

Phase 1 Heritage Impact Assessment of the National  
Route 5 Section 1 between Harrismith and Kestell, FS  
Province.

Lloyd Rossouw  
National Museum, PO Box 266,  
Bloemfontein



## Executive Summary

- A Phase 1 Heritage Impact Assessment was carried out along National Route 5 (N5) Section 1 situated between the Harrismith interchange and Kestell. The section is earmarked for rehabilitation by SANRAL.
- A foot survey suggests little evidence of Stone Age archaeological material, capped or distributed as surface scatters on the landscape.
- There is no indication for the accumulation and preservation of intact fossil material within the Quaternary sediments (alluvium and topsoils) covering the underlying sedimentary rocks.
- Impact on potential *in situ* archaeological material, prehistoric structures, historical structures older than 60 years, rock art sites or graves in the affected area is considered unlikely.
- There are no major archaeological or palaeontological grounds to suspend the proposed development. However, outcrops of Adelaide and Tarkastad Subgroup sediments may well be of palaeontological interest where existing road cuttings occur. It is advised that newly uncovered fossil material found during the course of excavations into intact sedimentary bedrock along the footprint must be reported to SAHRHA and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

## Introduction

At the request of Terraworks Environmental Consultants, a Phase 1 Heritage Impact Assessment was carried out along National Route 5 (N5) Section 1 situated between the Harrismith interchange and Kestell (**Fig. 1**). The section is earmarked for rehabilitation by SANRAL. The survey is required as a prerequisite for new development in terms of Section 38 (1) of the National Heritage Resources Act 25 of 1999. A site visit and subsequent assessment took place in May 2012. 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.

## Description of the Affected Area

### Details of area surveyed

#### Locality data

N5 Section 1 lies between the Harrismith interchange and Kestell, situated in the Local Municipal area of Maluti A Phofung in the Free State. Section 1 is 46.20 km in distance and crosses four notable rivers (**Fig. 2**). The surrounding land use along the section is predominantly agricultural in nature (**Fig. 3**). The rehabilitation will remain mainly within the existing road reserve except for a delineation change at one of the bridge sites crossing the Elands River. The road reserve along this section varies from 40 meters to 80 meters in width. No borrow pits were assessed during the survey.

In addition to improvements to existing pavement, major alterations will include:

- Adding of a passing lane at the Nuwejaarsspruit River bridge;
- Re-alignment at the Elands River Bridge
- New intersection construction at N5/R74;

Alternatives were considered at the Elands River bridge area and included four options, namely to

- Re-construct the existing bridge by widening the bridge;
- Re-align the road by constructing a new bridge of which option 1 of three options has been determined as the preferred option (**Fig. 4**).

### Route co-ordinates

Start: 28°16'59.36"S, 29°06'58.24"E

Middle: 28°16'35.13"S, 28°54'43.04"E

End: 28°18'16.53"S, 28°42'28.52"E

### **Geology**

The geology of the region has been described by Johnson and Verster (1994). The survey area is situated within the Beaufort Group (Karoo Supergroup), which is primarily represented by late Permian and Early Triassic sandstones and mudstone layers. Sedimentary rocks underlying the survey area belong to fossil – bearing sandstones, shales and mudstones of the Adelaide and Tarkastad Subgroups (Beaufort Group, Karoo Supergroup) (**Fig. 5 and 6**). Jurassic-age dolerite intrusions, in the form of sills and dykes, occur extensively in the area. The igneous dolerites are not fossiliferous and can be excluded from further consideration in the present assessment.

The sedimentary rocks form the base on which younger, superficial deposits of Quaternary age have been deposited (Partridge & Maud 2000). The Quaternary deposits are made up of unconsolidated soils, alluvial sediments and colluvial deposits. The modern substrate is comprised of red, yellow and grayish soils of varying depth.

### **Regional Palaeontology and Archaeology**

The palaeontological and archaeological footprint of the region is illustrated in **Fig 7**. The Karoo geological strata underlying Section 1 are generally accepted to be Late Permian to Early Triassic in age, which are assigned to the *Dicynodon* and overlying *Lystrosaurus* Assemblage Zones (Kitching 1977; 1995) (**Fig. 8**). 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. Plant fossils (*Dadoxylon*, *Glossopteris*) and trace fossils (arthropod trails, worm burrows) are also present. The sediments assigned to the *Dicynodon* AZ are associated with stream deposits consisting of floodplain mudstones and subordinate, lenticular channel sandstones. The vertebrate fossils of the *Lystrosaurus* Assemblage Zone are primarily found in the mudrock sequences between channel sandstones. Fossils are frequently preserved as articulated skeletons within well-defined blue-grey

or red-brown calcareous nodules. Burrow casts have been described from several localities within the biozone (Groenewald, 1991).

