# Palaeontological desktop study for the proposed construction of a filling station and a retail centre on Holding 63, Johandeo, Gauteng Province.

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## Summary

The desktop investigation indicates that the study area is underlain by the predominantly argillaceous Silverton Formation of the Early Proterozoic Pretoria Group (Transvaal Supergroup). The desktop study indicates that although carbon-rich mudrocks of the Silverton Formation are likely to contain assemblages of organic-walled microfossils, well-developed sedimentary carbonates that may contain stromatolites have not been recorded from the study area in the southeastern part of the Transvaal basin. There is also little chance of finding fossil material within the superficial (Quaternary) overburden within the proposed footprint mainly because of a lack of alluvium in the area. given the relatively small scale of the development and a lack of well-developed sedimentary carbonates in the Silverton Formation underlying the study area, potential impact on palaeontological heritage resources within the proposed 2.7 ha development footprint is considered very low. It is recommended that exemption from further specialist palaeontological studies is granted for the proposed construction of a filling station and a retail centre on Holding 63, Johandeo, provided that all excavation activities are restricted to within the boundaries of the development footprint. In the event of chance exposure of microfossil remains (*e.g.* stromatolites) the ECO should protect the fossil remains and notify SAHRA as soon as possible so that appropriate action (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

## Introduction

The report is a preliminary assessment of potential palaeontological impact with regard to the proposed construction of a filling station and a retail centre on Holding 63, Johandeo, Gauteng Province (**Fig. 1**). Johandeo is located in Sebokeng a township in southern Gauteng, near Vanderbijlpark. The proposed site is formally described as Holding 63, Johandeo and

falls within the jurisdiction of the Emfuleni Local Municipality, forming part of the Sedibeng District Municipality. It is approximately 12 km from Vanderbijlpark and 15 km from Vereeniging. The site is located at the corner of Makholong Street and the Golden Highway (R28) on degraded terrain and covers approximately 2.7 ha (**Fig. 2**).

Site coordinates:

A) 26°36'5.32"S 27°48'58.04"E

B) 26°36'7.21"S 27°49'4.31"E

C) 26°36'11.73"S 27°49'2.84"E

D) 26°36'9.49"S 27°48'55.53"E

# 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 assessment provided within this report is based upon a desktop study without the benefit of a site visit. As such, the presentation of geological units present within the study area is derived from 1:1 000000 scale and 1:250 000 scale geological maps that 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

As outlined on the 1: 1 million scale geological map of South Africa the study area is underlain by ancient Precambrian sedimentary and volcanic bedrocks of the Transvaal Supergroup, in this case represented by the Silverton Formation of the Early Proterozoic Pretoria Group (*Vsi*, light brown) (Eriksson *et al.* 1993; Catuneanu and Eriksson 1999; Erikson *et al.* 2006; Moore *et al.* 2001) (**Fig. 3**). The Silverton Formation of the Transvaal

Basin is a heterolithic succession dominated by mudrocks and siltstones and minor beds of chert and carbonates that were deposited along the margins of the Kaapvaal Craton as substorm wave-base pelagic deposits under epicontinental sea conditions between 2.22 and 2.06 Ga ago (Bekker *et al.* 2008; Eriksson *et al.* 2002, 2009). Sandstones increase towards the top of the succession, indicating deposition under shallow offshore conditions. Outcrops of the Machadodorp Member, a volcanic subunit in the middle of the Silverton Formation, and shallow-marine sandstones of the overlying Magaliesberg Formation are located to the north and east of the study area ((*Vmg*, purple and *Vh*, green). The advance of a transgressive epeiric sea onto the Kaapvaal Craton from the east that led to the deposition of the Silverton Formation mudrocks, was followed by regressive shoreline conditions that culminated in the fluvial and deltaic sandstones of the overlying Magaliesberg Formation.

## Impact Statement Recommendation

According to Bekker *et al.* (2008), the Silverton Formation has a thick sequence of shallow-marine sedimentary carbonates at the top in the northwestern part of the Transvaal Basin at the border between South Africa and Botswana, which display features of a shallow-water depositional environment including domal stromatolites (**Fig. 4**). The desktop study indicates that although carbon-rich mudrocks of the Silverton Formation may contain assemblages of organic-walled microfossils, well-developed sedimentary carbonates with stromatolites have not been recorded from the study area in the southeastern part of the basin. There is also little chance of finding fossil material within the superficial (Quaternary) overburden within the proposed footprint mainly because of a lack of alluvium in the area.

