

**Heritage Impact Assessment for proposed construction of a water  
pipeline in Senekal, Setsotso Local Municipality, FS Province.**

Palaeo Field Services

PO Box 38806

Langenhovenpark

9330

13 August 2019

## Summary

A phase 1 Heritage Impact assessment was conducted for a proposed construction of a water pipeline between the Cyferfontein Dam, the Senekal reservoir and the Matwabeng Dam in Senekal, FS Province. The survey area is primarily underlain by medium to coarse-grained sandstones of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). Investigation of the proposed pipeline route indicates that it has been severely degraded by previous road building, residential development or farming activities. There is no evidence for the accumulation and preservation of intact fossil material within the Quaternary sediments (topsoils) covering the underlying sedimentary rocks especially along the Sandspruit section. No aboveground evidence of fossils or fossil localities (large vertebrates, petrified trees) were observed within the footprint area during the survey, but it is noted that primarily coarse-grained Adelaide Subgroup sandstones are outcropping along high topography terrain at the high ground (koppie) where the town's reservoir is located. There are no indications of Stone Age artifacts, prehistoric structures or rock engravings within the footprint. There is also no evidence of historical structures within the confines of the route. A section of the footprint is located near a large cemetery in Matwabeng township, but it will not be affected by the proposed development. **Potential for palaeontological impact is considered low given the linear nature of the proposed development, but it is advised that any material that might resemble fossil material found during the course of excavations into intact sedimentary bedrock along the section flanking the Senator Lamprecht Bridge and the Senekal Reservoir area must be reported to SAHRA and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer. The bridge itself will not be impacted by the proposed development, but SAHRA should be notified of any attachments to the structure.**

The proposed development footprint is located on fairly 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.

## Introduction

A phase 1 Heritage Impact assessment was conducted for a proposed construction of a water pipeline between the Cyferfontein Dam, the Senekal reservoir and the Matwabeng Dam in Senekal, FS Province (**Fig. 1**). The extent of the proposed development (over 5000 m<sup>2</sup>) 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

### General Site Coordinates

Cyferfontein Dam: 28°14'28.36"S 27°39'37.02"E

Senekal Reservoir: 28°19'22.40"S 27°37'34.83"E

Matwabeng Dam pump station: 28°21'10.12"S 27°37'17.04"E

The proposed subsurface water pipeline will be located next to an existing road and on agricultural land between Cyferfontein Dam and the N5 national road entering Senekal. It will

then intersect with the Senekal reservoir and continue south towards the Sandspruit that runs west of the Matwabeng Township to terminate at the Matwabeng Dam pump station (**Fig. 1**).

## **Background**

### **Geology**

The geology of the region has been described by Nolte (1995). The survey area is primarily underlain by medium to coarse-grained sandstones of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) (**Fig. 2**). The sedimentary rocks form the base on which younger, alluvial deposits of Quaternary age have been deposited, especially along the Sandspruit to the south of the town (see map). The alluvial deposits here are mostly made up of grey and yellow sandy clays varying between 0.5 m and 3.0 m in thickness (**Fig. 13**).

### **Palaeontology**

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 (**Fig. 3**). 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 Waterloo 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**

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 Free State is extensive, in terms of both typology and chronology. This include Early Stone Age bifaces, and 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 archaeological footprint in the region is primarily dominated by 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, pieces 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 pipeline route indicates that:

- It has been severely degraded either by previous road building, residential development or farming activities (**Fig. 4, 7, 9 & 10**).
- There is no evidence for the accumulation and preservation of intact fossil material within the Quaternary sediments (topsoils) covering the underlying sedimentary rocks especially along the Sandspruit section (**Fig. 10 & 13**).
- No aboveground evidence of fossils or fossil localities (large vertebrates, petrified trees) were observed within the footprint area during the survey, but it is noted that primarily coarse-grained Adelaide Subgroup sandstones are outcropping along high topography terrain at the high ground (Senekal koppie) where the town's reservoir is located.
- There are no indications of Stone Age artifacts, prehistoric structures or rock engravings within the footprint. There is also no evidence of historical structures within the confines of the route. A section of the footprint is located near a large cemetery in Matwabeng township, but it will not be affected by the proposed development (**Fig. 11 & 12**).

### **Impact Statement and Recommendations**

Potential for palaeontological impact is considered low given the linear nature of the proposed development, but it is **advised that any material that might resemble fossil material found during the course of excavations into intact sedimentary bedrock along the section flanking the Senator Lamprecht Bridge and the Senekal Reservoir (Senekal koppie) area must be reported to SAHRA and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer. The bridge itself will not be impacted by the proposed development.**

The proposed development footprint is located on fairly 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.

