

Phase 1 PIA and AIA of two proposed dams on the farms
Loverswalk 1063 and Smithskraal 1519,
Boshof District, FS.



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Executive Summary

- There are no major palaeontological or archaeological grounds to suspend the construction of off-stream storage dams on the farms Loverswalk 1063 and Smithskraal 1519.
- Their footprint is not considered to be archaeologically or palaeontologically vulnerable with regard to **surface** finds, rock engravings, graves or historical structures.
- A moderate probability exists for locating capped Middle Stone Age artifacts within the Quaternary sands underlying the affected areas, because of sporadic occurrences of high densities of Fauresmith blades previously recorded in the lower levels of the Kalahari sands in the region.
- It is advised that newly uncovered material found during the course of excavation activities along the footprint must be reported to SAHRHA, that excavations into *in situ* sediments should allow for inspection by a specialist at the appropriate time and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

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Introduction

A Phase 1 Palaeontological and Archaeological Impact Assessment were carried out along designated areas on the farms Loverswalk 1063 and Smithskraal 1519 in the Boshof District, Free State Province. Anticipated development calls for the construction of two off-stream storage dams with specifications of 100 m x 150 m at a depth of 3 m. Dam 1 will be constructed next to existing residential and other outbuildings on the farm Loverswalk 1063, and Dam 2 next to active crop fields and a pump station on the farm Smithskraal 1519 (**Fig. 1**).

The survey 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. A site visit and assessment took place in May 2011.

The assessment required:

- identification and recording of potential palaeontological and archaeological heritage resources in the proposed areas of impact and;
- recommendation of mitigation measures to minimize potential impacts associated with the proposed development.

Details of area surveyed

The affected areas is located on the 1:50 000 topographic map 2825 AA Boshof (**Fig. 1**) Coordinates of the proposed water pipeline and two off-stream dams are presented as reference points in **Table 1**. The greater extent of the footprint consists of generally flat to undulating countryside that mainly covers agricultural land.

Table 1. General reference points of the pipeline and two off-stream dams.

| Feature | | Coordinates |
|---------|-----------|-----------------------|
| Dam 1 | NW Corner | S28 12.981 E25 05.815 |
| | NE Corner | S28 12.930 E25 05.873 |
| | SW Corner | S28 12.997 E25 05.833 |

| | | |
|-------|-----------|-----------------------|
| | SW Corner | S28 12.990 E25 05.895 |
| Dam 2 | NE Corner | S28 07.538 E25 03.837 |
| | NW Corner | S28 07.526 E25 03.753 |
| | SE Corner | S28 07.575 E25 03.851 |
| | SW Corner | S28 07.590 E25 03.781 |

Methodology

A pedestrian survey was conducted along the proposed sections. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant geological, palaeontological and archaeological information were assimilated for the report and integrated with data acquired during the on-site inspection.

Geology

Landscape topography between Loverswalk and Smithskraal consists largely of coalescent planar surfaces incised by the Vaal River drainage. The geology of the area has been described by Bosch (1993). The area in question is underlain by Archaeozoic and Phanerozoic sediments (1: 250 000 scale geological map 2824 Kimberley, Council for Geoscience, Pretoria, 1991). These are sediments of widely different geological ages. From oldest to youngest, the geology in the region is made up of Archaeozoic Ventersdorp andesites and volcanic breccia (*Rr*), Permian Ecca shales (*Ppr*), Jurassic dolerite intrusions (*Jd*), Quaternary calcretes, calcified pandunes (*Qc*) and aeolian sands (*Qs*) (**Fig.2**).

Ventersdorp Supergroup andesites, volcanic breccias, tuff and chert outcrops of the Rietgat and Allanridge Formations are exposed on the farms Honigkop 1002 and Honiglaagte 1234, about 10 km east of Loverswalk 1063 and on the farm Fourteen Streams about 15 km west of Smithskraal, respectively. Ventersdorp Supergroup rocks are not palaeontologically significant. Karoo sediments represented by shales of the Lower Ecca Group (Prince Albert Frm.) are exposed at Pandam 467, about 15 km west of Loverswalk. In the main Karoo Basin the Ecca Group straddles the Early-Late Permian boundary with the Prince Albert Formation, which consists essentially of mudrock, making up the basal part of the group. It conformably overlies the Dwyka Group, but locally it unconformably overlies pre-Karoo basement rocks where the

Dwyka Group is absent. Fossils, including cephalopods, brachiopods, fishes, coprolites, wood, leaves (*Glossopteris*) and spores have been recorded in the lowermost part of the formation. Lower Ecca Group rocks will not be impacted by the proposed development.

