

**Palaeontological Impact Assessment for proposed  
Charlie 1 Landfill Optimisation and Stormwater  
Management Project, Sasol Synfuels, Secunda,  
Mpumalanga**

**Desktop Study**

**For**

**Royal HaskoningDHV**

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## **Expertise of Specialist**

The Palaeontologist Consultant is: Prof Marion Bamford

Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf

Experience: 30 years research; 20 years PIA studies

## **Declaration of Independence**

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Royal HaskoningDHV. The views expressed in this report are entirely those of the author and Royal HaskoningDHV and no other interest was displayed during the decision making process for the project.

Specialist: ..... Prof Marion Bamford.....

Signature: .....

## **Executive Summary**

The desktop Palaeontological Impact Assessment for the proposed Charlie1 Stormwater optimization project which consists of the construction of 2 ponds, which aims to comply with environmental permit and licencing conditions, to be located on the remainder of Portion 43 Driehoek 275 IS, Govan Mbeki Local Municipality, in the Mpumalanga Province.

Once excavations and construction operations have begun the personnel should look out for fossils in the shales between coal seams. If any fossil plants are found, they should be removed and protected, and a palaeontologist called to assess their significance.

# **Palaeontological Impact Assessment for proposed Charlie 1 Landfill Optimisation and Stormwater Management Project, Sasol Synfuels, Secunda, Mpumalanga**

## **Background**

As requested by Royal HaskoningDHV on behalf of their client Sasol South Africa, Secunda and recommended by SAHRA (Case id: 8542 Response to NID (Notification of Intent to Develop), a desktop palaeontological impact assessment has been conducted in terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999).

Sasol Synfuels Secunda proposes the Charlie1 Stormwater optimization project which consists of the construction of 2 ponds, which aims to comply with environmental permit and licencing conditions, to be located on the remainder of Portion 43 Driehoek 275 IS, Govan Mbeki Local Municipality, in Mpumalanga Province.

The National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998) requires that the proposed development must be preceded by the relevant impact assessment, in this case, a desktop palaeontological assessment.

## **Methods and Terms of Reference**

1. In order to determine the likelihood of fossils occurring in the affected area geological maps, literature, palaeontological databases and published and unpublished records must be consulted.
2. If fossils are likely to occur then a site visit must be made by a qualified palaeontologist to locate and assess the fossils and their importance.
3. Unique or rare fossils should either be collected (with the relevant South African Heritage Resources Agency (SAHRA) permit) and removed to a suitable storage and curation facility, for example a Museum or University palaeontology department or protected on site.
4. Common fossils can be sacrificed if they are of minimal or no scientific importance but a representative collection could be made if deemed necessary.

The published geological and palaeontological literature, unpublished records of fossil sites, catalogues and reports housed in the Evolutionary Studies Institute, University of the Witwatersrand, and SAHRA databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.

## Consultation Process

No consultations were carried out during the desktop study. Apart from reviewing interested and/or affected party (IAP) comments received by the EIA consultant during the EIA process, no other consultation took place as part of the paleontological study.

## Geology and Palaeontology

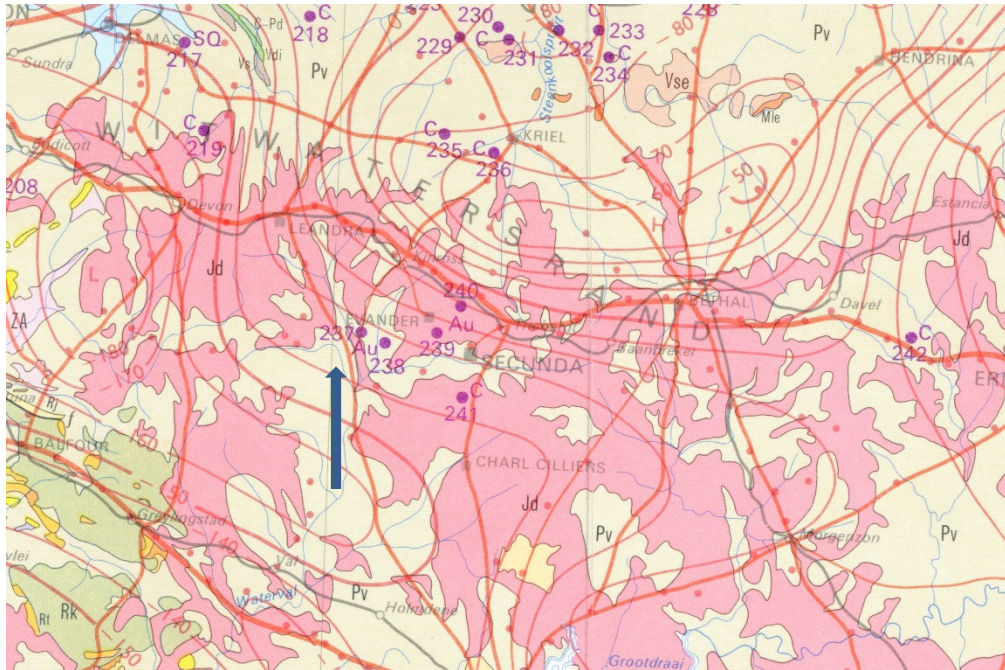
### Project location and geological setting



