

Phase 1 Palaeontological Impact Assessment for a proposed new phosphoric acid plant on Portion 4 of the farm Holfontein 399 near Standerton, Mpumalanga Province.

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02 October 2017

Summary

The proposed development is located on degraded, low topography terrain, largely covered by the ruins of an old clay-brick factory. The superficial overburden covering the study area is extensively degraded and is not considered to be palaeontologically significant with regard to Quaternary fossil remains. Sedimentary rocks underlying the study area are made up of palaeontologically significant sandstones, shales and minor conglomerates of the Early to Middle Permian Vryheid Formation (Ecca Group, Karoo Supergroup). These rocks are largely buffered by the superficial overburden and the chances of finding fossils are considered low. However, given the nature and scale of the development (e.g. laying of foundation trenches and associated underground infrastructure), any excavation within the development footprint larger than 1 m² that exceeds depths of >1 m into unweathered/fresh Vryheid Formation sediments, will need further monitoring by a professional palaeontologist. It is therefore advised that, as part of a follow-up Phase 2 Palaeontological Impact Assessment, a professional palaeontologist should monitor unweathered/fresh sedimentary bedrock should large scale excavations, exceeding depths of >1m into unweathered/fresh sedimentary bedrock, be conducted during the construction phase of the development.

Introduction

The report is an assessment of potential palaeontological impact with regard to the proposed construction of a phosphoric acid plant, on Portion 4 of the farm Holfontein 399 (site coordinates 26°52'11.25"S 29° 1'51.79"E), in the Lekwa Luthuli Local Municipality near Standerton, Mpumalanga Province (**Fig. 1**). The study area is located north of the R23 provincial road, approximately 23 km west-northwest of Standerton (**Fig. 2**). The project will cover a 5 ha area and will include the construction of the following facilities: a Phosphoric Acid Plant, a Calcium Ammonium Nitrate Plant, a Pure Mono Ammonium Phosphate Plant

and a Mono Ammonium Phosphate Plant. It is also proposed that an existing Granular Fertilizer Blending Plant from Sonskyn Kunsmis (Pty) Ltd is relocated from Standerton to the proposed Phosphoric Acid Plant site.

Methodology

The assessment was carried out in accordance with National Heritage Resources Act 25 of 1999 with the aim to assess the potential impact on palaeontological heritage resources that may result from the proposed development. The palaeontological significance of the affected areas were evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature.

Assumptions and Limitations

The presentation of geological units present within the study area is derived from the 1:1 000 000 scale map of South Africa and the 1:250 000 scale geological map of the region, which may vary in their accuracy. It is also assumed, for the sake of prudence, that fossil remains are always uniformly distributed in fossil-bearing rock units, although in reality their distribution may vary significantly.

Background

According to the 1:250 000 scale geological map 2628 West Rand, the proposed development footprint is located within the outcrop area of the Early to Middle Permian, Vryheid Formation of the Ecca Group (Karoo Supergroup) (**Fig. 3**). The deltaic sandstones, shales coal beds and minor conglomerates of the Vryheid Formation is well-known for the occurrence of a rich variety of plant fossils (Glossopteris Flora), including tree trunks, stumps and roots, palynomorphs, rare insects, conchostracans and low diversity trace fossil assemblages (Anderson and Anderson 1985; Bamford *et al.* 2004). Vertebrate fossils are absent from the Vryheid Formation, although the aquatic reptile, *Mesosaurus*, as well as fish (*Palaeoniscus capensis*), have been recorded in equivalent-aged strata in the Whitehill Formation in the southern part of the Karoo basin (Oelofson and Aroujo 1987; MacRae, 1999; Modesto, 2006; Johnson *et al.* 2006). Invertebrate trace fossils have been described in some detail by Mason and Christie (1986).

