

**Heritage Impact Assessment for proposed construction of Drying  
Ponds, Water Treatment Works (WTW) and Pipeline section  
designated for supernatant discharge into the Sandspruit in  
Senekal, Setsotso Local Municipality, FS Province.**

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## Summary

A phase 1 Heritage Impact assessment was conducted for a proposed construction of a Drying Ponds and a water treatment works (WTW) located on an escarpment situated on the eastern outskirts of Senekal, FS Province, and a pipeline designated for supernatant discharge that will terminate further west in the nearby Sandspruit. Investigation of the proposed development footprint indicates that the proposed WTW and Drying Ponds site B and C localities have been severely degraded by previous forestry activities as evidenced by the remains of blue gum groves at the site. The escarpment is visibly underlain by lenticular and poorly sorted sandstones of the palaeontologically significant Adelaide Subgroup (Beaufort Group, Karoo Supergroup). The proposed pipeline footprint for the Supernatant Discharge Point leading from the Drying Ponds B locality and terminating in the Sandspruit is severely degraded by forestry activities on top of the escarpment, as well as by building activities on the pediment below going south towards the Sandspruit, while the section going west towards the latter are capped by superficially disturbed alluvial sediments and residual soils. No aboveground evidence of fossils or fossil localities (large vertebrates, petrified tree remains) were observed within the footprint area during the survey, but it is noted that all the above – mentioned localities including pipeline footprint for the Supernatant Discharge Point are underlain by coarse-grained Adelaide Subgroup sandstones. There is no evidence for the accumulation and preservation of intact fossil material within the veneer of Quaternary sediments (topsoils) covering the underlying sedimentary rocks on top of the escarpment. There is no evidence for the accumulation and preservation of intact fossil material within the veneer of Quaternary sediments (topsoils) covering the underlying sedimentary rocks along the pediment below the escarpment and especially within alluvial sediments exposed by the Sandspruit at the Supernatant Discharge Point. The field assessment indicates that the proposed development will primarily affect Quaternary-age surface deposits with potential palaeontological impact limited to Adelaide Subgroup strata underlying the whole footprint. Here, excavations that may *exceed 1 m into sedimentary bedrock*, will impact *in situ* rocks which could be palaeontologically sensitive. The palaeontological significance of the Adelaide Subgroup sandstones strata in the region is considered high. It is the opinion of the author that the proposed development can continue. However, in the event where deep trench excavations could affect underlying Adelaide Subgroup strata, **it is advised that newly uncovered sedimentary strata must be monitored by professional palaeontologist during the construction phase** of the Drying Ponds and WTW sites, as well as the the pipeline footprint for the Supernatant Discharge Point. There are no indications of Stone Age artifacts, prehistoric structures, rock engravings or aboveground evidence of graves within the footprint. There is also no evidence of historically significant structures within the confines of the study area. It is the author's opinion that the proposed pipeline footprint is not archaeologically vulnerable and that it will not impact on archaeologically sensitive heritage. Archaeologically, the development footprint is designated a site rating of General Protection C.

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## Introduction

A phase 1 Heritage Impact assessment was conducted for a proposed construction of a Drying Ponds and a water treatment works (WTW) located on an escarpment situated on the eastern outskirts of Senekal, FS Province and a pipeline designated for supernatant discharge that will terminate option a) further east at Johan du Plessis Street (Preferred position) (**Fig. 1a**) OR option b) further west in the Sandspruit (Alternative position) (**Fig. 1b**). 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 2019. 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

WTW sites: 28°19'15.03"S, 27°37'40.68"E

Drying Ponds, Preferred: 28°19'18.58"S; 27°37'54.64"E

Drying Ponds, Alternative: 28°19'16.65"S, 27°37'43.78"E

Discharge Point, Preferred: 28°19'35.42"S, 27°38'27.19"E

Discharge Point, Alternative: 28°19'36.85"S; 27°37'13.02"E

The proposed Drying Ponds and WTW sites are located on the escarpment situated on the eastern outskirts of Senekal while the pipeline footprint for the Supernatant Discharge Point will intersect John du Plessis Street on the southern pediment of the escarp to terminate further west in the Sandspruit (**Fig. 2 & 3**).

