

Phase 1 Palaeontological Impact Assessment of the Xashimba Abattoir site near Queenstown, EC Province

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Executive Summary

- Anticipated development calls for the construction of a new abattoir facility, approximately 20 km west of the town of Queenstown in the Eastern Cape Province.
- The proposed site has a surface area of approximately 5 ha and is located on the property Stockenstroomsloot Noord 434 on the R61 road.
- The site is located on flat terrain in a valley flood plain with minimal topography and outcrop exposure.
- The abattoir site is underlain by Burgersdorp Formation mudstones and unconformably overlying Quaternary deposits primarily made up of unconsolidated alluvium and thick calcretes.
- Results indicate that the proposed development will primarily impact on the overlying Quaternary sediments.
- There is no evidence for *in situ* palaeontological material located within any of the exposed alluvial and calcrete outcrops at the site.
- The probability of finding intact palaeontological material within the Quaternary sediments covering the proposed footprint is considered to be low.
- There are no major palaeontological grounds to suspend the development of the Xishimba Abattoir.
- A low probability exists for locating capped Quaternary vertebrate fossils within or beneath calcrete cappings and unconsolidated alluvial deposits as a result of excavation activities related to construction.
- 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 SAHRA and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

Introduction

A Phase 1 Palaeontological Impact Assessment was carried out in an area demarcated for the construction of a new abattoir facility, approximately 20 km west of the town of Queenstown in the Eastern Cape Province (**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.

Anticipated development calls for the installation of several facilities designed for 30 large stock units per day. Additional facilities on terrain will include a feedlot for cattle, spray dip, handling and isolation pens, waste treatment and security (COSEC 2011). The main potable water source is from existing boreholes. Water for usage at the abattoir will be stored in PVC tanks anchored on a concrete slab (COSEC 2011).

The assessment required:

- identification and recording of potential palaeontological 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

1:50 000 scale topographic map 3126 DC Lehmansdrif.

The proposed site has a surface area of approximately 5 ha and is located on the property Stockenstroomsloot Noord 434 (**Table 1**), approximately 20km west of Queenstown on the R61 road (**Fig. 1**). The Klaas Smits River borders the property to the north. The site is located on flat terrain in a valley flood plain with minimal topography and outcrop exposure (**Fig 2 & 3**).

Geology

Landscape topography consists largely of flat terrain incised by the present Klaas Smits River drainage. The study area is situated within the Beaufort Group, Tarkastad Subgroup of rocks (Karoo Supergroup) consisting of sedimentary layers of sandstone, siltstone and mudstone (**Fig. 4**). Bedrock geology in the region is primarily represented by

Table 1. General reference points of the proposed site (see **Fig. 3**).

Point	Coordinates	
A	S31 55' 25.79"	E26 40' 22.17"
B	S31 55' 33.30"	E26 40' 23.09"
C	S31 55' 35.81"	E26 40' 27.59"
D	S31 55' 30.30"	E26 40' 30.50"

uppermost Katberg Formation sandstones (*Trk*) and mudstones overlain by Burgersdorp Formation mudstones (*Trb*). The Katberg Formation consist of reddish-grey medium-grained lithic sandstone and brownish-red and grey mudstones. The Burgersdorp Formation is mainly represented by grayish-red and greenish-grey mudstones with subordinate greenish-grey fine-grained lithic sandstone. Based on the characteristic presence of upward-fining cycles, lenticular sandstones, massive mudstones and non-marine vertebrate remains, the depositional history of the Tarkastad Subgroup is also interpreted as a fluvatile environment. Dykes, sills and inclined sheets of resistant Jurassic dolerites (*Jd*) determine the relief of the surrounding area. Overlying Quaternary alluvial sediments are derived from old flood plain deposits that are presently incised by the Klaas Smits River drainage.

Methodology

Relevant geological, palaeontological information were assimilated for the report and integrated with data acquired during the impact assessment.

Palaeontological Background

In the Tarkastad Subgroup the Katberg Formation strata (*Trk*) are assigned to the *Lystrosaurus* Assemblage Zone (AZ). Vertebrate fossils are primarily found in mudrock sequences between channel sandstones. The *Lystrosaurus* AZ is characterized by an abundance of *Lystrosaurus* in association with *Procolophon* and the absence of *Dicynodon lacerticeps*. Other common genera include *Moschorhinus*, *Proterosuchus* and

Lydekkerina. Casts of large burrows have also been described from several localities within this biozone.

