

Palaeontological Impact Assessment for the proposed reservoir for Johannesburg Water at Lenasia, Gauteng

Desktop Study

**For
Nemai Consulting
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Background

As requested by Nema Consultants on behalf of their client, Johannesburg Water, here is a desktop palaeontological assessment for the proposed construction of a new reservoir, adjacent to the existing one, south of Lenasia (26°22'30.86"S; 27°51'50.63"E), with unspecified routes for piping to and from the reservoir. Although the area is situated on ancient rocks of the Witwatersrand system there are isolated pockets of Permian kaolinite clays that contain fossil plants of the *Glossopteris* flora, such as the ones at Corobrick Lawley quarry.

In accordance with the national legislation (National Heritage Resources Act (Section 25 of 1999)) the sites to be developed must be assessed for the occurrence of any palaeontological material. If any fossils are likely to be present then their importance and rarity must be gauged and if they are important then plans must be put in place to remove the fossils (under a SAHRA permit and housed in an recognized institution), protect them and/or divert the proposed construction.

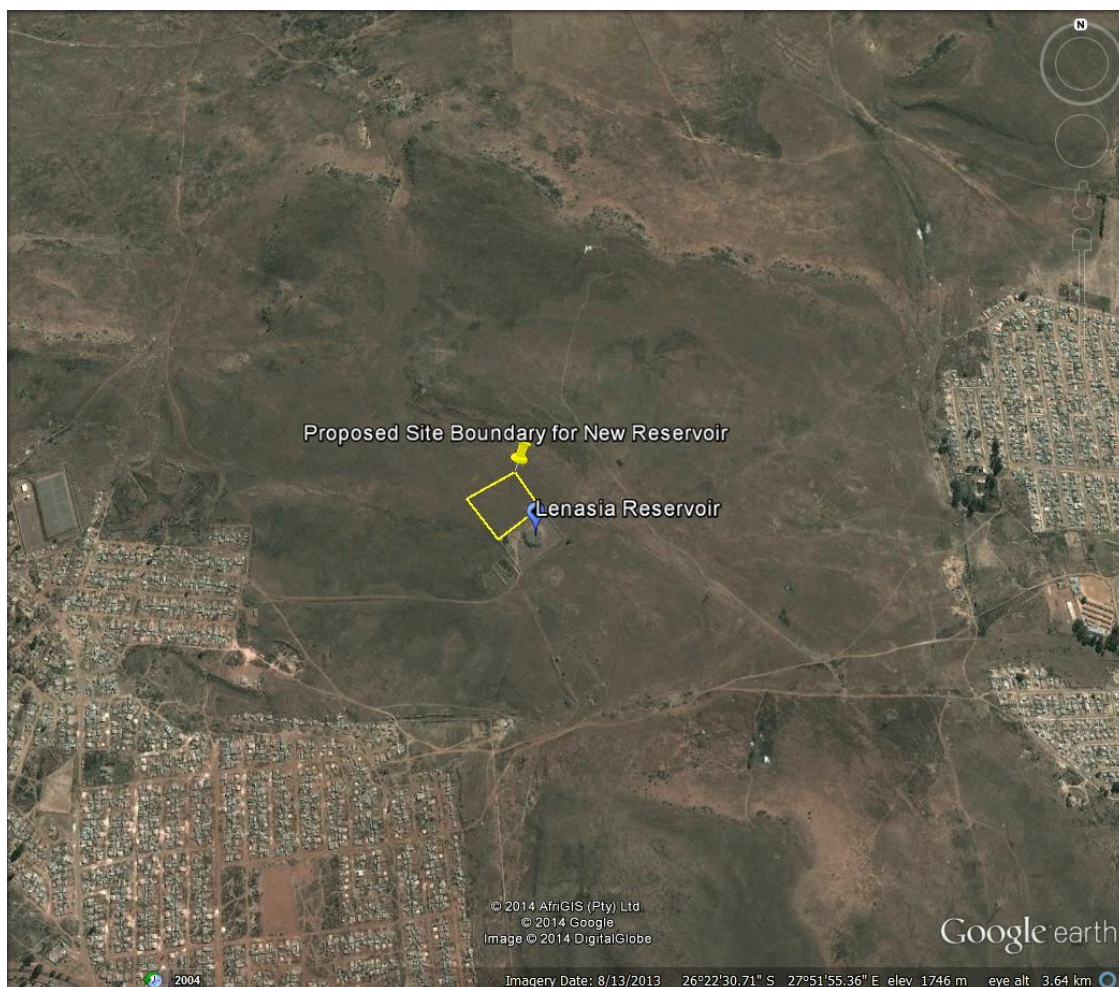


Figure 1: Map from Google Earth showing the proposed New Reservoir site (yellow outline) that could be constructed adjacent to the existing reservoir, near Lenasia, south of Johannesburg, Gauteng. Map supplied by Nema Consulting.