## Background

Background to potential heritage associated with the footprint has been previously discussed (Rossouw 2019). The study area is underlain by medium to coarse-grained sandstones of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) (**Fig. 4 & 5**). Senekal was established in 1875 on the farm De Put and named after Frederik Petrus Senekal (1815-1866), who led the commando against Witsie and fought in the First and Second Basuto Wars of 1858 and 1865-66 (Raper 1984).

## Field Assessment

Investigation of the proposed development footprint indicates that:

- The proposed WTW locality has been severely degraded by previous forestry activities as evidenced by the remains of blue gum groves at the site (**Fig. 6**).
- The proposed Drying Ponds site B and C localities have been severely degraded by previous forestry activities as evidenced by the remains of blue gum groves at the site (**Fig. 7**).
- The escarpment is visibly underlain by lenticular and poorly sorted sandstones (**Fig.8 & 9**).
- The proposed pipeline footprint for the preferred Supernatant Discharge Point leading from the Drying Ponds B locality and terminating in the Sandspruit is severely degraded by forestry activities on top of the escarpment, as well as by building activities on the pediment below going south towards the Sandspruit, while the section going west towards the latter are capped by superficially disturbed alluvial sediments and residual soils (**Fig. 10a**). The Alternative Supernatant Discharge Point is also impacted due to previous agricultural activities. The last 150 m of the section going east towards the latter are capped by superficially disturbed residual soils (Fig. 10b).
- No aboveground evidence of fossils or fossil localities (large vertebrates, petrified tree remains) were observed within the footprint area during the survey, but it is noted that all the above – mentioned localities including pipeline footprint for the Supernatant Discharge Point are underlain by coarse-grained Adelaide Subgroup sandstones.
- There is no evidence for the accumulation and preservation of intact fossil material within the veneer of Quaternary sediments (topsoils) covering the underlying sedimentary rocks on top of the escarpment.
- There is no evidence for the accumulation and preservation of intact fossil material within the veneer of Quaternary sediments (topsoils) covering the underlying sedimentary rocks along the pediment below the escarpment and especially within alluvial sediments exposed by the Sandspruit at the Supernatant Discharge Point.
- There are no indications of Stone Age artifacts, prehistoric structures, rock engravings or aboveground evidence of graves within the footprint. There is also no evidence of historically significant structures within the confines of the study area.

## Impact Statement and Recommendations

### Palaeontology

The field assessment indicates that the proposed development will primarily affect Quaternary-age surface deposits with potential palaeontological impact limited to Adelaide Subgroup strata underlying the whole footprint. Here, excavations that may *exceed 1 m into sedimentary bedrock*, will impact *in situ* rocks which could be palaeontologically sensitive. The palaeontological significance of the Adelaide Subgroup sandstones strata in the region is considered high. It is the opinion of the author that the proposed development can continue. However, in the event where deep trench excavations could affect underlying Adelaide Subgroup strata, **it is advised that newly uncovered sedimentary strata must be monitored by professional palaeontologist during the construction phase** of the Drying Ponds and WTW sites as well as the the pipeline footprint for the Supernatant Discharge Point.

### Archaeology

It is the author's opinion that the proposed pipeline footprint is not archaeologically vulnerable and that it will not impact on archaeologically sensitive heritage. The footprint is designated a site rating of General Protection C (**Table 1**).

## Chance Finds Protocol for Developer

### Palaeontology

Any excavations required for laying of foundations or installation of underground infrastructure that *exceeds 1 m into Normandien Formation bedrock*, will impact *in situ* sedimentary strata which could be palaeontologically sensitive. In this case Dr Ragna Redelsdorf at SAHRA must be alerted accordingly since freshly exposed sedimentary rock will require contracting **a professional palaeontologist for appropriate monitoring for fossil remains by** during the construction phase.

If any newly discovered palaeontological resources prove to be significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;

The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.

If, in the event that localized fossil material is discovered exposed or eroding **out of intact superficial overburden** during the construction phase, it will in all probability resemble modern-looking, but more or less lithified animal bones and teeth and it will most likely be those belonging to bovids (Bovidae: the biological family of ruminant mammals that includes wildebeest, buffalo, antelopes, etc.) (**Fig. 11-13**).

In the unlikely event of fossil discovery within previously undisturbed Quaternary overburden, a professional palaeontologist must be called in immediately to confirm and record the finds.