The Burgersdorp Formation strata (*Trb*) are assigned to the *Cynognathus* AZ, which overlies the *Lystrosaurus* AZ. The zone is characterized by the presence of *Cynognathus*, *Diadermodon* and *Kannemeyeria* and the absence of *Lystrosaurus*. Sediments assigned to this zone are well exposed in the Queenstown and Lady Frere districts and have been traced eastward as far as the Engcobo district. Rocks consist of blue-green, pale grayish green, dark red to very dark maroon mudstones that are in many instances more consolidated than those of the underlying *Lystrosaurus* AZ. Fossil-bearing lenticular sandstones with calcareous concretions are common. The fossil record of the *Cynognathus* AZ includes a variety of plants, trace fossils, amphibians, fish reptiles, synapsids, and occasional molluscs. Complete, articulated skeletons are rare, but well preserved therapsids occur in mudrock units as dispersed and isolated specimens. Fragmentary therapsid and amphibian fossils frequently occur in localized scatters or in conglomerates at the base of lenticular sandstones.

The dolerite dykes, sills and inclined sheets dolerite represents no palaeontological impact.

Quaternary palaeontological sites are occasionally found exposed along Pleistocene alluvial terraces and dongas along rivers and streams. Quaternary alluvial deposits, especially near water courses and drainage lines, have the potential to yield microfossil and fossil vertebrate remains.

Results of Survey

The abattoir site is underlain by Burgersdorp Formation mudstones and unconformably overlying Quaternary deposits primarily made up of unconsolidated alluvium and thick calcretes (**Fig 5 & 6**). The calcrete horizons represent pedogenic hardpans formed within the upper metre of the alluviums during periods of non-deposition as they were being built up along a flood plain that was periodically active in the past.

Results indicate that the proposed development will primarily impact on the overlying Quaternary sediments. There is no evidence for *in situ* palaeontological material located within any of the exposed alluvial and calcrete outcrops at the site.

Statement of Significance and Recommendation

The probability of finding intact palaeontological material within the Quaternary sediments covering the proposed footprint is considered to be low (**Table 2**).

Table 2. Impact Summary.

Duration of Impact	Long term
Primary rock types / sediments impacted	Quaternary alluvium and calcretes
Palaeontological significance of footprint	Low
Potential Impact	Low
Irreplaceable loss of heritage resources?	No
Suggested Mitigation	None
Field Rating	Low

There are no major palaeontological grounds to suspend the development of the Xashimba Abattoir and it is recommended that the proposed development can proceed, provided the developer complies with the following requirements:

A low probability exists for locating capped Quaternary vertebrate fossils within or beneath calcrete cappings and unconsolidated alluvial deposits as a result of excavation activities related to construction. 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 SAHRA,

- and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

References

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Declaration

Dr. L. Rossouw occasionally does independent specialist consulting and is in no way connected with the proponents of the development, other than delivery of consulting services.

