HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999)

FOR THE PROPOSED SCHOEMANSKLOOF ROUTE R539 IMPROVEMENT PROJECT, MPUMALANGA

Type of development:

Road Upgrade

Client:

Prism EMS Pretoria

Environmental Impact Practitioner information:

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Developer:

Trans African Concessions" (TracN4) on behalf of The South African National Roads Agency SoCLimited (SANRAL)

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Project Reference:
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APPROVAL PAGE

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Report Title	Heritage Impact Assessment for the Schoemanskloof Route R539 Improvements Project, Mpumalanga
Authority Reference Number	TBC
Report Status	Final Report
Applicant Name	Trac N4 on behalf of SANRAL

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork & reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	August 2021
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	August 2021

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Amendments on Document

Date	Report Reference Number	Description of Amendment
7 January 2022	2156	Inclusion of Alternatives and addressing comments from the client
1 February 2022	2156	Addressing layout changes
15 March 2022	2156	Alternatives amended

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REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	CV
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	*Declaration of Independence*
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA)an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8 and 9
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 1.3
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(I) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EIR report
(q) Any other information requested by the competent authority	Provides upon request

Executive Summary

Prism EMS (Pretoria) was appointed as the Environmental Assessment Practitioner (EAP) by The Trans African Concessions (TRAC) N4 to undertake the required environmental authorisation process for the proposed Schoemanskloof Road Upgrades. The following upgrades is proposed:

- Overtaking lanes along the existing R539/ Schoemanskloof road;
- Access routes to privately owned properties along the R539/ Schoemanskloof road.

Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed on desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The overtaking lanes are in the R539/ Schoemanskloof road reserve, these areas have been altered by construction of the existing road. Along sections of the road Iron Age stone walled settlements occur and have been impacted on by the existing road;
- The access routes will impact on several similar Iron Age stone walled settlements and earlier Iron Age sites as well as burial sites and ruins;
- In terms of the palaeontological component, the area is of low paleontological sensitivity and no further studies are required for this aspect;
- Heritage visibility is extremely low outside of the road reserve because of plantations, cultivation and dense vegetation, and additional heritage resources can occur in these areas. This is a limitation and will have to be mitigated throughout the project.

The project is in line with surrounding land use and the project will improve traffic flow speeds and improve the safety of motorists. The impacts to heritage resources prior to mitigation is medium to high but can be mitigated to an acceptable level with reference to the recommendations outlined below and detailed in Section 10.1, 10.2, 10.5 and 10.6.

Recommendations:

The project can commence provided that the recommendations in this report (including the site-specific mitigation measures in Table 2) are adhered to and based on the South African Heritage Resource Authority (SAHRA) 's approval:

- Preservation of recorded heritage features *in-situ* if this is not possible mitigation measures for these sites are outlined in Table 2;
- If the recorded grave sites are to be retained *in-situ* without a 30 m buffer zone then a social consultation process in terms of Chapter XI of the NHRA Regulations, must be carried out to identify the descendants of the burials and to obtain permission to encroach on the identified graves;
- Should final adjustments be made to the preliminary access route alignments due to heritage sensitivities already found, a final heritage walkdown must be conducted for these sections where changes are made;
- Should additional heritage constraints be identified through the Public Participation Process of the BAR, these must be included in the Final EMPr for implementation during and after construction;
- Compilation of a Development Heritage Management Plan (DHMP) to ensure ongoing protection and management of recorded heritage resources; and
- Implementation of a chance find procedure for the project.

Table 2: Site specific recommendations.

LABEL	Description report	Heritage Significance	Field Rating	Impact	Area	Mitigation
SCH001	SCH001-SCH004 marks a cluster of packed stone walled features running along the proposed line. These stone walled features seem to form part of a much larger series of stone walled ruins that extend across the landscape in an eastern direction over the various hills. These extensive ruins can be seen on the historical imagery on Google earth. This area has a substantial grass cover making ground visibility here fairly low.	Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH002		Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH003		Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH004		Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH005	Concrete bridge of unknown age and a section of the old tar road.	Low to medium significance	GP B	No direct Impact (40 m away from the overtaking lanes)	Access Road	No Mitigation
SCH006	Cement slabs and concrete mix of recent origin	No significance (recorded to avoid confusion)	GP C	Outside of the development footprint (59 m from the access road)	Access Road	No Mitigation
SCH007	Ephemeral stone walling in an extensive thicket. The site is highly overgrown, and it is not possible to determine layout or time period.	Low to medium significance	GP B	Direct	Access Road and road widening	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH008	Remains of ephemeral walling. Probably robbed to build stone walls for garden landscaping/terraces at adjacent residential dwelling	Low to medium Significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH009	Low density undiagnostic ceramic scatter and grinding stone exposed by trenching next to fence. No other cultural deposit visible	Low Significance	GP C	Direct	Access Road	Monitor during construction
SCH010	Possible Iron Age ephemeral stone walls. The site is highly overgrown, and it is not possible to determine site layout or time period.	Low Significance	GP C	Direct	Access Road	The area should be cleared to confirm the presence of features. If features are found mapping and destruction permit. The area should be monitored during construction.

