Phase 1 Palaeontological Impact Assessment of a proposed water pipeline near Nelspoort, Beaufort West district, Western Cape Province.

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Executive Summary

- A Phase 1 Palaeontological Impact Assessment was carried out in an area demarcated for the construction of a proposed water pipeline near the town of Nelspoort, Beaufort West district.
- The length of the pipeline is approximately 2 km in length. The proposed water pipeline has an internal diameter of less than 0.36 m and will be placed about 1 m below current land surface
- The survey area is located north of the town of Nelspoort. It adjoins a section of the Kambro and Sout Rivers and consists of substantial sedimentary deposits of Quaternary age, including alluvial sands and silts and strongly structured clayey, alkaline soils of up to five meters in thickness.
- The assessment found no evidence for the accumulation and preservation of intact fossil material within the Quaternary sediments in which the proposed pipeline will be placed.
- The 2 km section of Quaternary sediments in which the proposed pipeline will be placed, is of low palaeontological significance.

Introduction

A Phase 1 Palaeontological Impact Assessment was carried out in an area demarcated for the construction of a proposed water pipeline near the town of Nelspoort, Beaufort West district. 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. The site visit and assessment took place in February 2009.

Beaufort West Local Municipality proposes the abstraction of ground water from a borehole on the farm Klipkraal 127, as well as the construction of a pipeline connecting the boreholes with existing water purification works (Fig 1). The length of the pipeline is approximately 2 km in length. The proposed water pipeline has an internal diameter of less than 0.36 m and will be placed about 1 m below current land surface. This project was proposed in order to supply the peak water demands due to other existing borehole not providing enough water during dry seasons for the residents of Nelspoort.

Terms of reference

1. Identify and map possible palaeontological heritage resources in the proposed areas of impact;
2. determine and assess the potential impacts of the proposed development on palaeontological heritage resources in the proposed areas of impact, and
3. recommend mitigation measures to minimize impacts associated with the proposed development.

Description of the Affected Area

Locality data

The 1:50 000 topographical map of the area is 3223AA Nelspoort (Fig 1).

Coordinates of the proposed pipeline are presented as reference points in Table 1 (Figs. 2 – 5). The survey section consists of natural veld with some heavily overgrown sections, especially in the vicinity between reference points C4 and C5. The section between reference points C4 and C2 show evidence of disturbance including ground-moving activities while the section between C2 and the southern terminal point show evidence of agricultural and industrial disturbance.

Table 1. Position of the proposed pipeline represented by reference points

Point	Coordinates	
C1	S32 04 39.5 E23 00 23.2	S32 04 39.5 E23 00 23.2
C2	S32 04 34.3 E23 00 26.2	S32 04 34.3 E23 00 26.2
C3	S32 03 59.4 E23 00 20.3	S32 03 59.4 E23 00 20.3
C4	S32 03 54.5 E23 00 20.6	S32 03 54.5 E23 00 20.6
C5	S32 03 52.4 E23 00 28.1	S32 03 52.4 E23 00 28.1

Geology

Fluvially derived sedimentary rocks of the Karoo Supergroup, comprising mudstones and sandstones of the Beaufort Group dominate the underlying geology of the region, and are represented by Middle-Late Permian paleosols of the lower Abrahamskraal Formation and the overlying Teekloof formation. Sandstone and the mudstone exposures respectively represent river channel and floodplain deposits. Intrusions of Jurassic age Karoo dolerite, in the form of sills and dykes, occur extensively to the west of the survey area.

The survey area adjoins a section of the Kambro and Sout Rivers and consists of substantial sedimentary deposits of Quaternary age, including alluvial sands and silts and strongly structured clayey, alkaline soils of up to five meters in thickness (Figs. 3 – 5). Alluvial silts and clays and medium to fine terrace gravel deposits show clearly along the banks of the Kambro and Sout Rivers where sharp profiles occur (Fig 6). Colluvial deposits exposed by railway cuttings indicate calcrete-cemented clastic rubble deposits that occur as terrace remnants approximately 10 metres above the riverbed (Fig.7). The colluvium may include elements of sheet wash and alluvial-related deposits.

Methodology

The baseline study involved a systematic foot survey of the 2 km-transect demarcated for the construction of the proposed pipeline. Two important features were identified for investigation – exposed profiles of the Sout River adjoining the transect and occasional erosional gullies situated along the riverbanks. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum), and a digital camera were used to record relevant data.

