Desktop study

Palaeontology

Ermelo to Empangeni – Eskom powerline

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Summary

There are two main routes proposed for the powerline between Ermelo and Empangeni, from the central Free State to eastern KwaZulu Natal (Refer to Map from Konrad Kruger, Zitholele Consulting). The western one passes near the towns of Amersfoort, Volksrust, Utrecht, Nondweni and Melmouth. The eastern route passes near Piet Retief, Paulpietersberg, Vryheid, Hlobane, Gluckstadt, Ulundi.

The eastern route passes through mostly very old and non-fossiliferous rocks but there are potentially a few fossiliferous sites. The farther east the line is constructed the least impact on the palaeontology. See below. The western route passes mostly through potentially fossiliferous Karoo deposits. More detail is given below. The Archaeozoic rocks of the Swazian and Randian Eras are not discussed in the next section as they are too old for fossils, but they are listed in the table for the sake of completeness.

West Route fossil sites

Around Ermelo there are exposures of Permian rocks of the Vryheid Formation which contains fossil plants of the *Glossopteris* flora (Table 1) but no vertebrates. The Drakensberg Formation has only rare foot prints, leaf impressions and fossilised wood but these have not been recorded from this area. East of Amersfoort there are exposures of the Adelaide Group that could have Beaufort plants and animals. Between Amersfoort and Utrecht there is the Vryheid Formation. Near Bloedrivier rocks of the Pietermaritzburg Formation outcrop. Dwyka exposures are near Nondweni. These are usually glacial pavements, diamictites and mudrocks. Fossil leaves, wood and trackways have been recorded from the south and northwest but not from KwaZulu Natal. Potentially these outcrops could contain fossil material.

The Ordovician-Silurian deposits near Melmoth may contain very early forms of plant life. Around Empangeni there are deposits of the Volksrust Formation with Ecca fossil plants and Emakwazini Formation that could have plants and animals of Beaufort age. Outcrops of the Emakwazini Formation at

Kwa Yaya railway siding and Emakwazini station have particularly well preserved and important t floras. Various coal mines in the region have good fossil floras too.

East Route Fossil sites

Around Ermelo there are Vryheid Formation deposits that could have the *Glossopteris* flora plants. Heading south east ancient rocks are common but near Hlobane at the quarry an extensive Ecca flora has been recorded and must be fairly widespread. Melmoth to Empangeni has the same formations as along the western route, i.e. Ordovican-Silurian, Volksrust and Emakwazini.

Age	Group	Formation	Plants	Animals
Jurassic	Drakensberg		*Agathoxylon spp.* *Otozamites sp.* *Ref, 3*	footprints
Permian	Beaufort	Adelaide, Emakwazini	*Glossopteris spp.* *Phyllotheca australis* *Dictyopteriduim flabellatum* *Rigbya arberioides* *Lidgettonia spp.* *Trizygia speciosa* *Ottokaria spp.* *Schizoneura gondwanensis* (Refs 3-9)	Fish Amphibians: *Rhinesuchus* Captorhinida *Eunotosaurus, Bradysaurus* + 2 Eosuchia: *Youngina* Dinocephalia: 20 genera Dicynodontia: 16 genera Gorgonopsia: 17 genera Therocephalia: 19 genera (Ref 10)
	Ecca	Volksrust	*Phyllotheca australis* *Raniganjia kilburnensis* *Schizoneura africana* *Glossopteris spp.* (Refs 2-6, 8-9)	Anteosauridae *Eodicynodon* *Pristerognathus* (Ref 4)
		Vryheid Pietermaritzburg	*Azaniodendron fertile* *Cyclodendron leslii* *Sphenophyllum hammanskraalensis* *Annularia sp.* *Raniganjia sp.* *Asterotheca spp.* *Liknopetalon enigmata* *Glossopteris > 20 species* *Hirsutum 4 spp.* *Scutum 4 spp.* *Ottokaria 3 spp.* *Estcourtia sp.* *Arberia 4 spp.* *Lidgetonnia sp.*	

			Noeggerathiopsis sp. *Podocarpidites sp.* (Refs 3-6, 8-9)	
Permo-Carbon-iferous		Dwyka	*Dwykea goedhopensis* *Palaeovittaria sp.* *Ottokaria buriadica* *Glossopteris sp.* (Refs 1-3)	Fish scales and tracks (Refs 1-2)
Devonian		(Witteberg, Bokkeveld)		
Ordovician Silurian		Ordovician-Silurian	Earliest land plants	Conodonts
Archaeo-zoic		Randian and Swazian	Too old	Too old

Table 1: Plant and animal taxa occurring in the different Formations mentioned in the text.

Conclusion and recommendation

The easternmost route would have the least impact on the palaeontological heritage.

Ground-truthing is necessary to confirm the presence of fossils but as this is a large area the visits should be prioritized once the complete scoping and impact exercise has been completed.

Little data have been published on these potentially fossiliferous deposits. Around the coalmines there is most likely to be good material and yet in other areas the exposures may be too poor to be of interest. When they do occur fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites, however, in the interests of heritage and science such sites should be well recorded, sampled and the fossils kept in a suitable institution. The original site can then be developed. I recommend that one or two sites be preserved for posterity, the selection of them being determined by quality of the fossils, and practical issues such as being far away from development and interference by people and livestock, and also have some means of monitoring the safekeeping in place.

Once construction has begun and if good exposures are found then the contractors and/or Eskom should contact a palaeontologist urgently to do a rescue operation.

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