HERITAGE IMPACT ASSESSMENT
SCOPING REPORT

PROPOSED CAPACITY IMPROVEMENTS TO NATIONAL ROUTE 1, SECTION 16
WINBURG STATION (km 89,8) and VENTERSBURG (KM 133,53)
LEJWELEPUTSWA DISTRICT MUNICIPALITY,
FREE STATE PROVINCE

Report prepared for:

ENVIROMATRIX Environmental Services Consultants
P O Box 2580
BETHLEHEM
9700

Report prepared by:

eThembeni Cultural Heritage
P O Box 20057
ASHBURTON
3213

16 October 2019

Executive Summary

eThembeni Cultural Heritage was appointed by ENVIROMATRIX Environmental Management Services to undertake a Heritage Impact Scoping of the proposed capacity improvements to National Route 1 (N1) between Winburg Station (km 89,8) and Ventersburg (km 133,53). This as required by the National Environmental Management Act 107 of 1998 (NEMA), as amended; and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), as amended.

Assessment of development impact

The proposed upgrading of Section 16 of the N1 between Ventersburg and Winburg will have a low impact on heritage resources if the proposed mitigation measures in Section 3, below are adhered to.

Recommended mitigation measures

Archaeological sites

The eastern edge of the Late Iron Age (LIA) stone-walled site illustrated in Figure 11 currently lies some 50m west of the current N1 median and 30 m from the edge of the road reserve fence. In order to protect the integrity of this site this buffer distance should be maintained as far as possible. Road widening should be considered westwards of the current alignment.

The LIA site located on the same axis some 200m west of the N1 median should be avoided entirely as a stock-pile area, plant park area, or the establishment of a construction camp.

These archaeological features have **High** heritage significance and may not be altered or impacted on without approved mitigation measures prescribed in a permit and protocols from SAHRA.

Palaeontological deposits

During the laying of the road bedding for the proposed project it is recommended that non- fossiliferous rocks are used (e.g. dolerite / berg-gruis etc.) as a foundation fill for tar/concrete mix, and that if local rocks are being sourced for this purpose then it is suggested that the quarrying of fossiliferous bedrock be avoided if possible. If sandstone, mudstone or shale is locally quarried for use in the new development, it is very likely to contain fossil material, and this will require monitoring by a professional palaeontologist.

Graves and cemeteries

All graves have **High** heritage significance and may not be altered or removed without a permit and stringent protocols issued by SAHRA.

All identified graves and cemeteries within 50m of the expanded alignment must be securely fenced with minimally, steel fence posts and 5 strands of barbed wire. During construction these should be draped with ski-netting.

Should road design predicate that any graves should be relocated such will have to be done by an ASAPA accredited grave specialist under a permit and protocols issued by SAHRA under a separate Phase 2 mitigation programme.

Public Monuments and Memorials

Although no direct impact on the Sand River Convention Monument itself is envisaged, widening of the road will impinge on the current circular access and layout of the memorial site. At the design phase, SANRAL and its agents should negotiate with FSPHRA and SAHRA to design an access route to the site, off the N1, compatible with national road standards and safety requirements. Die Erfenisstigting should also be consulted in this regard.

Recommended monitoring

None

CONCLUSION

We recommend that the development proceed with the proposed heritage mitigations being part of the anticipated Record of Decision (R.o.D); and will submit this report electronically via SAHRIS[1] to SAHRA[2], in fulfilment of the requirements of the National Heritage Resources Act (NHRA).

If permission is granted for development to proceed, the client is reminded that the NHRA requires that a developer cease all work immediately and adhere to the protocol described in Section 7 of this report should any heritage resources, as defined in the Act, be discovered during the course of development activities.

[1] SAHRIS – South African Heritage Resources Inventory System

[2] SAHRA – South African Heritage Resources Agency as established in terms of the National Heritage Resources Act, 25 of 1999 (NHRA), as amended.

INDEPENDENT HERITAGE SPECIALIST

Consultant:	eThembeni Cultural Heritage
Contact person:	Leonard van Schalkwyk
Physical address:	7 Dely Crescent, Ashburton
Postal address:	PO Box 20057, Ashburton, 3213
Telephone:	0826559077 Fax: 086 672 8557
Email	thembeni@iafrica.com

DECLARATION OF INDEPENDENCE

I, Leonard van Schalkwyk, declare that I act as the independent specialist in this application.
I will perform the work relating to the application in an objective manner even if this results in views and findings that are not favourable to the applicant.
I declare that there are no circumstances that may compromise my objectivity in performing such work. I have no, and will not engage in, conflicting interests in the undertaking of the activity. I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.

Signed: Date: 16 October 2019

Introduction

The South African National Roads Agency SOC Limited (SANRAL) is responsible for improving, managing and maintaining the network of national roads which act as the "economic arteries" of South Africa. Sections of the N1 are operating at full capacity and traffic studies indicate a need to upgrade them to accommodate future growth and improve road safety.

eThembeni Cultural Heritage was appointed by ENVIROMATRIX Environmental Management Services to undertake a Heritage Impact Scoping of the proposed capacity improvements to National Route 1 (N1) Section 16, between Winburg Station (km 89,8) and Ventersburg (km 133,53). This in terms of a BAR, as required by the National Environmental Management Act 107 of 1998 (NEMA), as amended; and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 as amended (NHRA).

Scope of work

Proposed upgrades will include:

- constructing a new carriageway,
- increasing the road reserve width from 32 m to 80 m,
- strengthening the existing pavement,
- vertical and horizontal geometric improvements,
- lengthening existing minor and major structures,
- constructing new road-over-river bridges,
- developing new borrow pits and possible quarries.

ENVIROMATRIX required that information must be provided on the following:

- Results of an overview survey of the study area and the identification of heritage resources that may be affected by the proposed infrastructure or which may affect the construction and operation of the proposed infrastructure.
- Recommendations on alternatives where additional alternatives could be identified to avoid negative impacts.
- Recommended mitigation measures for enhancing positive impacts and avoiding or minimizing negative impacts and risks (to be implemented during design, construction and operation).
- Formulation of a protocol or heritage management plan to be followed for the identification, protection or recovery of cultural heritage resources during construction and operation.
- The early identification of any red flag and fatal flaw issues or impacts.
- Address any other sensitivities and important issues from a specialist perspective that are not identified in these terms of reference.

Methodology

Appendix 2 describes the methodology employed for this project, which included drive/walkovers of proposed development areas on 30-31 July 2019, and a desktop study. Appendix 3 also includes heritage resource significance assessment criteria; development impact assessment criteria; and the assumptions and limitations associated with this project and report.

1. PROJECT LOCATION AND ENVIRONMENTAL DESCRIPTION

The proposed upgrading of National Route 1 (Section 16) lies between Winburg Station (km 89,8) and Ventersburg (km 133,53) in the Lejweleputswa District Municipality in the province of the Free State. Section 16 is well maintained, in good condition and fenced.

The coordinates of the start of the project are 28° 27.842'S; 27° 1.960'E, and those of the end of the project are 28° 5.381'S; 27° 8.406'E (Figure 1). See kml. loaded to SAHRIS Case File.

