Phase 1 Heritage Impact Assessment of a proposed new borrow pit on the farm Kaalspruit 491, Bloemfontein, FS Province.

Report prepared for Ekolaw Consulting

by
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Executive Summary

A Phase 1 Heritage Impact Assessment was carried out as part of a mining permit application for a new borrow pit area on the farm Kaalspruit 491 near Bloemfontein, Free State Province. The affected area covers 4.5 ha of degraded terrain made up of previously used farmland and shallow excavation areas. It is underlain by palaeontologically insignificant dolerite bedrock, capped by a veneer of Quaternary aeolian sand. A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. The pedestrian survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, Anglo Boer War sites, graves or buildings with historical significance older than 60 years within the boundaries of the study area. There are no major palaeontological or archaeological grounds to suspend excavation activities within the proposed development footprint. The proposed development footprint is assigned a site rating of Generally Protected C (GP.C).

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Introduction

A Phase 1 Heritage Impact Assessment was carried out as part of a mining permit application for a new borrow pit area on the farm Kaalspruit 491 near Bloemfontein, Free State Province (**Fig. 1**). The assessment is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act 25 of 1999. The task involved identification of possible paleontological sites or occurrences in the proposed zone, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Terms of Reference

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Methodology

The heritage significance of the affected area was evaluated on the basis of existing field data, database information, maps and published literature. This was followed by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes.

Field Rating

Site significance classification standards as prescribed by SAHRA (2005) for archaeological sites were used for the purpose of this report (**Table 1**).

Locality data

1 : 50 000 scale topographic map 2926AC Tierpoort Dam

1:250 000 geological map 2926 Bloemfontein

The farm Kaalspruit 491 is situated 20 km south of the Bloemfontein CBD and next to the N6 national road between Bloemfontein and Reddersburg (**Fig. 2**). The affected

area covers 4.5 ha of degraded terrain made up of previously used farmland and shallow excavation areas (**Fig. 3**). An operational dolerite quarry is located about 200m west-southwest of the study area (**Fig. 4**).

Site coordinates (**Fig. 4**):

A) 29°18'17.00"S 26°13'13.52"E

B) 29°18'16.01"S 26°13'24.62"E

C) 29°18'20.94"S 26°13'25.14"E

D) 29°18'21.97"S 26°13'14.58"E

Geology

The geology of the region has been described by Theron (1963) and Johnson (2006). It is situated within the Beaufort Group, Adelaide Subgroup (Karoo Supergroup), and is primarily represented by late Permian, Balfour Formation sedimentary rocks, which are made up of alternating sandstone and mudstone layers (*Pa*) associated with stream and floodplain deposits (**Fig. 5**). Dykes and sills of resistant Jurassic dolerites (*Jd***)** determine the relief in the region. Superficial deposits in the region consist mainly of and shallow to well-developed, windblown sand, alluvium and residual soils of varying depth.

Background

The local palaeontological footprint is primarily represented by Late Permian Karoo vertebrate fauna and Late Cenozoic (Quaternary) macrofossils (Broom 1909 a, b; Kitching 1977; Churchill *et al* 2000; Rossouw 1999, 2000, 2006). In terms of biostratigraphy of the Beaufort Group the sedimentary strata underlying the affected area are assigned to the *Dicynodon* Assemblage Zone (AZ) (Kitching 1995) (**Fig. 5**). a biozone characterized by the presence of a distinctive and fairly common dicynodont genus as well as plant (*Dadoxylon, Glossopteris*) and trace fossils (arthropod trails, worm burrows). Numerous mammal fossils stretching as far back as the Middle Pleistocene have been discovered around Bloemfontein, especially within alluvial deposits associated with the Modder River and Tierpoort Rivers.

The Stone Age archaeological record of the region spans back to the early Middle Stone Age. Prehistoric archaeological remains previously recorded include stone tools and mammal fossil remains from sealed and or exposed contexts (Churchill *et al*. 2000; Rossouw 1999, 2000, 2006). The incidence of surface scatters usually decreases

away from localized areas such as alluvial contexts and dolerite-shale contact zones when stone tools largely occur as contextually derived individual finds in the open veld. Stone tools are mostly made of hornfels, a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area. As a result, stone tool factory sites are commonly found near dolerite-shale contact zones. The study area is located outside the south-western periphery of distribution of Late Iron Age stone-walled settlements in the Free State (Maggs 1976).