If any newly discovered palaeontological resources prove to be significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;

The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.

In the meantime, *ex situ* remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. *In situ* material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.

### **Archaeology**

If any evidence of archaeological sites or remains, e.g. stone tool artifacts (**Fig. 14 & 15**), ostrich eggshell fragments, charcoal and ash heaps, or remnants of stone-made structures or unmarked graves (**Fig. 16**) are found during the proposed development, SAHRA APM Unit (Phillip Hine 021 462 5402) must be alerted.

In the meantime, *potential archaeological structures such as stone-build enclosures, buildings or graves* must be avoided by a no-go buffer zone until further confirmation by the archaeologist. Smaller *in situ* material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet.

If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist must be contracted as soon as possible to inspect the findings.

If the newly discovered heritage resources prove to be of archaeological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;

The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.

## References

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#### 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.

28 February 2020

## 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

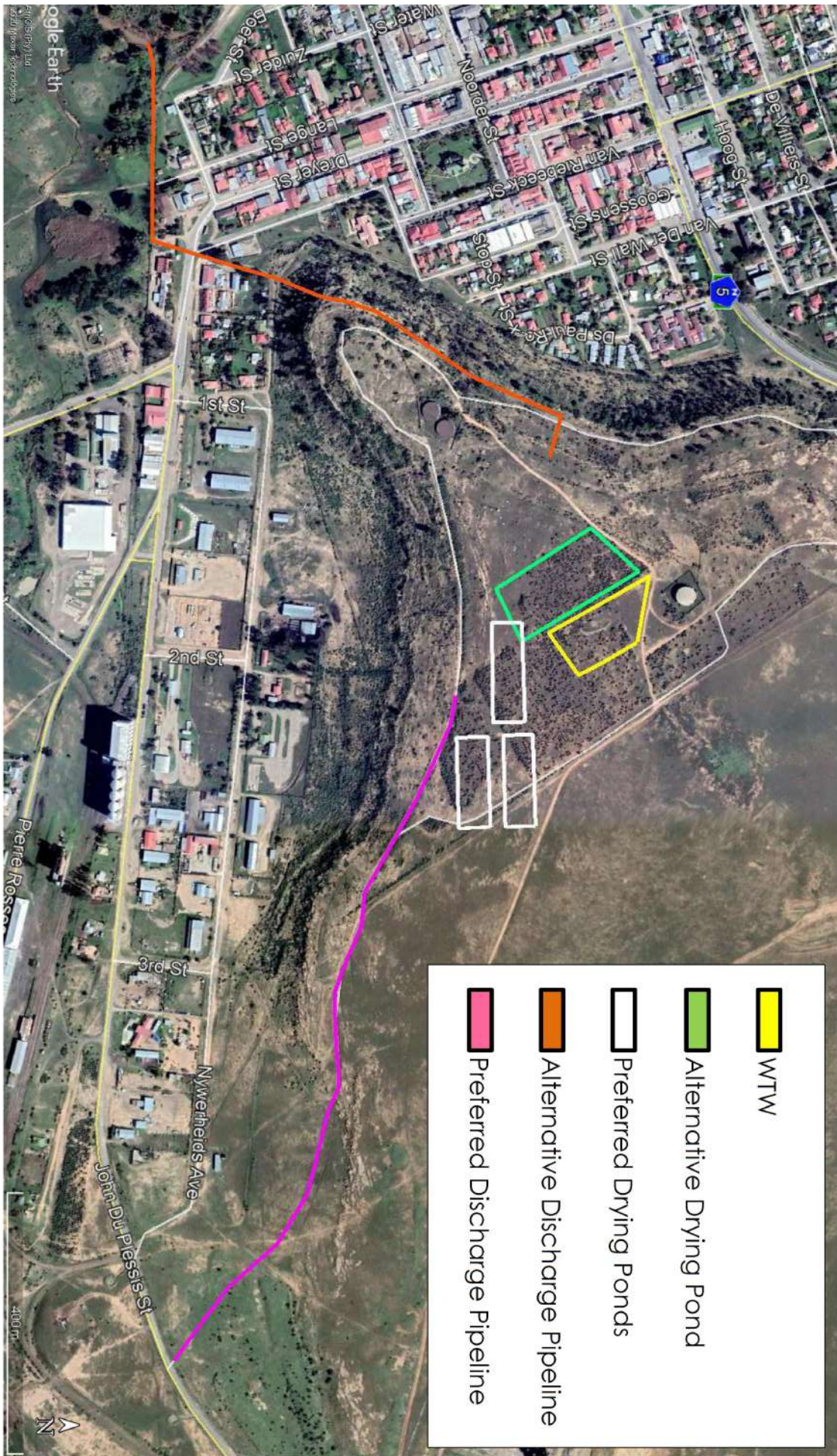


Figure 1. Aerial view indicating the footprint of the infrastructure related to the proposed project.

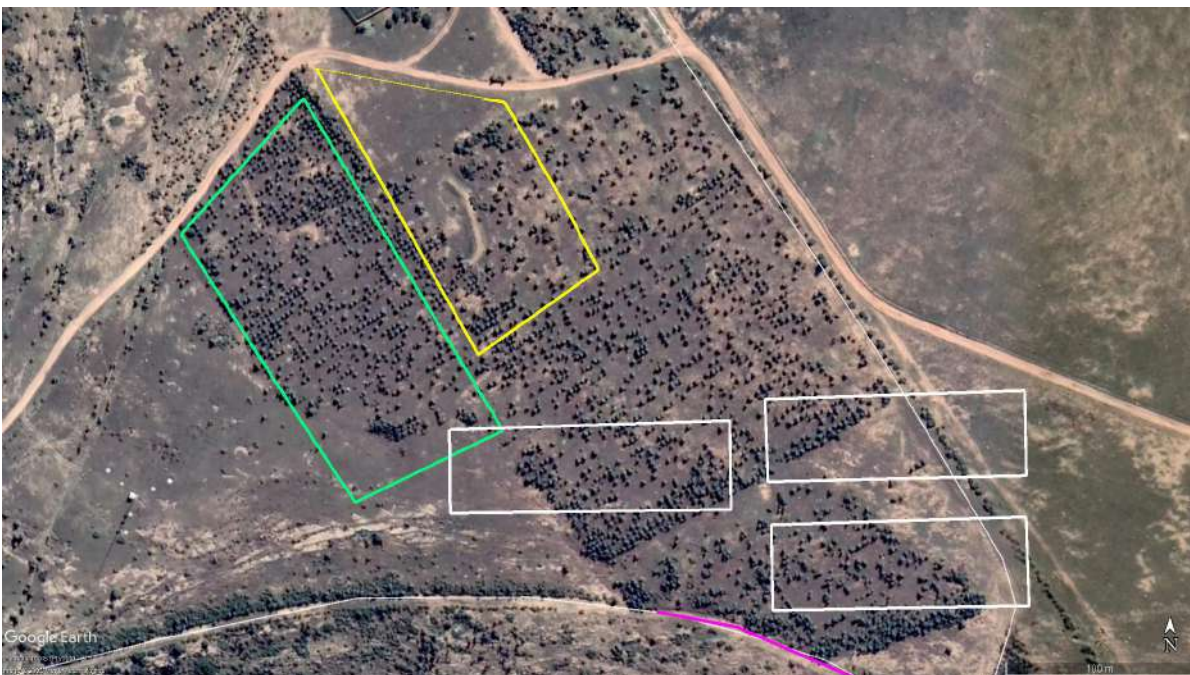


Figure 2. Layout of study area.