SCH011	Iron Age stone wall settlement within inaccessible thickets next to existing Schoemanskloof road. The road impacted on a section of the site.	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH012	Early Iron Age site decorated ceramics could indicate Klingbeil ceramic facies. Sorghum lower grinder on site. The site is exposed by agricultural activities.	Medium significance	GP B	Direct	Access Roads	Test Pits
SCH013	Broken down lodge-Falcon glen (Modern Features)	No Heritage Significance	GP C	Direct	Access Road	No Mitigation
SCH014	Broken down and overgrown labourer housing	No Heritage Significance	GP C	Direct	Access Road	No Mitigation
SCH015	Late Iron Age site with multiple sections of packed stone walling. The walls are ephemeral and highly overgrown limiting visibility and site layout, or time period could not be determined.	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH016	Ephemeral stone walls next to road leading to modern dwelling. The walls are highly overgrown, and it is not possible to determine site layout or time period.	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH017	Ephemeral stone wall in overgrown thicket.	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH018	Stone packed foundations of dwelling with small cemetery of at least 5 graves with stone packed grave dressings.	High Social Significance	GP A	Potential direct impact	Access Road	Indicate on development plans and avoid. Monitor area during construction and operation
SCH019	Graves of the Bos family located next to road. Inscriptions date the cemetery to 2016 with possible older graves present as well	High Social Significance	GP A	Potential direct impact	Access Road	Indicate on development plans and avoid. Monitor area during construction and operation
SCH020	Small cemetery located in a bamboo thicket. Graves are marked by stone packed grave dressings and large stones as headstones	High Social Significance	GP A	Potential direct impact	Access Road	Indicate on development plans and avoid. Monitor area during construction and operation
SCH021	Ephemeral stone walling in an overgrown thicket. The walls are ephemeral and highly overgrown limiting visibility and site layout, or time period could not be determined.	Low to medium Significance	GP B	Indirect Impact (20 m from access road)	Access Road	Indicate on development plans and avoid.
SCH022	Cement slab.	Low Significance	GP C	No direct Impact (27 m from access road)	Access Road	No mitigation required.
SCH023	Ephemeral walls possibly related to terracing at the farmstead. The area is very overgrown. The structures are not in use and dilapidated.	Low to medium significance	GP B	Direct	Access Road and road widening	Mapping and permitting

SCH024	Small cemetery located within thicket with 4 visible graves of the Schoeman family. The graves are marked by cement borders and headstones. Visible inscriptions date the cemetery to 1934.	High Social Significance	GP A	Possible direct impact	Access Road	Indicate on development plans and avoid.
SCH025	Demolished remains of ruins with stone foundations with a possible more recent addition. The site is highly overgrown.	Low to medium significance	GP B	Direct impact	Access Road and road widening	Mapping and permitting
SCH026	Upper grinding stone, no other cultural material is noted.	Low significance	GP C	Indirect impact (18 m from the access road)	Access Road	Monitor during construction
SCH027	Possible ephemeral walling forming terraces next to drainage line. The site is overgrown and difficult to determine if the linear looking stones are anthropogenic.	Low significance	GP C	Indirect impact (15 m from the access road)	Access Road	Monitor during construction
SCH028	Recent homestead with a bridge crossing the river dating to 1966.	Low significance	GP C	No direct Impact	Access Road	Map on development plans and avoid structures.
SCH029	Low density scatter of undiagnostic ceramics exposed in agricultural field.	Low Significance	GP C	No direct Impact	Access Road	No Mitigation
SCH030	Remnants of a small historical homestead approx. 20m from the roadside in an inaccessible area. The structures are stone built with multiple foundations scattered close to the standing feature. The small homestead is situated close to a stream that also has small stone built features that seem to have been built to prevent erosion.	Low to medium significance	GP B	No direct Impact (60 m from the access road)	Road Widening Site	No Mitigation
SCH031	Large area of multiple stone-built enclosures. The stone features extend far into the surrounding environment. These features are highly disturbed and overgrown making it difficult to determine layout and could contain Iron Age and historical components.	Medium significance	GP B	Within the impact area	Road Widening Site	Avoidance. If this is not possible Phase 2 mitigation and destruction permit.
SCH032	Remnants of a ruin approx. 10 m from the roadside within an inaccessible area on the other side of a large fence.	Low to medium significance	GP B	Outside of the development footprint (12 m)	Road Widening Site	Indicate on development plans and avoid.
SCH033	Multiple areas of Circular stone walling on the edge of the road buffer. These features are highly disturbed with some areas having been cut through due to the construction of the road. The rest of these features continue into an inaccessible area on the other side of the road buffer fence line. Waypoints taken at multiple locations to indicate the closest existing features within the development area.	Low to medium significance	GP B	Direct	Road Widening Site and access road	Avoidance. If this is not possible Phase 2 mitigation and destruction permit.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I: • 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 expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • 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; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	04/08/2021

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Guinea, Afghanistan and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DEA: Department of Environmental Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMPr: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA: Middle Stone Age
NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID Notification of Intent to Develop
NoK Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to recently, 100 years ago)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a HIA for the proposed Schoemanskloof Road Upgrades, on Route 539 Mpumalanga Province (Figure 1-1 to 1-4). The report forms part of the Basic Assessment (BA) and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey, Iron Age sites, burial sites and historical features were recorded. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the BA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

1.2 Project Description

(SANRAL) is proposing road upgrades and improvements to the Schoemanskloof Route (R539) which is an alternative route between to the N4 route between eMgwenya (Waterval Boven) and Mbombela (Nelspruit), Mpumalanga (Figure 1.1). Project components and the location is outlined under Table 3 and 4.