#### AUTHOR DETAILS

Dr. Lloyd Rossouw specializes in the southern African Quaternary and has over twenty years of extensive fieldwork experience. He graduated with Archaeology and Cultural Anthropology for his BA degree and went on to receive training in southern African archaeology at Honours level at the University of Stellenbosch's Archaeology Department. He received specialized training in faunal osteology and Quaternary palaeontology for his MSc-degree at the Bernard Price Institute of Palaeontology (Wits) and obtained his PhD-degree at the University of the Free State, specializing in plant microfossil research. He is a member of the Association for Southern African Professional Archaeologists (ASAPA) and the Palaeontological Society of Southern Africa (PSSA).

#### 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.

Yours truly,

A handwritten signature in black ink, appearing to read 'L. Rossouw', written in a cursive style.

16 July 2019



## Tables and Figures

**Table 1.** Field rating categories as prescribed by SAHRA.

<b>Field Rating</b>	<b>Grade</b>	<b>Significance</b>	<b>Mitigation</b>
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. Aerial view of the proposed water pipeline footprint between the Cyferfontein Dam and the Matabeng Dam pump station.

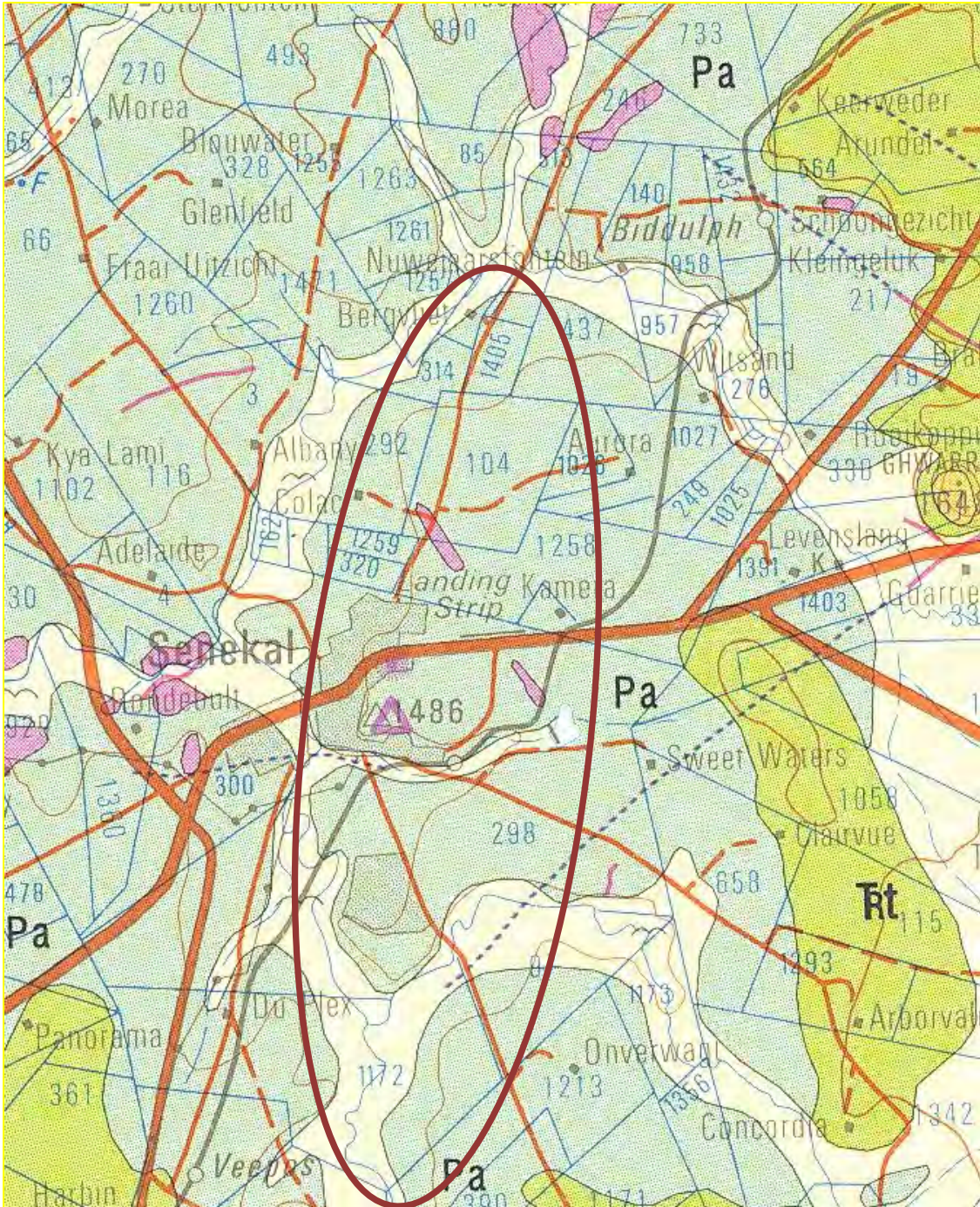


Figure 2. According to the 1:250 000 scale geological map 2826 Winburg, the survey area is primarily underlain by medium to coarse-grained sandstones of the Adelaide Subgroup (*Pa*, Beaufort Group, Karoo Supergroup) on which younger, residual soils and alluvial deposits of Quaternary age have been deposited

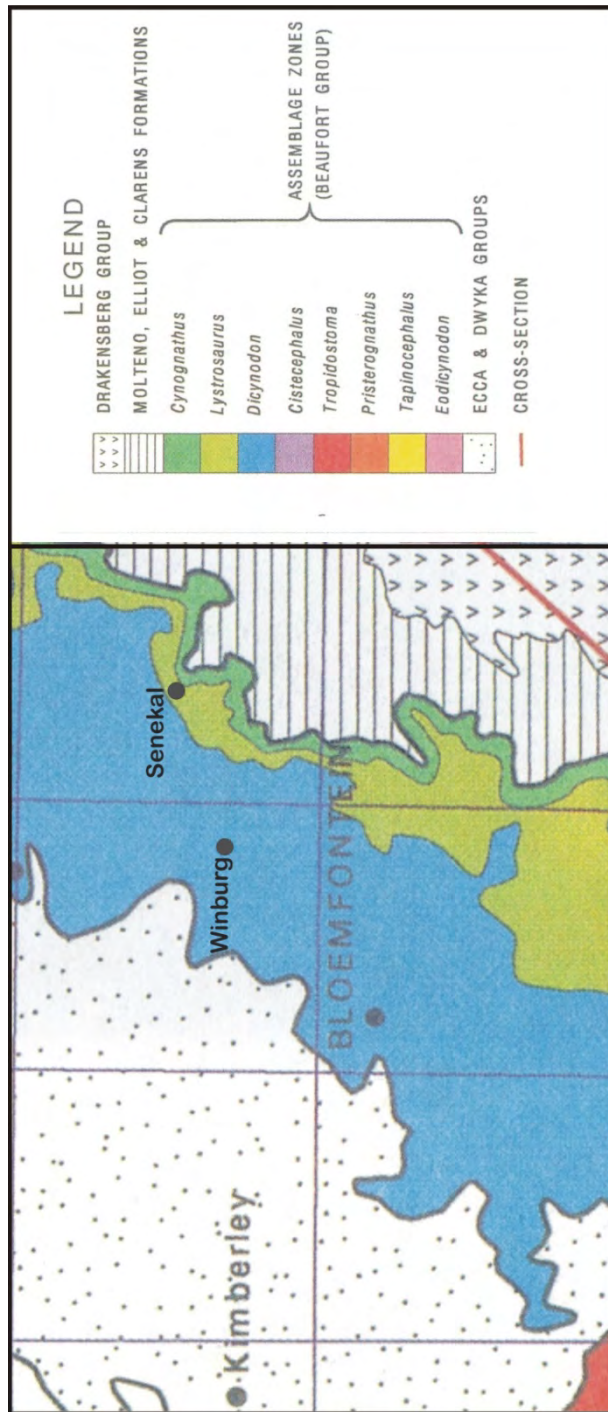


Figure 3. Geographical distribution of vertebrate biozones within the Beaufort Group (after Rubidge 1995). The Karoo sedimentological strata underlying the proposed pipeline route and surrounding area are generally accepted to be Late Permian in age, and are assigned to the *Dicynodon* and overlying *Lystrosaurus* Assemblage Zones.



Figure 4. General view of the pipeline footprint on agricultural land near the Cyferfontein Dam.