There are currently no records of Quaternary-age fossils, which are assigned to the Pleistocene Period, from alluvial sediments in the vicinity of the footprint.

Surface scatters of Later Stone Age and Middle Stone Age artefacts are frequent archaeological components along erosional gullies of rivers and streams of the southern Highveld. The incidence of surface scatters usually decreases away from localized areas such as riverine sites and dolerite-shale contact zones. Stone Age artefacts generally occur as contextually derived individual finds in the open veld.

Stone enclosures found on and around dolerite koppies along the Wilge and Elands River valleys 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 in the region at Beginsel, Weltevreden, Israel, Bakers Kop and Elandsrivierkop

A known historical site in the region is the Battle of Groenkop (Battle of Tweefontein) locality where a Boer commando surprised and defeated a force of the British Imperial Yeomanry in 1901 during the Anglo Boer War. A memorial monument has been erected on the top of Groenkop Situated between Bethlehem and Kestell.

## **Methodology**

A survey by vehicle and foot was conducted along both sides of the road reserve. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera, were used to record relevant data. Relevant archaeological and palaeontological information were assimilated for the report and integrated with data acquired during the on-site inspection.

## **Results of Survey**

Results are summarized in **Table 1**. Impact as a result of improvements to the existing pavement along Section 1 will mostly be constricted to moderately disturbed Quaternary sediments covering the road reserve (**Fig. 9**).

- Construction of a new intersection at the N5/R74 junction will affect moderately disturbed Quaternary sediments and recent topsoils (**Fig. 10**).
- Construction of an additional passing lane at the Nuwejaarsspruit River bridge (**Fig. 11**), and the re-alignment at the Elands River Bridge (preferred Option 1) (**Fig. 12**) will affect sedimentary bedrock, intact alluvial sediments (Quaternary) and recent topsoils.

Investigation of exposed topsoils suggests little evidence of Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There is also no indication for the accumulation and preservation of intact fossil material within the Quaternary sediments covering the underlying sedimentary rocks. No graves or graveyards were recorded. Historical buildings or structures older than 60 years are absent along the footprint. Impact on potential *in situ* archaeological material, prehistoric structures, historical structures, rock engravings or graves in the affected area is considered unlikely.

### **Statement of Significance and Recommendations**

The area demarcated for development has been suitably recorded, mapped and documented in accordance with the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999).

There are no major palaeontological grounds to suspend the proposed development. However, outcrops of Adelaide and Tarkastad Subgroup sediments may well be of palaeontological interest where existing road cuttings occur or should bedrock excavations be required. It is advised that newly uncovered fossil material found during the course of excavations into intact sedimentary bedrock along the footprint must be reported to SAHRHA and that possible intact finds may require a Phase 2 rescue operation at the cost of the developer.

There are no major archaeological grounds to suspend the proposed development, because there is no evidence of building structures, material or localities of cultural significance or intact archaeological sites within the confines of the footprint.

### **References**

Groenewald, G.H., 1991. Burrow casts from the Lystrosaurus- Procolophon Assemblage Zone, Karoo Sequence, South Africa. *Koedoe*, 34, p. 13-22.

- Groenewald G.H. and J.W. Kitching J.W. 1995 Biostratigraphy of the Lystrosaurus Assemblage Zone **In**. Rubidge, B. S. (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.
- Johnson, M.R. and Verster, P.S.J. 1994. Die Geologie van die gebied Harrismith. Geological Survey. Pretoria.
- 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.
- 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.
- Partridge, T.C. & Maud, R.R. 2000. *The Cenozoic of Southern Africa*. Oxford Monographs on Geology and Geophysics No. 40.
- Rubidge, B.S. 1995. (ed) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.

Table 1. Summary of results.