Table 3: Project Description

Project area	The whole length of the Schoemanskloof R539 Route itself is situated east of the town of eNtokozweni (Machadodorp) and running in an easterly direction to the T- junction with the N4 at Montrose, which is approximately 30 km east of Mbombela (Nelspruit), Mpumalanga
Magisterial District	Mbombela
Co-ordinate of the development	25°36'31.89"S Eastern starting point 30°16'49.08"E Western ending point

Table 4: Infrastructure and project activities

Type of development	Road Upgrade
Project Components	The project includes road widening, access roads as well as bridge upgrades.

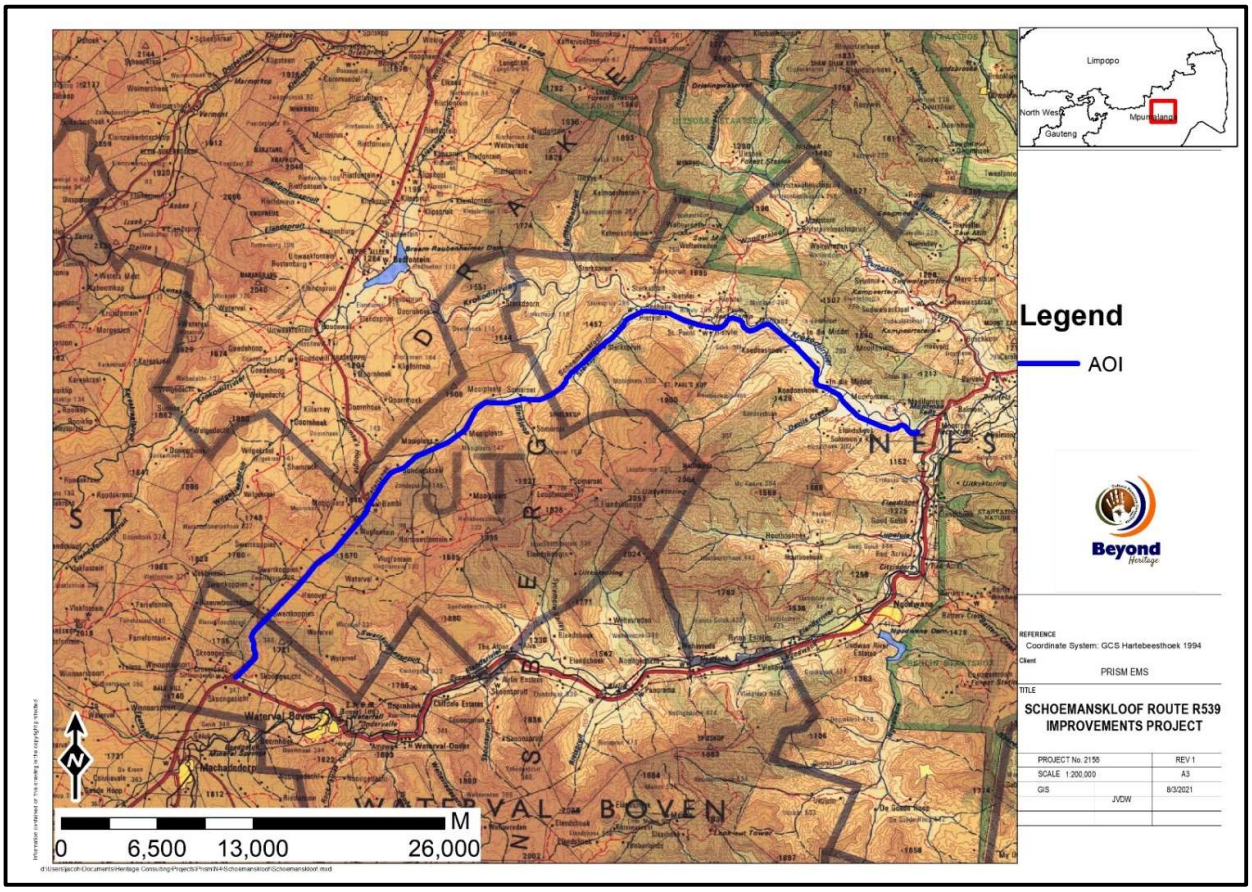


Figure 1.1. Regional setting (1: 250 000 topographical map) indicating the area of interest (AoI) marking the section of road that will be upgraded.