The two proposed dam sites are located on a mantle of Quaternary sediments (Q_c , Q_s). These sediments are made up of undifferentiated deposits of unconsolidated to semi-consolidated sediments including aeolian sands, calcretes and surface limestones, with the characteristically red-brown Kalahari sands (Hutton sands) representing the latest geological phase.

Background

Archaeology

Stone Age archaeology

The lower Vaal River Basin has produced a wealth of archaeological finds from its fluviially deposited Pleistocene river gravels. Archaeological finds are exclusively derived from the Younger Gravels and include an abundance of Acheulian (Early Stone Age) handaxes, cleavers and core-axes, primarily made from quartzite. The base and lower levels of the characteristically red Hutton sands (Q_s), which cover vast areas between Kimberley and Boshof, have produced localized densities of Fauresmith and Middle Stone Age artifacts. The Fauresmith types are regarded as an important transitional stone tool industry at the beginning of the Middle Stone Age. The incidence of Later Stone Age surface scatters is also common on the modern landscape.

No archaeological artifacts have been previously reported from intact Quaternary deposits (Q_c , Q_s) at Smithskraal 1519 and Loverswalk 1063.

Palaeontology

Extensive fossil fauna of uncertain provenance have been retrieved from the alluvial and terrace gravels between Bloemhof and the Vaal River's junction with the Orange River. Quaternary fossils are abundant in the youngest river gravels along the river itself, but intrusive features within the gravels, such as fossilized hyaena dens, are also located higher up outside the present valleys along calcified pandunes. No vertebrate

fossil remains have been previously reported from intact Quaternary deposits (*Qc*, *Qs*) at Smithskraal 1519 and Loverswalk 1063.

Results of Survey

Dam 1

The proposed dam area is located in open veld, next to farm laborer houses and other outbuildings on the farm Loverswalk 1063 (**Fig. 3**). The survey revealed no evidence of palaeontological exposures, Stone Age archaeological material distributed as surface scatters on the landscape. There are also no indications of prehistoric structures or remains within or in the immediate vicinity of the survey area. There is no evidence of graves, graveyards or historical structures in the demarcated area.

Dam 2

The proposed dam area is located in open veld, next to a pump station and is surrounded by ploughed fields on the farm Smithskraal 1519 (**Fig. 4**). The survey revealed no evidence of palaeontological exposures, Stone Age archaeological material distributed as surface scatters on the landscape. There are also no indications of prehistoric structures or remains within or in the immediate vicinity of the survey area. There is no evidence of graves, graveyards or historical structures in the demarcated area.

Impact Statement and Recommendations

Assessment of the potential impact on archaeological and palaeontological resources within the inspected area is summarized in **Table 2**.

There are **no major palaeontological or archaeological grounds to suspend the construction** of the two off-stream storage dams. However, any developments that may potentially destroy or damage fossils and archaeological remains or that conduct excavations exposing fresh superficial deposits are of conservation and research interest.

Impact Statement on surface features or exposures

- The footprint is not considered to be archaeologically or palaeontologically vulnerable with regard to surface finds, rock engravings, graves or historical structures.

Table 2. Assessment of impact along the footprint.

| Feature | Geological Unit | Palaeontological & Archaeological significance of footprint (surface features) | Palaeontological & Archaeological significance of footprint (subsurface finds) | Potential Impact | Irreplaceable loss of heritage resources? | Mitigation required |
|---------|-----------------|--|--|------------------|---|---|
| Dam 1 | <i>Qs</i> | low | medium | medium | no | monitoring of fresh exposures / excavations |
| Dam 2 | <i>Jd, Qs</i> | low | Medium (Qs) | medium | no | monitoring of fresh exposures / excavations |

- Impact on palaeontological remains or archaeological finds is therefore likely to be low.
- In accordance with the types and range of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999), there is no evidence of palaeontological exposures, building structures or material of cultural significance, places which are associated with living heritage, rock engravings, graves or archaeological sites within the demarcated area. **The surface terrain of the footprint represents no palaeontological or archaeological significance. The two proposed sites has been sufficiently recorded, mapped and documented in terms of conditions necessary for a Phase 1 archaeological impact assessment and can be accessed for further development.**

Impact Statement on potential subsurface finds

- The dams will be excavated to a depth of 3 m. A moderate probability therefore exists for locating capped Middle Stone Age artifacts within the

Quaternary sands as previously demonstrated by sporadic occurrences of high densities of Fauresmith blades recorded in the lower levels of the Kalahari sands in the region. *In situ* material may be present, but capped underneath the substantial Quaternary deposits (*Qs*) where trenching for the proposed dams will take place.