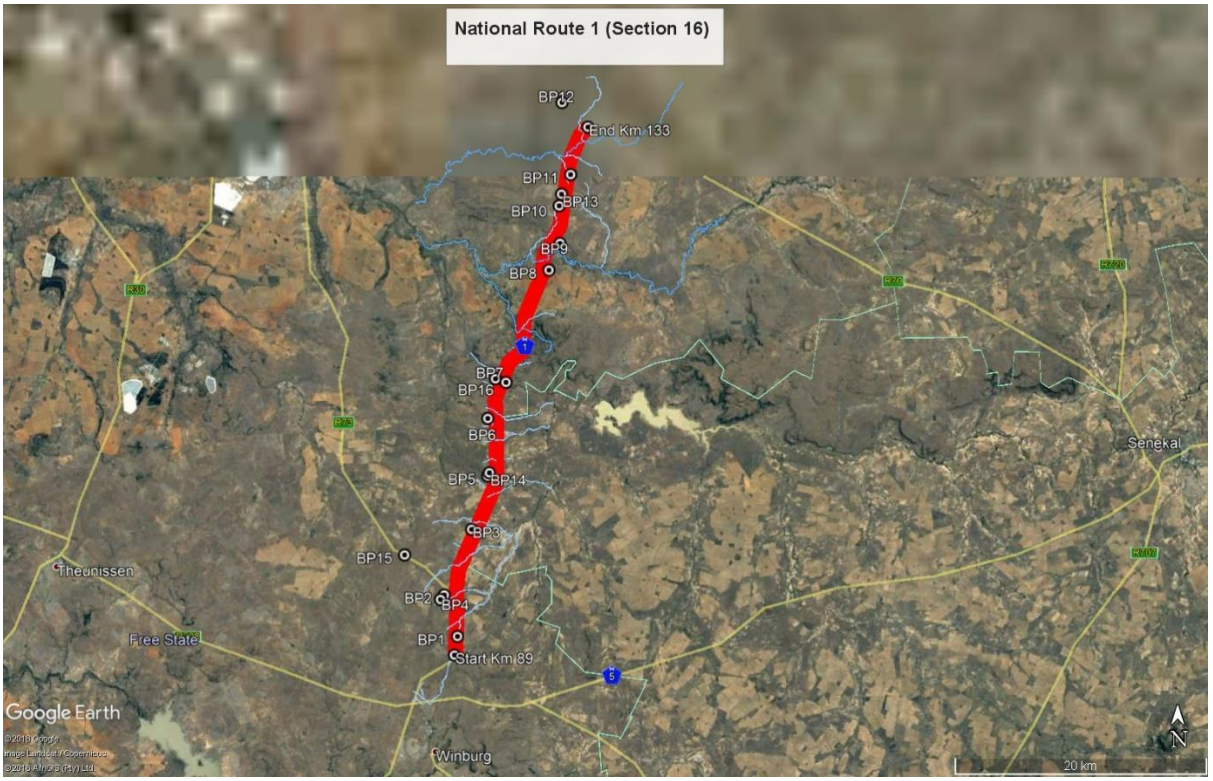


Figure 1 **National Route 1 (Section 16) (source: Google Earth).**

The geology of the study area grades from the Adelaide sub-group of the Beaufort Formation to extensive intrusive Karoo dolerite sills and dykes. The Adelaide sub-group lithology is of high palaeontological significance and consequently a palaeontology scoping report has been commissioned.[3]

The overall region consists largely of farmland and open veld with woody vegetation confined to the dolerite inselbergs (koppies), sills and dykes; or around established farmsteads. The prevailing vegetation type is Central Free State Grassland and Winburg Grassy Shrubland.[4]

[3] See Appendix 1. Trower, G. Palaeontology Impact Assessment Report. 10 September 2019.

[4] Mucina, L. & Rutherford, M.C. 2012. Vegetation map for South Africa, Lesotho and Swaziland. SANBI. Pretoria.

Figures. 2 & 3 - National Route 1 (Section 16) – Typical landscape views along N1 study area.

Figure 2

Figure 3

2. DESCRIPTION AND SIGNIFICANCE OF HERITAGE RESOURCES

No development activities associated with the proposed project had begun at the time of our visits. Table 1 summarises the heritage resource types assessed, and our observations.

Table 1 Heritage resources types assessed.

Heritage resource type	Observation
Places, buildings, structures and equipment	See below.
Places associated with oral traditions or living heritage	None were identified within the proposed development area.
Protected Landscapes	None were identified within the proposed development area.
Natural features	None were identified within the proposed development area.
Traditional burial places	See below
Formal graves and cemeteries	See below.
Geological / Palaeontological sites of scientific or cultural importance	See below
Archaeological sites	See below
Historical settlements and townscapes	None were identified within the proposed development area.
Public monuments and memorials	See below
Battlefields	None were identified within the proposed development area.

The N1 national route in the Free State has been constructed over the past approximately forty years. Accordingly, no infrastructure associated with the road, such as bridges, is older than sixty years and therefore generally protected in terms of the NHRA.

2.1 Places, buildings, structures and equipment

During the PIA survey two historical stone structures were observed on the western side of the highway, less than 50 m from the N1 at **28° 18' 03.06" S 27° 03' 53.14" E.**

They appeared to be foundations of some structure, although no walls were present. These may have been of mud but more likely of dressed stone that has been culled for recycling. It is, however, difficult to determine their approximate age and what purpose they served. We have rated them as having **Low** local heritage significance. They are unlikely to be affected by the increased size of the road reserve.

Figure 4 Deflated rectangular stone structures

3.1 Traditional burial places and formal graves and cemeteries

3.1.1 Some 200m to the south of the rectangular stone structures a cluster of stone packed graves without headstones was observed at **28° 18' 20.65" S 27° 03' 55.35" E**. Some of the graves are within metres of the existing road reserve and will be directly impacted by the proposed widening. All graves have **High** heritage significance and may not be altered or removed without a permit and stringent protocols issued by SAHRA.

Figure 5 Unmarked, stone packed graves

3.1.2 A small graveyard was observed at **28°21'51.80"S 27° 3'16.79"E.** It is well fenced and contains 3 visible headstones with one appearing to read: "Elliot Esau- Ohlokamette - March? See Figures 6 & 7. The graveyard lies approx. 25m from the existing N1 alignment and 2m W of proposed extension. The graveyard has **High** heritage significance and may not be altered or removed without a permit from SAHRA. Preferably the site should be buffered with a sturdy fence. However, construction activities in its vicinity may negatively impact on the graves and exhumation and relocation may have to be considered, following prescribed protocols by SAHRA.

Figure 6 **Figure 7**

3.1.3 A graveyard was observed at the Eittel turn off, at road marker N1 -16X, **28°20'28.86"S 27° 3'57.84"E**. These graves are less than 50m from the existing road reserve. (Figures 8 & 9).

Figure 8 **Figure 9**

The graveyard has **High** heritage significance and may not be altered or removed without a permit from SAHRA. Preferably the site should be buffered with a sturdy fence. However, construction activities in its vicinity may negatively impact on the graves and exhumation and relocation may have to be considered, following prescribed protocols by SAHRA.

3.2 Geological / Palaeontological sites of scientific or cultural importance

Only two pieces of petrified wood were observed on the surface during the ground surveys. The fossils were out of context and consequently of little value to palaeontologists (see Figure 10).

Figure 10

Very little fossil material was found during the survey and very little Adelaide Subgroup rock was observed exposed at the surface immediately adjacent to the road. Most of the road cuttings were observed as being into dolerite. Consequently, no further palaeontological assessment is required. (But, see **5.1.2**, below).

3.3 Archaeological sites

Several stone-walled archaeological features occur on top of some of the hills in the study area are especially well-preserved in the hills of the nearby Willem Pretorius Game Reserve. The stone-walling occurs on the tops of hills in the region and stretches over several kilometres.

A large settlement was observed within the project footprint where the road cuts through one such occurrence at coordinates **28° 15' 18.84" S 27° 04' 39.66" E**. (Figure 11). The circular stone-walled features represent an early Sotho archaeological village comprising of houses with courtyards and probably livestock pens and are associated with the Leghoya, some of the first Sesotho-speaking groups to settle in the area in the late 16th C [5,6].

A second site lies to the east of the N1 on the same axis at **28°15'20.36"S 27° 4'49.63"E**. The latter is however some 200m beyond the current median and should not be impacted by construction activities.

These archaeological features have **High** heritage significance and may not be altered or impacted on without approved mitigation measures prescribed in a permit and protocols from SAHRA.

[5] MAGGS. T,M.0'C. 1976. *Iron* Age communities of the southern highveld. Pietermaritzburg: University of Natal Press.
[6] DREYER, J.J.B. 1992. The Iron Age Archaeology of Doornpoort, Winburg, Orange Free State. Navorsinge van die Nasionale Museum, Bloemfontein, Vol.8(7):262- 390.