1.3 Alternatives

The Basic Assessment process assessed design options regarding the Schoemanskloof Road Upgrade Project. The options were determined from the below list of alternatives investigated by the design engineers. These included:

- Option A: Introduce shoulders to the existing route, instead of passing lanes
- Option B: Upgrading to an undivided dual carriageway for the entire Schoemanskloof Road
- Option C: Upgrading the Elandsvalley/Ngodwana route instead of Schoemanskloof
- Option D: Inclusion of consolidated accesses and associated access roads
- Option E: Inclusion of consolidated accesses and associated access roads and introducing road safety upgrades and features on either end of- and along the existing bend at Poplar Creek
- Option F: Inclusion of consolidated accesses and associated access roads and re-alignment of the existing bend at Poplar Creek
- Option G: Do nothing option

The preferred option from the Basic Assessment Process was found to be Option F, which was assessed as Alternative 2 in the Basic Assessment Report which is described as: *Upgrades of Schoemanskloof Road inclusive of lengthening of passing lanes, widening some lanes and re-aligning certain sections; taking into account inclusion of consolidated accesses and associated access roads, and introducing road safety upgrades and features on either end of- and along the existing bend at Poplar Creek.*

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 HIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site development management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process was managed by the EAP and involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of BA report.

The results are indicated in Section 5.1.

3.4 Site Investigation

The aim of the site visit was to:
a) survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest;
b) record GPS points of sites/areas identified as significant areas;
c) determine the levels of significance of the various types of heritage resources recorded in the project area.
Details of the site investigation are provided in Table 5.

Table 5: Site Investigation Details

	Site Investigation
Date	23 January 2021 and 17-21 May 2021
Season	Archaeological visibility is varied due to the large size of the survey area. Large sections have previously been disturbed/developed by agricultural and forestry activities while other areas are highly overgrown and mountainous. In summary, archaeological visibility was low, the study area was however sufficiently covered to understand the heritage character of the area (Refer to Annexure A for tracklogs of the areas covered).

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

Table 6. Heritage significance and field ratings

FIELD RATING	*GRADE*	*SIGNIFICANCE*	*RECOMMENDED MITIGATION*
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP. A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP. B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

3.6 Impact Assessment Methodology

The significance of the identified impacts will be determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and will be assessed according to methodology prescribed in the following section.

Scale utilised for the evaluation of the Environmental Risk Ratings

Evaluation Component	Rating	Scale	Description / criteria
MAGNITUDE of negative impact (at the indicated spatial scale)	**10**	**Very high**	Bio-physical and/or social functions and/or processes might be *severely* altered.
	8	**High**	Bio-physical and/or social functions and/or processes might be *considerably* altered.
	6	**Medium**	Bio-physical and/or social functions and/or processes might be *notably* altered.
	4	**Low**	Bio-physical and/or social functions and/or processes might be *slightly* altered.
	2	**Very low**	Bio-physical and/or social functions and/or processes might be *negligibly* altered.
	0	**Zero**	Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10**	**Very high**	Positive: Bio-physical and/or social functions and/or processes might be *substantially* enhanced.
	8	**High**	**Positive**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced.
	6	**Medium**	**Positive**: Bio-physical and/or social functions and/or processes might be *notably* enhanced.

	4	**Low**	**Positive**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced.
	2	**Very low**	**Positive**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced.
	0	**Zero**	**Positive**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	**5**	**Permanent**	**Impact in perpetuity. –**
	4	**Long term**	Impact ceases after operational phase/life of the activity > 60 years.
	3	**Medium term**	Impact might occur during the operational phase/life of the activity – 60 years.
	2	**Short term**	Impact might occur during the construction phase - < 3 years.
	1	**Immediate**	**Instant impact.**
EXTENT (or spatial scale/influence of impact)	**5**	**International**	**Beyond the National boundaries.**
	4	**National**	Beyond provincial boundaries, but within National boundaries.
	3	**Regional**	Beyond 5 km of the Impact Area and within the provincial boundaries.
	2	**Local**	Within a 5 km radius of the Impact Area .
	1	**Site-specific**	**On site or within 100 meters of the site boundaries.**
	0	**None**	**Zero extent.**
IRREPLACEABLE loss of resources	**5**	**Definite**	**Definite** loss of irreplaceable resources.
	4	**High potential**	**High** potential for loss of irreplaceable resources.
	3	**Moderate potential**	**Moderate** potential for loss of irreplaceable resources.
	2	**Low potential**	**Low** potential for loss of irreplaceable resources.
	1	**Very low potential**	**Very low** potential for loss of irreplaceable resources.
	0	**None**	**Zero potential.**
REVERSIBILITY of impact	**5**	**Irreversible**	Impact **cannot** be reversed.
	4	**Low irreversibility**	**Low** potential that impact might be reversed.
	3	**Moderate reversibility**	**Moderate** potential that impact might be reversed.
	2	**High reversibility**	**High** potential that impact might be reversed.
	1	**Reversible**	Impact **will be** reversible.
	0	**No impact**	No impact.
PROBABILITY (of occurrence)	**5**	**Definite**	>95% chance of the potential impact occurring.
	4	**High probability**	75% - 95% chance of the potential impact occurring.
	3	**Medium probability**	25% - 75% chance of the potential impact occurring
	2	**Low probability**	5% - 25% chance of the potential impact occurring.
	1	**Improbable**	<5% chance of the potential impact occurring.
	0	**No probability**	**Zero probability.**

Evaluation Component	Rating scale and description / criteria
CUMULATIVE impacts	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. ***Medium**:* The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. ***Low**:* The activity is localised and might have a negligible cumulative impact. ***None**:* No cumulative impact on the environment.