Palaeontological Background

Skeletal fossils of reptiles, especially mammal-like reptiles, amphibians and freshwater fishes are well preserved in the Beaufort Group of sedimentary rocks between Beaufort West and Victoria West. The Beaufort Group lies about halfway up the Karoo Sequence and comprises a 2000 m thick fluvio-lacustrine succession of late Permian age. The oldest rocks of the Beaufort Group have yielded the most primitive therapsid fossils that become more mammal-like in the successively younger Karoo rocks with the earliest true mammals appearing in the uppermost Elliot Formation of the Stormberg Group. For

example, fragmentary fossil remains have been found in siltstone and mudstone horizons and in mud-pebble conglomerate deposits on the farms Kuilspoort, Lemoenfontein, Tafelberg and Wittekop, north of Beaufort West, and in the Biesiespoort area, south of Victoria West.

There is currently no record of Quaternary fossil localities present in the survey area. Rock engravings on the farm Klipkraal suggest the possibility that a giant long-horned buffalo (*Homoiocerus antiquus*), which became extinct more than 10 000 years ago, previously occurred in the area (Fig. 8). Several Later Stone Age rock engraving sites are found on eastern slopes of a range of dolerite koppies situated west of the national road that leads to Nelspoort from the north. These localities are firmly outside the boundary of the proposed water pipeline (Fig. 1).

Results of Survey

The foot survey indicated that construction of the pipeline will impact exclusively on deposits of Quaternary age. The foot survey also found no evidence for the accumulation and preservation of intact fossil material within the Quaternary sediments, as shown by the sterile profiles and erosional gullies exposed along the nearby riverbanks.

Impact Statement and Field Rating

The terrain that was surveyed is not considered to be palaeontologically vulnerable and potential impact related to proposed pipeline development on palaeontological remains is likely to be low. The 2 km section of Quaternary sediments in which the

proposed pipeline will be placed, is therefore of low palaeontological significance.

References

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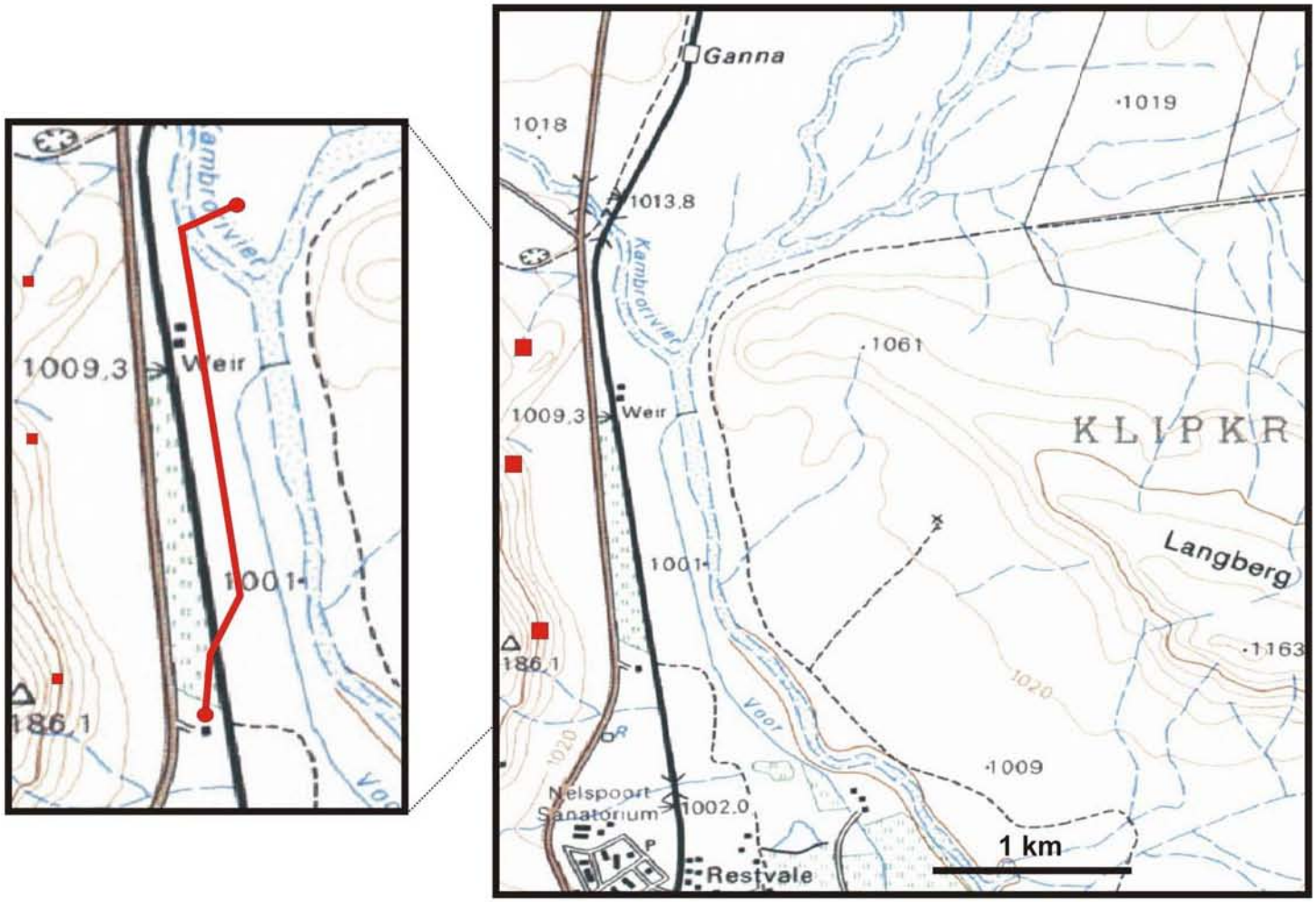