## Recommendation

The argillaceous Silverton Formation is known to contain assemblages of organic-walled microfossils but given the relatively small scale of the development and a lack of well-developed sedimentary carbonates in the Silverton Formation underlying the study area, potential impact on palaeontological heritage resources within the proposed 2.7 ha development footprint is considered very low. It is recommended that exemption from further specialist palaeontological studies is granted for the proposed construction of a filling station and a retail centre on Holding 63, Johandeo, provided that all excavation activities are restricted to within the boundaries of the development footprint. The Environmental Control Officer (ECO) of the project should regularly monitor bedrock excavations in case of chance

exposure of microfossil remains (*e.g.* stromatolites, see **Fig. 4**). In such an event the ECO should protect the fossil remains and notify SAHRA as soon as possible so that appropriate action (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

# References


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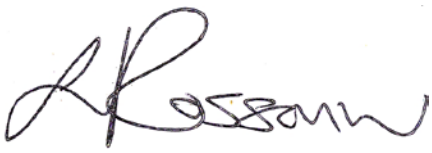
DECLARATION OF INDEPENDENCE

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.



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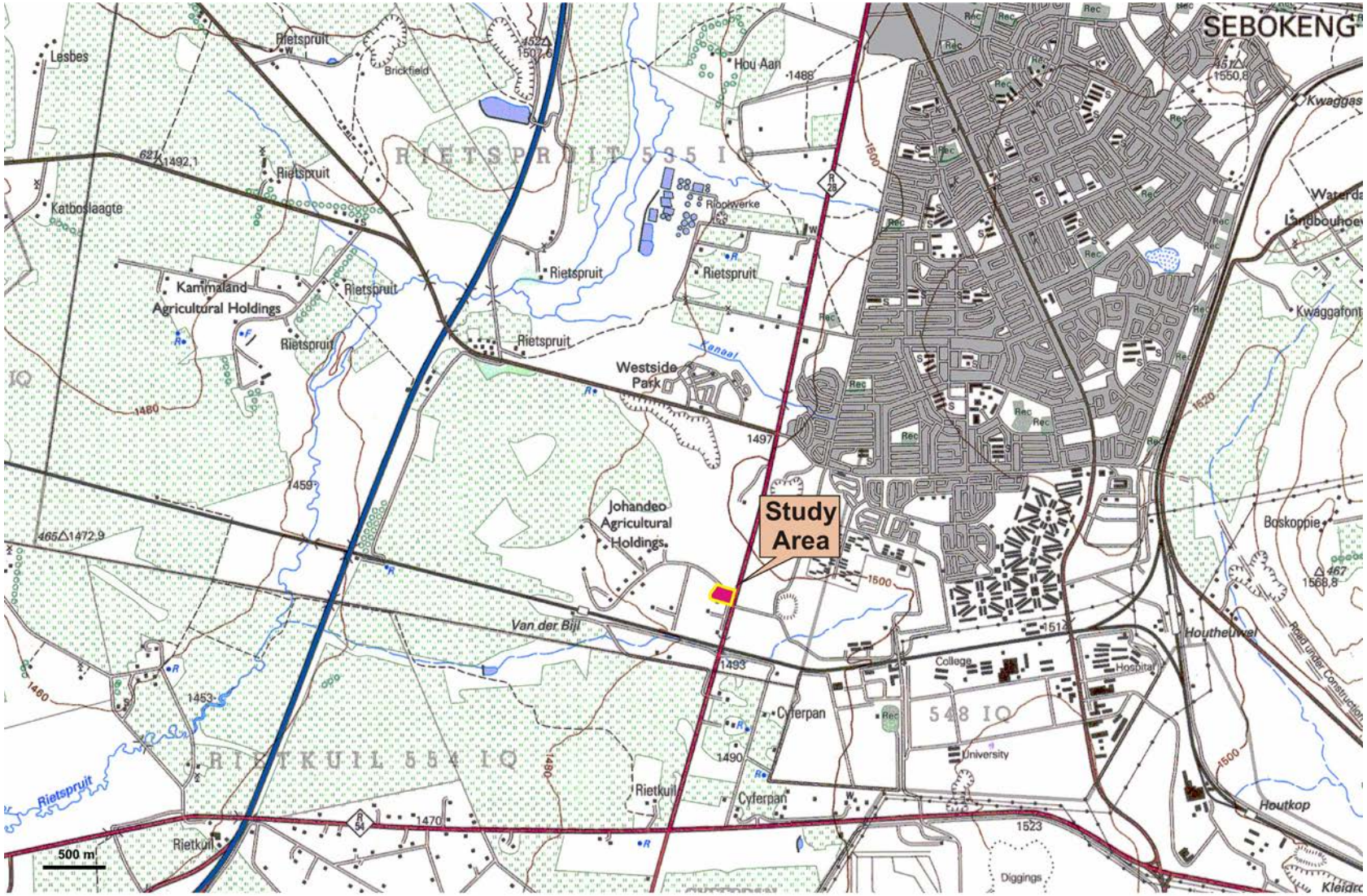


Figure 1. Map of the proposed development footprint (portion of 1:50 000 scale topographic 2627DB Vereeniging).