Once the Environmental Risk Ratings have been evaluated for each potential environmental impact, the Significance Score of each potential environmental impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact as per below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.

Scale used for the evaluation of the Environmental Significance Ratings

Significance Score	Environmental Significance	Description / criteria
125 – 150	**Very high (VH)**	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	**Medium-high (MH)**	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked at.
40 – 74	**Medium (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is compounded by the high vegetation cover and access restraints that limited the coverage of the survey. Heritage visibility is extremely low outside of the road reserve because of plantations, cultivation and dense vegetation, and additional heritage resources can occur in these areas. Similarly, the depth of cultural deposits and the extent of heritage sites cannot be accurately determined due its subsurface nature. These limitations are successfully mitigated with the implementation of a chance find procedure and monitoring throughout the project This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

Mpumalanga has a youthful population with approximately 64% of the population consisting of economically active people (15 to 34 years of age). This provides significant human resources for future economic growth and sustainability. The project will promote infrastructure and create employment opportunities. The study area falls in both the Ehlanzeni District Municipality and the Nkangala District Municipality.

5 Results of Public Consultation and Stakeholder Engagement:

5.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the BA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process. In addition, during the heritage field work the following parties were consulted:

- BBK (Susan) indicated 2 graves located well away from the impact area.
- Old Joe's Kaia - Paul Drew
- Joubert en Seuns - Lionel
- Access to Johan van Dyk's property and portion across from Old Joe's - Deon Terblanche
- St Pauls - Ralph Kirsten
- Falcon Glen/Crocriver Chalet - Erica

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located.

Various sites are known for the area. The sites recorded vary from Early and Middle Stone Age sites to Early and Late Iron Age sites. The following assessments were consulted for this report (Table 7):

Table 7. CRM Studies consulted for the project.

Author	Year	Project	Findings
Coetzee, T.	2005	Archaeological Investigation of the Proposed Black Eagle Valley - Residential Estate, Waterval Boven, Mpumalanga	Iron Age Stone Walled Settlements, farming structures and 2 cemeteries.
Van Schalkwyk, J.A.	2007	Heritage Impact Scoping Report for The Planned Hendrina-Marathon Powerline, Mpumalanga Province	Sites range from settlements to initiation sites, industrial and farming related sites as well as cemeteries
Van Wyk Rowe, C.	2014	Phase 1 Archaeological / Heritage Impact Assessment for The Development Of A Footbridge Across The Elands River, Elandshoek, Mpumalanga	Historical structures
Van der Walt, J.	2015	Archaeological Impact Assessment for the proposed widening of the N4 National Road, Section 6E, Near Waterval-Onder, Mpumalanga Province	Stone Cairn and two stonewalled sites
Celliers, JP	2018	Phase 1 Archaeological and Heritage Impact Assessment on the farm Mooifontein 292 JT in respect of proposed agricultural development, Mpumalanga Province	Stone enclosure
Van der Walt, J.	2020	Heritage Impact Assessment for the N4 Interchange, Mpumalanga Province	Stone enclosures

6.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area, but the following cemeteries are indicated in the surrounding area:

- Battle of Helvitia Cemetery 25°34'49.41"S and 30°18'16.80"E
- Farrefontein 349 Cemetery 25°34’58.62”S and 30°14'14.72"E
- Koedoeshoek 301 Cemetery 25°25'27.30"S and 30°35'41.08"E

The cemeteries are located away from the impact areas and will not be impacted on and is therefore not further discussed here.

6.2. Background to the general area

The archaeology of the area can be divided in three main periods namely the Stone Age, Iron Age and Historical period.

6.1.2 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation

regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases.
Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes. The three main phases can be divided as follows;

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. - Recently to ~30 thousand years ago.
- Middle Stone Age; associated with Homo sapiens and archaic modern human - . 30-300 thousand years ago.
- Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. - 400 000-> 2 million years ago.

Very few Early Stone Age (ESA) sites are on record for Mpumalanga. An example where ESA tools have been discovered located outside of the study area is at Maleoskop (Bergh 1999) on the farm Rietkloof, which is one of only a handful of such sites in Mpumalanga. Another example also outside of the study area is at Bushman Rock Shelter (Mason 1969, Wadley 1987), a well-known site in the Ohrigstad district. This cave was excavated twice in the 1960s by Louw and later by Eloff. The MSA layers show that the cave was repeatedly frequented over a long period. Lower layers have been dated to over 40 000 Before Present (BP), while the top layers date to approximately 27 000 BP (Esterhuysen and Smith in Delius, 2007). MSA material is found widely across South Africa and some MSA manifestations can be expected in the study area.

Sites dating to the LSA are found in numerous rock shelters throughout Eastern Mpumalanga, where some of their rock art is still visible. A number of these shelters have been documented throughout the Province (Schoonraad in Barnard, 1975; Bornman, 1995 and Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad.

