

**Heritage Impact Assessment for proposed construction of a new water
abstraction facility at the Cyferfontein Dam near Senekal, Setsotso Local
Municipality, FS Province.**

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Summary

A phase 1 Heritage Impact assessment was conducted for a proposed a new water abstraction facility with a ~1.15 ha footprint, at the Cyferfontein Dam near Senekal, FS Province. The proposed abstraction area footprint is made up of flatland and riparian terrain, located on the Sand River, approximately 250 m north of an existing waterworks facility and about 90 m due south of the Cyferfontein Dam. The site has been degraded by previous construction activities related to the building of Cyferfontein Dam and nearby waterworks facility. There are no indications of Stone Age artifacts, prehistoric structures, graves or rock engravings within the footprint. The site is underlain by geologically recent (cf. late Holocene) alluvium associated with adjacent Sand River overburden. There is no evidence for the accumulation and preservation of intact fossil material within these late Quaternary sediments. Fine- to medium-grained Adelaide Subgroup sandstone and Jurassic-age dolerite are outcropping along high ground to the east and south of the footprint, respectively. Potential for palaeontological impact is considered low given age of the unconsolidated sediments underlying the proposed footprint. The latter sediments, also appear to cap a dolerite knick, point intersecting the river. The proposed development footprint is not considered archaeologically vulnerable. There are no major archaeological grounds to suspend the proposed development, provided that all excavation activities are confined to within the confines of the development footprint. The study area is considered to be of low archaeological significance and is assigned a site rating of Generally Protected C.

Introduction

A phase 1 Heritage Impact assessment was conducted for a proposed a new water abstraction facility with a ~1.15 ha footprint, at the Cyferfontein Dam near Senekal, FS Province (**Fig. 1**). Raw water will be abstracted from the Sand River to the Cyferfontein Dam north of Senekal/Matwabeng, and transported via a new raw water booster pump station to a centralized water treatment works in Senekal.

The extent of the proposed development (over 5000 m²) falls within the requirements for a Heritage Impact Assessment (HIA) as required by Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act (Act No. 25 of 1999). The site visit and subsequent assessment took place in November 2013. The task involved identification of possible archaeological and 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.

Methodology

The palaeontological and archaeological significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information, published literature and maps. This was followed up with a field assessment by means of a pedestrian survey and investigation of all exposed sections within the footprint. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes.

Site significance classification standards prescribed by SAHRA (2005) were used to indicate overall significance and mitigation procedures where relevant (**Table 1**).

Site Information

Maps: 1:50 000 topographical 2827BC Senekal

1:250 000 geological map 2826 Winburg

Site Coordinates (**Fig 2**).

- A) 28°14'29.11"S 27°39'23.37"E
- B) 28°14'30.98"S 27°39'27.95"E
- C) 28°14'33.51"S 27°39'26.71"E
- D) 28°14'32.03"S 27°39'22.75"E

The proposed abstraction area footprint covers a 1.15 ha area made up of flatland and riparian terrain, located on the Sand River, approximately 250 m north of an existing waterworks facility and about 90 m due south of the Cyferfontein Dam (**Fig. 2**).

Background

Geology

The geology of the region has been described by Nolte (1995). The Senekal area is primarily underlain by light-coloured, fine to coarse-grained sandstone and blue-grey mudstone of the Adelaide Subgroup (*Pa*, Beaufort Group, Karoo Supergroup) (**Fig. 3**). Dolerite (*Jd*), in the form of dykes and sills are common but not palaeontologically significant, being part of an interconnected network of igneous dolerite intrusions. These dykes intruded the local environment during the Jurassic and “cooked” the adjacent sedimentary rocks (metasediments). This had the effect of hardening the rocks and destroying any fossil plant material or physically destroying neighboring vertebrate fossils.

Potential Heritage

The following (pre- site visit) introduction provides a brief overview of potential palaeontological and archaeological heritage resources previously recorded in the region, which are likely, but not certain to occur within the proposed development footprint .

Palaeontology

Possible occurrences: fossil bearing Karoo Supergroup sandstones and intercalated mudstone, fossil-bearing, late Quaternary alluvium associated with large river systems.