**Figure 1: Google Earth image of the proposed area to be developed with Secunda to the east**

### Geology

The region around Secunda is predominantly Jurassic dolerite dykes that are intruding into the Lower Permian, Ecca Group Vryheid Formation. These rocks comprise dolerite that contains no fossiliferous material as it would have been destroyed by the dykes, and sandstones, shales and coals of the Vryheid Formation (Figure 2, Table 1). This region is in the Highveld Coalfield where the no 4 seam is the most productive (used as feedstock for the indirect liquefaction by Sasol) and is thus overlain by the much less productive No 1 and 2 seams (Snyman, 1998).



**Figure 2. Geological map of the area to be developed**

The approximate location of the proposed ponds is indicated with the arrow. Abbreviations of the rock types are explained in Table 1. Map enlarged from the Geological Survey 1: 1 000 000 map (1984).

**Table 1: Explanation of symbols for the geological map and approximate ages (Cadle *et al.*, 1993; Johnson *et al.*, 2006; Snyman, 1998)**

Symbol	Group/Formation	Lithology	Approximate Age
Jd	Jurassic	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pa	Adelaide and Estcourt	Mudstone, sandstone	Beaufort
Pvo	Volkstrust	Shale	Middle Permian, Upper Ecca
Pv	Vryheid	Shales, sandstone, coal	Lower Permian, Middle Ecca
C-Pd	Dwyka	Tillite, sandstone, mudstone, shale	Upper Carboniferous to Lower Permian
ZB	unnamed	Potassic granite and granodiorite	Basement, >3000 Ma

### Palaeontology

Coals are formed by the burial of peats and over time the compaction and alteration of the organic material caused by increasing temperatures and pressures. Coals, therefore, are the product of fossil plants but within the coal seams the plant material is unrecognizable. In the shales and mudstones closely associated with the coal seams it is possible to find fossilized wood, leaf impressions, insect impressions, cuticle and pollen. The distribution of the fossils, however, is very patchy and unpredictable. Vertebrate fossils very seldom occur within the plant fossils.

The SAHRIS palaeosensitivity map for the site indicates red (very sensitive and very high probability of fossils occurring there) occurring around the Winkelhaak Mines and along the small river that feeds into the Evander Dam. The rest of the area is grey (insignificant to zero chance of finding fossils). Although there are coal seams below ground there are no published or published records of fossils plants from this area, most likely because the deposits are far below the surface.

### **Impact assessment**

The surface activities would not impact on the fossil heritage as the coals and any associated fossil plants are below ground. The impact is nil.

Once excavation and construction activities start there would be minor deterioration of the site and no impact on people. Therefore the severity of environmental impact would be very low but the duration would be permanent. Only the area of the proposed ponds be affected.

### **Assumptions and uncertainties**

Based on the geology of the area and the palaeontological record, it can be assumed that the formation and layout of the coal seams and associated shales are typical of other deposits in the Karoo Basin, so no fossil animals will occur there. Coal is made from fossil plants but compressed and altered to such an extent that the original plant material is unrecognisable. Fossil plants may be associated with the adjacent shales and shale lenses but are assumed to be the same as other coal deposits and therefore very common. Until the coal seams and shales are exposed and examined, this remains an uncertainty, but a minor one.

### **Recommendation**

While it is possible that plant fossils occur in the proposed pond and stormwater channels areas and infrastructure area they will not be detected until excavations begin. A site visit is therefore not feasible until such stage.

If fossil plant material is discovered during the excavation and construction of the development, then it is strongly recommended that a professional palaeontologist, preferably a palaeobotanist, be called to assess the importance and to rescue them if necessary (with the relevant SAHRA permit).

If the fossil material is deemed to be of scientific interest then further visits by a professional palaeontologist would be required to collect more material and house it in a recognised institution.

As far as the palaeontology is concerned the proposed development can go ahead. Any further palaeontological assessment would only be required after excavation has commenced and if fossils are found by the geologist or environmental personnel.

## References

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