- In such a case it is advised that newly uncovered material found during the course of excavation activities along the footprint must be reported to SAHRHA, that excavations into *in situ* sediments should allow for inspection by a specialist at the appropriate time and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

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List of Figures

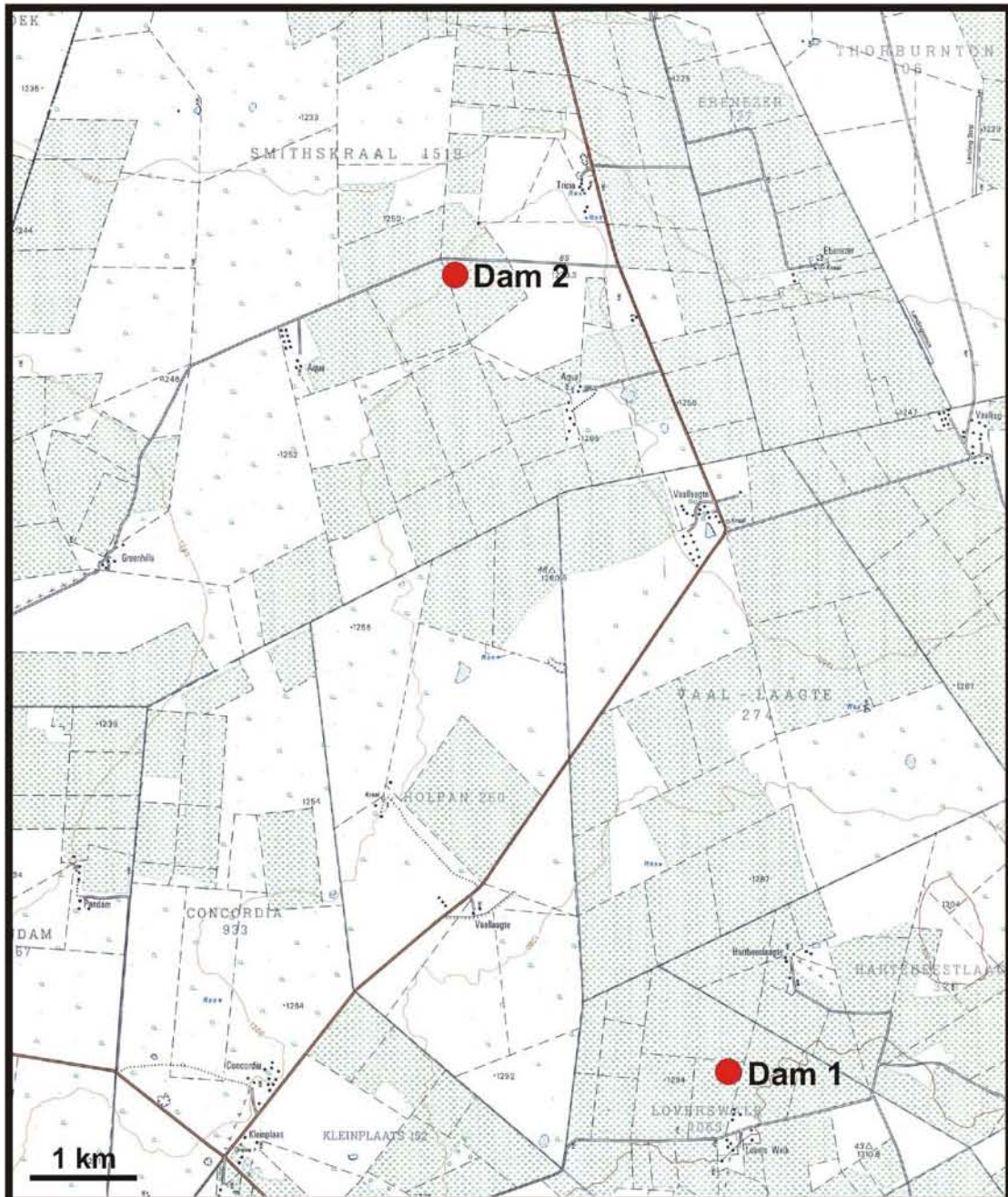


Figure 1. Portion of 1 to 50 000 scale topographic map of the area between Loverswalk 1063 and Smithskraal 1519 (2825 AA Boshof).