The Karoo sedimentological strata underlying the proposed pipeline route and surrounding area are generally accepted to be Late Permian in age, and are assigned to the *Dicynodon* and overlying *Lystrosaurus* Assemblage Zones. The sediments assigned to the *Dicynodon* AZ are associated with stream deposits consisting of floodplain mudstones and subordinate, lenticular channel sandstones. Therapsids and other vertebrate fossils from the *Dicynodon* AZ are usually found as dispersed and isolated specimens in mudrock horizons, associated with an abundance of calcareous nodules. *Dicynodon lacerticeps* have been found on the Senekal commonage. Plant fossils (*Dadoxylon*, *Glossopteris*) and trace fossils (arthropod trails, worm burrows) are also present. Fossil trees of the *Dadoxylon* genus are common in the Winburg and Harrismith districts. A high occurrence of

fossil wood has been recorded on the farms Waterloop 698, Langlaagte 398, Helderwater 701, Onze Rust 700 and Blinkwater 702. Partially consolidated Quaternary alluvium found along river valleys near Senekal, are characterized by extensive erosion in the form of dongas, and are known to occasionally contain late Pleistocene vertebrate remains (e.g. *Phacochoerus sp.*) and even localized death assemblages (e.g. alcelaphine remains at Heelbo). However, there is currently no record of Quaternary-age fossils from alluvial sediments in the vicinity of the footprint.

Archaeology

Possible occurrences: Middle Stone Age sites, Later Stone Age sites, Iron Age / Agropastoralist settlements, graves, rock art, early Colonial / Historical / Military sites or structures.

The South African central plateau is distinctive in that it supported Stone Age people over thousands of years, who were also prolific makers of stone tools until relatively recent times. This can be seen in the high density of Stone Age archaeological traces visible on the landscape today. The range of archaeological sites encountered in the region is extensive, in terms of both typology and chronology. This may include retouched blades and trimmed points from the Middle Stone Age to the microlithic Wilton and Smithfield Complexes from the Holocene. Surface scatters of Later Stone Age and Middle Stone Age artifacts are frequent archaeological components along erosional gullies (dongas) of rivers and streams in the region. The incidence of surface scatters usually decreases away from localized areas such as riverine sites and dolerite-shale contact zones. Away from riverine contexts, Stone Age artifacts generally occur as contextually derived individual finds in the open veld. Several Later Stone Age sites have been identified near Bethlehem including the Saulspoort, Poortjie and Trekpad rockshelters. In addition to these shelters, several rock art localities, containing depictions of human figures, have been recorded in the Witteberge southeast of Paul Roux. A variety of stone dagga pipes have been collected in the region, including engraved sandstone and mudstone pipes, as well as a number made of baked clay. The region has also yielded Late Iron Age stone wall complexes. Stone enclosures found on and around dolerite koppies along the river valley between Winburg and Bethlehem, exhibit telltale signs of basic structural units including huts, large enclosures, remnants of walling and stone circles related to Late Iron Age settlements in the area. These sites were occupied from as early as the sixteenth and seventeenth centuries and represent a system that can be broadly attributed to groups ancestral to the Sotho-speaking people of today (Maggs 1976). Extensive Iron

Age settlements have been recorded previously between Paul Roux and Winburg at Three Sisters, Palmietfontein, Monte Carlo, La Rochelle, Leeukop, Vaalbank, Petra, Erfstuk, Allemanskraaldam, Fraai Uitzicht and the Allemanskraal Dam at the Willem Pretorius Nature Reserve.

Field Assessment

Investigation of the proposed development footprint indicates that:

- It has been severely degraded by construction activities related to the building of Cyferfontein Dam and nearby waterworks facility (**Fig. 4 & 5**).
- There are no indications of Stone Age artifacts, prehistoric structures, graves or rock engravings within the footprint.
- The site is underlain by geologically recent (cf. late Holocene) alluvium associated with adjacent Sand River overburden (**Fig. 6**). The alluvial deposits here are mostly made up of black to dark grey sandy clays varying between 0.5 m and 3.0 m in thickness. There is no evidence for the accumulation and preservation of intact fossil material within these late Quaternary sediments.
- Fine- to medium-grained Adelaide Subgroup sandstones and Jurassic-age dolerites are outcropping along high ground to the east and south of the footprint, respectively (**Fig. 7**).

Impact Statement and Recommendations

Potential for palaeontological impact is considered low given age of the unconsolidated sediments underlying the proposed footprint. These sediments, also appear to cap a dolerite knick, point intersecting the river. The proposed development footprint is also located on degraded terrain and is not considered archaeologically vulnerable. There are no major archaeological grounds to suspend the proposed development, provided that all excavation activities are confined to within the confines of the development footprint. The study area is considered to be of low archaeological significance and is assigned a site rating of Generally Protected C (**Table 1**).