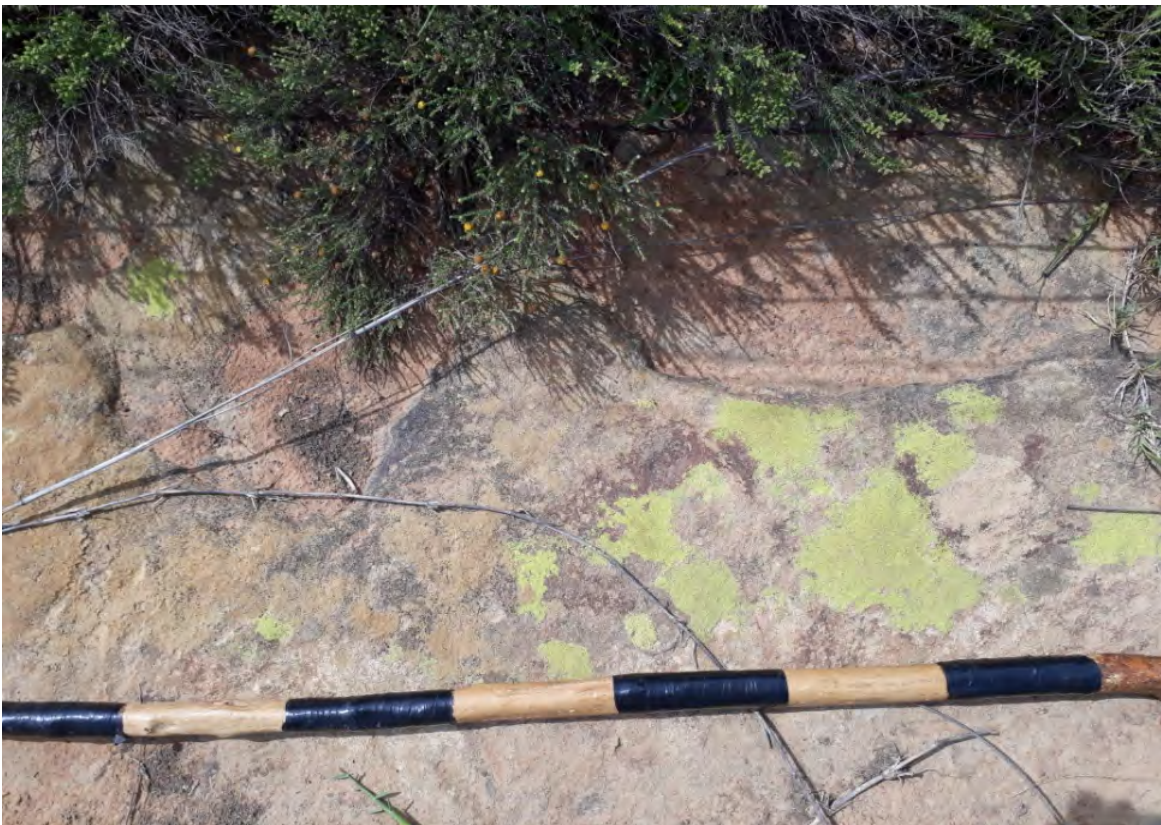


Figure 5. Adelaide Subgroup outcrop consisting of medium to coarse-grained sandstones.



Figure 6. Exposed Adelaide Subgroup sedimentary strata and geologically recent alluvium flanking the river crossing at the Senator Lamprecht Bridge, located 2.6 km south of the Cyferfontein Dam (GPS coordinates 28°15'51.82"S 27°39'3.37"E).



Figure 7. General view of agricultural land between the Cyferfontein Dam and the Koekemoers Rekwest Small Holdings, which will be impacted by the development.



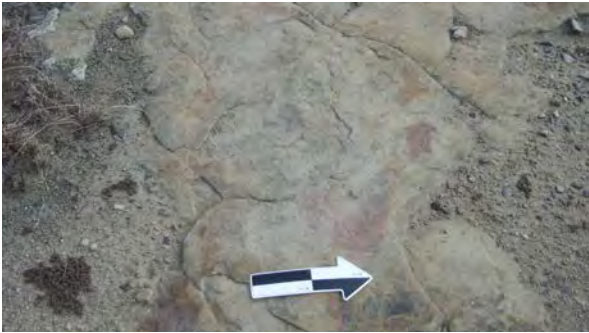


Figure 8. Course – grained Adelaide Subgroup sandstones (above, center and below left) outcropping near the Senekal Reservoir (above and center right).



Figure 9. General view of the pipeline footprint south of the Senekal reservoir (above) and near the railway tracks (below).



Figure 10. Severely degraded part of the footprint Matwabeng consisting of alluvial Quaternary alluvial deposits.



Figure 11. Modern cemetery at Matwabeng.



Figure 12. Aerial view of the cemetery at Matwabeng.



Figure 13. Quaternary alluvial overbank sediments eroding out to the south of Matwabeng (above) and north of the pump station at the Matwabeng Dam (below).



Figure 14. General view of the Matwabeng Dam, looking southeast.