

Phase 1 Palaeontological Impact Assessment of the Calypso Heights Commercial and Residential Development, off Woolwash Rd, Amalinda, East London, Buffalo City Metropolitan Municipality (BCMM), EC Province.



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Executive Summary

- A Phase 1 Palaeontological Impact Assessment was carried out at a property located situated adjacent to Woolwash Road, Amalinda in East London.
- The site and surrounding area is underlain by the Mid-Permian Middleton Formation of the Adelaide Subgroup (*Pm*, Beaufort Group).
- Fresh bedrock surfaces are virtually non-existent at the site, but creamy and buff coloured, Middleton Formation channel sandstone outcrop is visible where recent ground-clearing activities have taken place. No mudrock exposures were recorded during the survey.
- The overlying residual deposits are made up of unconsolidated clayey soils and are not fossiliferous.
- Excavations into bedrock resulting from the proposed development, will almost certainly impact on Middleton Formation sandstones. Potential palaeontological impact at the site will be considered low to moderate since the mode of occurrence for fossils is primarily restricted to the mudrock sequences between the channel sandstones.
- However, while not recorded during the survey, potential palaeontological impact will be considered high when excavations extend into fresh mudrock sequences.
- In the event of a fossil discovery during the operational phase of the project, it is advised that SAHRA and a professional palaeontologist should be notified immediately so that appropriate mitigation measures can be taken. It is also advised that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

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Introduction

At the request of Terreco Environmental Consultants, a Phase 1 Palaeontological Impact Assessment was carried out at a property located situated adjacent to Woolwash Road, Amalinda in East London (**Fig. 1 & 2**). SKG Properties are proposing to develop a residential area with community facilities as well as a commercial area on a 18.48 ha plot (**Fig. 3**). The proposed development will be divided into four distinct parcels including:

- A commercial area which will occupy roughly 30 000 m²;
- 1500 social housing units which will consist of 3, 4 and 5 storey buildings;
- Group housing which will occupy roughly 20 000 m² and;
- 20 000 – 25 000 m² will be set aside for the gap/affordable market.

In terms of Section 38 of the National Heritage Resources Act 25 of 1999 the survey is required as a prerequisite for any development which will change the character of a site

exceeding 5 000 m² in extent. A site visit and subsequent assessment took place on 20 June 2014.

Methodology

The site was surveyed on foot, using a Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera for recording purposes. Relevant paleontological information was integrated with data acquired during the on-site inspection.

Terms of reference for assessment

- Identify and map possible palaeontological resources;
- Determine and assess the potential impacts of the proposed development on potential palaeontological resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Description of the Affected Area

Locality Data

1 : 50 000 scale topographic map: 3227DD Cambridge

1 : 250 000 scale geological map:3226 King William's Town

General Site Coordinates: 32°59'47.02"S 27°51'17.18"E

The site is situated about 5km northwest of the East London CBD on a rolling, hilly terrain capped by a veneer of clayey soil (**Fig. 4 - 6**).

Geology

The geology of the region has been described by several authors (Mountain 1974; Le Roux 1989; Johnson and Le Roux 1994). The site and surrounding area is underlain by the Mid-Permian Middleton Formation of the Adelaide Subgroup (*Pm*, Beaufort Group) which is made up of alternating fine-grained sandstones and greyish-red mudstones (**Fig 6**). Jurassic-age dolerite intrusions, in the form of sills and dykes (*Jd*), occur extensively to the south of the Buffalo River. Late Mesozoic sediments in the area are confined to a series of small limestone deposits at Needs Camp and at Goda River Mouth near Kidd's Beach. Near the coastline Adelaide Subgroup sediments are capped by Late Pleistocene, calcareous Nahoon Formation sandstones (*Qn*, Algoa Group) (Le Roux 1989).