<b>Activity</b>	<b>Affected Strata</b>	<b>Archaeological Impact</b>	<b>Palaeontological Impact</b>	<b>Archaeological Significance</b>	<b>Palaeontological Significance</b>
Improvements to existing pavement	Residual deposits (Quaternary to Recent);	Low	Low	Low	Low
Adding of a passing lane at the Nuwejaarspruit River bridge	Alluvium (Quaternary to Recent); Adelaide Subgroup	Low	Low  Low	Low	Low  Moderate
New intersection construction at N5/R74;	Residual deposits (Quaternary to Recent);	Low	Low	Low	Low
Re-alignment at the Elands River Bridge	Alluvium (Quaternary to Recent); Tarkastad Subgroup	Low	Low  Moderate	Low	Low  Moderate

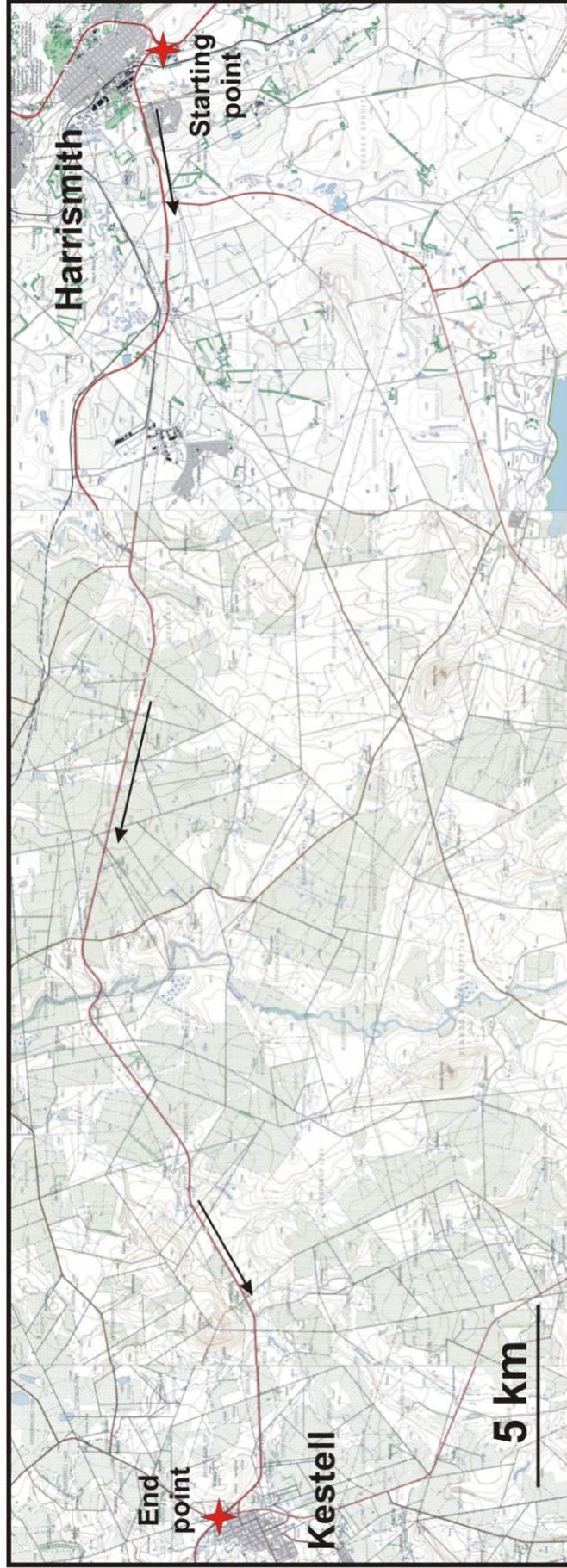
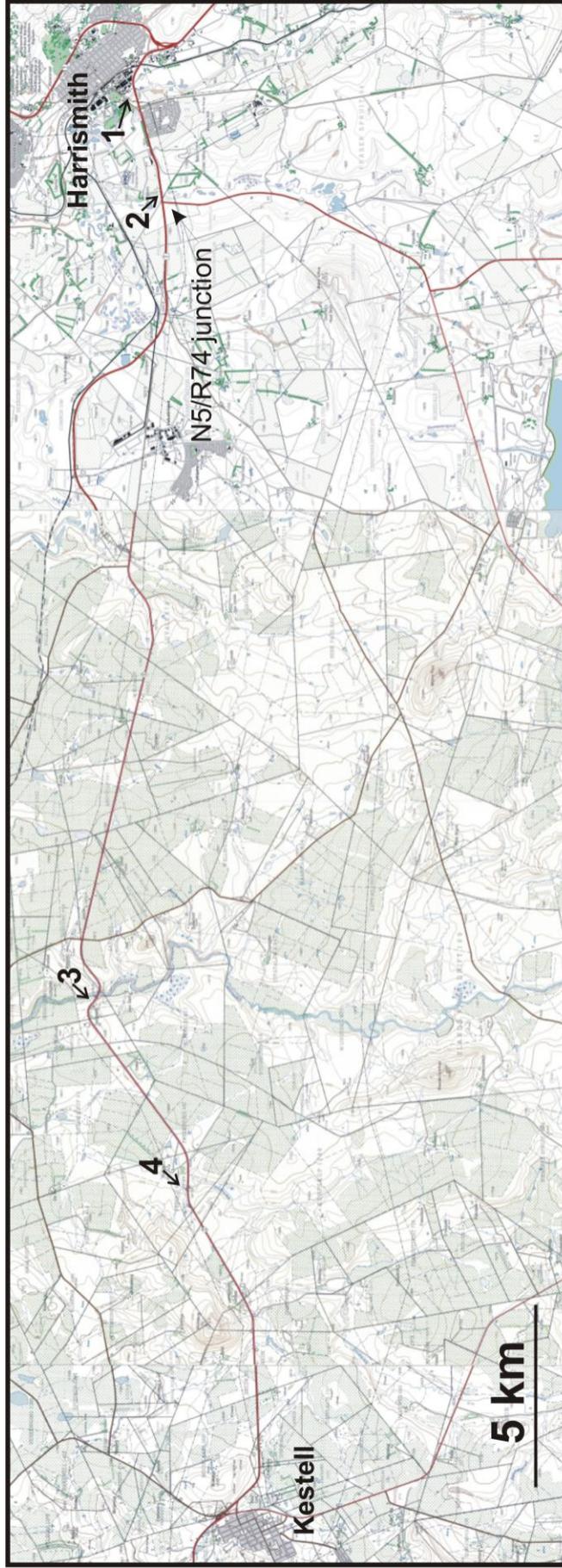