Figure 1. 1 : 50 000 topographic map of the proposed pipeline (red line). Rock engraving localities indicated by red squares.

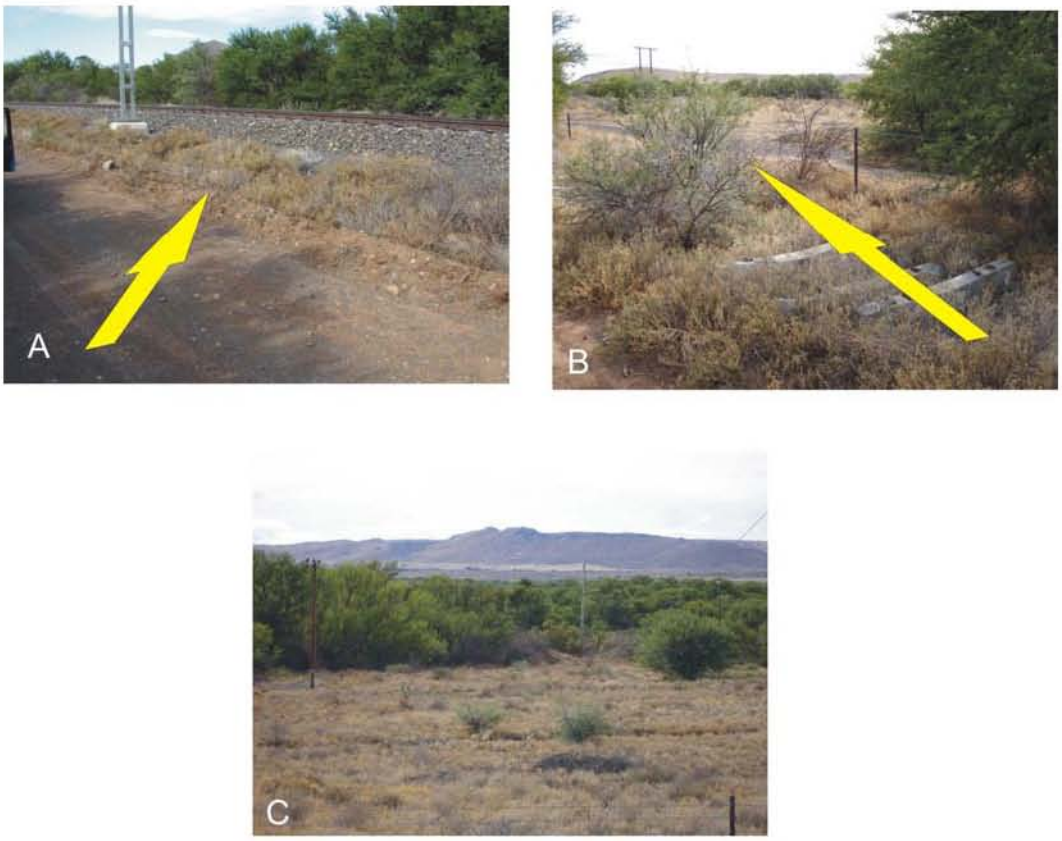


Figure 2. Reference point C1. Position of the proposed pipeline Looking southwest (A); looking northeast (B) and southern terminal point (C)