Background

The Mid-Permian Middleton Formation (Adelaide Subgroup) is biostratigraphically subdivided to include the upper *Pristerognathus Assemblage Zone (AZ)*, the *Tropidostoma AZ*, as well as the lower *Cistecephalus AZ* (Rubidge 1995). Vertebrate fossils characteristic of the Middleton Formation include amphibians, anapsids and therapsids (Rubidge, 2005). Anapsid fossil diversity decreases in the Middleton Formation, while therapsid taxa (Dicynodontia, Gorgonopsia) show diversification in the *Tropidostoma* and especially in the *Cistecephalus AZs* (Rubidge 2005). The *Cistecephalus AZ* is characterized by the predominance of a number of dicynodont species including *Diictodon*, *Pristerodon*, *Cistecephalus*, *Aulacephalodon* and *Oudenodon*. Plant fossils include *Glossopteris* and *Schizoneura*. The vertebrate fauna are mostly preserved as dispersed isolated fossils in interchannel mudrocks. The overlying *Pristerognathus AZ* is distinguished by its relatively low vertebrate biodiversity (Nicolas and Rubidge 2010).

Historically, the East Londen area has yielded very few vertebrate fossils. Poorly preserved reptile remains have previously been recovered from several localities believed to be along the western bank of the Buffalo River as well as near Morgan Bay (Mountain 1974). Ichnofossil occurrences are known from the uppermost *Pristerognathus AZ* (Bordy *et al.* 2011). Fish, amphibians and *Glossopteris* plant fossils are also known from these assemblages.

Quaternary-age surface sediments in the region can be highly fossiliferous in places, such as fossil dunes and caves, and especially those that are directly related to fluvial environments along major river courses or near spring areas. Three hominid footprints preserved as casts were found in 1964 in Pleistocene aeolianites of the Pleistocene Nahoon Formation (Algoa Group) near Bats Cave. In addition, shell fragments and foraminifera are common in the Nahoon Formation and fossil bone fragments have been observed in Nahoon Formation aeolinites at Black Rock and Kasuka between East London and Port Alfred.

The site and surrounding area are covered by geologically recent superficial deposits. There is currently no record of Quaternary palaeontological exposures in the vicinity.

Results of Survey

Fresh bedrock surfaces are virtually non-existent at the site, but creamy and buff coloured, Middleton Formation channel sandstone outcrop is visible where recent ground-clearing activities have taken place (**Fig. 7 & 8**). No mudrock exposures were recorded during the survey. The overlying residual deposits are made up of unconsolidated clayey soils and are not fossiliferous.

Impact Statement and Recommendation

While exposure as a result of excavation activities and subsequent reporting of fossils could be seen as a beneficial for research purposes, any damage to, or loss of potential fossil material due to inadequate mitigation are considered a negative palaeontological impact.

Excavations into bedrock resulting from the proposed development, will almost certainly impact on Middleton Formation sandstones. Potential palaeontological impact at the site will be considered low to moderate since the mode of occurrence for fossils is primarily restricted to the mudrock sequences between the channel sandstones. However, while not recorded during the survey, potential palaeontological impact will be considered high when excavations extend into fresh mudrock sequences. In the event of a fossil discovery during the operational phase of the project, it is advised that SAHRA and a professional palaeontologist should be notified immediately so that appropriate mitigation measures can be taken. It is also advised that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

References

- Bordy, E.M., Linkermann, S. and Prevec, R. 2011. Palaeoecological aspects of some invertebrate trace fossils from the Mid to Upper Permian Middleton Formation, Eastern Cape, South Africa. *Journal of African Earth Sciences* 61, 238 – 244.
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Le Roux, F.G. 1989. Lithostratigraphy of the Nahoon Formation. *SA Comm. Strat.* 9, 1-14.

Mountain, E.D. 1974. The geology of the area around East London, Cape Province. Geological Survey, Pretoria.

Nicolas, M., Rubidge, B.S., 2010. Changes in Permo-Triassic terrestrial tetrapod ecological representation in the Beaufort Group (Karoo Supergroup) of South Africa. *Lethaia* 43, 45–59.

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Figures



Figure 1. Locality map of the proposed commercial and residential development (portion of 1:50 000 scale topographic map 3227DD Cambridge).



Figure 2. Aerial view of the study area.