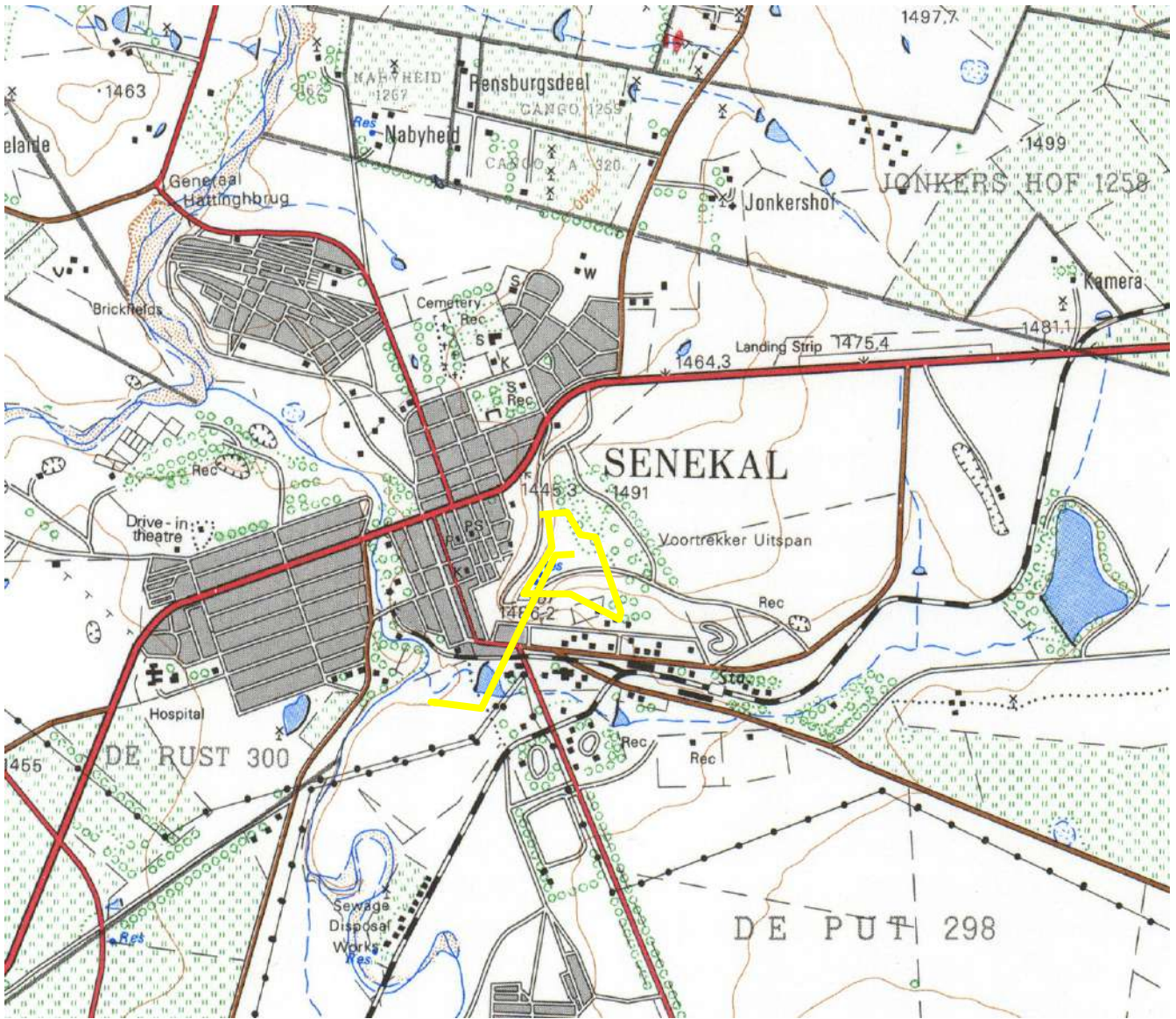


Figure 3. Portion of 1:50 000 scale topographic map 2827BC Senekal showing the position of the study area (yellow polygon).