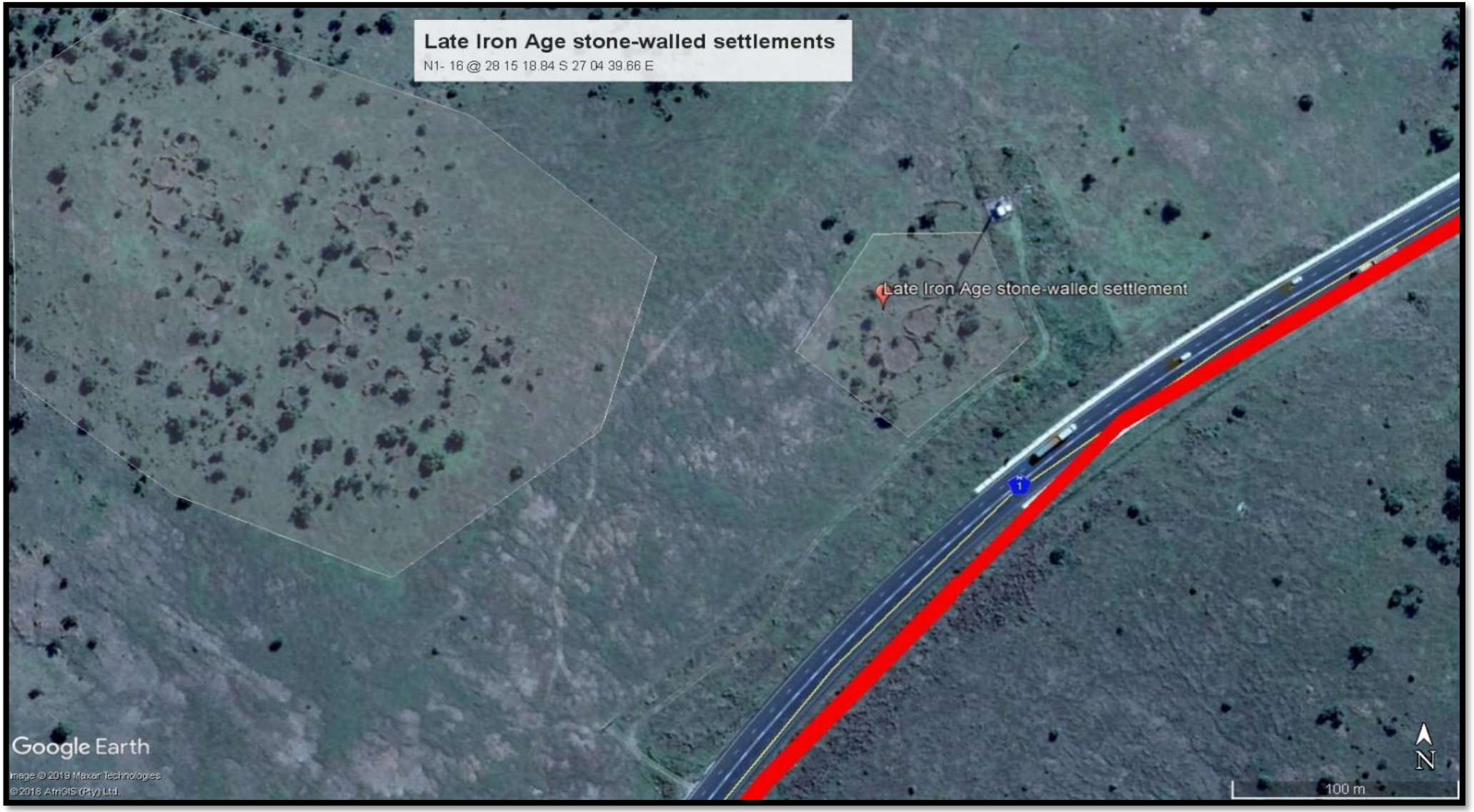

Late Iron Age stone-walled settlements
N1- 16 @ 28 15 18.84 S 27 04 39.66 E
Late Iron Age stone-walled settlement
Google Earth
Image © 2019 Maxar Technologies
©2018 AfriGIS (Pty) Ltd.
N
100 m

Figure 11

3.4 Public Monuments and Memorials

The Sand River Convention Monument commemorates the signing of a convention on the 17th January 1852 whereby the British Colonial Government in South Africa formally recognised the independence of the Boers north of the Vaal River. It was the contravention of this treaty by the British that led to the First Boer War of 1877.

Figures 12-14 taken at and around the Memorial access and site.

Figure 12

The monument is located at 28°13.898'S; 27°05.341'E, some 80 m (eighty) to the East of the current N1 road-shoulder. Proposed widening of the road would impact on the circular access road to the monument, but not on the monument location itself.

Figure 13

Figure 14

Recommended Mitigation Measures

3.4.1 Archaeological sites

The eastern edge of the Late Iron Age (LIA) stone-walled site illustrated in Figure 11 currently lies some 50m west of the current N1 median and 30 m from the edge of the road reserve fence. In order to protect the integrity of this site this buffer distance should be maintained as far as possible. Road widening should be considered westwards of the current alignment.

The LIA site located on the same axis some 200m west of the N1 median should be avoided entirely as a stock-pile area, plant park area, or the establishment of a construction camp.

3.4.2 Palaeontological deposits

During the laying of the road bedding for the proposed project it is recommended that non-fossiliferous rocks are used (e.g. dolerite / berg-gruis etc.) as a foundation fill for tar/concrete mix, and that if local rocks are being sourced for this purpose then it is suggested that the quarrying of fossiliferous bedrock be avoided if possible. If sandstone, mudstone or shale is locally quarried for use in the new development, it is very likely to contain fossil material, and this will require monitoring by a professional palaeontologist.

3.4.3 Graves and cemeteries

All identified graves and cemeteries within 50m of the expanded alignment must be securely fenced with minimally, steel fence posts and 5 strands of barbed wire. During construction these should be draped with ski-netting.

Should road design predicate that any graves should be relocated such will have to be done by an ASAPA accredited grave specialist under a permit and protocols issued by SAHRA under a separate Phase 2 mitigation programme.

3.4.4 Public Monuments and Memorials

Although no direct impact on the Sand River Convention monument itself is envisaged, widening of the road will impinge on the current circular access and layout of the memorial site. At the design phase, SANRAL and its agents should negotiate with FSPHRA and SAHRA to design an access route to the site, off the N1, compatible with national road standards and safety requirements. The Heritage Foundation (Die Erfenisstigting) should also be consulted in this regard.[7]

4 RECOMMENDED MONITORING

None

5 PROTOCOL FOR THE IDENTIFICATION, PROTECTION AND RECOVERY OF HERITAGE RESOURCES DURING CONSTRUCTION AND OPERATION

1. It is possible that sub-surface heritage resources could be encountered during the construction phase of this project. The environmental control officer and all other persons responsible for site management and excavation should be aware that indicators of sub-surface sites could include:
   - Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
   - Bone concentrations, either animal or human;
   - Ceramic fragments, including potsherds;
   - Stone concentrations that appear to be formally arranged (may indicate the presence of an underlying burial, or represent building/structural remains); and
   - Fossilised remains of fauna and flora, including trees.

2. In the event that such indicator(s) of heritage resources are identified, the following actions should be taken immediately:

   - All construction within a radius of at least 20m of the indicator should cease. This distance should be increased at the discretion of supervisory staff if heavy machinery or explosives could cause further disturbance to the suspected heritage resource.
   - This area must be marked using clearly visible means, such as barrier tape, and all personnel should be informed that it is a no-go area.
   - A guard should be appointed to enforce this no-go area if there is any possibility that it could be violated, whether intentionally or inadvertently, by construction staff or members of the public.
   - No measures should be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone or stone.

3. If a heritage practitioner has been appointed to monitor the project, s/he should be contacted, and a site inspection arranged as soon as possible.

4. If no heritage practitioner has been appointed to monitor the project, SAHRA or FSPHRA should be contacted.

5. The South African Police Services should be notified by a SAHRA/FSPHRA staff member or an independent heritage practitioner if human remains are identified. No SAPS official may disturb or exhume such remains, whether of recent origin or not.

[7] Die Erfenissentrum, Monument Hill, Eeufees Road, Groenkloof, Pretoria. PO Box 1514 GROENKLOOF 0027. Tel. (012) 325 7885 (012) 323 9050. **info@es.org.za**

6. All parties concerned should respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time.

Any extension of the project beyond its current footprint involving vegetation and/or earth clearance should be subject to prior assessment by a qualified heritage practitioner, considering all information gathered during the initial assessment.

6 CONCLUSION

We recommend that the development proceed with the proposed heritage mitigations being part of the anticipated Record of Decision (R.o.D); and will submit this report electronically via SAHRIS[8] to SAHRA[9], in fulfilment of the requirements of the National Heritage Resources Act.

If permission is granted for development to proceed, the client is reminded that the NHRA requires that a developer cease all work immediately and adhere to the protocol described in Section 7 of this report should any heritage resources, as defined in the Act, be discovered during the course of development activities.