Quaternary palaeontological sites are occasionally found in Pleistocene alluvial terraces and dongas along rivers and streams. Quaternary alluvial deposits, especially near water courses

and drainage lines, have the potential to yield microfossil and large mammal fossil remains. Small, fossil rich alluvial exposures of the Cornelia Formation have been recorded north and east of Cornelia south of the Vaal River, about 50 km southwest of Standerton (**Fig. 4**). One of these sites is known as the Cornelia-Uitzoek vertebrate locality, and is the type site of the Cornelian Land Mammal Age (Butzer *et al.* 1974; Bender & Brink 1992; Brink & Rossouw 2000). The site consists of a pocket of Quaternary alluvial and colluvial gravels and clays in small basins of Karoo Ecce shale. These Quaternary deposits are characterized by several distinct fossil mammal species, including *Stylochoerus compactus*, *Connochaetes laticornutus* and *Megalotragus eucornutus*. During recent excavations a human first upper molar, was discovered during the systematic excavation of a densely-packed bone bed in the basal part of the sedimentary sequence (Brink *et al.* 2012). This sequence was dated by palaeomagnetism which correlated the bone bed to the Jaramillo subchron, between 1.07 and 0.99 Ma. This makes the specimen the oldest southern African hominine remains outside the dolomitic karst landscapes of northern South Africa.

Field Assessment

The proposed development is located on degraded, low topography terrain that is largely covered by the ruins of an old clay-brick factory (**Fig. 5**). The area is capped by heavily disturbed superficial, residual soils. Outcrop visibility is very low and no fossil exposures were observed.

Impact Statement Recommendation

The proposed development will impact on a relatively small, flat and highly degraded/disturbed area. The superficial overburden covering the study area is extensively degraded and is not considered to be palaeontologically significant with regard to Quaternary fossil remains. Sedimentary rocks underlying the study area are buffered by the superficial overburden and the chances of finding fossils are considered low. However, given the nature and scale of the development (e.g. laying of foundation trenches and associated underground infrastructure), any excavation within the development footprint larger than 1 m² that exceeds depths of >1 m into **unweathered/fresh** Vryheid Formation sediments, will need further monitoring by a professional palaeontologist. It is therefore advised that, as part of a follow-up Phase 2 Palaeontological Impact Assessment, a professional palaeontologist should monitor unweathered/fresh sedimentary bedrock should large scale excavations, exceeding

depths of >1m into unweathered/fresh sedimentary bedrock, be conducted during the construction phase of the development. The palaeontologist must apply for a valid collection / removal permit from SAHRA if fossil material is found within unweathered/fresh sedimentary bedrock.

References

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DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project and have no conflicting interests in the undertaking of the activity.

A handwritten signature in dark ink, appearing to read 'L Rossouw', with a stylized, cursive script.