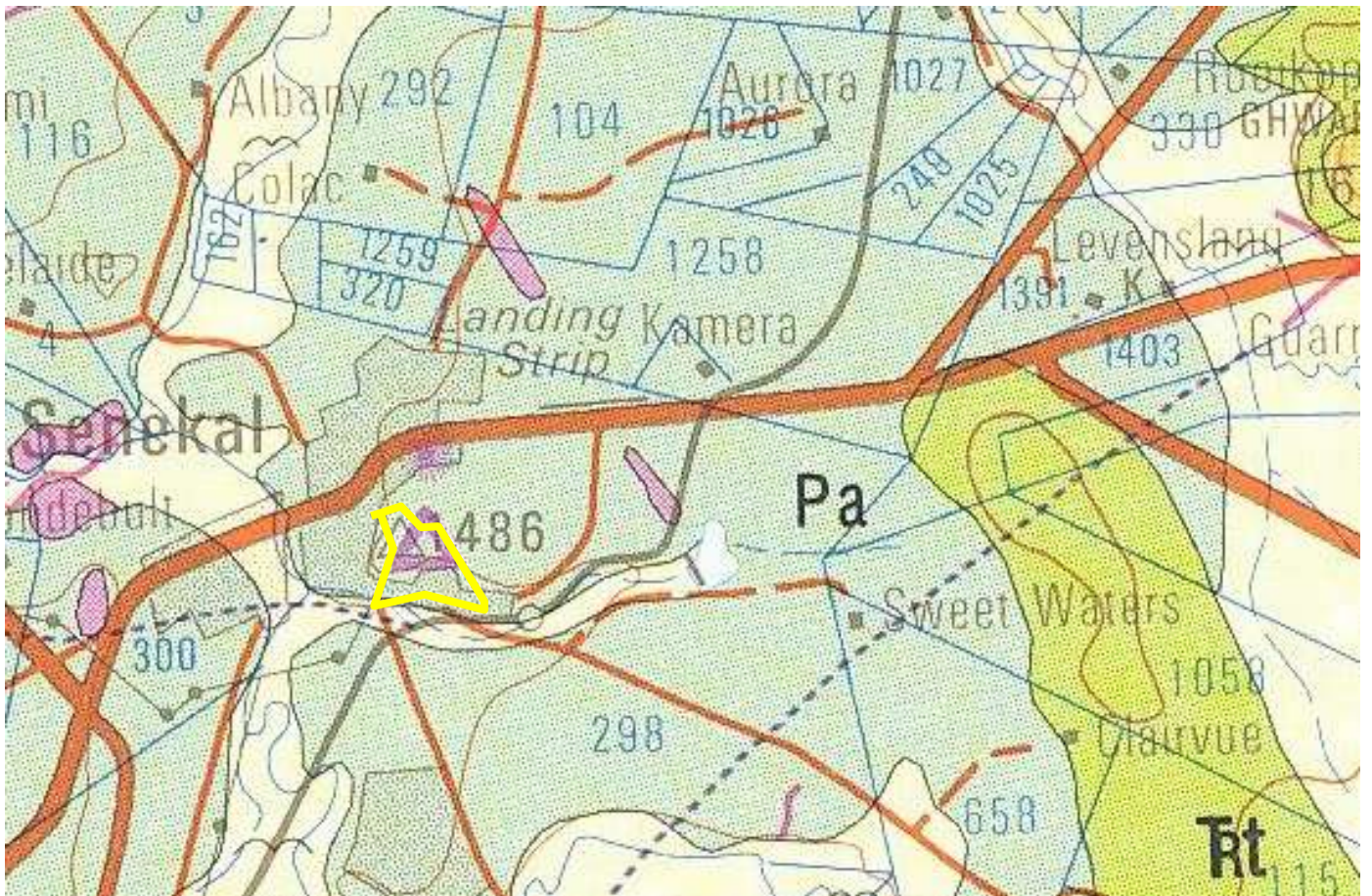


Figure 4. According to the 1:250 000 scale geological map 2826 Winburg (above), the survey area (yellow polygon) is primarily underlain by medium to coarse-grained Permian sandstones of the Adelaide Subgroup (*Pa*, Beaufort Group, Karoo Supergroup).