Figure 2. Aerial view of the study area.

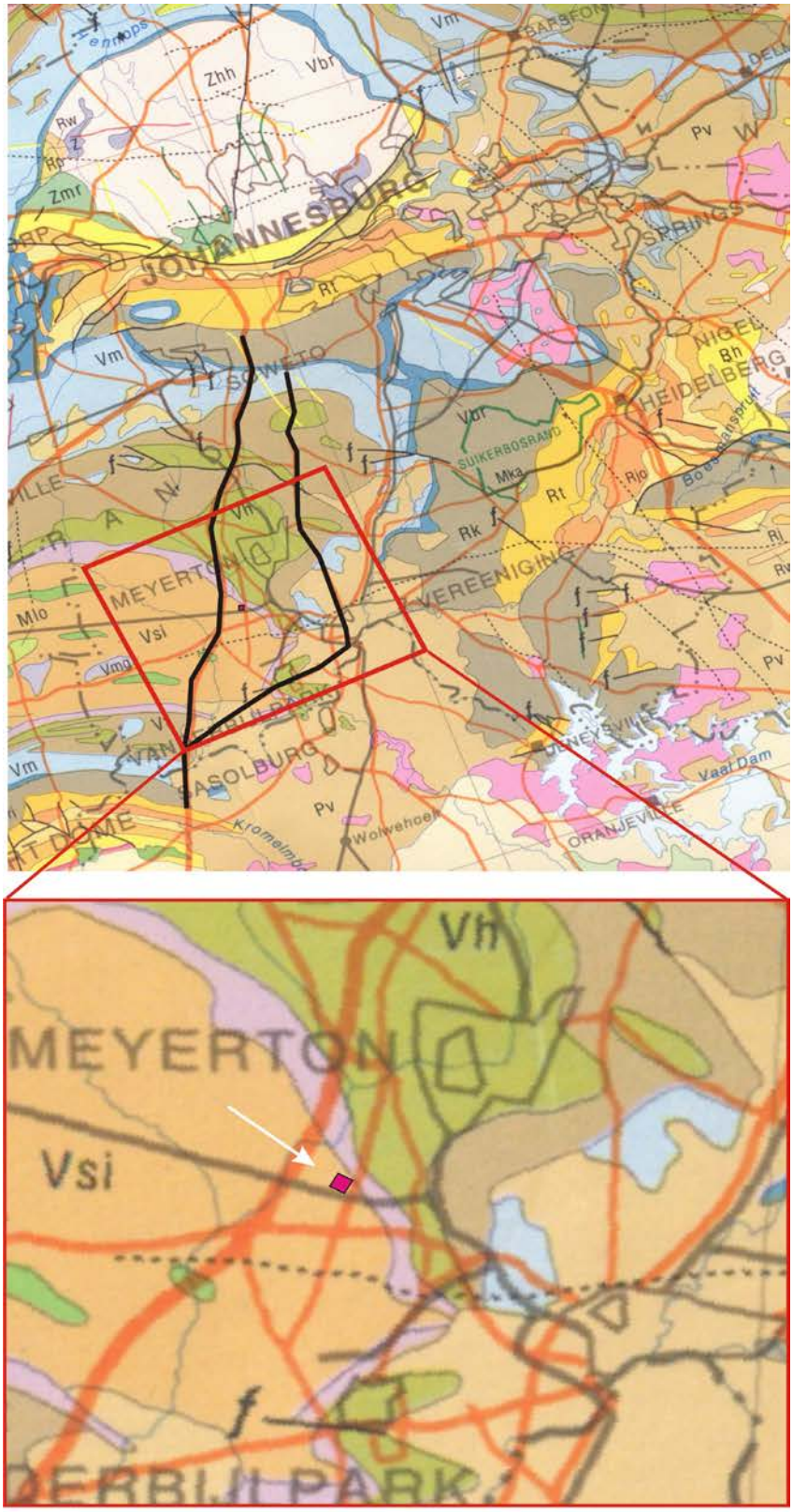


Figure 3. Portion of 1: 1 000 000 geological map of South Africa (Council for Geoscience, Pretoria) showing the geology of the proposed development footprint near Sebokeng. The study area is underlain by mudrocks of the Silverton Formation (*Vsi*). Volcanic rocks of the Machadodorp Member (*Vh,* green) and sandstones of the overlying Magaliesberg Formation (*Vmg,* purple) crop out to the north and east of the study area.

