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20 April 2013

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Dear Mr Turner,

Palaeontological Desktop Report – Lusthof Colliery

As requested, herewith a Desktop Palaeontological Impact Assessment with regard to the proposed development of the Lusthof Colliery, Albert Luthuli Local Municipality in Mpumalanga Province.

Yours sincerely

A handwritten signature in blue ink, appearing to read "B. Rubidge".

Bruce Rubidge PhD, FGSSA, FRSSA, Pr Sci Nat

**PALAEONTOLOGICAL DESKTOP STUDY
LUSTHOF COLLIERY,
ALBERT LUTHULI LOCAL MUNICIPALITY,
MPUMALANGA PROVINCE**

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EXECUTIVE SUMMARY

A desktop Palaeontological Impact Assessment was undertaken on the proposed Lusthof Colliery, Albert Luthuli Local Municipality, situated 17 km to the south-east of Carolina and 10 km to the north of Chrissiesmeer in Mpumalanga Province. The proposed development is for a new opencast coal mine.

The entire study area is underlain by rocks of the Karoo Supergroup comprising sedimentary rocks of the Permian Vryheid Formation.

Rocks of the Vryheid Formation contain rich coal deposits which are derived from the famous Permian *Glossopteris* flora which has Gondwana-wide distribution. As large parts of the proposed development will be on rocks of the Vryheid Formation this has the potential to affect fossil plants.

The process of coal mining has the potential to destroy palaeontological heritage, and by its nature coal mining will destroy plant fossils. However, as these fossils are not usually well preserved and are not currently exposed, the development of a coal mine will enhance possibilities to discover plant fossils. If fossils are exposed in the course expanding the mining development at the Lusthof Colliery a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented.

TABLE OF CONTENTS

Background of development.....	4
Details of the study area.....	5
Geological Setting.....	5
Palaeontological Heritage.....	6
Recommendation.....	6
Conclusions.....	6
Bibliography.....	6

REPORT

Background information of the development

This desktop report is part of a Heritage Impact Assessment to determine the effect that the development of the proposed Lusthof Colliery will have on palaeontological heritage. The proposed colliery will be situated 17 km south-east of Carolina and 10 km to the north of Chrissiesmeer within Mpumalanga Province and comprises the development of a new opencast mine (Figure 1). This upgrade will occur on Portions 4 and 6 of the Farm Lusthof 60 IT, located within the Albert Luthuli Local Municipality.

The study was commissioned by JMA Consulting (Pty) Ltd, Delmas and, I was asked to provide a desktop assessment of the affect that the proposed development will have on the palaeontological heritage.