Field Assessment

The study area is underlain by dolerite capped by a veneer of Quaternary aeolian sand (**Fig. 6**). A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. The pedestrian survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, Anglo Boer War sites, graves or buildings with historical significance older than 60 years within the boundaries of the study area.

Impact Statement and Recommendation

The affected area is underlain by intrusive igneous dolerites which are considered to be of low paleontological significance. It is highly unlikely that Karoo fossil remains will be encountered during excavation activities within the study area. There is also little chance of finding fossil material within the superficial overburden because of a lack of suitable Quaternary-aged alluvial deposits in the area. There are no major palaeontological grounds to suspend excavation activities within the proposed development footprint.

Impact on potential *in situ* archaeological remains, rock art localities or historically significant structures within the study area is considered unlikely. There are no major archaeological grounds to suspend excavation activities within the proposed development footprint. The proposed development footprint is assigned a site rating of Generally Protected C (GP.C).

References

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Theron, J.C. 1963. Geology of Bloemfontein area. Dept. of Mines. Government Printer, Pretoria.

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.

17 / 02 / 2017

Tables and Figures

Table 1. Field rating categories for heritage sites as prescribed by SAHRA.

Field Rating	**Grade**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

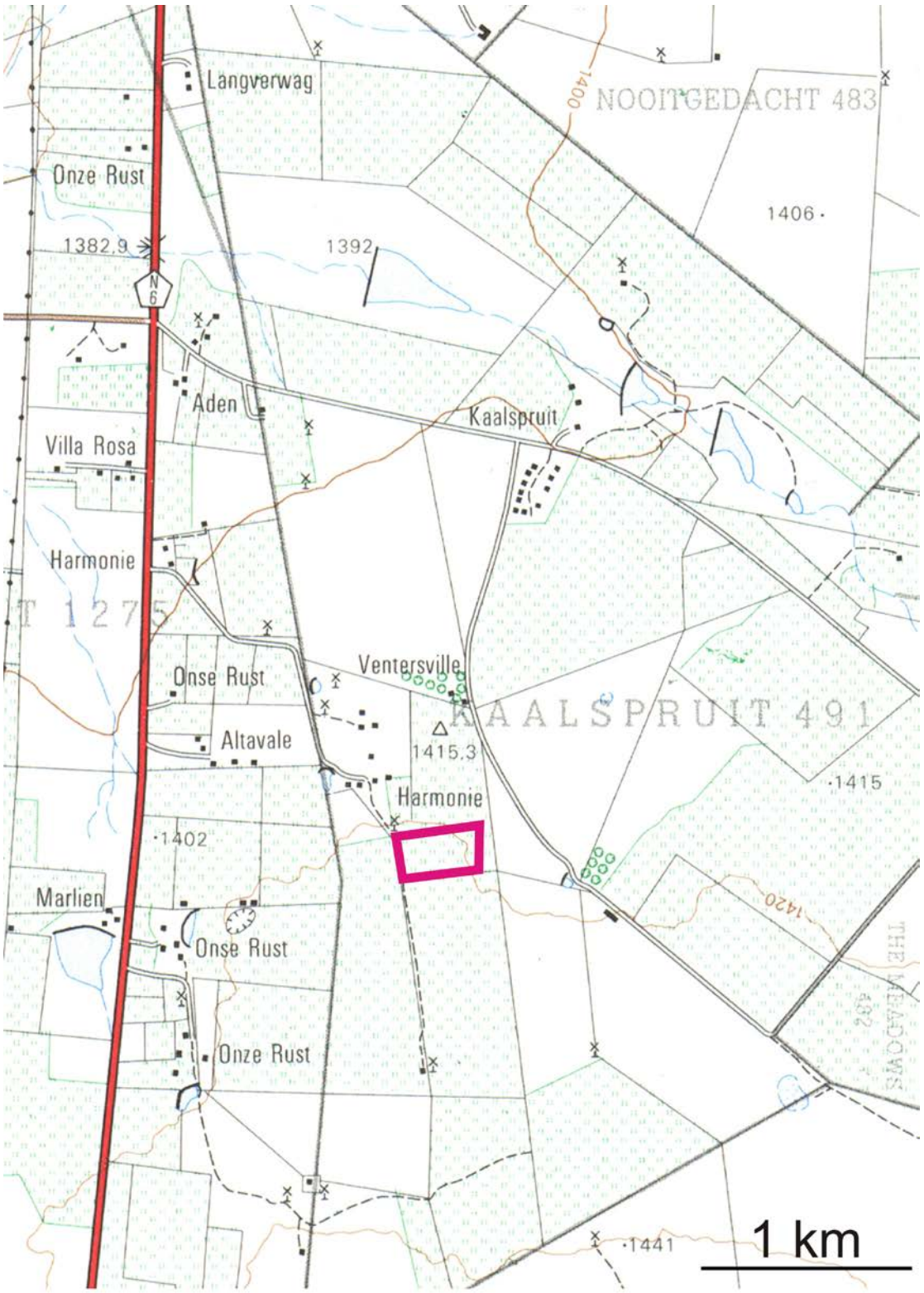

Figure 1. Map of the proposed new borrow pit area on the farm Kaalspruit 491 (portion of 1:50 000 scale topographic 2926AC Tierpoort Dam).