Methods

The published geological and palaeontological literature, unpublished records and databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.

Geology and Palaeontology

The proposed site for the new reservoir lies close to an isolated outcrop of the Vryheid Formation around Westonaria. The dominant rocks in this region are those of the Chuniespoort Group (the Malmani Subgroup) and the Pretoria Group (Timeball Hill, Rooihoogte and Hekpoort Formations). These rocks are too old to contain fossils and are also not of the correct lithology (Cowan, 1995).

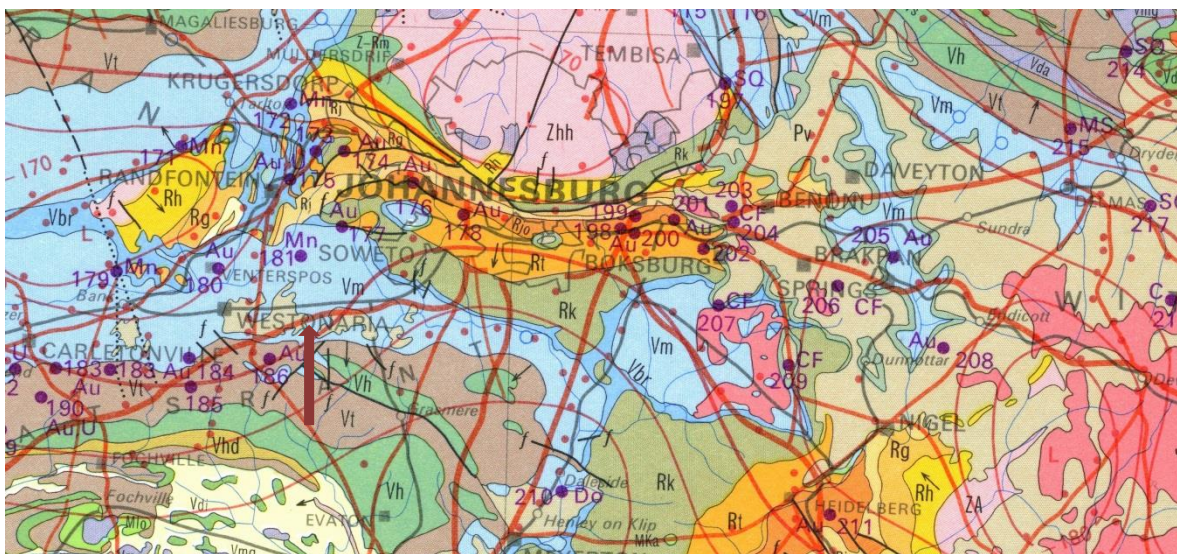


Figure 2. Geological map of Gauteng with the arrow indicating the proposed site for the new reservoir near Lenasia. Abbreviations of the rock types are explained in Table 1. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Symbol	Group/Formation	Lithology	Approximate Age
Vp	Vryheid Formation	Sandstone, shale, coal	Early Permian 300-275 Ma
Vh	Hekpoort Fm, Pretoria Group	andesite	2224 Ma
Vt	Timeball Hill & Rooihoogte Fms	Shale, quartzite, conglomerate, sandstone, breccia, diamictite	Ca. 2500 Ma
Vm	Malmani sub group Chuniespoort Group	Dolomite, chert	>2500 Ma
Vbr	Blackreef Fm,	quartzite	>2642 Ma
Rk	Klipriviersberg (Ventersdorp)	Andesite, tuff	>2650 Ma

Table 1: Explanation of symbols for the geological map and approximate ages with the references: Eriksson et al., 2006; Johnson et al., 2006; Van der Westhuizen et al., 2006.

Because of the interest in economically exploitable gold, coal and in particular refractory clay deposits, the East and West Rand region has been mapped in detail by Bredell (1979, fig 4; here Fig 3). West Rand deposits are much thicker than the East Rand ones and were formed by the gradual subsidence of the depressions in which the clays formed (Horn and Strydom, 1998). These refractory or kaolinitic clays are of sedimentary origin and are used in a wide variety of industries with ceramics being the most obvious. The site for the proposed new reservoir is on rocks of the Pretoria Group (Fig 3), not on Vryheid Formation sediments or clay deposits that are the right age for the preservation of plants (but not always the right conditions). Furthermore, although these are not swelling clays, they would not be ideal for the foundations of buildings.

Fossil plants of the *Glossopteris* flora have been recorded from the kaolinite refractory brick quarry at Lawley (Corrobrick). This is an isolated basin and of Ecca age (Anderson and Anderson, 1985; Rayner and Coventry, 1987; Adendorff, 2004). The Lawley site (26° 20' S; 27° 50' E), is to the northwest of the proposed reservoir and is on sedimentary rocks of the Vryheid Formation.