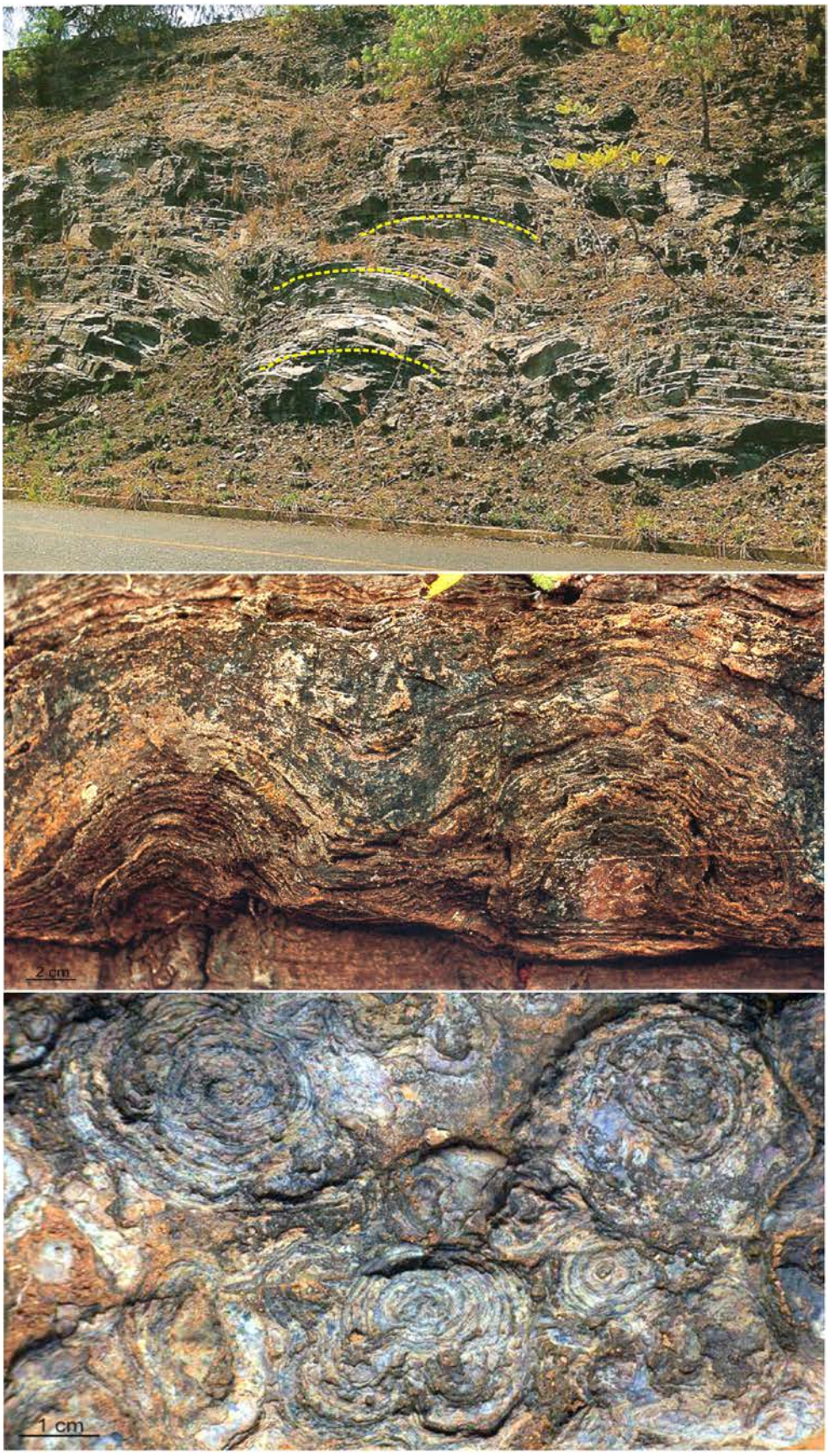


Figure 4. Examples of weathered stromatolite dome structures in Transvaal Supergroup dolomites: Malmani Subgroup (top & center, side view) and Ghaap Group (bottom, plan view).