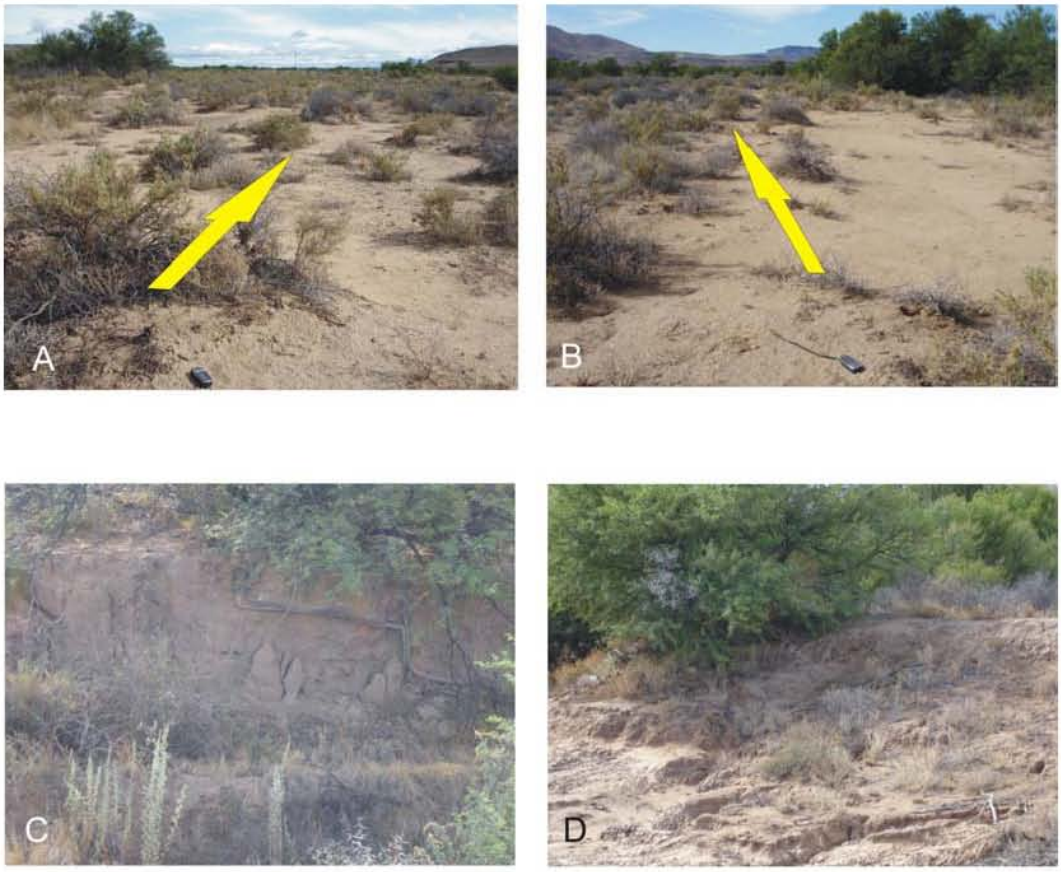


Figure 3. Reference point C2. Position of the proposed pipeline - looking north (A); looking south (B). Exposed profiles of the Sout River (C); an erosional gully (donga) on the western bank of the Sout River (D).

Figure 4. Reference point C3. Exposed profile of the Sout River (A); position of the proposed pipeline, looking south (B).