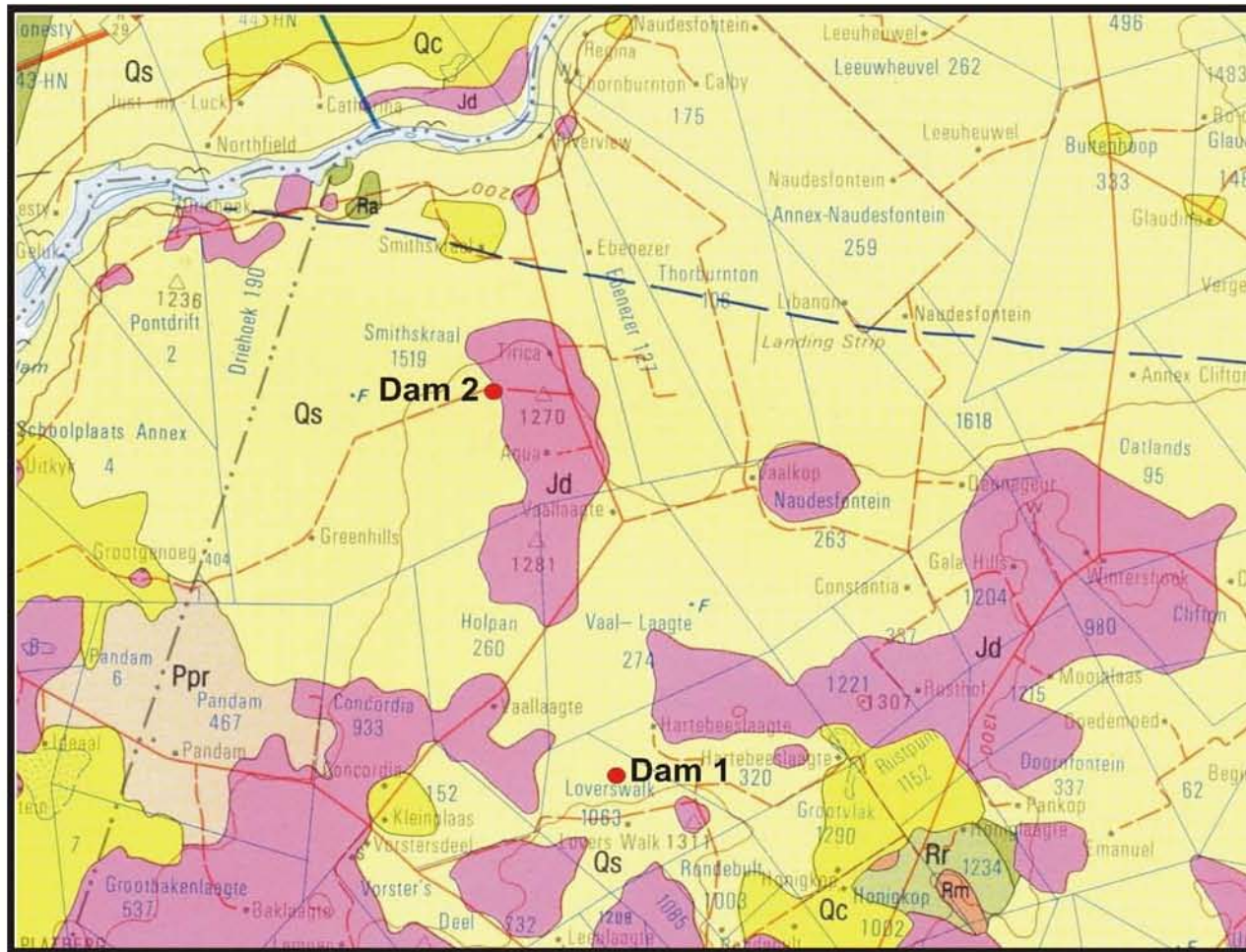


Figure 2. Portion of the 1 :250 000 scale geological map 2824 Kimberley showing bedrock geology of the study area. From oldest to youngest, strata consist of Archeozoic Ventersdorp andesites and volcanic breccia (*Rr*), Permian Ecca shales (*Ppr*), Jurassic dolerite intrusions (*Jd*), Quaternary calcretes, calcified pandunes (*Qc*) and aeolian sands (*Qs*).



Figure 3. Dam 1 locality. The area consist of undeveloped veld (above) underlain by a thick mantle of Quaternary aeolian sand (below).



Figure 4. Locality of Dam 2. The dam will be constructed in in open veld (above) next to active crop fields (below).