Figure 1. Locality map of the study area (portion of 1 : 50 000 topographical maps 2828BC Kestell, 2828BD Korfskop and 2829AC Harrismith).



- 1 Wilge River
- 2 Nuwejaarspruit
- 3 Elands River
- 4 Klerkpruit

Figure 2. Major points of interest along the route. (portion of 1 : 50 000 topographical maps 2828BC Kestell, 2828BD Korfskop and 2829AC Harrismith).

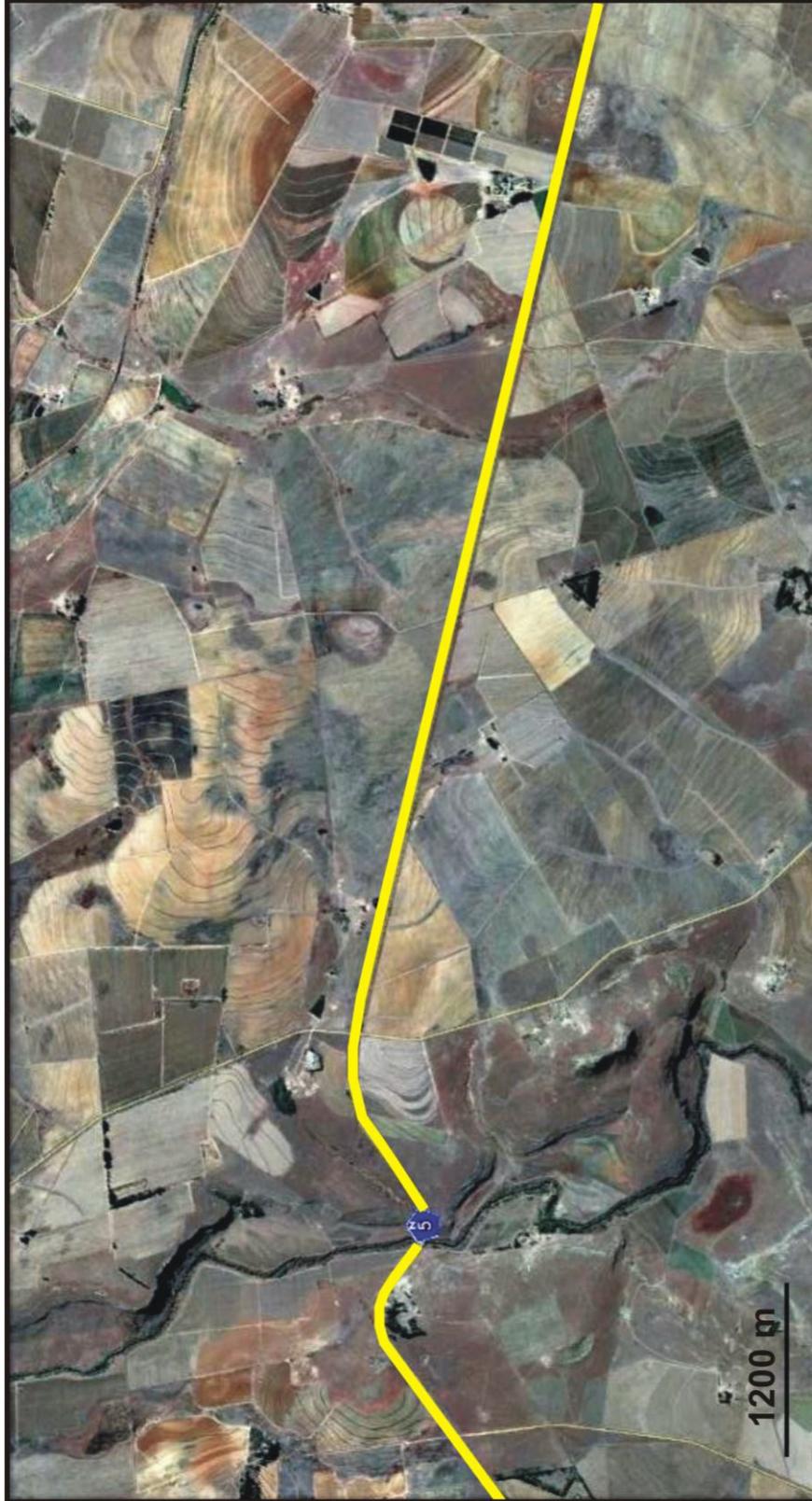


Figure 3. Aerial photograph of a segment of the route between  $28^{\circ}17'10.20''\text{S}$   $28^{\circ}57'41.00''\text{E}$  and  $28^{\circ}16'39.25''\text{S}$   $28^{\circ}50'35.48''\text{E}$  showing that land use along the section is predominantly agricultural in nature.