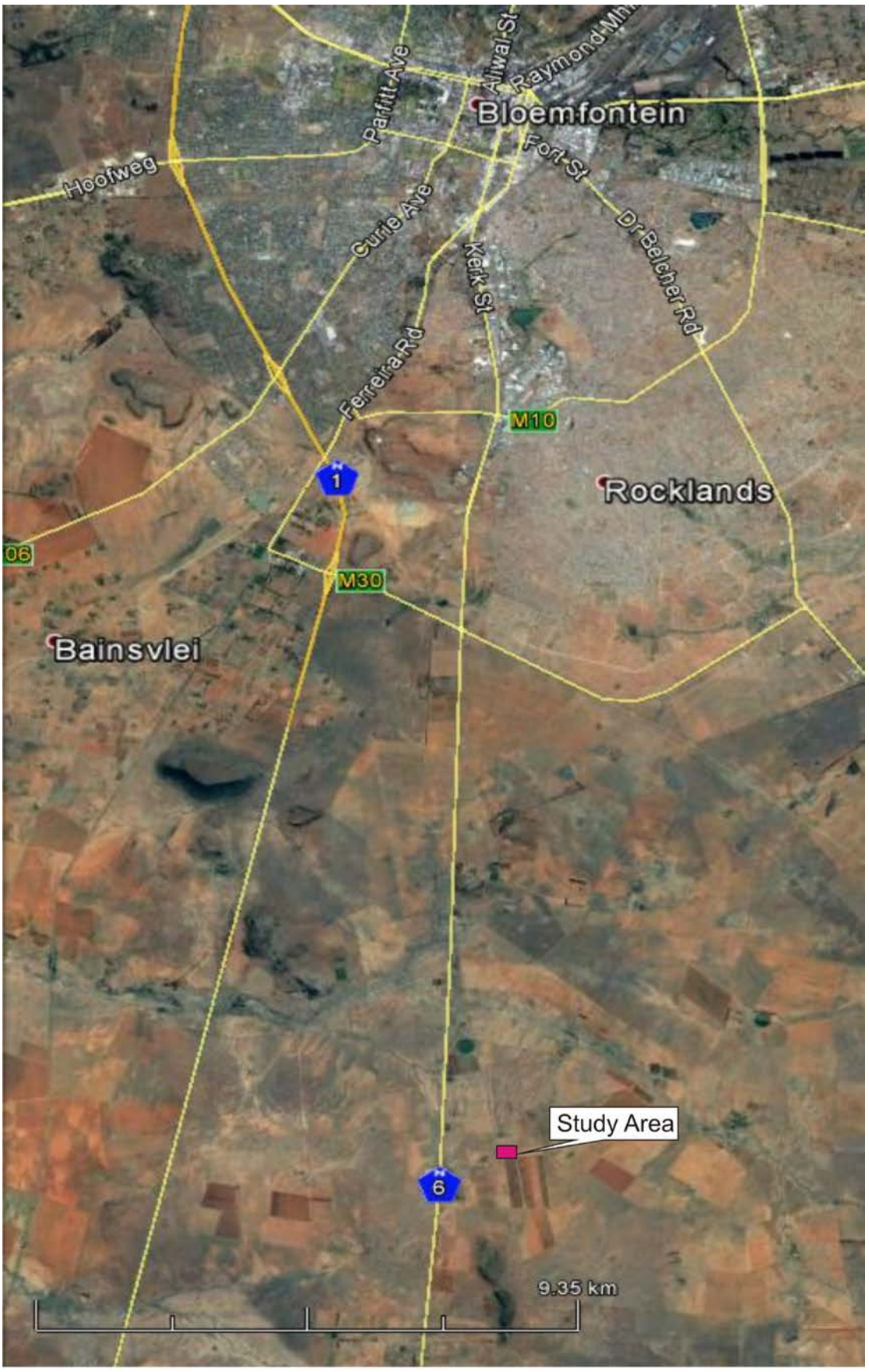

Figure 2. Position of the site relative to Bloemfontein.