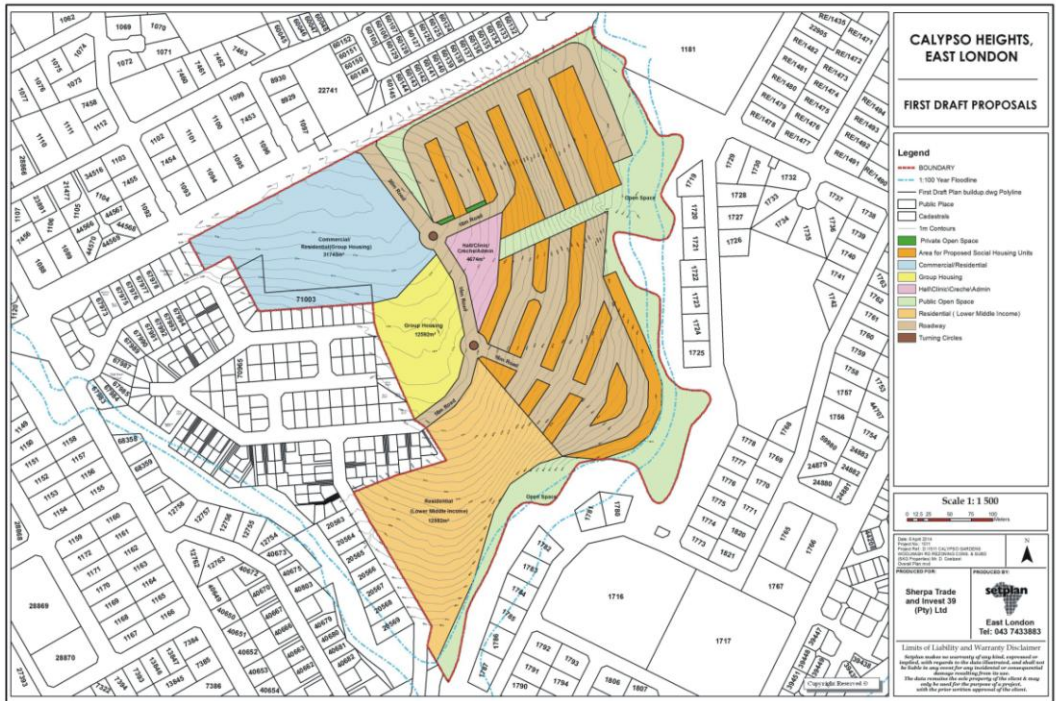
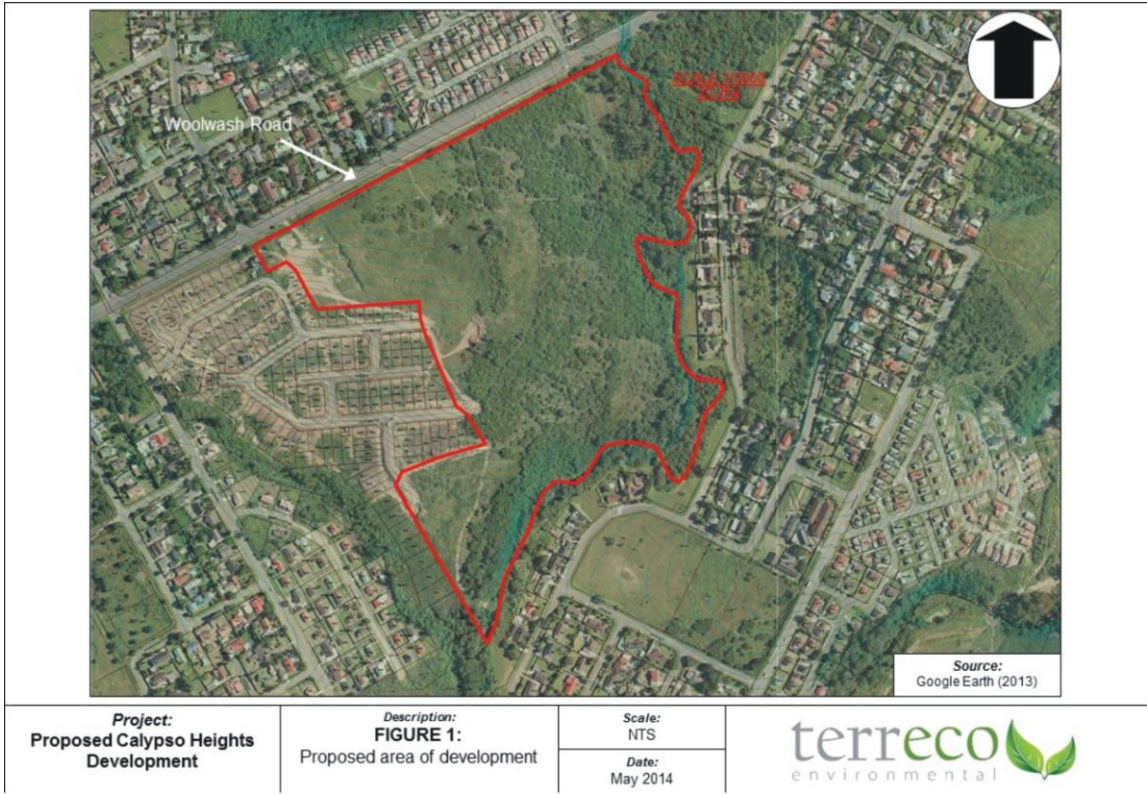