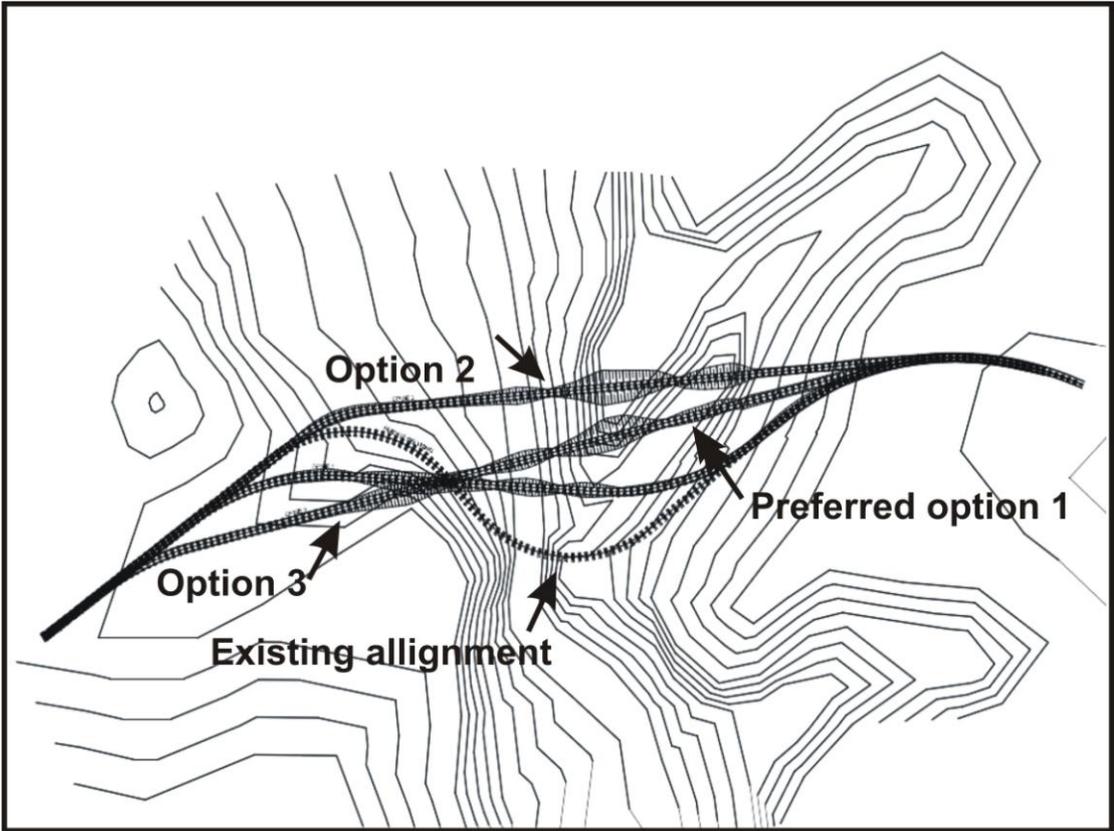


Figure 4. Alternatives for re-alignment at the Elands River Bridge.

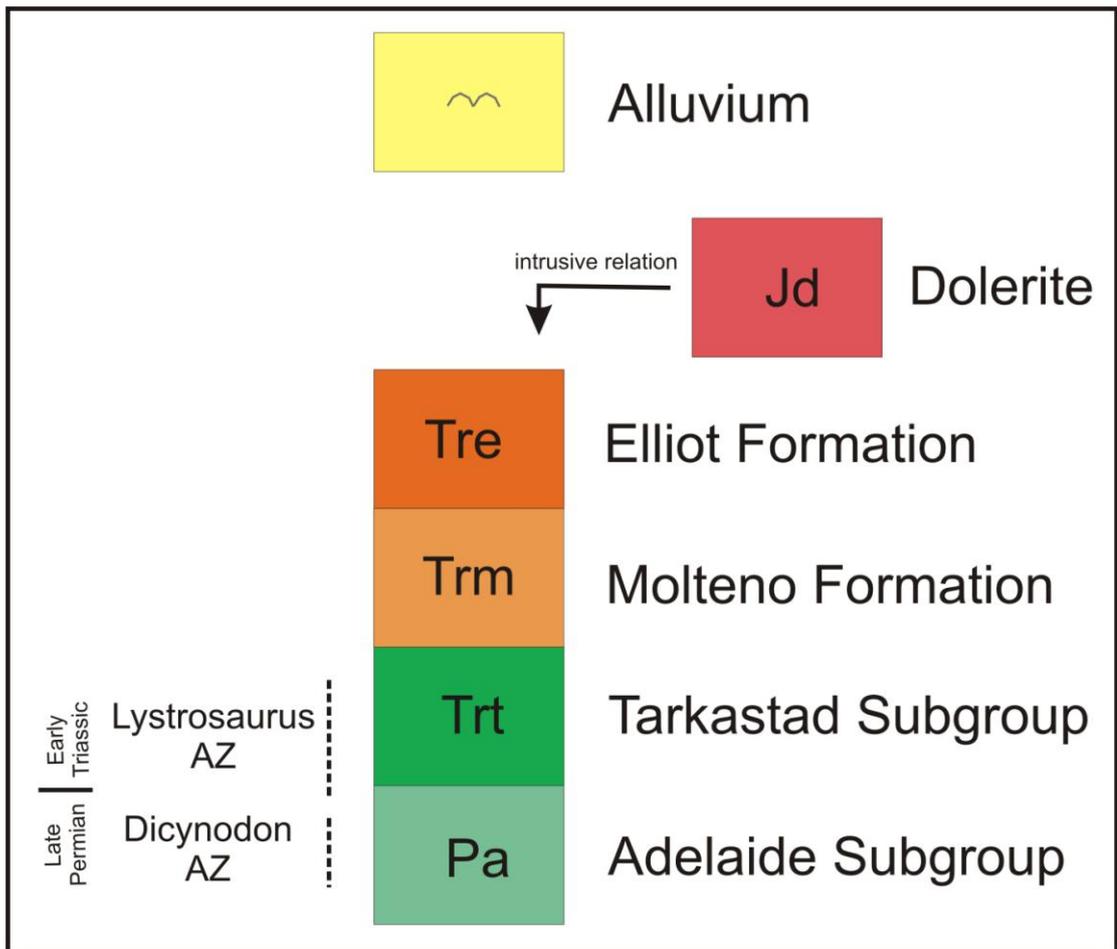


Figure 5. Schematic representation of the geology in the affected area.