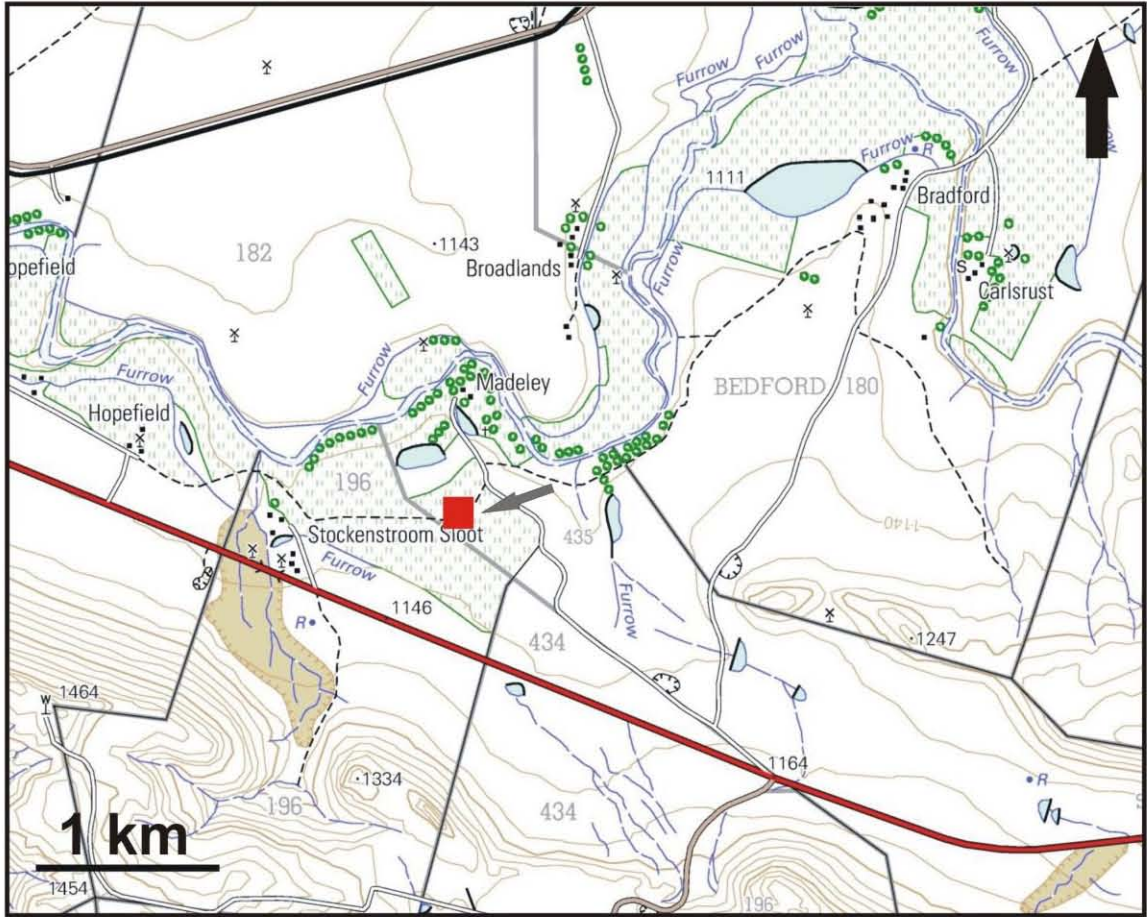


Figure 1. Portion of 1:50 000 scale map 3126 DC Lehmansdrif showing the locality of the proposed abattoir site.



Figure 2. General view of the terrain, looking northwest. The site is located on flat terrain along a valley flood plain with minimal topography and outcrop exposure.



Figure 3. Aerial view of the site (Google Earth).