Figure 3. Plan and layout of the study area (as provided by Terreco Environmental Consultants).



Figure 4. View of the terrain, looking west.



Figure 5. The terrain is mantled by unconsolidated clayey soils, looking north (l) and southeast (r).

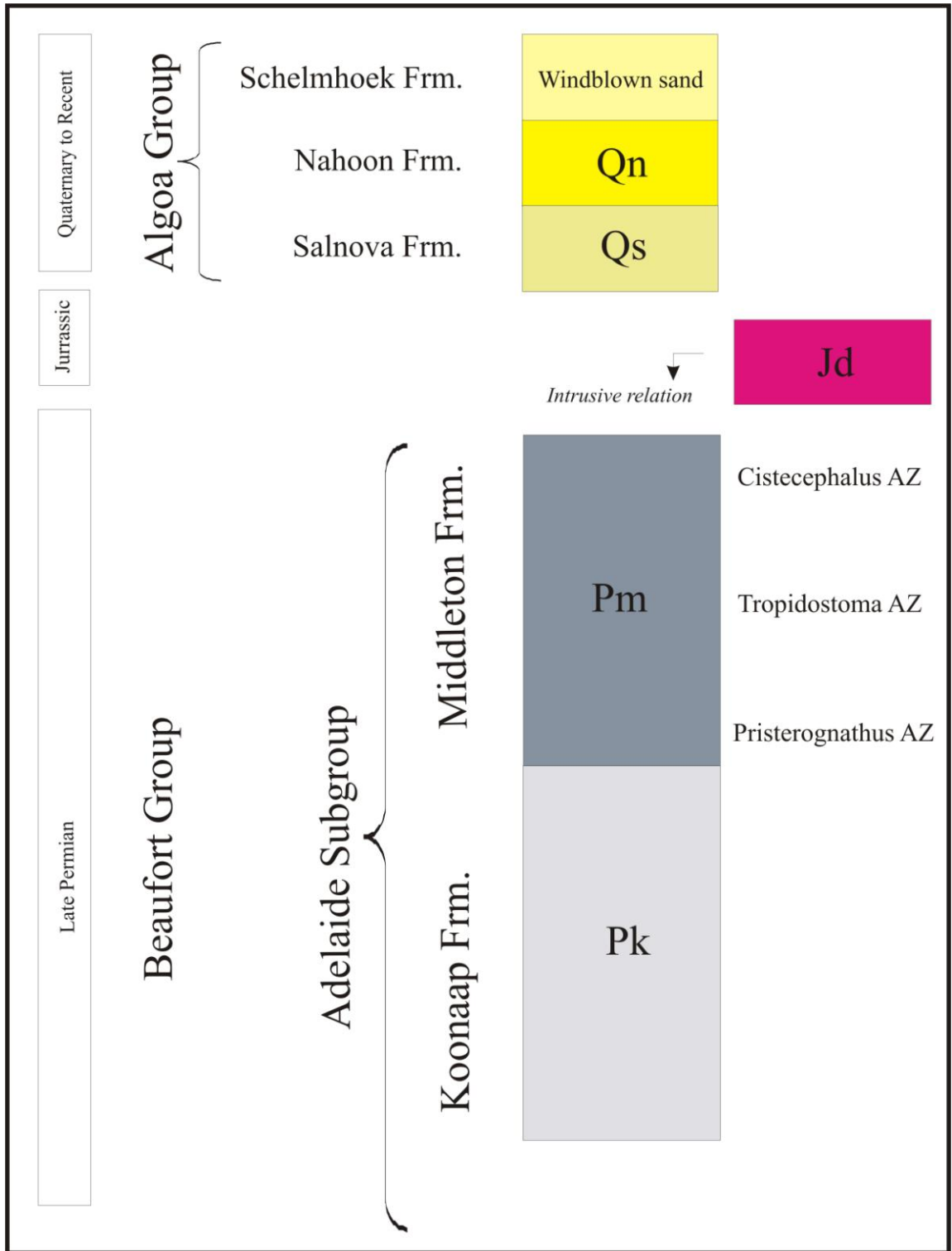