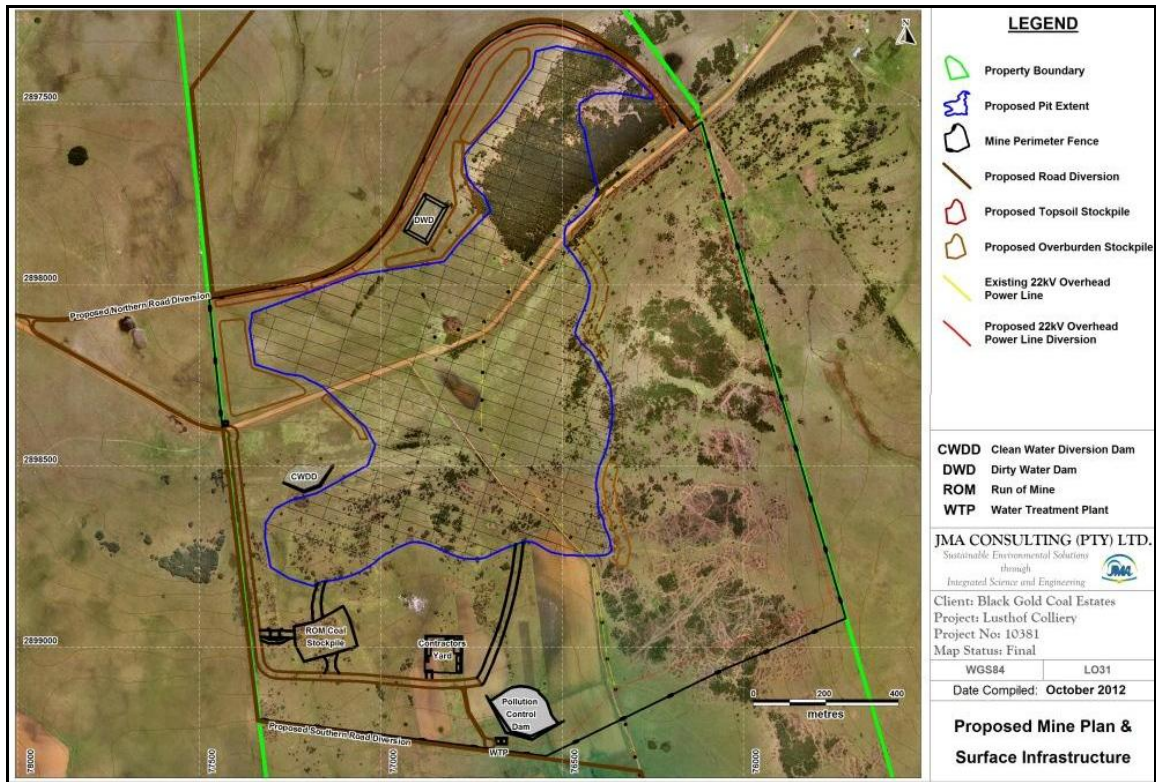


Figure 1: Proposed mine plan and surface infrastructure of the Lusthof Colliery. The property boundary is shown in green

Details of the study area

The study area of the proposed Lusthof Colliery is situated between the towns of Carolina and Chrissiesmeer within the Ermelo Coalfield of Mpumalanga Province (Figure 2). It is to be situated on Portions 4 and 6 of the Farm Lusthof 60 IT within the Albert Luthuli Local Municipality, and is covered by the 1:50 000 topographical maps (*Sheet 26230AA Carolina (1985) and Sheet 26230AB Warburton (1985)*). The surface extent of mining will be restricted to an area of 74 hectares and the mining depth will vary between 5 m and 31 m below ground surface.