Recommendation

Since the rocks in this region are much too old (Archaean in age) to contain fossils it is extremely unlikely that any fossils will be found where the reservoir will be constructed or along the routes for the water pipelines.

As far as the palaeontology is concerned the proposed development can go ahead along the proposed route. If, however, in the extremely unlikely chance of fossils being found during construction, it is strongly recommended that a palaeontologist be called to assess the fossils and rescue them if necessary (with a SAHRA permit). The fossils would then be housed in a suitable, recognized institute.

No further palaeontological assessment is required for this project.

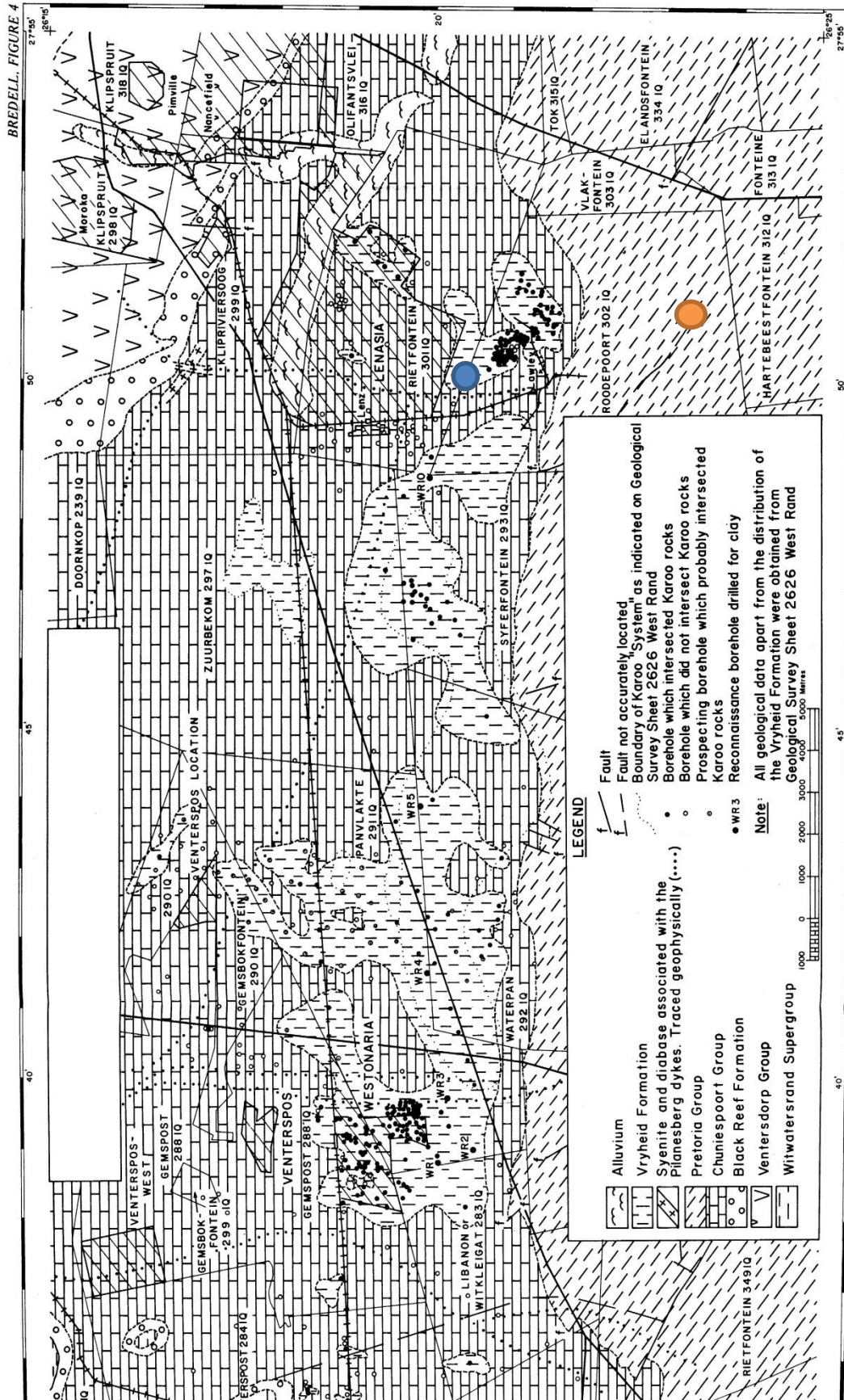


Figure 4
The Vryheid Formation on the West Rand.

Fig 3: detailed geology of the proposed site for construction of the reservoir, orange circle; Lawley blue circle. Map from Bredell 1979.

References

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