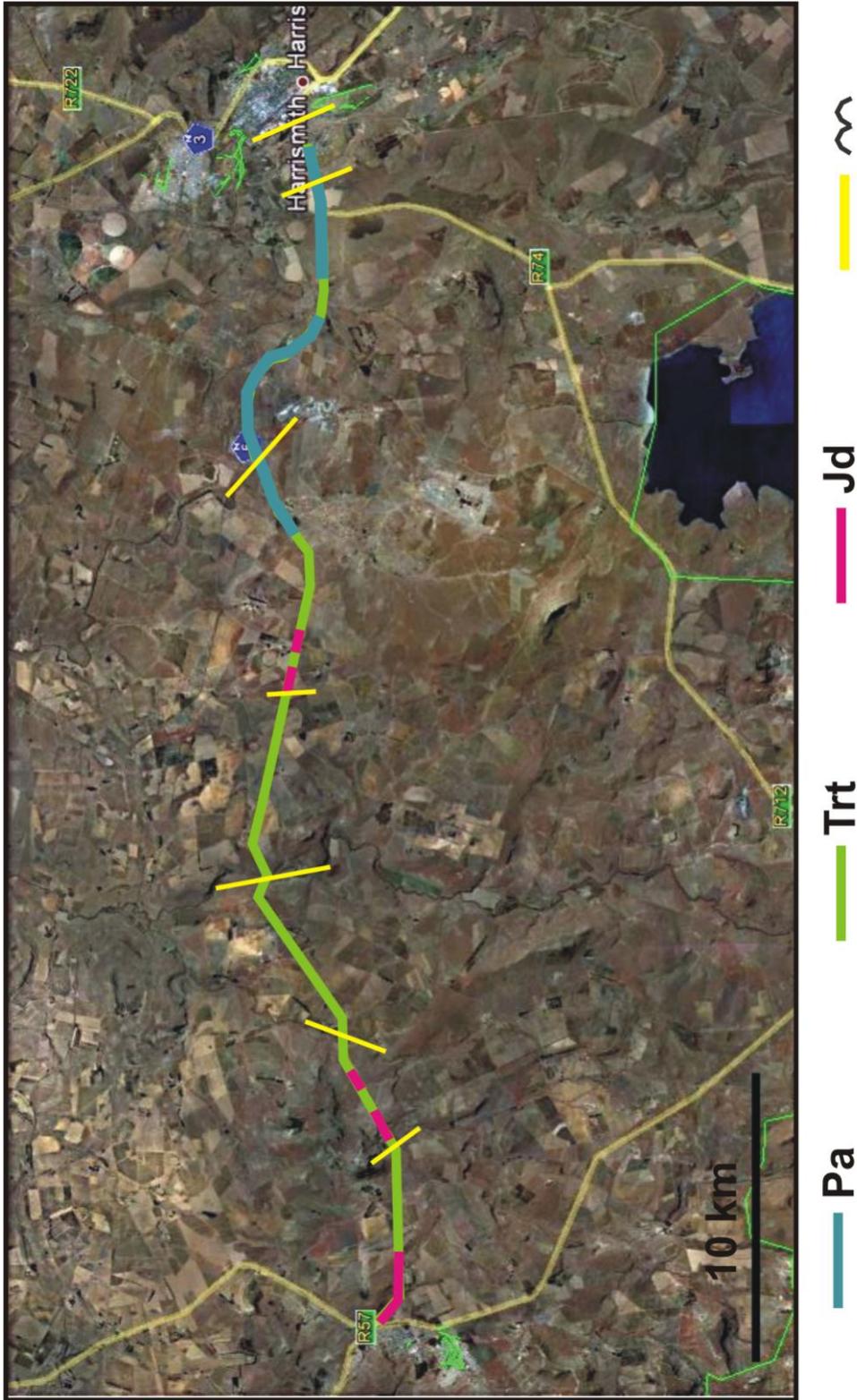


Figure 6. Aerial photograph showing the relative distribution of geological strata along Section 1.



Battlefield Site
  Iron Age Settlement
  Karoo Fossil Locality

Figure 7. Portion of 1:250 000 topographic map showing distribution of palaeontological and archaeological localities in the vicinity of Section 1.

