BPI for Palaeontological Research

Private Bag 3, WITS 2050, South Africa • Telephone +27 11 717-6682 • Fax +27 11 717-6694

Email: bruce.rubidge@wits.ac.za

3 August 2013

Mr Anton Pelser
APelser Archaeological Consulting cc
P O Box 73703
Lynnwood Ridge
0040
PRETORIA

E-Mail: pelseranton@gmail.com

Dear Mr Pelser,

**Palaeontological Desktop Report – Wonderfontein Colliery**

As requested, herewith a Desktop Palaeontological Impact Assessment with regard to the proposed development of the Wonderfontein Colliery close to Belfast, Mpumalanga Province.

Yours sincerely

**Bruce Rubidge** PhD, FGSSA, FRSSA, Pr Sci Nat

**PALAEONTOLOGICAL DESKTOP STUDY**
**WONDERFONTEIN COLLIERY,**
**SOUTHWEST OF BELFAST,**
**MPUMALANGA PROVINCE**

**AUTHOR:**
Professor Bruce Rubidge
PO Box 85346
Emmarentia

Tel: 072 575 7752

Email: bruce.rubidge@wits.ac.za

**COMPILED FOR:**
APelser Archaeological Consulting cc
P O Box 73703
Lynnwood Ridge
0040
PRETORIA

Cell No: 083 459 30086 695 7247

Email: pelseranton@gmail.com

**DATE: 3 August 2013**

## EXECUTIVE SUMMARY

A desktop Palaeontological Impact Assessment was undertaken on the proposed Wonderfontein Colliery near Belfast in Mpumalanga. There are three farms involved namely Wonderfontein 428JT, Grootpan 456JT and Klippan 452 JT, situated southwest of Belfast near Wonderfontein. The proposed development is for a new opencast coal mine.

The entire study area is underlain by rocks of the Karoo Supergroup comprising mainly sedimentary rocks of the Permian Vryheid Formation, but in places there are exposures of the Carboniferous Dwyka Group and also igneous rocks the Precambrian Pretoria Group.

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 Wonderfontein Colliery a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented.

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## 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 Wonderfontein Colliery will have on palaeontological heritage. The proposed colliery will be situated southwest of Belfast near Wonderfontein in Mpumalanga and comprises the development of a new opencast mine (Figure 1). This upgrade will occur on the farms Wonderfontein 428JT, Grootpan 456JT and Klippan 452 JT