At Honingklip near Badplaas in the Carolina District, two LSA rock shelters with four panels of rock art was excavated. The site was used between 4870 BP and as recently as 200 BP. Stone walls at both sites date to the last 250 years of hunter-gatherer occupation and they may have served as protection against intruders and predators. Pieces of clay ceramic and iron beads found at the site indicates that there was early social interaction between the hunter-gatherer (San) communities and the first farmers who moved into this area at around 500 AD.

6.1.3 Iron Age and historical period

Bantu-speaking people moved into Eastern and Southern Africa about 2,000 years ago (Mitchell, 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. The Iron Age as a whole represents the spread of Bantu speaking people and includes both the Pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD.
- The Late Iron Age: 14th century to colonial period.

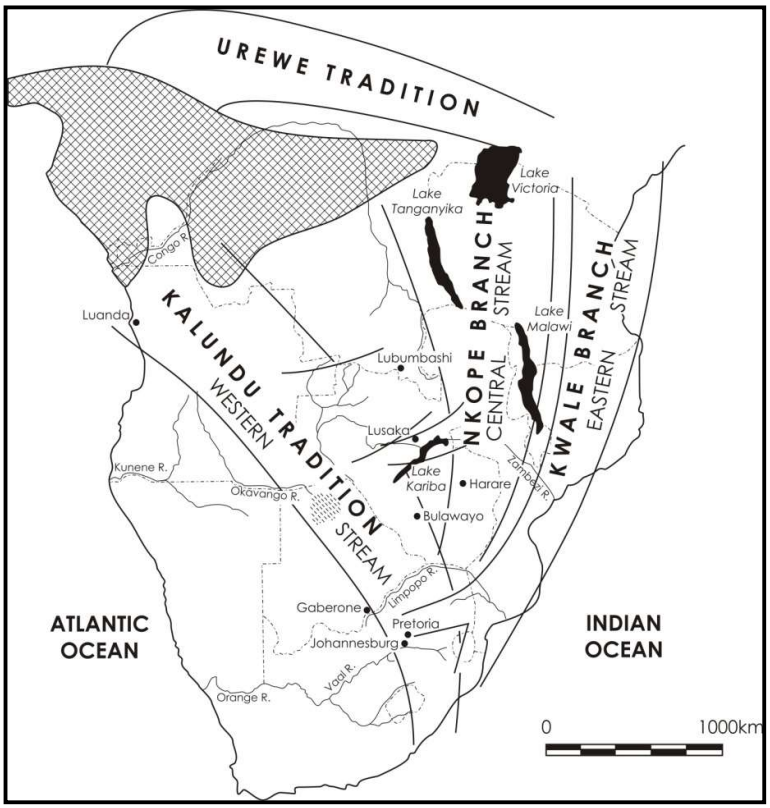


Figure 6.1:Movement of Bantu speaking farmers (Huffman 2007).

The later phases of the Iron Age (AD 1600-1800's) are represented by various tribes including Ndebele, Swazi, BaKoni, and Pedi, marked by extensive stonewalled settlements found throughout the escarpment and particularly around Machadodorp, Lydenburg, Badfontein, Sekhukuneland, Roossenekal and Steelpoort. The BaKoni were the architects of a unique archaeological stone building complex who by the 19th century spoke seKoni which was similar to Sepedi. The core elements of this tradition are stone-walled enclosures, roads and terraces. These settlement complexes may be divided into three basic features: homesteads, terraces and cattle tracks.

Researchers such as Mike Evers (1975) and David Collett (1982) identified three basic settlement layouts in this area. These sites can be divided into simple and complex ruins. Simple ruins are normally small in relation to more complex sites and have smaller central cattle byres and fewer huts. Complex ruins consist of a central cattle byre, which has two opposing entrances and several semi-circular enclosures surrounding it. The perimeter wall of these sites is sometimes poorly visible. Huts are built between the central enclosure and the perimeter wall. These are all connected by track-ways referred to as cattle tracks. These tracks are made by building stone walls, which forms a walkway for cattle to the centrally located cattle byres. A combination of these features occurs on a few dispersed sites to the northwest of the study area (Celliers 2019).
Individual sites range from simple enclosures, which consist of single or two concentric stonewalled circles found in small, isolated settlements, to complex sites with large central enclosures which have smaller enclosures attached to their outer walls. The walls are built with undressed, locally occurring, stone. Walls on average are 0.5 to approximately 1 meter high, although often only the foundation stones are left.

6.1.4 Cultural Landscape

The area is characterized by the development of the R539/Schoemanskloof road, surrounding agricultural activity and is rural in character. The cultural landscape is layered by an extensive Iron Age stone walled component dating to the Bakoni period followed by a historical layer of early western farmers.

6.2 Graves and Burial Sites

No known graves are indicated on databases consulted but graves and cemeteries are widely distributed across the landscape and can be expected anywhere.

7 Description of the Physical Environment

The study area is situated along the R539/ Schoemanskloof road. The vegetation in the study area although transformed in some area's forms part of the Savanna Biome and classed as Legogote Sour Bushveld and the landscape is characterised by gently to moderately upper pediment slopes with dense woodland including many medium to large shrubs, with short thicket occurring on less rocky sites (Mucina and Rutherford, 2009). The area to the west is mountainous levelling down to the east (Figure 7.1).