[8] SAHRIS – South African Heritage Resources Inventory System
[9] SAHRA – South African Heritage Resources Agency as established in terms of the National Heritage Resources Act, 25 of 1999 (NHRA), as amended.

APPENDIX 1

Palaeontology Assessment Report

G. Trower – 13 September 2019

PHASE 1 PALAEONTOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED UPGRADING OF THE NATIONAL ROUTE 1 (N1) SECTION 16 BETWEEN WINDBURG STATION AND VENTERSBURG, FREE STATE

Gary Trower

P.O. Box 2878 Welkom

9460

PhD candidate (Archaeology) University of the Witwatersrand

Masters (Environmental Management) University of the Free State, 2011

Honours (Palaeontology) University of the Witwatersrand, 2008

1 September 2019

Declaration of Consultants independence

I, Gary Trower, am an independent consultant and have no business, financial, personal or other interest in the proposed development project in respect of which I was appointed to do a palaeontological assessment other than fair remuneration for work performed. There are no circumstances whatsoever that compromise the objectivity of this specialist performing such work.

Gary Trower

7 Introduction

In terms of the National Environmental Management Act 107 of 1998, and Section 38 (8) of the National Heritage Resources Act 25 of 1999 (sections 34-36), all aspects of heritage are protected. Proposed developments that are likely to impact on heritage resources (i.e. historical, archaeological, palaeontological & cosmological) require a desktop and/or field assessment to gauge the importance of such resources in order to ensure that such sites are not damaged or destroyed by the processes that threaten them. Identified heritage resources should be recorded through detailed documentation, and mitigation measures applied if resources are threatened, or collection and/or a rescue excavation carried out if necessary.

SANRAL proposes to upgrade the National Route 1 (N1) Section 16 between Winburg Station (km 89.8) and Ventersburg (km 133.53) by constructing a new carriageway that will have an increased road reserve width, going from 32m to 80m (Figure 1-3). The new road will run parallel to the existing road and will be approximately 44 km in length. It also proposes to lengthen and improve certain structures, and to build new bridges over certain rivers. Sections of the road will cross through parts of the landscape where the underlying geology could contain palaeontological material. According to the SAHRIS map summarised in Figure 5 (www.sahra.org.za/sahris/map/palaeo), portions of the property are given the highest ranking of red (highly sensitive), whereas other patches are green (moderate sensitivity), with dolerite intrusions allocated a grey ranking (zero/insignificant). Quaternary deposits can also contain fossils and artefacts from the Early to Later Stone Age, and coupled with the high palaeo-sensitivity of the Beaufort bedrock, a ground survey was conducted as part of a Phase 1 palaeontological impact assessment to locate and record any fossil material within the boundaries of the proposed development, as well as within a buffer zone surrounding the site footprint.

Figure 1: Sign showing the on-ramp onto the N1from Ventersburg, heading south

Figure 2: Photograph taken behind **N1 Bloemfontein** sign shown in Figure 1, showing the bridge crossing the N1 highway on the left of the image. As can be seen in the road cutting, fine-grained sandstone is exposed to the east and west of the highway

Figure 3: Looking south from Ventersburg, showing the on-ramp heading out of town joining up with the N1 hyighway

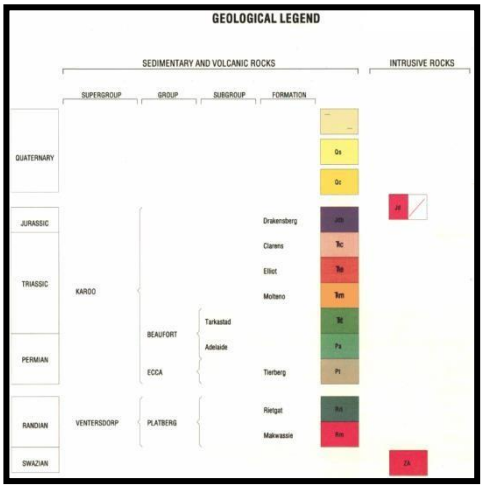
Geology

Rocks of the Karoo Basin are rich repositories for palaeontological material, necessitating measures to minimize activities which may disturb or destroy fossils preserved in underlying beds. The geology in the area of the proposed development comprises of dolerite, Quaternary deposits, and Late Permian deposits of the Beaufort Group, more specifically the Adelaide Formation. This latter sedimentary package accumulated as floodplain deposits within various drainage basins that flowed towards a giant inland sea and comprises of grey mudstone and dark grey shale, as well as siltstone and fine-grained sandstone (Figure 4). These deposits form an important component and subdivision of the stratigraphy of the Karoo Supergroup, an extensive inland basin which preserves a rich array of tetrapod fauna which

existed through the Permian and Triassic of southern Gondwana (Rubidge 2005, Smith *et al*. 1993). The existence of terrestrial, fresh water, brackish and marine ecosystems in this palaeo-landscape means that an array of important fossil fauna which existed before the Permo-Triassic extinction event may be present within this geological unit, and this is also the reason why it has a palaeo-sensitivity rating of very high (red, Figure 5). Known fossils in the area include *Zorillodontops* and a new Burnetiamorph near Verkeerdevlei (David Groenewald, pers. comm.)

Quaternary deposits are given a moderate palaeo-sensitivity rating as they can also contain fossils and artefacts from the Early to Later Stone Age, and alluvial deposits with an alkaline chemistry are the sediments most likely to yield fossil material.

Figure 4: Map showing the geology of the region, with the site footprint crossing over dolerite, 2 types of Quaternary deposits, and the Adelaide Formation of the Beaufort Group, a geological unit with high sensitivity. Modified from 2826 Winburg, 1:250 000 Geological Series, Geological Survey, 1981)



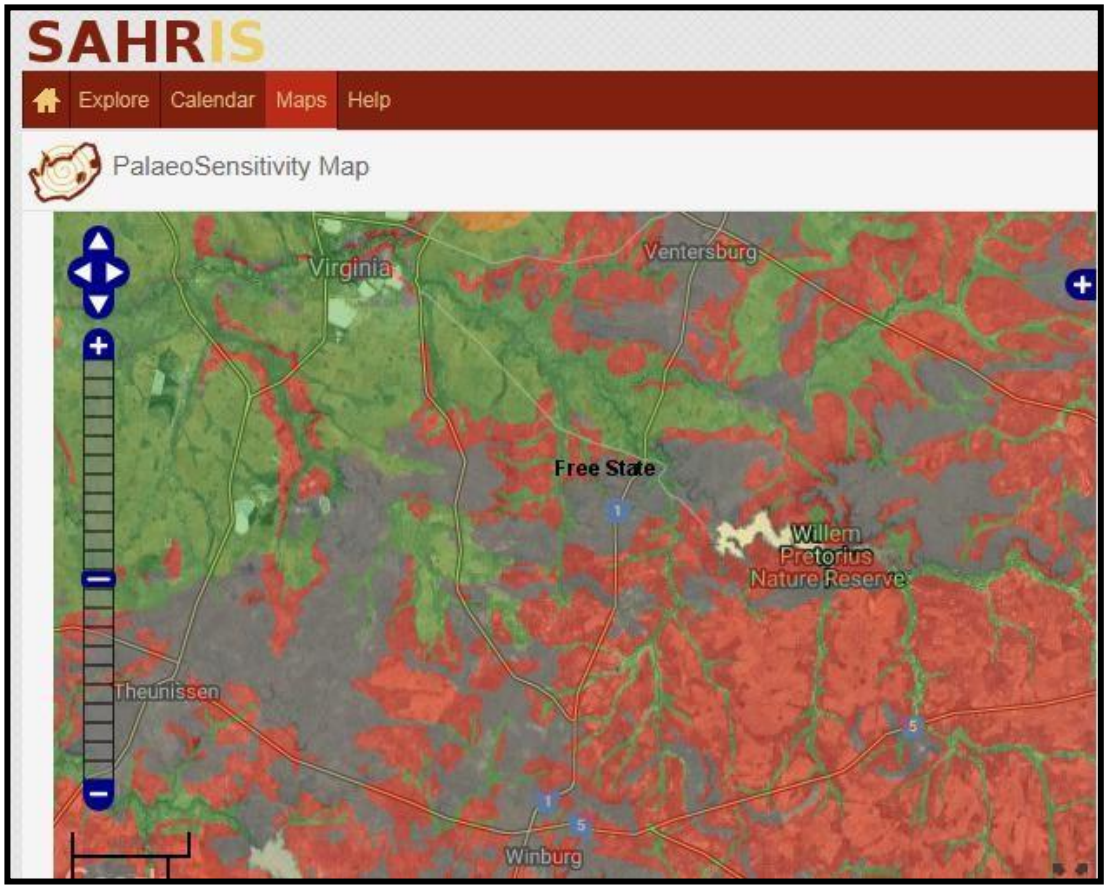


Figure 5: Map showing how the geology of the region translates into palaeo-sensitivity. The patches of red represent the Adelaide Formation of the Beaufort Group, a rock type with a high sensitivity for possible fossil occurrences. The green patches represent Quaternary deposits, whereas the grey areas represent dolerite outcrops which have a zero/insignificant palaeontology rating. Modified from the SAHRIS palaeosensitivity map, www.sahra.org.za/sahris/map/palaeo