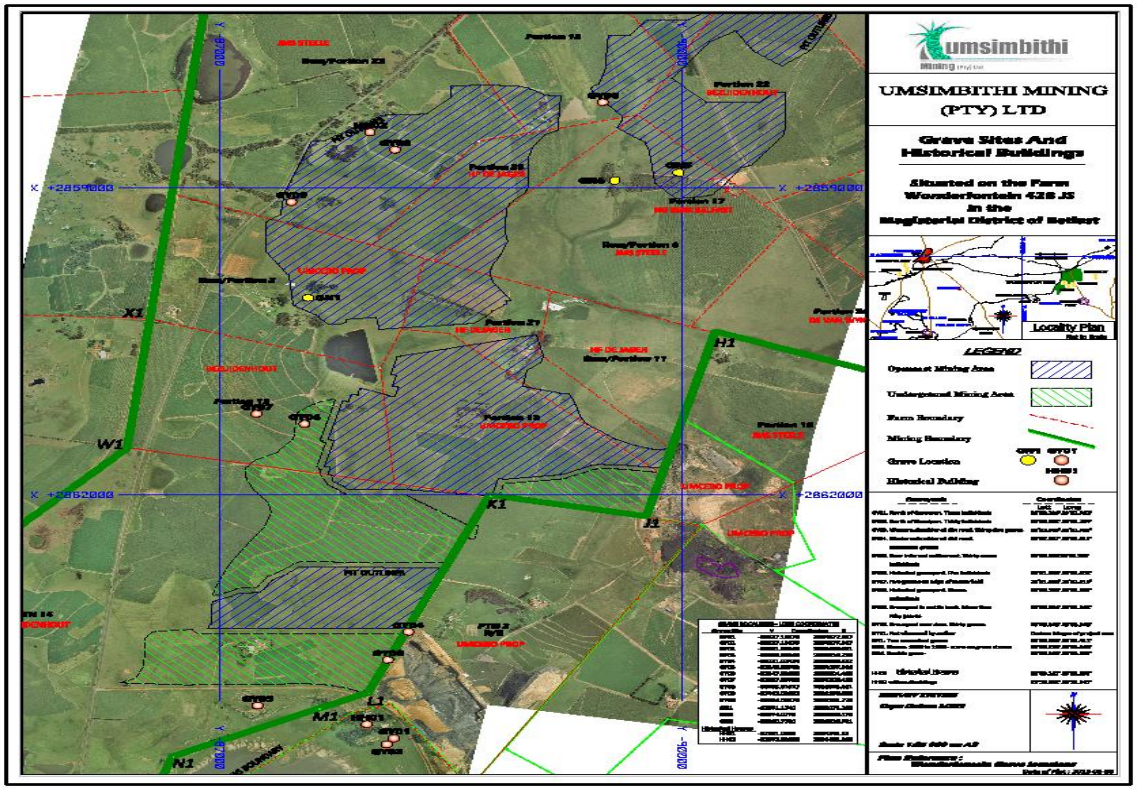


*Figure 1: Proposed mine plan and surface infrastructure of the proposed Wonderfontein Colliery. The property boundary is shown in green*

The study was commissioned by Apelser Archaeological Consulting cc and, I was asked to provide a desktop assessment of the affect that the proposed development will have on the palaeontological heritage.

**Details of the study area**

The study area of the proposed Wonderfontein Colliery is situated southwest of the town of Belfast in Mpumalanga Province (Figure 2). It is to be situated on the farms Wonderfontein 428JT, Grootpan 456JT and Klippan 452 JT and is covered by the 1:50 000 topographical maps (*Sheet 2529DD Arnot – 1986*). The surface extent of mining will be restricted to an area of 1320 hectares, while 146 hectares will be underground, and the mining depth will vary between 19.72 m and 33.62 m below ground surface.