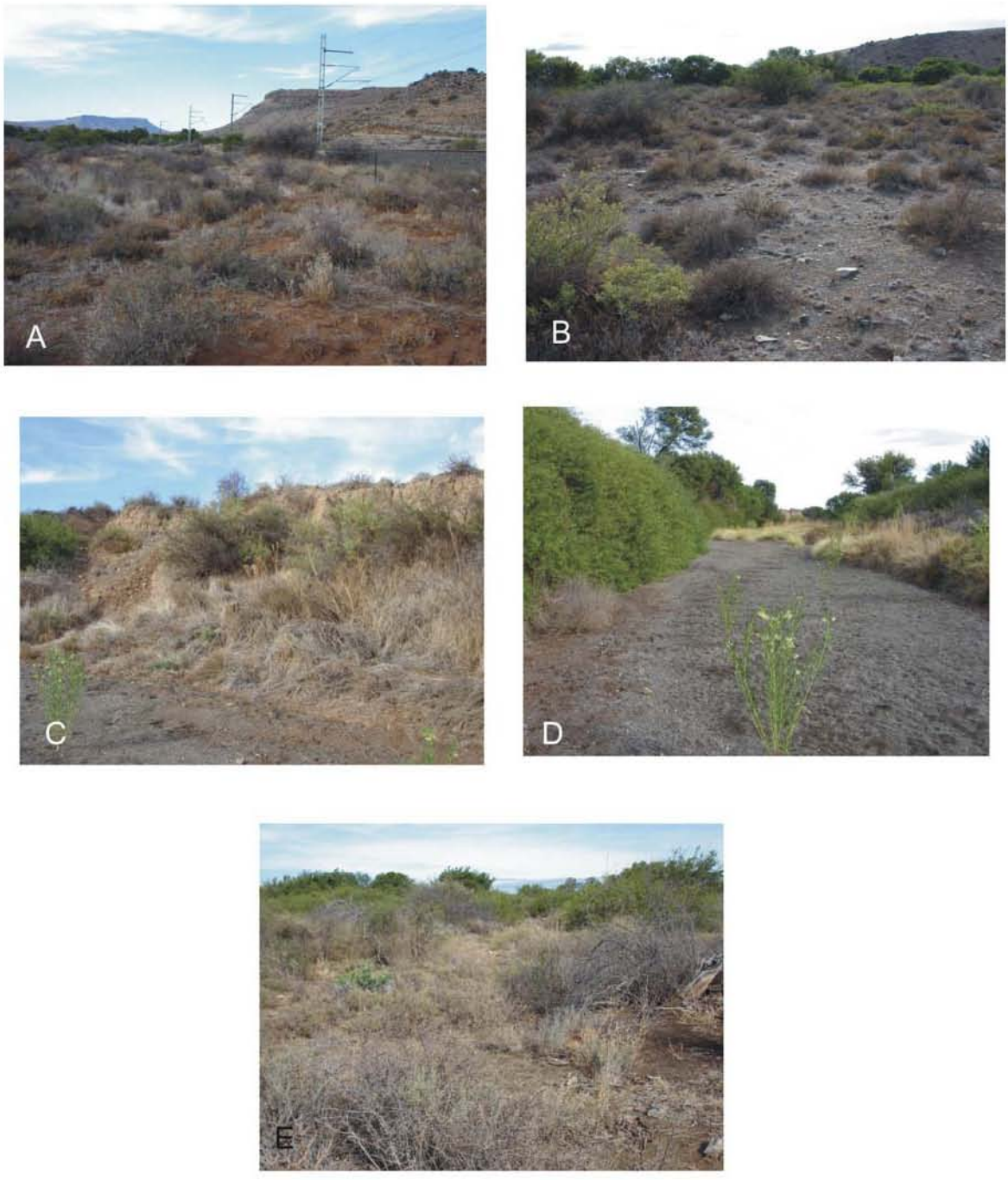
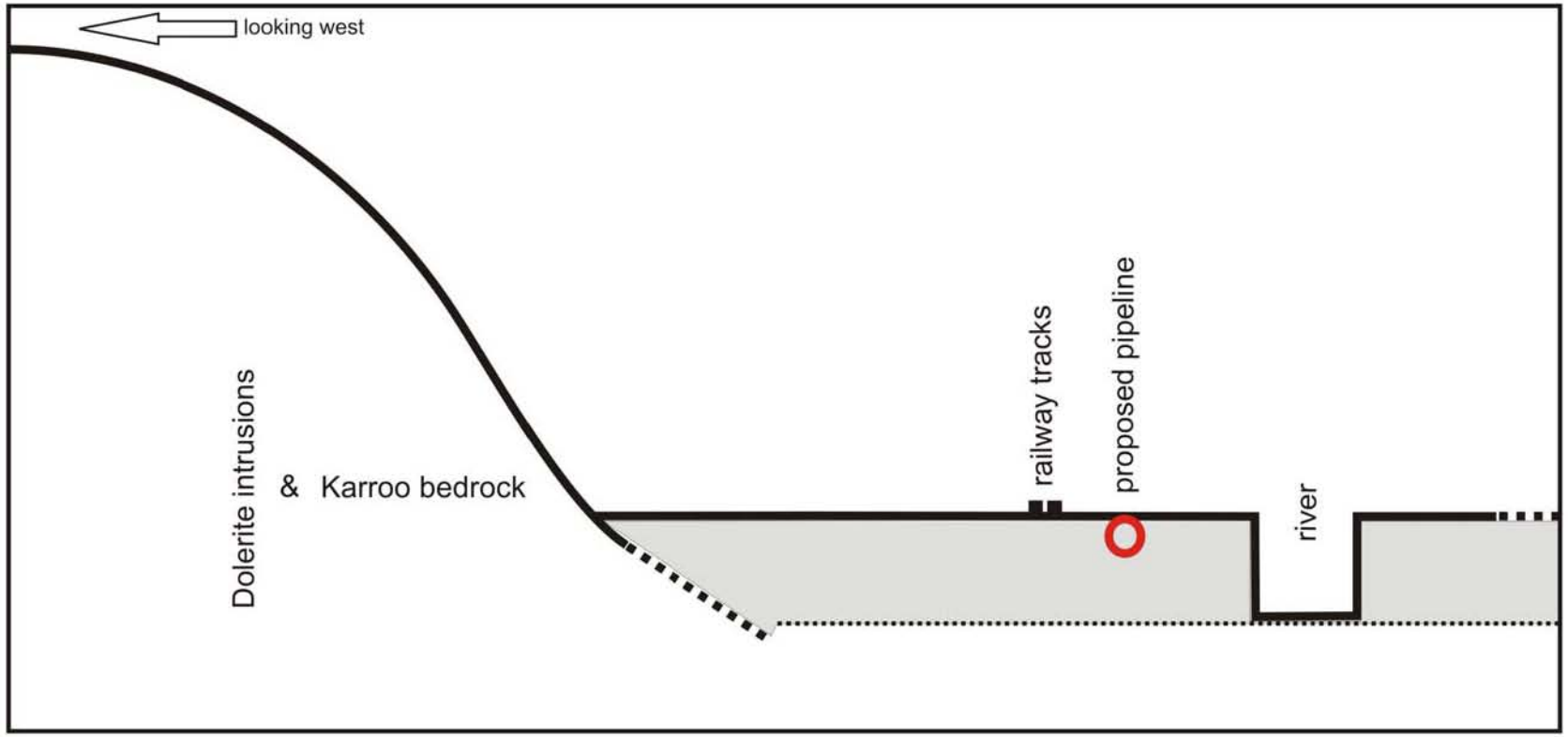


