

# **HARRISMITH DEVELOPMENT- JUNCTION OF N3 AND N5 HIGHWAYS PALAEOLOGICAL IMPACT ASSESSMENT**

## **Executive summary**

A palaeontological impact assessment was undertaken on the proposed commercial development site which includes Portions 147, 148, 149 150 of the Farm Dorps Gronden of Harrismith, Erf 2266 and Portion of Erf 985, Harrismith, Free State Province. The area is underlain by rocks of the Beaufort Group which are internationally renowned for their wealth of fossil reptiles. Despite an intensive search over the study area no fossil bearing rocks were found and because the fossil bearing rocks have a thick covering of Quaternary and Recent rubble deposit it is considered that the proposed development of commercial site, with shallow foundations, will have no impact on palaeontological heritage. As the Harrismith area, in particular Queens Hill and the Harrismith dongas on the eastern side of the N3 highway, is particularly rich in fossils, a palaeontologist should be called in to clear the area of fossils should outcrops of Beaufort Group rocks be exposed in the course of building excavation.

## **Introduction**

This report covers the impact which the proposed commercial development, situated on Portions 147, 148, 149 150 of the Farm Dorps Gronden of Harrismith, Erf 2266 and Portion of Erf 985, Harrismith, Free State Province (Figure 1), will have on palaeontological heritage.

The Harrismith area is geologically positioned on rocks of the Beaufort Group of the Karoo Supergroup, a  $\pm 3000\text{m}$  thick sequence of dominantly fluvial sedimentary rocks (Smith 1990; Smith et al. 1993). These rocks are of international importance as they contain one of the most remarkable assemblages of tetrapod fossils, which cover a timespan ranging from the Early Permian to the Middle Triassic (270-140 million years ago). This is an important time in life's history as it is during this period that the stem lineages to both mammals and dinosaurs evolved and diversified, and the rocks of the Beaufort Group contain many important fossils which document these evolutionary changes (Hancox & Rubidge 2001; Rubidge 2005). These rocks in addition preserve one of the most complete and best studied nonmarine Permo-Triassic (PT) boundary sequences in the world (Smith 1995; Smith & Macleod 1999). These boundary sections are of great importance as for the first time they are allowing a glimpse into the terrestrial record of the greatest mass extinction event to have befallen the planet (Erwin 1990).

Because of their richness in fossil tetrapods the rocks of the Beaufort Group have been divided into seven assemblage zones (Keyser & Smith 1978/79; Kitching 1977; Rubidge 1995). In particular, because of the relatively high topography and resulting excellent rock outcrops, the Harrismith district, particularly Queens Hill and the Harrismith dongas on the eastern side of the N3 highway, is renowned for the abundance of fossils which have been recovered from the area and which are now stored in various museum collections in South Africa (Nicolas 2007).

The area affected by the proposed development is underlain by rocks of the Adelaide Subgroup of the Beaufort Group. From research undertaken throughout the Karoo Basin

the rocks of the Adelaide Subgroup in the Free State Province are known to contain a rich diversity of fossil tetrapods of the *Dicynodon* Assemblage Zone, which is Late Permian in age.

In contrast on Queens Hill, on the eastern side of the N3 highway which will not be affected by the proposed development, rocks of the overlying Tarkastad Subgroup are exposed and contain fossils of the *Lystrosaurus* Assemblage Zone.

A site inspection was undertaken of the study area to assess the possibility of finding fossils, and the potential impact which the proposed commercial site development will have on palaeontological heritage.

### **Description of the affected environment**

The study area is situated on Portions 147, 148, 149 150 of the Farm Dorps Gronden of Harrismith, Erf 2266 and Portion of Erf 985, Harrismith and is bordered, on the northern side, by residential and commercial property, on the eastern side by the N3 highway and further east by Queens Hill, which has exposures of sandstones, mudrocks of the Tarkastad Subgroup and Karoo dolerites (Figure 2). On the southern side the site is bordered by the N3 and N5 highways. My inspection revealed no fossil bearing rock outcrops in the area which will be affected by the proposed development, and the basement rocks are covered by Quaternary sediments and recent builders rubble which is at least 3 metres thick as revealed by exposures in banks of the gulley which flows through the property (Figures 3, 4).

### **Sources of risk, impact identification and assessment**

Because the rocks of the Beaufort Group are known to contain a rich diversity of fossil tetrapods, there is a strong possibility of the presence of fossils throughout the geographic region underlain by these rocks. As a result of the thick cover of Quaternary sediments and builders rubble, which do not have fossils, in the study area it is unlikely that fossils of the Beaufort Group will be affected by the proposed commercial development.

### **Recommended Mitigation Measures and Management Actions**

In my opinion the proposed GMB landfill development will have no negative impact on palaeontological heritage. However as the Harrismith area, in particular Queens Hill and the Harrismith dongas on the eastern side of the N3 highway, is particularly rich in fossils, a palaeontologist should be called in to clear the area of fossils should outcrops of Beaufort Group rocks be exposed in the course of building excavation

### **Conclusions and Recommendations**

Despite the fact that the rocks of the Beaufort Group in the Harrismith district are renowned for their wealth of fossils, my site inspection revealed that there are no fossil-bearing rock outcrops in the area which will be affected by the proposed development. Because the rocks of the Beaufort Group in the study are covered by a relatively thick covering of Quaternary overburden and builders rubble which does not contain fossils, the proposed commercial development poses no threat to palaeontological heritage.

However, should large areas of underlying bedrock be exposed by excavation, a palaeontologist should be called in to clear the area of fossils.

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Figure 3: Gully in study area showing thick soil and builders' rubble covering.



Figure 4: Builders rubble on site, this makes up most of overburden.

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