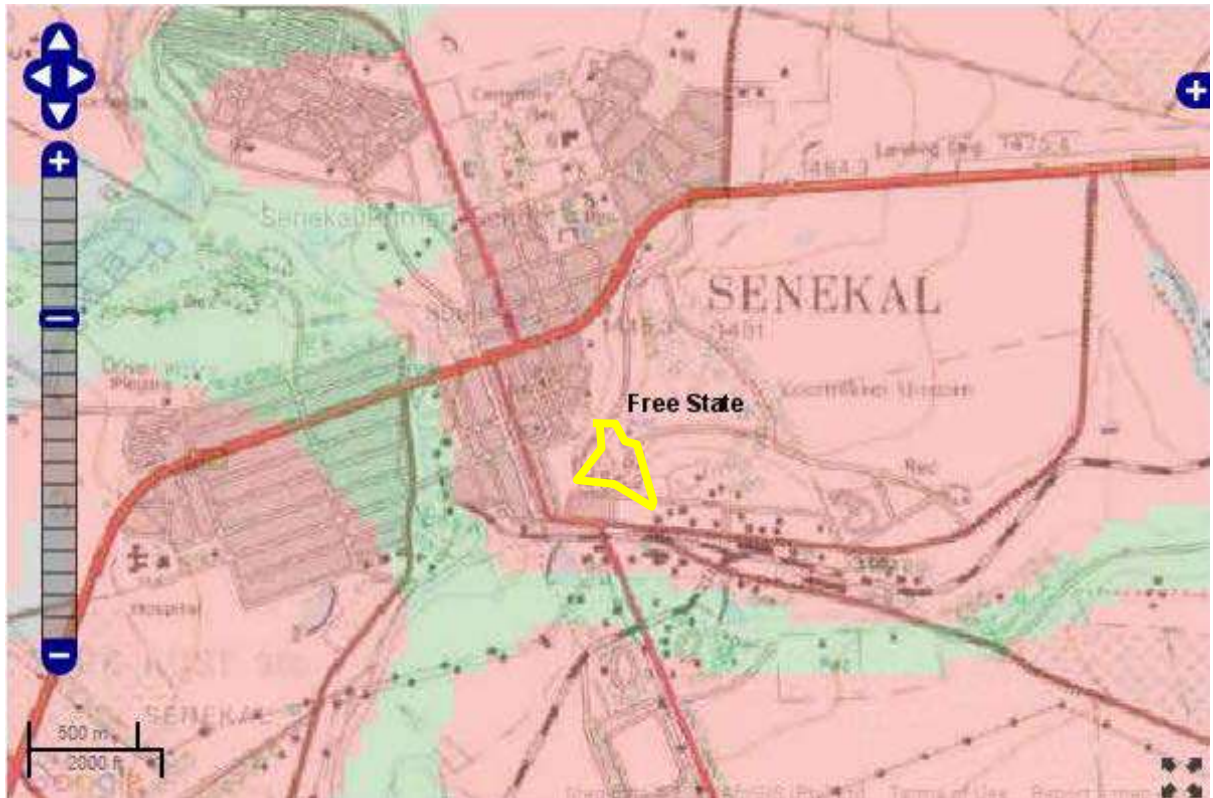


Figure 5. Palaeontologically significant red area indicated by the 2020 SAHRIS palaeontological sensitivity map. These rocks are typically capped by younger, residual soils and alluvial deposits of Quaternary age where low relief terrain predominates.



Figure 6. General view of the proposed Water Treatment Works site on top of the sandstone escarpment.





Figure 7 General view of the Alternative Drying Ponds sites on top of the sandstone escarpment.



Figure 8. Course-grained lenticular sandstone outcrop exposed on escarpment.



Figure 9. Ripple-marked and eroded, coarse- to medium grained sandstone.



Figure 10a. The section of the pipeline for the Preferred Supernatant Discharge Point going east towards John du Plessis Street are capped by superficially disturbed alluvial sediments and residual soils.



Figure 10b. The section of the pipeline for the Alternative Supernatant Discharge Point going west towards the Sandspruit are capped by superficially disturbed alluvial sediments and residual soils.



Figure 11. Example of intact bovid skeletal remains exposed within Quaternary overbank deposits from the Vaal River.



Figure 12. Side view (buccal view) of bovid lower dentition removed from jaw bone.



Figure 13. Example of post-cranial bovid skeletal elements including from left to right:  
femur, humerus, radius, tibia, scapula and vertebrae (x 3).



Figure 14. Example of general appearance of Stone Age artifacts rarely found intact as open sites and largely derived as isolated scatter on the landscape



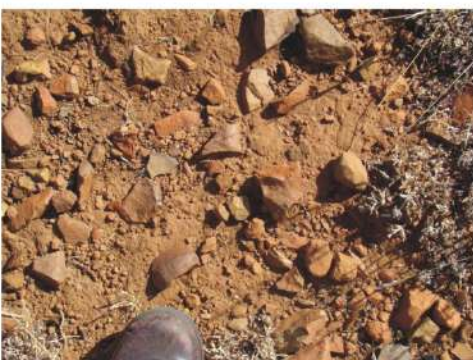


Figure 15. Example of rare stone tool knapping site occasionally found near dolerite intrusions in the region.



Figure 16. Typical example of unmarked grave recorded in the region - distinctive mound with occasional head markers and a characteristic **dolerite cobble** dome.