcourt Formation. For this reason, a Moderate Palaeontological Sensitivity rating is allocated to the site and a Phase I PIA must be done to record the presence of fossils in the sedimentary sequence exposed in the erosion dongas on site. The site must also be inspected for the presence of fossils in the sedimentary bedrock, after removal of the topsoil.

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6. REFERENCES

Groenewald GH. 2012. Palaeontological Technical Report for KwaZulu-Natal. AMAFA internal report.

Johnson MR, Anhausser CR and Thomas RJ. 2009. The Geology of South Africa. Geological Society of South Africa.

7. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

8. DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.



Dr Gideon Groenewald
Geologist