Figure 5. Reference point C4 to C5. River entry point, looking southwest towards railway track (A); Kambro River terrace (B); Exposed profile of the Kambro River (D); northern terminal point (E).

Figure 6. Diagrammatic section of the position of the proposed pipeline, looking north (not to scale).



Unconsolidated Quaternary sediments comprising alluvial sands and silts and strongly structured clayey, alkaline soils occur proximal to the river. Colluvial deposits consisting of partly cemented clastic rocks (igneous and sedimentary), are exposed further away from the modern drainage area and closer to the dolerite koppies west of the railway line

Figure 7. Colluvial sediments exposed by railway cuttings show calcrete-cemented clastic rubble deposits that occur as terrace remnants approximately 10m above the current riverbed.

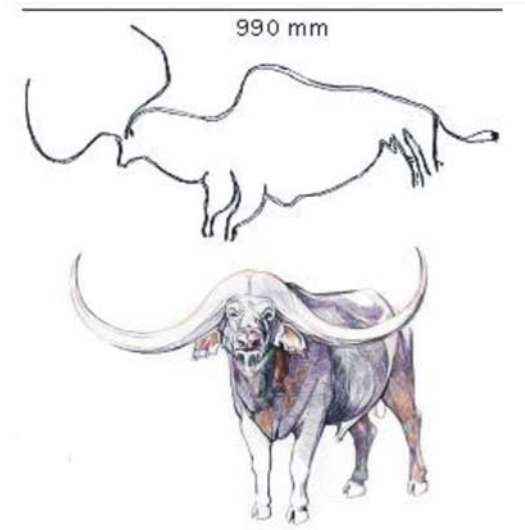


Figure 8. Engraving of extinct buffalo (top) and artist's impression of *H. antiquus* (bottom).