02 / 10 / 2017

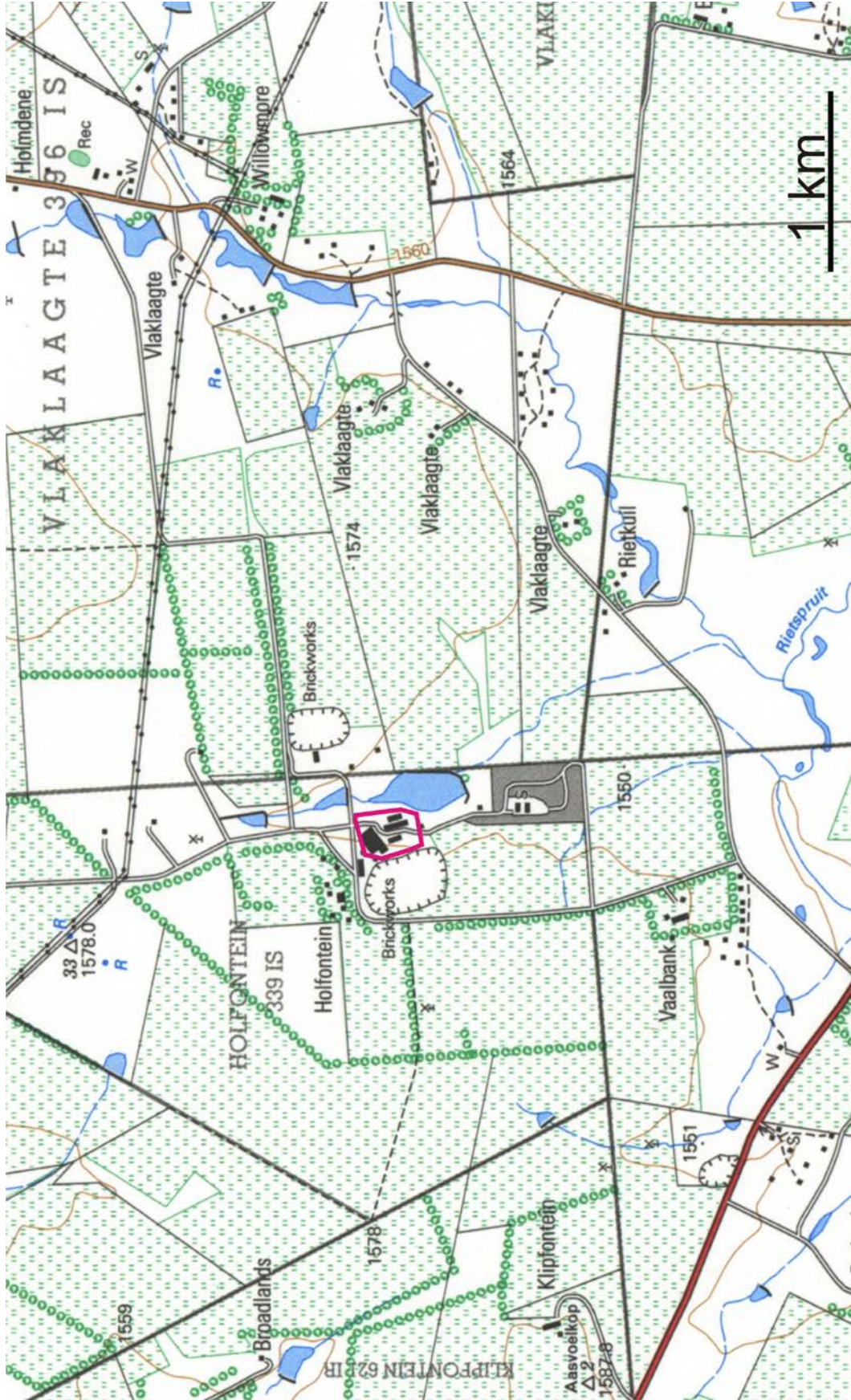


Figure 1. Map of the proposed development (1:50 000 scale topographic 2629CC Standerton).

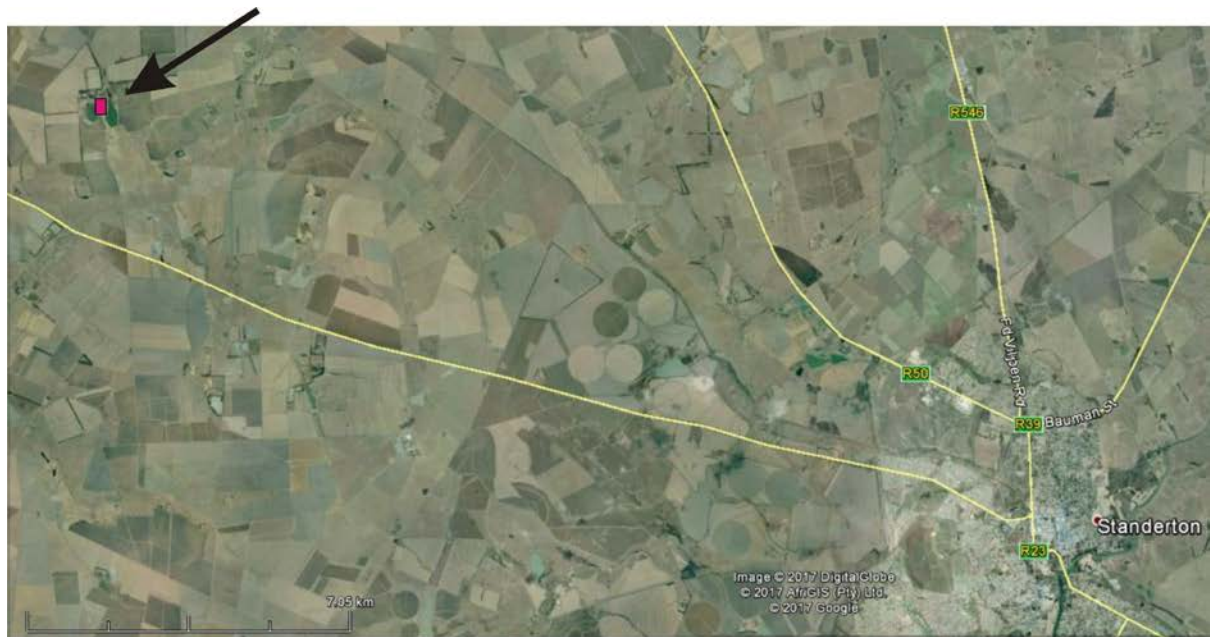


Figure 2. Aerial view of the study area.