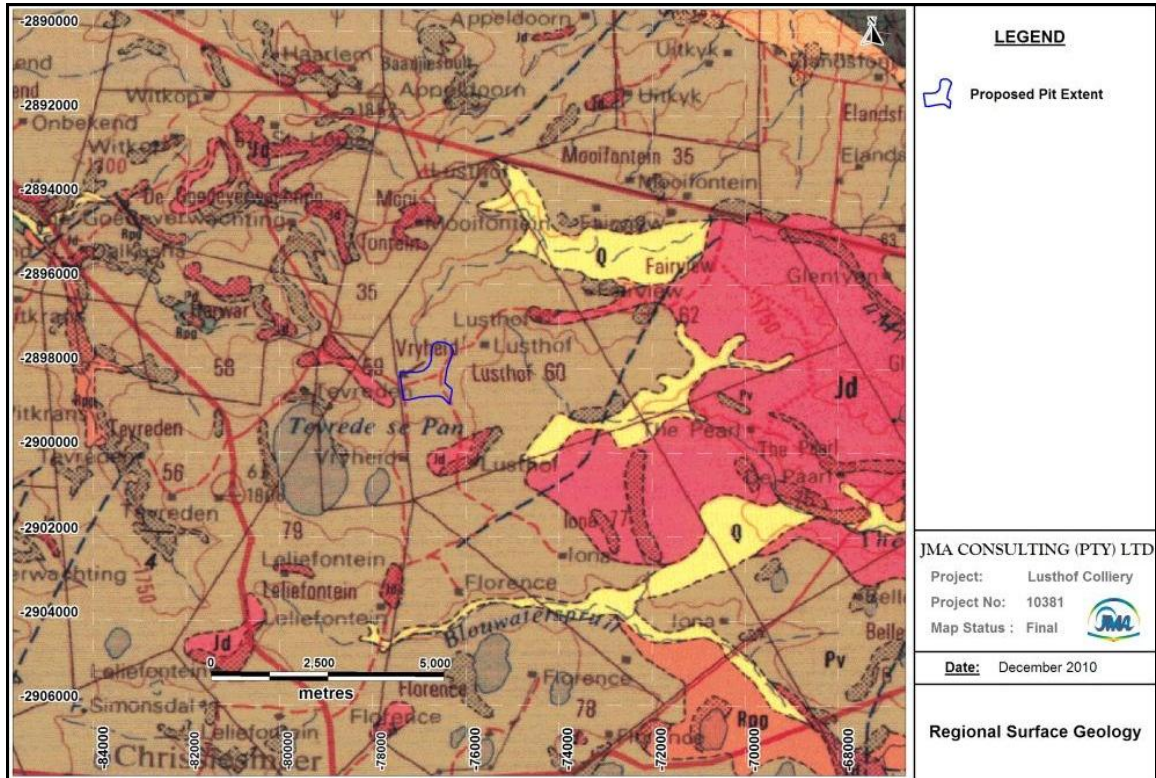


Figure 2: Geological map showing the position of the proposed Lusthof Colliery (outlined in blue) in relation to the regional geology.

Geological Setting

The entire area is underlain by rocks of the Karoo Supergroup comprising sedimentary rocks of the Permian Vryheid Formation and Jurassic Karoo Dolerites. The mudrocks, coals and sandstones of the Vryheid Formation were deposited in a delta plain depositional environment. In places Quaternary alluvial deposits are present along the banks of water courses as depicted on Figure 2 (1:250 000 Geological Map (*Sheet 2630 Mbabane, 1984*)).

The Lushof Colliery will be situated entirely on rocks of the Vryheid Formation which in the study area comprise mainly argillaceous units of carbonaceous shales and siltstones as well as arenaceous sandstones ranging in grain size from coarse to fine grained.

Palaeontological Heritage

The rocks of the Vryheid Formation of the Ecca Group are renowned for their wealth of plant fossils of the famous Gondwanan *Glossopteris* flora which has been described from Permian-aged rocks. This flora is the source of the coal which is mined from the Vryheid Formation in South Africa and is the reason for the coal mining operations. Within the Vryheid Formation there are occurrences of well-preserved elements *Glossopteris* flora comprising wood and/or leaves. Large collections of fossil flora from this Formation are present in the collections of the Council for Geoscience in Pretoria and the BPI Palaeontology at the University of the Witwatersrand in Johannesburg.

Recommendation

Because important plant fossil localities are known from the Vryheid Formation the proposed mining development activities may expose rocks of the Vryheid Formation which are not currently visible as they are covered by soil and vegetation.

If mining construction activities expose extensive outcrops of the Vryheid Formation, it will create a unique opportunity to explore the area for fossils. It is thus recommended that, should fossils be exposed, a qualified palaeontologist be contacted to assess the exposure for fossils before further development takes place so that the necessary rescue operations are implemented. Depending on the nature of the fossils discovered this could entail excavation and removal to a registered palaeontological museum collection. A list of professional palaeontologists is available from South African Heritage Resources Agency (SAHRA).

Conclusions

The proposed development of Lusthof Colliery will cover Permian-aged sedimentary rocks of the Vryheid Formation of the Karoo Supergroup. There is a good possibility that the rocks of the Vryheid Formation could contain fossil plant material of *Glossopteris* flora. The process of coal mining has the potential to destroy palaeontological heritage, and by its nature coal mining will destroy plant fossils. However, as these fossils are not usually well preserved and are not currently exposed, the development of a coal mine will enhance possibilities to discover plant fossils. If fossils are exposed in the mining development at Lusthof Mine a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented.

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