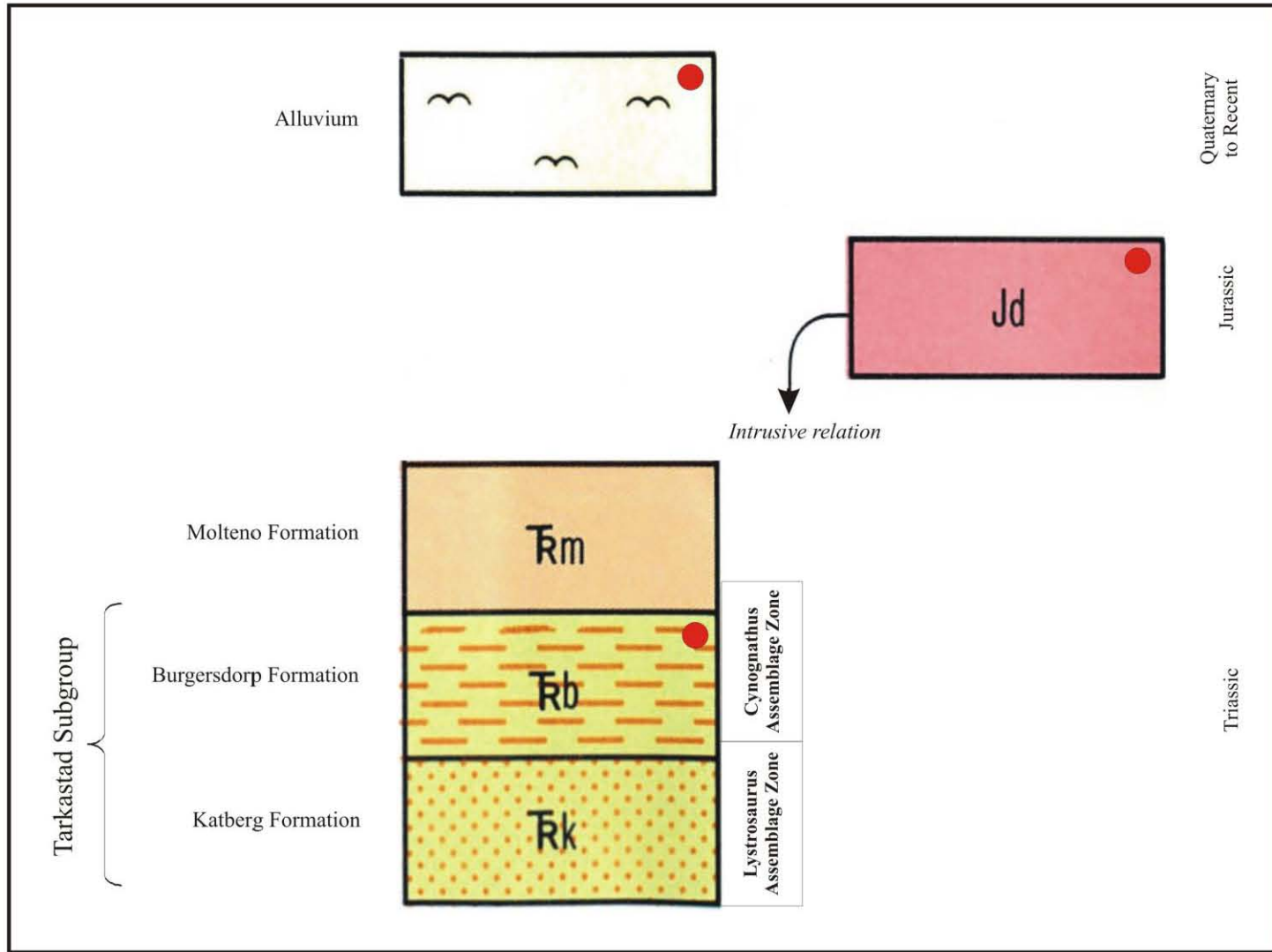


Figure 4. Schematic representation of the regional geology.

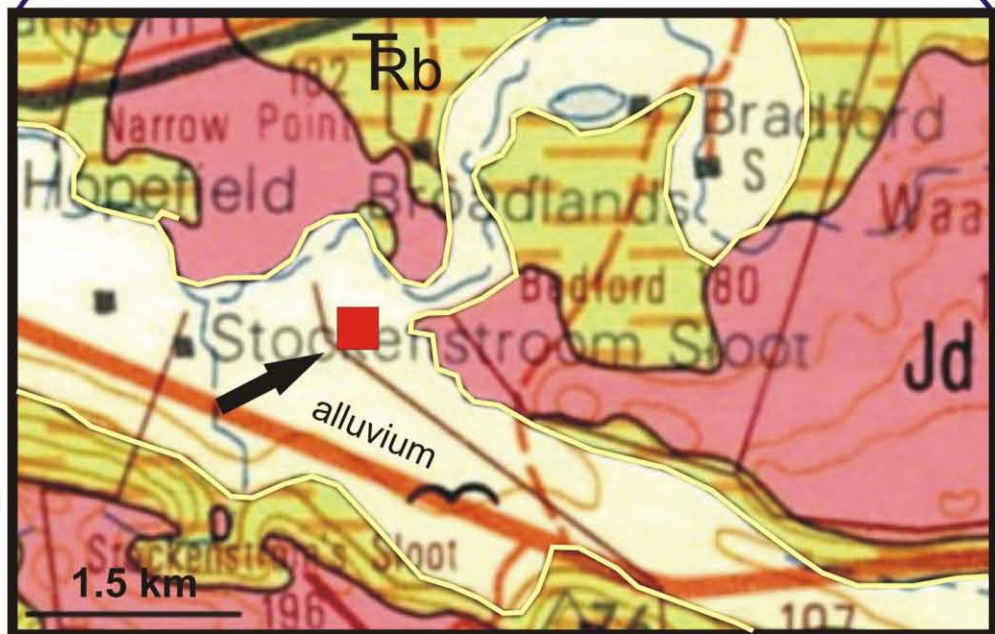
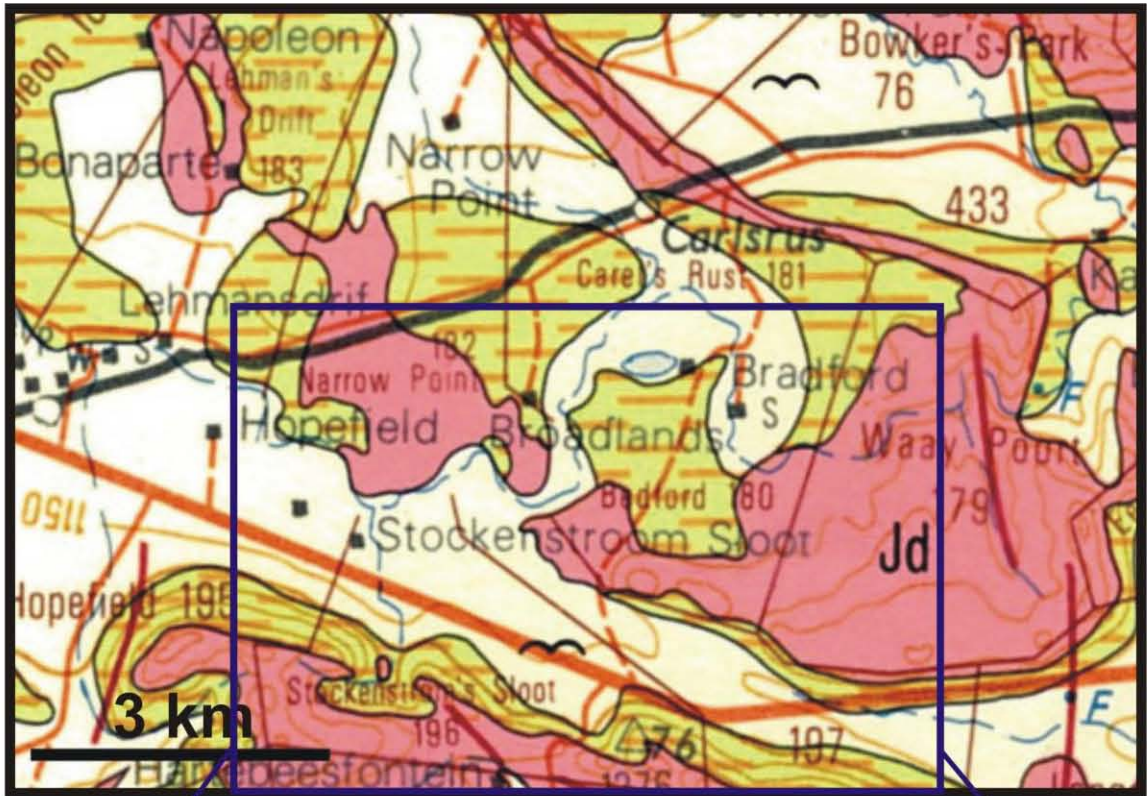