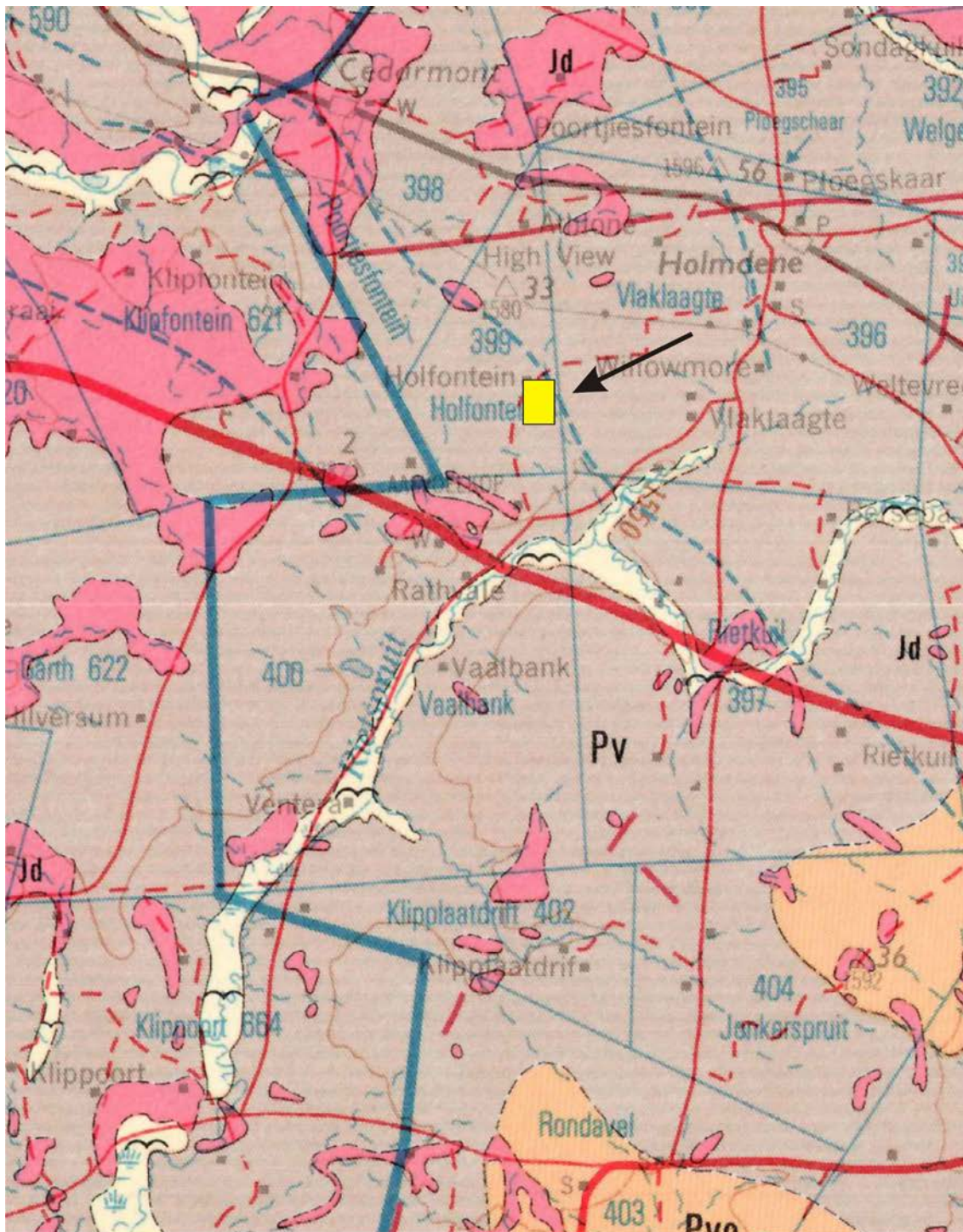


Figure 3. According to the 1:250 000 scale geological map 2628 West Rand, the proposed development footprint is located within the outcrop area of the Early to Middle Permian, Vryheid Formation of the Eccia Group (*Pv*). The deltaic sandstones, shales coal beds and minor conglomerates of the Vryheid Formation is well-known for the occurrence of a rich variety of plant fossils (*Glossopteris Flora*).



Figure 4. The Cornelia-Uitzoek vertebrate locality consists of a pocket of fossil-rich Quaternary alluvial and colluvial gravels and clays located in small basins of Eccca Group shale.



Figure 5. General view of the study area.