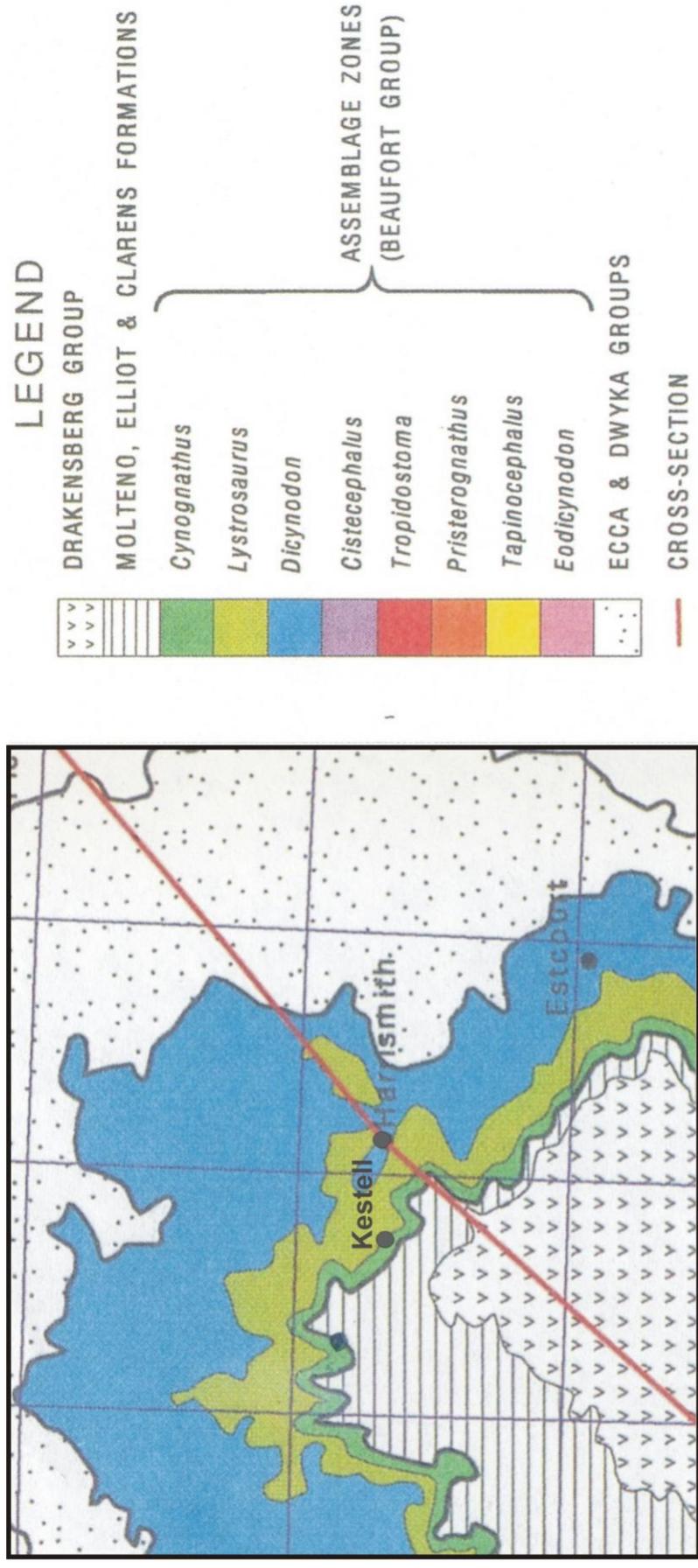


Figure 8. Geographic distribution of the vertebrate biozones of the Beaufort Group around the study area (Rubidge 1995)



Figure 9. Improvements to the existing pavement along Section 1 will largely affect moderately disturbed Quaternary sediments covering the road reserves.



Figure 10. Construction of a new intersection at the N5/R74 junction will affect moderately disturbed Quaternary sediments and recent topsoils



Figure 11. The Nuwejaarsspruit River bridge. Construction of an additional passing lane will affect sedimentary bedrock, intact alluvial sediments (Quaternary) and recent topsoils.



Figure 12. The Elands River bridge. Re-alignment of the bridge (preferred Option 1) will affect sedimentary bedrock, intact alluvial sediments (Quaternary) and recent topsoils.