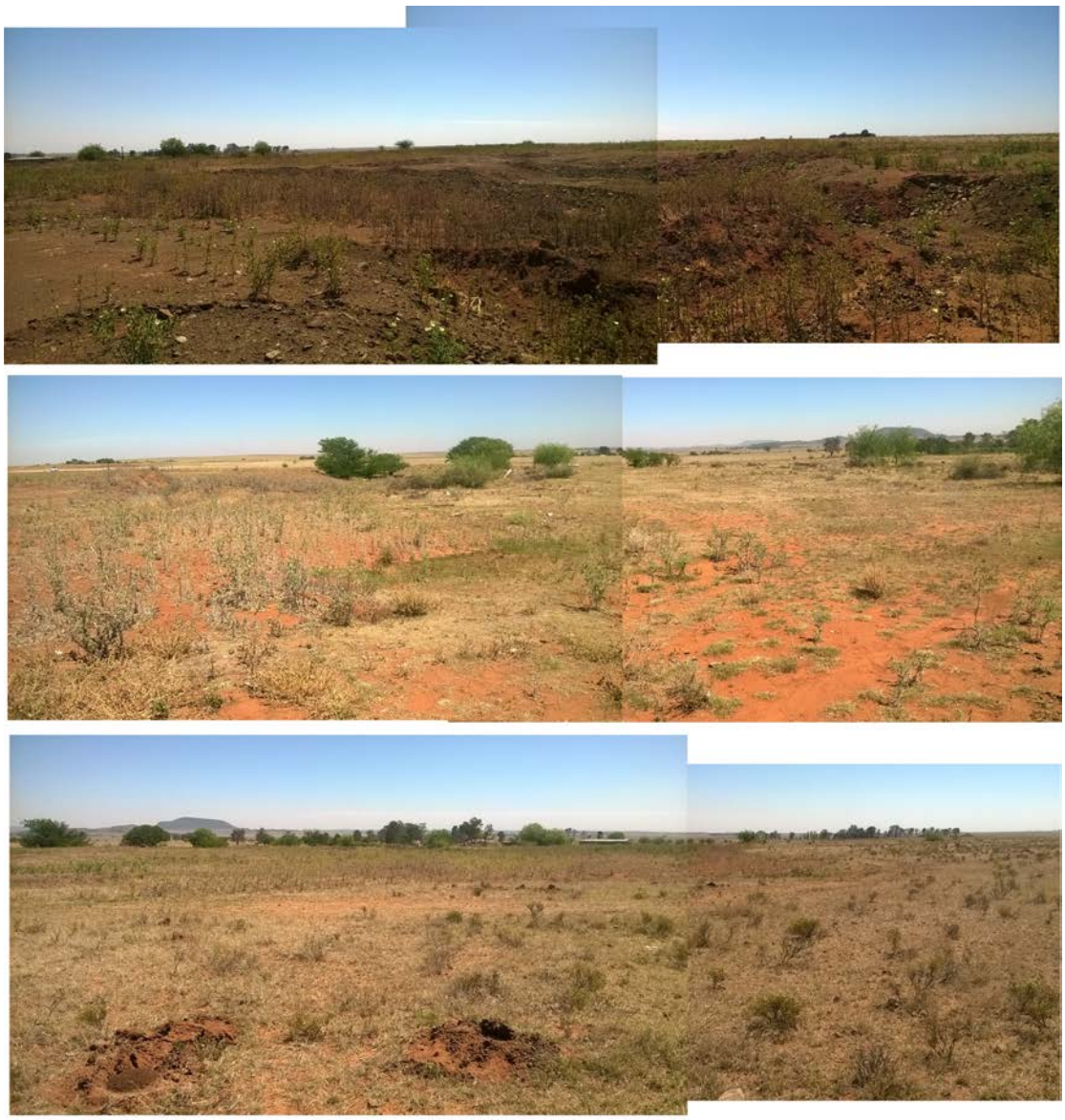

Figure 3. General view of the study area, looking norhwest (top) southwest (center) and west (bottom).

Figure 4. Aerial view of the existing quarry and proposed new borrow pit area.

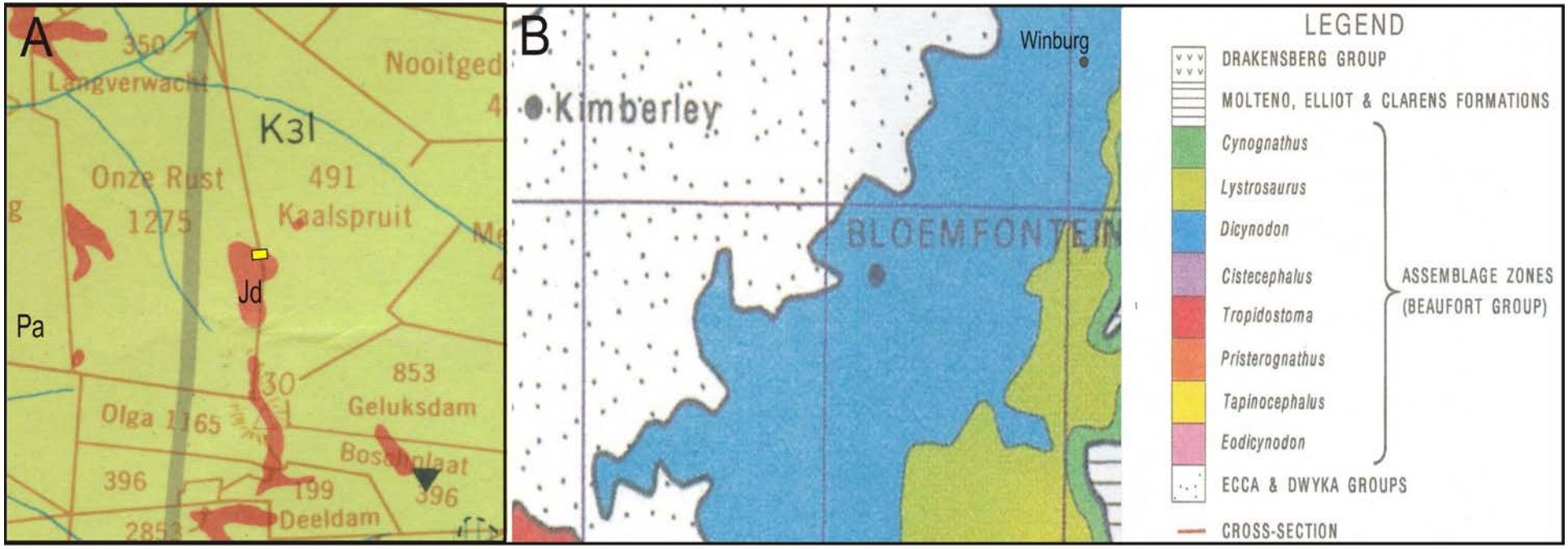

Figure 5. (A) Portion of the 1:250 000 scale geological map Bloemfontein 2926. The site (yellow rectangle) is situated within Adelaide Subgroup outcrop (*Pa*)The sedimentary rocks are intruded by weather-resistant Jurassic dolerites (Karoo Dolerite Suite, Jd). Superficial deposits in the region consist mainly of windblown sand, alluvium and residual soils. (B) Geographical distribution of vertebrate biozones of the Beaufort Group around Bloemfontein (Rubidge 1995).

Figure 6. The study area is underlain by palaeontologically insignificant dolerite bedrock (top) capped by a veneer of Quaternary aeolian sand (below). Scale 1 = 10 cm.