8 Site observations

Before the ground survey commenced, an aerial survey of the study site was first carried out using Google Earth. The relevant geology map of the area and SAHRIS palaeo-sensitivity map were both used in combination to gain an understanding of the underlying bedrock along the route, and how it is ranked in terms of possible fossil occurrences. The location of outcrops of Quaternary deposits along the route of the proposed upgrade, especially pockets of alluvium which could harbour archaeological and/or palaeontological material, were also noted so that those locations could receive more attention during the fieldwork survey.

The terrain along the site footprint has an aesthetic value including springs, streams, rocks and densely vegetated hills (Figure 6). Several stone-walled archaeological features occur on top of some of the hills in this area and have been referred to as Goya sites (Figure 9-12). These are especially well-preserved in the hills of the nearby Willem Pretorius Game Reserve, but a huge settlement was also noted within the site footprint where the road cuts through one such occurrence at GPS coordinates 28° 15' 18.84" S 27° 04' 39.66" E, Figure 10. Grave sites were observed at two locations, with one site at (GPS coordinates 28° 18' 20.65" S and 27° 03' 55.35" E) comprised of several heaps of rock in close proximity to each other but with no headstones, Figure 17-20. These features were located just a few hundred metres south of two rectangular bases made of stone slabs, which appeared to be the foundations of old houses or similar structures (GPS coordinates 28° 18' 03.06" S 27° 03' 53.14" E, Figure 13-16). The graves from the second site had headstones and were historical in age, and were located at the turn-off to Eittel, at road marker N1-16X, 103.2 (Figure 21- 24). Both sets of graves are located less than 50 m from the N1, and work activities are likely to come within metres of them, so extra caution will have to be exercised by site workers along these two sections of the road.

Where the road crosses palaeontologically sensitive areas, the terrain was surveyed on foot. In spite of examining several road cuttings (Figure 25-27) and patches of rock which were exposed at the surface (Figure 7-8), only one piece of petrified wood was recorded. This fossil fragment was out of context, found lying on the surface, and is of low significance as it has little information to offer scientists (GPS coordinates 28° 18' 09.73" S 27° 03' 53.64" E, Figure 28-29). Fossil wood of this kind is common and only helpful to palaeontologists when found *in situ*, where there is a good understanding of the age of the deposit it originated from, and when the specimen is more complete in nature. As the rocks of this region are highly

fossiliferous, it is probable that fossil material is located within the broader landscape but was not observed due to its hidden or buried nature.

Quaternary alluvial deposits were challenging to survey as they were almost entirely covered with well-established vegetation. It was therefore difficult to gauge the nature of these occurrences as there were no good exposures where it was possible to view what was present below the surface, therefore no fossil material could be seen at the points where the N1 crosses over the various drainage lines along the route.

Figure 6: The surrounding landscape has an aesthetic value, with streams and densely vegetated hills, so developers should make the effort to reduce scarring of the terrain by selecting appropriate well- hidden quarry sites, and to clean-up and rehabilitate stockpile and/or construction camps after completion of the project.

Figure 7: Outcrops of potentially fossiliferous bedrock exposed near the road and likely to be impacted by its upgrade were examined for any indication of palaeontological material but non e was found.

Figure 8: The bedrock depicted in Fig.7 looked very promising from a distance, but when examined close-up showed no signs of fossils in the exposed sandstone

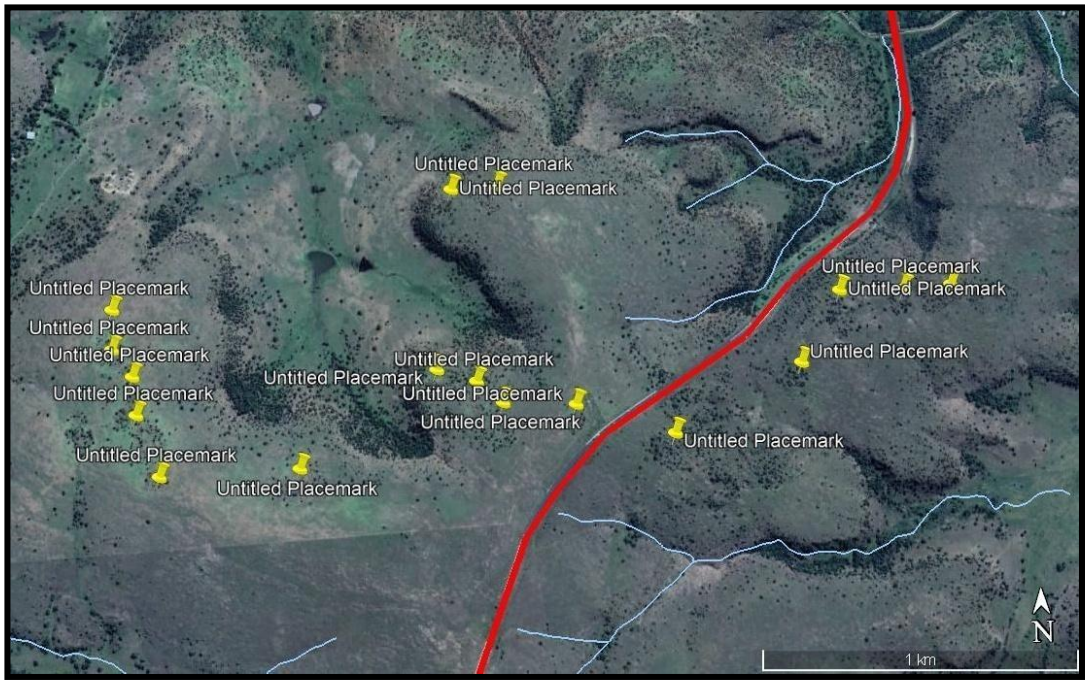
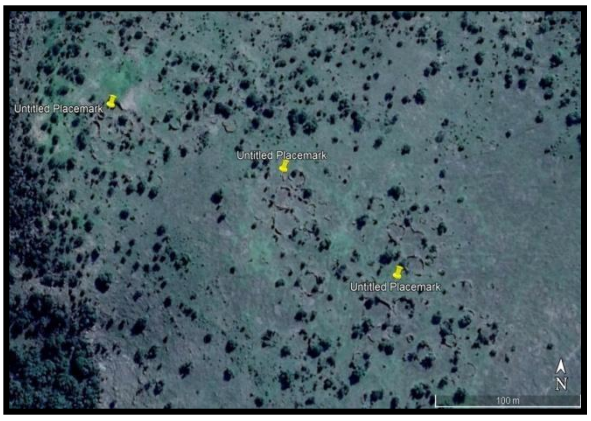


Figure 9: The yellow markers indicate all of the stone-walled features that occur in the hills adjacent to the road at GPS coordinates 28° 15' 18.84" S 27° 04' 39.66" E



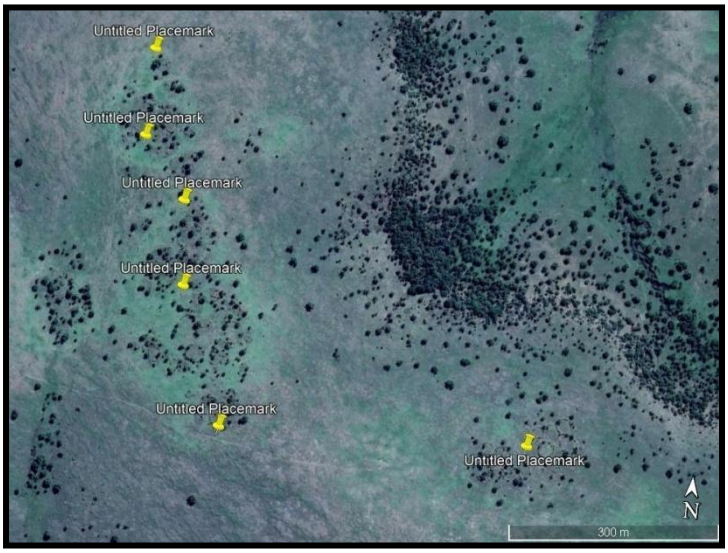


Figure 10-12: The circular stone- walled features represent an archaeological village comprising of houses with courtyards and probably livestock pens. The stone-walling occurs on tops of hills in the region and stretches over several kilometres.