Figure 5. Portion of the 1 : 250 000 scale geological map 3126 Queenstown showing bedrock geology in the study area. From oldest to youngest, strata consist of Beaufort Group rocks, namely the Early Triassic Burgersdorp Formation (*Trb*) of the Tarkastad Subgroup, Jurassic age dolerite intrusions (*Jd*) and Quaternary alluvium.

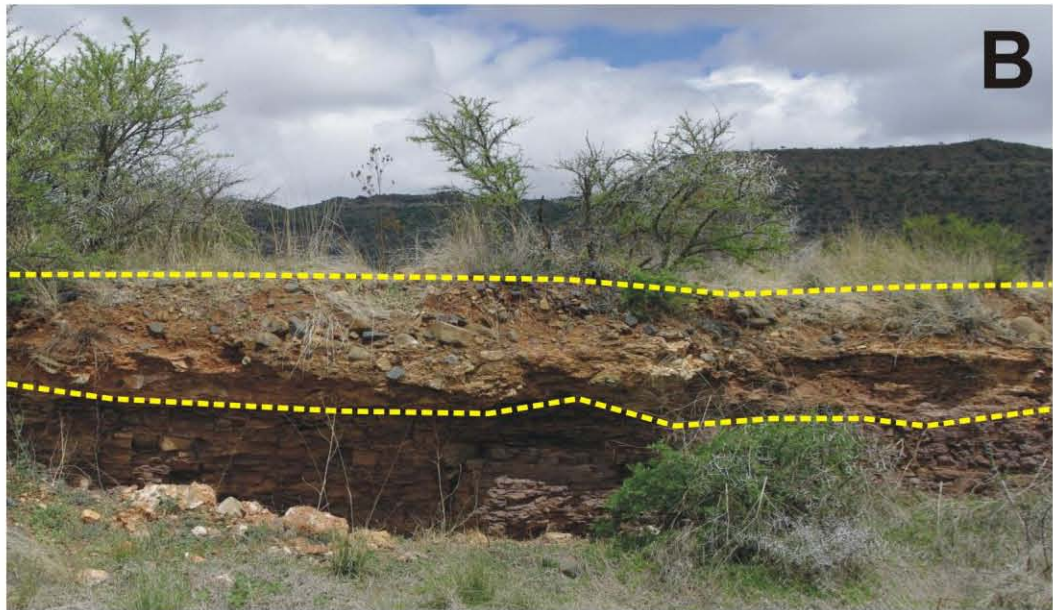


Figure 6. Sedimentary exposures at the site. Hardpan calcrete deposits (A) and unconsolidated alluvial sediments (yellow line, B) unconformably overly Burgersdorp Formation mudstones.