References

- Kitching, J.W. 1977. The distribution of Karoo Vertebrate Fauna. Bernard Price Institute for Palaeontological Research. Memoir 1, 1 – 131.
- Kitching 1995. Biostratigraphy of the Dicynodon Assemblage Zone **In**. Rubidge, B. S. (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.
- Maggs, T.C. 1976. *Iron Age communities of the southern Highveld*. Occasional Papers of the Natal Museum No. 2.
- Nolte, C.C. 1995. The geology of the Winburg area. Geological Survey of South Africa. Council for Geoscience.
- Partridge, T.C. *et al.* 2006. Cenozoic deposits of the interior. **In**: M.R. Johnson, *et. al.* (eds). *The Geology of South Africa*. Geological Society of South Africa.
- Rubidge, B.S. 1995. (ed) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.
- SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports.
- Van Riet Lowe, C. 1941. *Prehistoric Art in South Africa*. Archaeological Series No. V. Bureau of Archaeology, Dept. of the Interior. Pretoria.

DECLARATION OF INDEPENDENCE

Paleo Field Services act as an independent specialist consultant. PFS do not 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. PFS has no interest in secondary or downstream developments as a result of the authorization of this project.

Tables and Figures

Table 1. Field rating categories 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

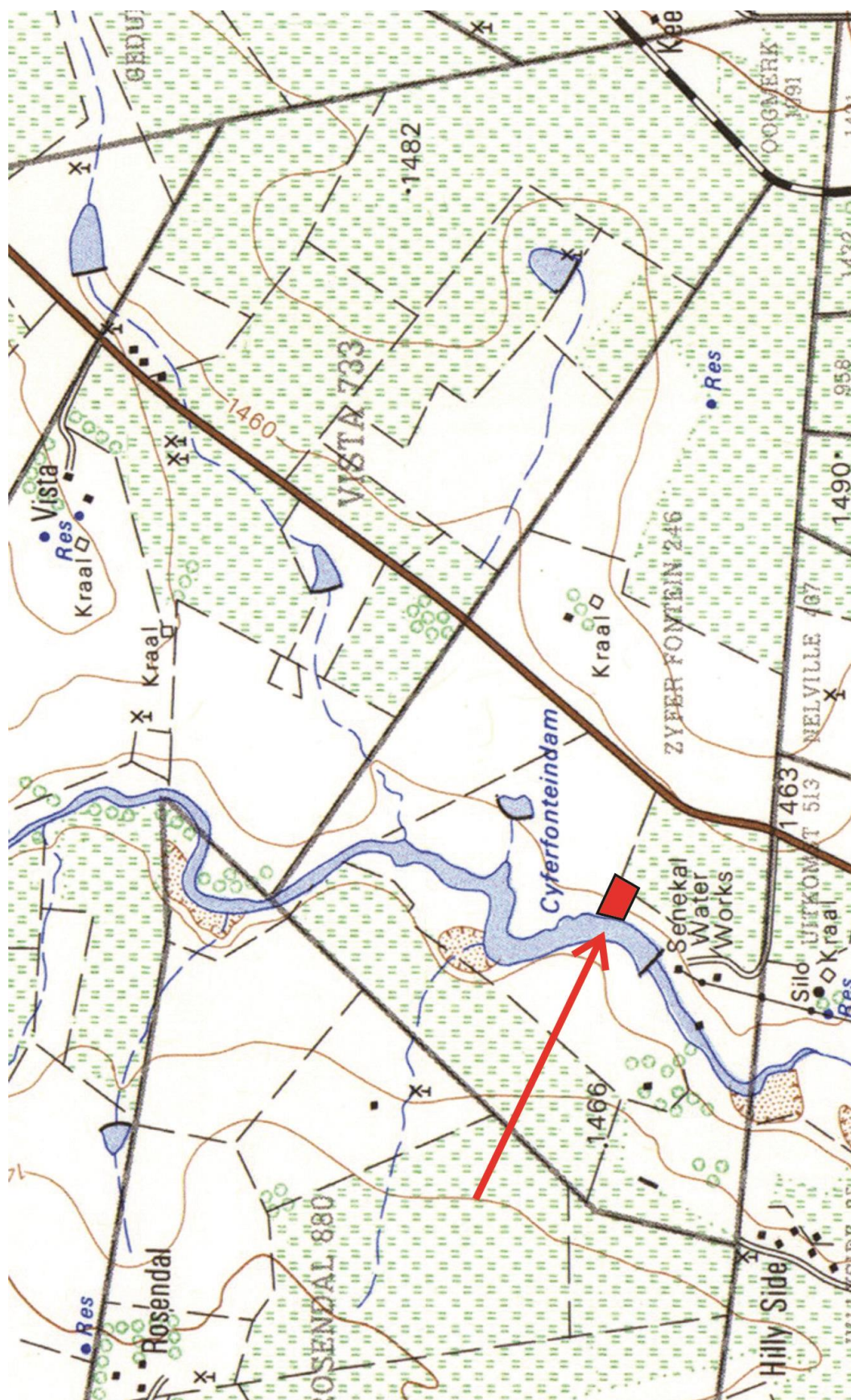




Figure 2. Aerial view of the proposed abstraction site at the Cyferfontein Dam.