Figure 13-16: During the PIA survey two historical stone structures were observed on the western side of the highway, less than 50 m from the N1. They appeared to be foundations of some sort, although no walls were present so it difficult to determine their approximate age and what purpose they served. These structures were just a few hundred metres away from the possible graves in Fig.17 -20

Fig.17

Fig.18

Fig.19

Fig.20

Figure 17-20: During the PIA survey possible graves were observed just a few hundred metres south of the stone foundations in Fig.13-16 on the western side of the highway. These graves do not have head-stones but the shape of the stone piles suggests human burials. Furthermore, they resemble graves observed on previous surveys as this is a common form of burial in rural areas. The graves are less than 50 m from the N1, with some being only metres from the roadside

Figure 21-24: During the PIA survey graves were observed at the Eittel turn off, at road marker N1 -16X, 103.2. When parked where the car is standing, the graves are on the left, on the eastern side of the highway. These graves are less than 50 m from the N1.

Figure 25-27: During the survey several road cuttings were surveyed on sides of the highway, but most of these comprised of dolerite. Depicted above is one such cutting, at road marker N1-16X, 109.6

Figure 28 & 29: Piece of petrified wood that was observed on the surface during the ground survey. The fossil was out of context and of little value to palaeontologists

9 Contingency plan for possible palaeontological discoveries: chance find protocol

Based on the work of Almond *et al*. (2009) and Groenewald *et al*. (2014) and summarised on the SAHRIS website (www.sahra.org.za/sahris/map/palaeo), if a development occurs within a red zone a desktop study is required, as well as a phase 1 Palaeontological Impact Assessment (PIA) comprising a field survey and recording of fossils. A phase 2 PIA is also required, which entails the rescue of fossil materiel during construction activities, as well as the compulsory application for a collection and destruction permit. If the development occurs in an orange zone, a desktop survey as well as a phase 1 PIA comprising of a field survey and collection of fossils is compulsory. A prior application for a collection permit is therefore recommended and a phase 2 PIA may be necessary during the construction phase of the project. If the development occurs in a green zone, a desktop survey as well as phase 1 PIA comprising a field survey is recommended. Lastly developments which occur in a blue or grey zone may require a desktop survey, based on the known heritage sites in the area as well as the nature of surrounding geological units.

The normal procedure for recovering palaeontological material would be to identify areas which show investigative potential through a concentration of fossils and whose recovery and preparation could address certain scientific questions. The process would then entail obtaining permission from the landowner/s and applying to SAHRA (South African Heritage Resources Agency) or another provincial heritage agency for a collection permit to excavate or remove blocks of bedrock for preparation in the lab. This is a slow and time-consuming process which requires the skills of a field archaeologist/palaeontologist to spot worthy material within geological/stratigraphic exposures, and skilled fossil excavators and/or preparators who can successfully recover fossils from sediment or slabs of bedrock.

But in the case of developments, artefacts/fossils may be exposed which were not being targeted as a part of a formal scientific investigation, which then requires intervention to ensure that such heritage resources are documented and evaluated, and possibly recovered. In this way, construction activities can provide an opportunity for scientists in that sediments or bedrock and other heritage related material will be exposed which otherwise would have gone unnoticed as it was hidden from view and would have been costly to excavate.

Heritage consultants such as palaeontologists are required to evaluate proposed development sites in the hope of recording and/or recovering important objects and artefacts before they are damaged or destroyed, but during the entire timeline of a project a PIA consultant is generally only on site for a few hours. Having a palaeontologist on site to examine every scoop of a back actor/JCB would be very costly and impractical, so additional site visits may be required for certain large-scale projects, or developments in highly sensitive areas. If fossils are unearthed during the rest of the project timeline when no palaeontologist is on site, they may be difficult for the on-site layman to identify as many geological formations superficially resemble palaeontological material. Pseudo- fossils and certain mineral deposits often form into a variety of shapes which may closely resemble plant and animal fossils, making it more difficult for laypersons to positively identify chance finds in the field.

It is not the responsibility of site workers to keep an eye out for heritage objects neither are they likely to have had the appropriate training on what to look for but they are on the ground witnessing and observing, which is a helpful tool when there is a flow of information from on-site staff to management and the protocol dictates that you convey when something unusual or out of the ordinary is observed during work operations. The probability of on-site foremen or construction workers operating heavy earth moving equipment and working to a strict time schedule spotting heritage objects amongst tons of bedrock or sediment is unlikely but nonetheless possible. In South Africa many important archaeological and palaeontological discoveries have been made during construction projects, and companies can play their part by following the law and making the effort to report heritage resources which have been unearthed during digging operations. In so doing, developers can improve their public image and potentially contribute to a rare fossil or object reaching a museum or tertiary institution where it can be studied and eventually displayed to the public as heritage belongs to the entire nation and should be preserved as best as possible.

If by chance fossils or any other heritage-related material were to be discovered which was not anticipated in this Phase 1 report, construction would need to cease immediately and a protocol should be followed whereby the relevant provincial or national heritage custodians in the relevant province would need to be informed. Developers would also need to acquire the services of a suitably qualified palaeontologist to rank the significance of the discoveries. If anything relevant is observed, mitigation measures may be necessary and an application for a collection permit may be required. A Phase 2 heritage study may be necessary so that scientists can be given the opportunity to record and/or recover fossil material if it is ranked as significant and likely to make a positive contribution to the field of science.

10 Assumptions and limitations

According to the amended 2017 EIA regulations, various assumptions and limitations need to be stated when reporting on proposed developments. The professional opinion given in this PIA report is based on the results of a field survey which was used to gauge the fossiliferous potential of the bedrock likely to be exposed during the proposed development. As a general rule, field observations are based on recording palaeontological material which is eroding out or visible on the surface. As many developments require a degree of digging down into the soil and/or underlying stratigraphy, fossils will only be exposed once they have been disturbed from their original positions. Therefore, such objects would have been hidden from the assessor during the fieldwork survey as they had not yet started eroding out from the stratigraphy, they are preserved in.

In addition, the results reported herein are based upon a thorough field survey and careful scrutiny of the best available maps and data sets and all attempts were made to take a holistic, informed decision. Yet in spite of this, it is possible that fossils may be present somewhere along the route of the proposed development but are hidden from view due to their buried nature. Moreover, certain predictions about the likelihood of encountering fossils was based on all available evidence and may prove to be less or more likely than anticipated.

A key assumption for this report is that the kml/kmz file sent to the heritage specialist accurately conveys the layout and nature of the development, which is not always the case as plans are often revised or the site layout has not been accurately drawn in Google Earth. A further assumption is that the geological maps used in this assessment are accurate and up to date, which may not be the case as there is a continuous refinement and revision of the geological model through new scientific research, some which may still need to become incorporated into available maps. A further limitation with these large-scale maps (1:250 000)

is that smaller outcrops of fossiliferous bedrock may not be indicated within the represented geological model. In addition, several potentially fossiliferous outcrops may have been weathered and eroded over millennia, buried under younger deposits in the form of alluvial and colluvial sediments, or capped by topsoil. Palaeontologically-sensitive bedrock may have also been metamorphosed through its contact with intrusive lavas, damaging or destroying fossil specimens along the contact zone.

Furthermore, it is assumed that the developers will respect the guidelines set out in the laws of South Africa with regards to good environmental management practices and policies and will immediately cease all construction if any fossiliferous material is discovered. It is also assumed that developers will practice integrity and embrace an unwavering mind-set with regards to respecting and protecting all aspects of heritage, including due consideration for the fact that such objects cannot simply be sacrificed to meet project deadlines.