The project area is characterised by cleared areas next to the existing R539/ Schoemanskloof road within the road servitude. Outside of these areas the physical environment is marked by the farming of citrus and vegetables (eastern section) while the western section is primarily used for Pine and Eucalyptus plantations. Some of the archaeological sites within this area have been preserved such as Blaauboschkraal, however many of the stone walled settlements were probably lost during the original preparation of the plantations. General site conditions are illustrated in Figure 7.2 to 7.11.

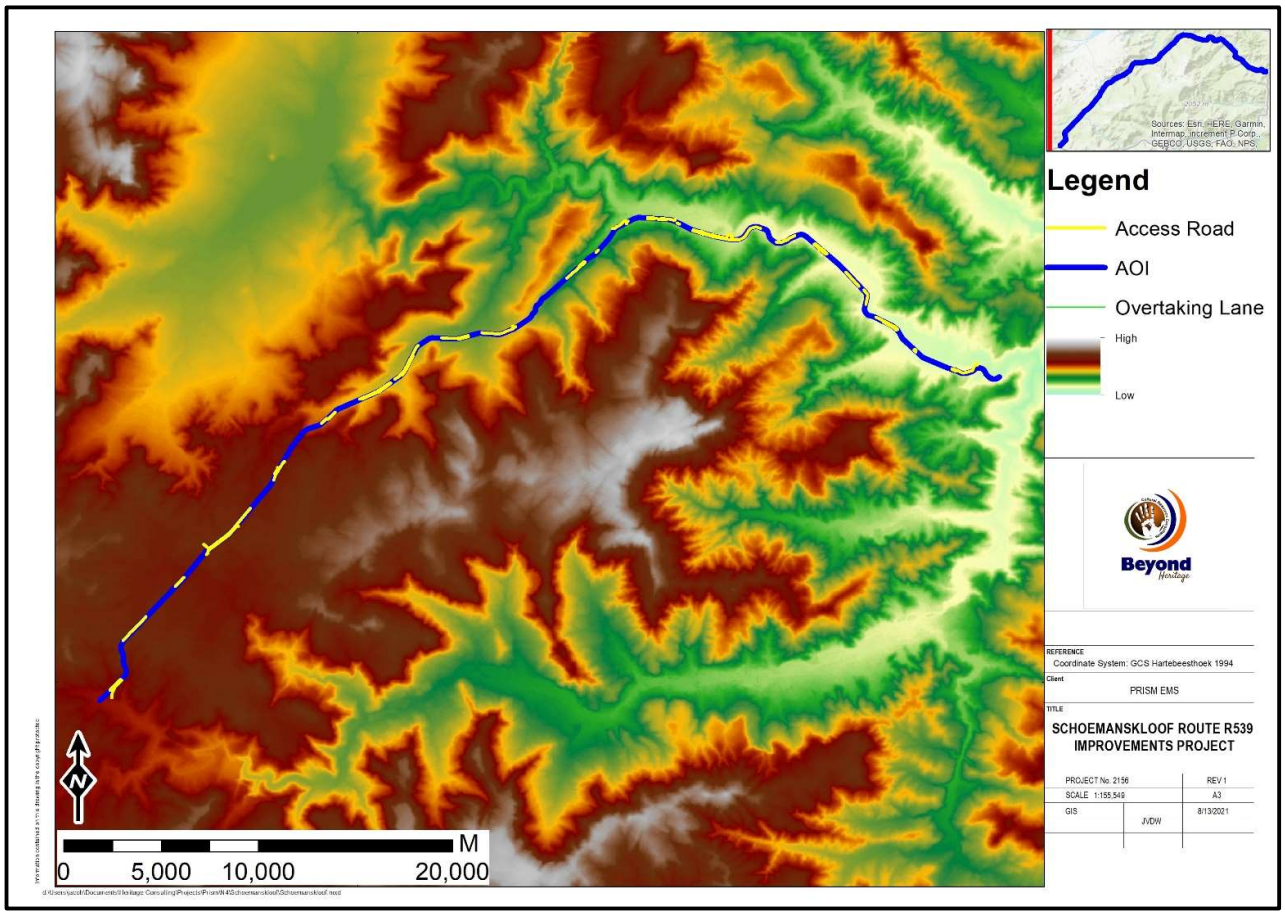


Figure 7.1. Topographical setting of the project.

Figure 7.2. General site conditions.

Figure 7.3. Forestry activities.

Figure 7.4. General site conditions.

Figure 7.5. Fences in the study area.

Figure 7.6. Grass cover in the study area.

Figure 7.7. Grass cover in the study area.

Figure 7.8. Extensive thickets occur throughout the study area.

Figure 7.9. Extensive thickets occur throughout the study area.

Figure 7.10. Existing Eucalyptus plantations.

Figure 7.11. Existing citrus orchards.