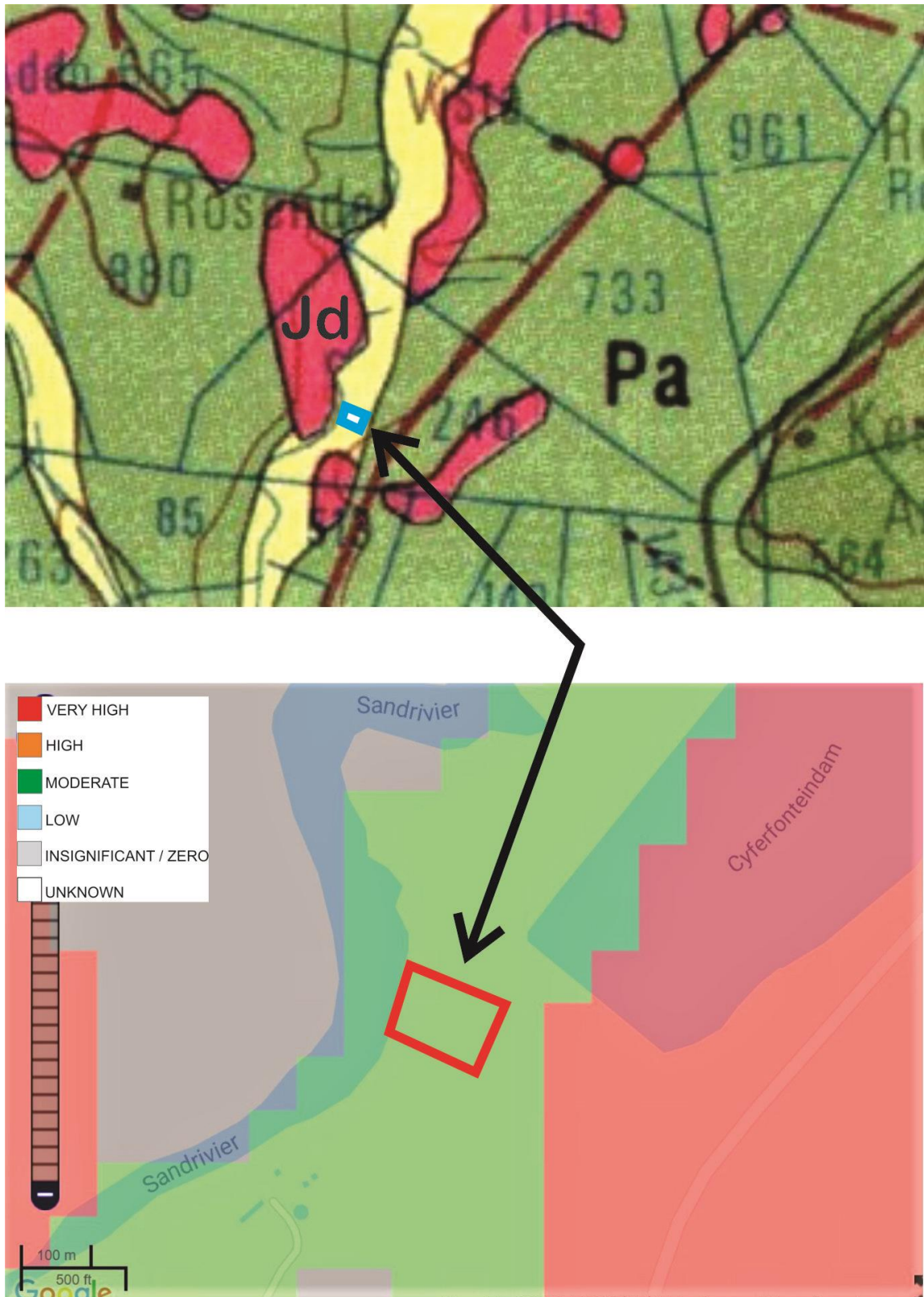


Figure 2. Portion of geological map 2826 Winburg (above) showing position of development footprint on geologically recent alluvium (yellow areas). Corresponding palaeosensitivity map below.



Figure 4. General view of the site, looking southwest (above) and northwest (below), standing near its eastern boundary.



Figure 5. General view of the site, looking southwest (above) and west (below), standing near its southeastern boundary with dolerite outcrop in foreground.



Figure 6. General view of the site, standing at the eastern boundary, looking northwest towards the underlying dolerite knick point with geologically recent alluvium in foreground.



Sandstone (above) and dolerite outcropping along high ground to the east and south of the footprint, respectively.
Scale 1 = 10 cm.