11 Conclusion

During the ground survey only one fossil was located, which was out of context and of low significance and this undated fragmentary fossil therefore has little information to offer scientists.

Other heritage-related resources were recorded within the site footprint, and planners will need to be cautious and sensitive to these occurrences, especially where the road gets to within 45 metres of a stone-walled archaeological feature at GPS coordinates 28° 15' 18.84" S 27° 04' 39.66" E, and where the road comes to within 50 metres of graves at the Eittel turn-off at road marker N1-16X, 103.2, and to less than 50 metres of possible graves at GPS coordinates 28° 18' 20.65" S 27° 03' 55.35" E.

During the laying of the building foundations for the proposed project it is recommended that non- fossiliferous rocks are used (e.g. dolerite / berg-gruis etc.) as a foundation fill for tar/concrete mix, and that if local rocks are being sourced for this purpose then it is suggested that the quarrying of fossiliferous bedrock be avoided if possible. If sandstone, mudstone or shale is locally quarried for use in the new development, it is very likely to contain fossil material. Developers should make the effort to take a greener, more holistic approach to building by considering what visual impact quarrying is having on the aesthetic value of the surrounding landscape by ensuring that quarried raw materials are (as far as possible) non-fossiliferous and are being harvested in a manner that reduces the scarring on the landscape. As the aesthetic beauty of the natural landscape also falls under heritage, developers should carefully plan the layout of new quarry sites in order to reduce their visibility, and where possible to select existing quarry sites. They should also ensure that quarrying activities do not interfere with the flow of water at spring eyes as dolerite is the suggested raw material for quarrying, but some dolerite dykes have springs associated with them. Springs are also very often sacred sites or places of significance in local lore and a source of water for birds and wildlife and should be protected as best as possible.

In conclusion, during the site survey several heritage-related occurrences were recorded, including petrified wood, graves, stone-walled historical buildings and stone-walled archaeological settlements. As the road reserve width will be increased from 32 m to 80 m, engineers may need to make small adjustments to the proposed layout of the route in order to avoid some of these features, more especially the graves and stone-walled archaeological site. The fact that very little fossil material was found during the survey, as well as the fact that very little Adelaide Subgroup rock is exposed at the surface immediately adjacent to the road, and the fact that most of the road cuttings are into dolerite no further palaeontological assessment is required. If any palaeontological material were to be unearthed, developers are reminded that

work should immediately cease and the chance find protocol outlined above should be followed to ensure that developments comply with the law, and to ensure that a rare object stands a good chance of being recorded and/or relocated before destruction. The surrounding landscape also has heritage value, with springs, streams and densely vegetated hills, and several game reserves in the area, so developers should make the effort to reduce scarring of the terrain by selecting appropriate, well-hidden quarry sites, and to clean-up and rehabilitate stockpile and/or construction camps after completion of the project.

12 References

1) Almond, J.E., De K lerk, B. & Gess, R., 2009. *Palaeontological Heritage of the Eastern Cape*. Internal report, SAHRA

2) Evolutionary Studies Institute fossil collection database

3) Groenewald, G.H., Groenewald, D.P. & Groenewald, S.M., 2014. *Palaeontological Heritage of the Free State, Gauteng, Limpopo, Mpumalanga and North West provinces*. Internal Palaeotechnical Reports, SAHRA

4) Rubidge, B.S. 2005. Re-uniting lost continents - fossil reptiles from the ancient Karoo and their wanderlust. *South African Journal of Geology* 108 (1): 135-172

5) Smith, R.M.H., Eriksson, P.G. and Botha, W.J. 1993. A review of the stratigraphy and sedimentary environments of the Karoo-aged basins of Southern Africa. *Journal of African Sciences 16*: 143-169

APPENDIX 2

Methodology

Site survey

eThembeni staff inspected the project area on 30 and 31 July 2019, and completed a controlled-exclusive surface survey, where 'sufficient information exists on an area to make solid and defensible assumptions and judgements about where [heritage resource] sites may and may not be' and 'an inspection of the surface of the ground, wherever this surface is visible, is made, with no substantial attempt to clear brush, turf, deadfall, leaves or other material that may cover the surface and with no attempt to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures that are observed by accident' (King 1978; see bibliography for other references informing methodological approach).

The site survey comprised a drive/walkover visual survey of the proposed activity area. Geographic coordinates were obtained using a handheld Garmin global positioning unit (WGS 84). **See Track Log loaded to SAHRIS Case File.**

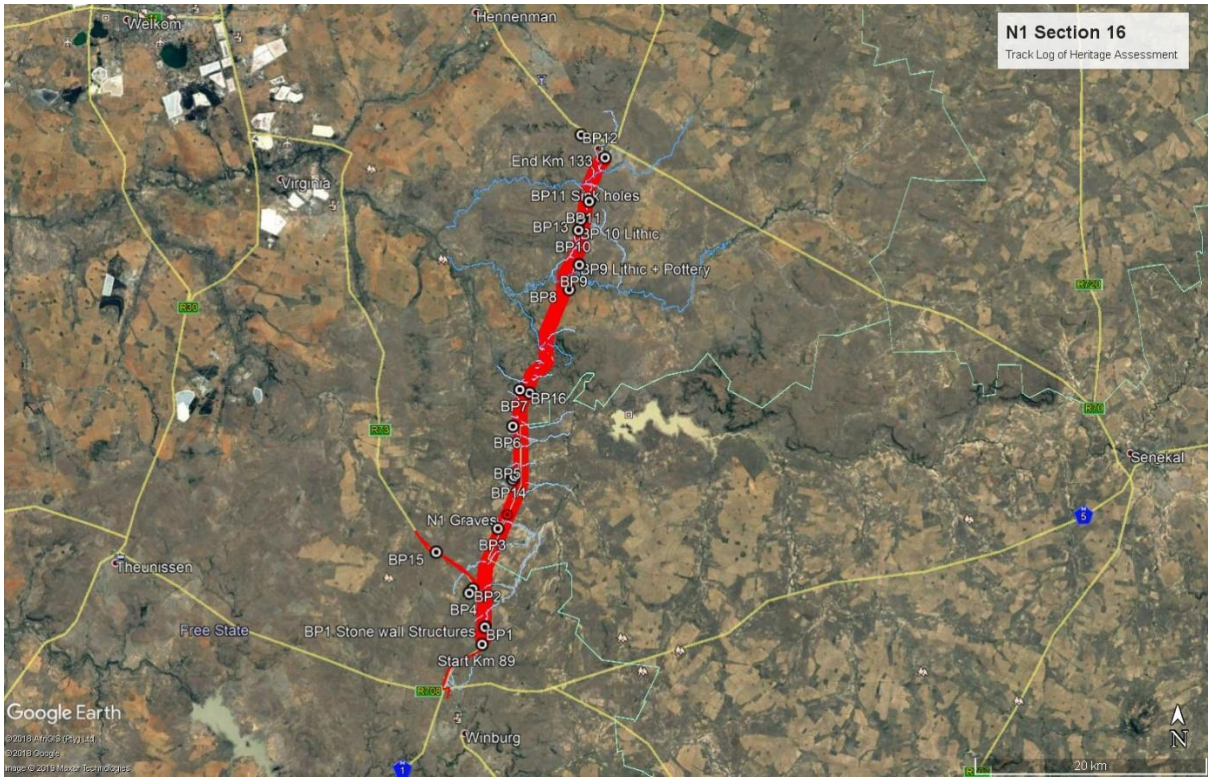


Figure 3 Track log of Heritage Assessment

Database and literature review

Existing maps and Google Earth imagery were studied in detail prior to and during fieldwork. Existing specialist reports, including research papers and HIA reports, were reviewed where relevant and available. Archaeological site data was sought for the project area from the National Museum, Bloemfontein database and SAHRIS.

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Assessment of heritage resource value and significance

Heritage resources are significant only to the extent that they have public value, as demonstrated by the following guidelines for determining site significance developed by Heritage Western Cape (HWC 2007) and utilised during this assessment.