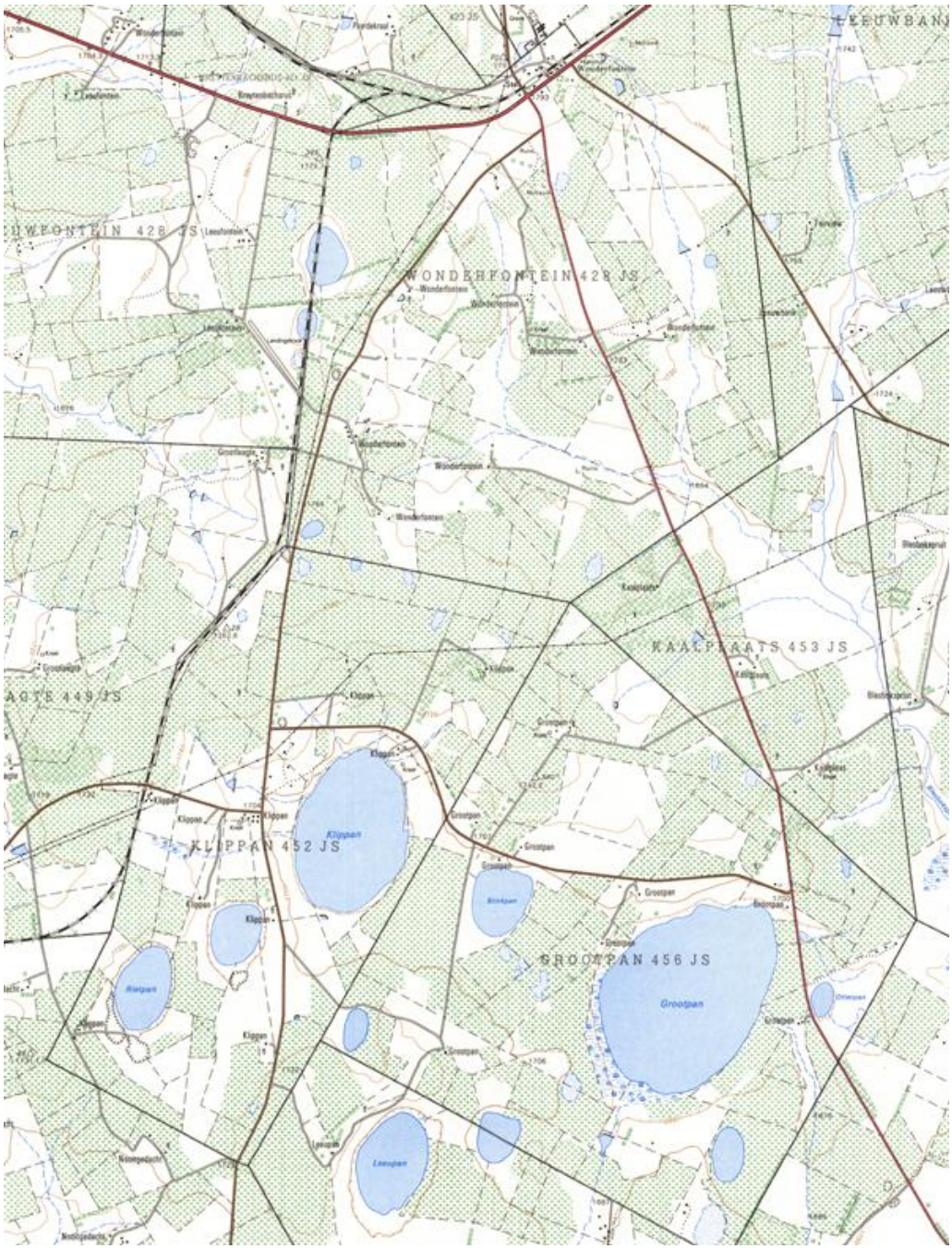


*Figure 2: Topographic map showing the position of the proposed Wonderfontein Colliery.*

## Geological Setting

The entire area is underlain by rocks of the Karoo Supergroup comprising sedimentary rocks of the Carbonifeous Dwyka Group and Permian Ecca Group. The diamictites of the Dwyka Group were deposited by glaciers while the mudrocks, coals and sandstones of the Vryheid Formation were deposited in a delta plain depositional environment. Toward the eastern side of the farm Grootpan igneous rocks of the Precambrian Pretoria Group are exposed (Figure 3).

The Wonderfontein Colliery will be situated almost entirely on rocks of the Ecca Group 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. On the eastern side of the farms Grootpan and Wondderfontein diamictites of the Dwyka Group are present, and on the eastern side of Grootpan there are outcrops of the Pretoria Group


*Figure 3: Geological map showing the position of the proposed Wonderfontein Colliery (outlined in blue) in relation to the regional geology* (*1:250 000 Geological Map (Sheet 2528 Pretoria, 1984)).*

## Palaeontological Heritage

The Precambrian igneous rocks of the Pretoria Group will not contain any fossils. The rocks of the Dwyka Group, comprising largely of very course tillites, were deposited in a glacial environment and are known to be depauperate in fossils. Fossils discovered so far include fragmentary fossil plant material. It is thus unlikely that any fossils will be preserved in the diamictites of the Dwyka Group. The 1: 250 000 geological map

consulted for this study does not differentiate between the Formations of the Ecca Group, but the rocks of this Group in the area under consideration are known for their wealth of plant fossils of the famous Gondwanan *Glossopterus* flora. 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 the Wonderfontein 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 in enhance possibilities to discover plant fossils. If fossils are exposed in the mining development at Wonderfontein 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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