Figure 6. Schematic representation of the geology in and around the survey area.

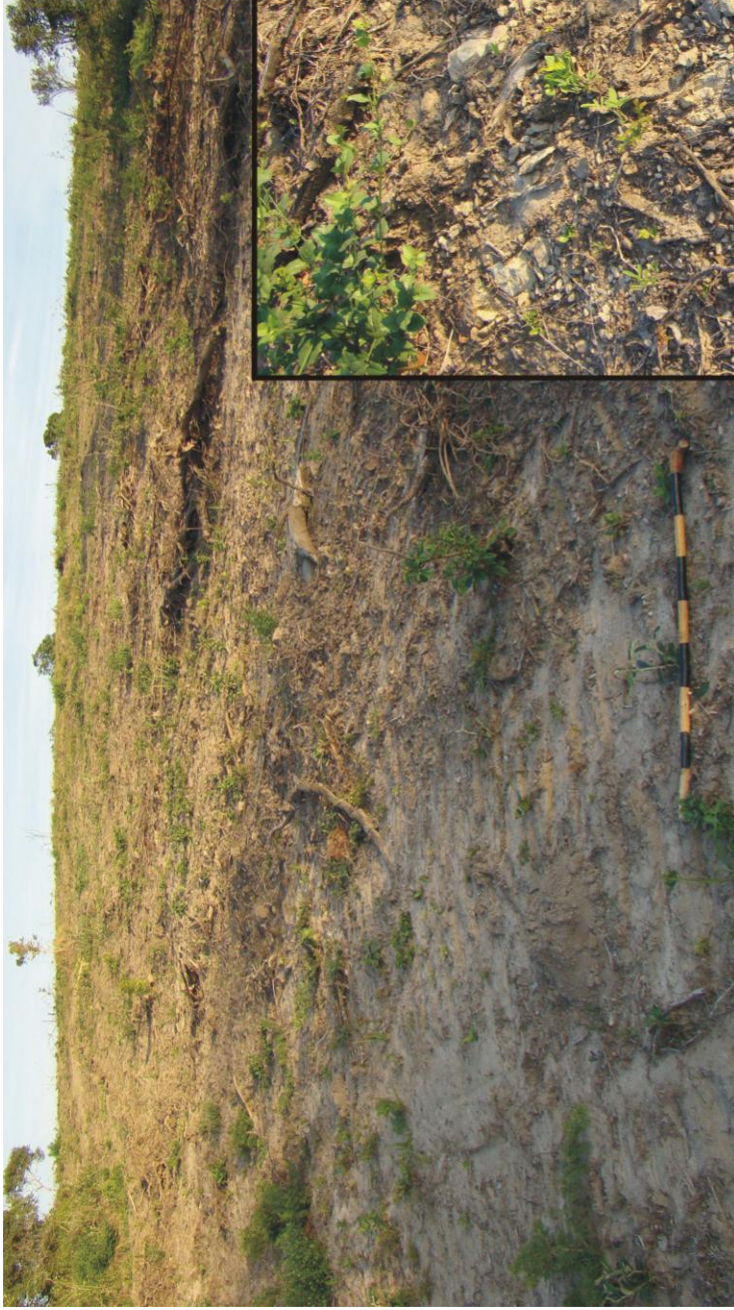


Figure 7. Sandstone outcrop is visible where recent ground-clearing activities have taken place.



Figure 8. Creamy and buff coloured sandstone outcrop.