Grade I Sites (National Heritage Sites)[10]

Grade I heritage resources are heritage resources with qualities so exceptional that they are of special national significance should be applied to any heritage resource which is

a) Of outstanding significance in terms of one or more of the criteria set out in section 3(3) of the NHRA;
b) Authentic in terms of design, materials, workmanship or setting; and is of such universal value and symbolic importance that it can promote human understanding and contribute to nation building, and its loss would significantly diminish the national heritage.

1. Is the site of outstanding national significance?
2. Is the site the best possible representative of a national issue, event or group or person of national historical importance?
3. Does it fall within the proposed themes that are to be represented by National Heritage Sites?
4. Does the site contribute to nation building and reconciliation?
5. Does the site illustrate an issue or theme, or the side of an issue already represented by an existing National Heritage Site – or would the issue be better represented by another site?
6. Is the site authentic and intact?
7. Should the declaration be part of a serial declaration?
8. Is it appropriate that this site be managed at a national level?
9. What are the implications of not managing the site at national level?

Grade II Sites (Provincial Heritage Sites)

Grade II heritage resources are those with special qualities which make them significant in the context of a province or region and should be applied to any heritage resource which -

a) is of great significance in terms of one or more of the criteria set out in section 3(3) of the NHRA; and
(b) enriches the understanding of cultural, historical, social and scientific development in the province or region in which it is situated, but that does not fulfil the criteria for Grade 1 status.

Grade II sites may include, but are not limited to –

(a) places, buildings, structures and immovable equipment of cultural significance;
(b) places to which oral traditions are attached or which are associated with living heritage;
(c) historical settlements and townscapes;
(d) landscapes and natural features of cultural significance;
(e) geological sites of scientific or cultural importance;
(f) archaeological and palaeontological sites; and
(g) graves and burial grounds.

[10] Regulation 43 Government Gazette no 6820. 8 No. 24893 30 May 2003, Notice No. 694

The cultural significance or other special value that Grade II sites may have, could include, but are not limited to –

(a) its importance in the community or pattern of the history of the province;
(b) the uncommon, rare or endangered aspects that it possess reflecting the province's natural or cultural heritage
(c) the potential that the site may yield information that will contribute to an understanding of the province's natural or cultural heritage;
(d) its importance in demonstrating the principal characteristics of a particular class of the province's natural or cultural places or objects;
(e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group in the province;
(f) its importance in demonstrating a high degree of creative or technical achievement at a particular period in the development or history of the province;
(g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
(h) its strong or special association with the life or work of a person, group or organization of importance in the history of the province.

Grade III (Local Heritage Resources)

Grade III heritage status should be applied to any heritage resource which

(a) fulfils one or more of the criteria set out in section 3(3) of the NHRA; or
(b) in the case of a site contributes to the environmental quality or cultural significance of a larger area which fulfils one of the above criteria, but that does not fulfill the criteria for Grade 2 status.

Grade IIIA

This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant any alteration being regulated. The significances of these buildings and/or sites should include at least some of the following characteristics:

- Highly significant association with a
  - historic person
  - social grouping
  - historic events
  - historical activities or roles
  - public memory
- Historical and/or visual-spatial landmark within a place
- High architectural quality, well-constructed and of fine materials
- Historical fabric is mostly intact (this fabric may be layered historically and/or past damage should be easily reversible)
- Fabric dates to the early origins of a place
- Fabric clearly illustrates an historical period in the evolution of a place
- Fabric clearly illustrates the key uses and roles of a place over time
- Contributes significantly to the environmental quality of a Grade I or Grade II heritage resource or a conservation/heritage area

Such buildings and sites may be representative, being excellent examples of their kind, or may be rare: as such they should receive maximum protection at local level.

Grade IIIB

This grading is applied to buildings and/or sites of a marginally lesser significance than grade IIIA; and such marginally lesser significance argues against the regulation of internal alterations. Such buildings and sites may have similar significances to those of a grade IIIA building or site, but to a lesser degree. Like grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than grade IIIA examples: as such they should receive less stringent protection than grade IIIA buildings and sites at local level and internal alterations should not be regulated (in this context).

Grade IIIC

This grading is applied to buildings and/or sites whose significance is, in large part, a significance that contributes to the character or significance of the environs. These buildings and sites should, as a consequence, only be protected and regulated if the significance of the environs is sufficient to warrant protective measures. In other words, these buildings and/or sites will only be protected if they are within declared conservation or heritage areas.

Assessment of development impacts

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, by minimising natural site erosion or facilitating non-destructive public use, for example. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the aforementioned examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on identified heritage resources:

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific, affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.
	Medium	Intensity is medium and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all of the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

Appendix 3

PROTOCOL FOR THE IDENTIFICATION, PROTECTION AND RECOVERY OF HERITAGE RESOURCES DURING CONSTRUCTION AND OPERATION

1 It is possible that sub-surface heritage resources could be encountered during the construction phase of this project. The environmental control officer and all other persons responsible for site management and excavation should be aware that indicators of sub-surface sites could include:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments, including potsherds;
- Stone concentrations that appear to be formally arranged (may indicate the presence of an underlying burial, or represent building/structural remains); and
- Fossilised remains of fauna and flora, including trees.

2 In the event that such indicator(s) of heritage resources are identified, the following actions should be taken immediately:

- All construction within a radius of at least 20m of the indicator should cease. This distance should be increased at the discretion of supervisory staff if heavy machinery or explosives could cause further disturbance to the suspected heritage resource.
- This area must be marked using clearly visible means, such as barrier tape, and all personnel should be informed that it is a no-go area.
- A guard should be appointed to enforce this no-go area if there is any possibility that it could be violated, whether intentionally or inadvertently, by construction staff or members of the public.
- No measures should be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone or stone.

3 If a heritage practitioner has been appointed to monitor the project, s/he should be contacted, and a site inspection arranged as soon as possible.

4 If no heritage practitioner has been appointed to monitor the project, SAHRA or FSPHRA should be contacted.

5 The South African Police Services should be notified by a SAHRA/FSPHRA staff member or an independent heritage practitioner if human remains are identified. No SAPS official may disturb or exhume such remains, whether of recent origin or not.

6 All parties concerned should respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time.

Any extension of the project beyond its current footprint involving vegetation and/or earth clearance should be subject to prior assessment by a qualified heritage practitioner, considering all information gathered during the initial assessment.

Assumptions and limitations of this HIA

- The description of the proposed project, provided by the client, is accurate.
- The public consultation process undertaken as part of the Environmental Impact Assessment is sufficient and adequate and does not require repetition as part of the heritage impact assessment.
- Soil surface visibility varied from good to non-existent. Heritage resources might be present below the surface or in areas of dense vegetation and we remind the client that the NHRA requires that a developer cease all work immediately and observe the protocol in Section 7 of this report should any heritage resources, as defined in the Act, be discovered during the course of development activities.
- No subsurface investigation (including excavations or sampling) were undertaken, since a permit from SAHRA or the FSPHRA is required to disturb a heritage resource.
- Stopping or parking of vehicles and walking are not allowed on the N1 and the minimum speed allowed on the N1 is 60 kilometres per hour. This affected observation made from the N1, particularly in instances where alternative access to road sections was difficult or impossible due to the nature of the terrain.
- Specialists were not permitted to enter private property or engage land-owners. If a specialist has a specific need to investigate a portion of land, this will need to be undertaken only once the proposed upgrades have been announced in the public domain.

- A key concept in the management of heritage resources is that of non-renewability: damage to or destruction of most resources, including that caused by bona fide research endeavours, cannot be reversed or undone. Accordingly, management recommendations for heritage resources in the context of development are as conservative as possible.
- Human sciences are necessarily both subjective and objective in nature. eThembeni staff members strive to manage heritage resources to the highest standards in accordance with national and international best practice; but recognise that their opinions might differ from those of other heritage practitioners.
- Staff members involved in this project have no vested interest in it; are qualified to undertake the tasks as described in the terms of reference; and comply at all times with the Codes of Ethics and Conduct of the Association of Southern African Professional Archaeologists (ASAPA) and the Association of Professional Heritage Practitioners (APHP)..
- **ETHEMBENI STAFF MEMBERS TAKE NO PERSONAL OR PROFESSIONAL RESPONSIBILITY FOR THE MISUSE OF THE INFORMATION CONTAINED IN THIS REPORT, ALTHOUGH THEY WILL TAKE ALL REASONABLE PRECAUTIONS AGAINST SUCH MISUSE.**