8 Findings of the Survey

It is important to note that only the development footprint of the project was surveyed over a week in January and again in June 2021 by two professional archaeologists. The landscape in which the project is located is characterised by LIA stone walled features such as enclosures, terracing and extensive settlements that is commonly associated with Bakoni cultural groups and several sites related to this phase of Iron Age occupation in the Schoemanskloof valley was recorded dating to the 18th century (Delius & Schoeman 2008). Ephemeral low packed stone wall terraces were also recorded often in highly overgrown areas where site-layout and site extent was not discernible. It is unclear if these walls are historical or dating to the Iron Age period. Older sites dating to the Early Iron Age occupation was also recorded, marked by low densities of ceramics without stone walls, diagnostic ceramics are stylistically similar to the Klingbeil *facies* dating to AD 1000 to 1200 (Huffman 2007). Construction of the existing Schoemanskloof road impacted on several of the recorded Iron Age features.

Several burial sites were recorded consisting of stone packed grave dressings, some with headstones and more grave sites are expected to occur in the proximity of the proposed road upgrades. Lastly some older farmsteads and ruins were recorded, some are historical, but most are modern and of no heritage concern. The location of the recorded heritage features is spatially illustrated in Figure 8.1 and briefly described under Section 8.1 to 8.4 of this report.

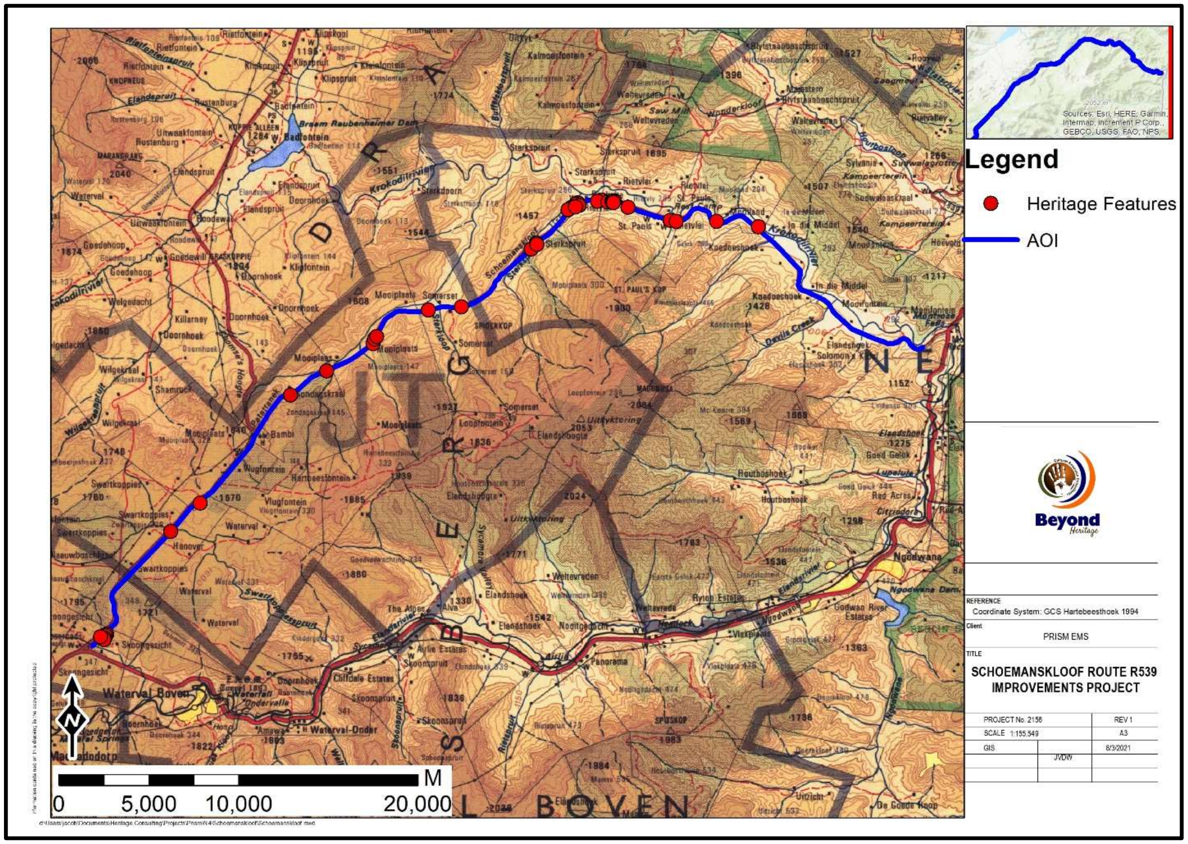


Figure 8.1. Site distribution map.

8.1 Built Environment (Section 34 of the NHRA)

Nine features related to the built environment were recorded. Features range from rectangular stone-built structures to bridges and modern ruins that are of no heritage significance.

Table 8. Structures identified in the study area.

Label	Longitude	Latitude	Description Report	Type Site	Heritage Significance	Field Rating
SCH005	30° 17' 04.2132" E	25° 36' 13.6145" S	Concrete bridge of unknown age and a section of the old tar road.	Possibly a historical feature	Low to medium significance	GP B
SCH006	30° 20' 04.1348" E	25° 32' 12.2322" S	Cement slabs and concrete mix of recent origin	Modern feature possibly related to road construction	No significance (recorded to avoid confusion)	GP C
SCH013	30° 31' 25.8093" E	25° 23' 10.5456" S	Broken down lodge-Falcon glen (Modern Features)	Modern ruin	No Heritage Significance	GP C
SCH014	30° 31' 22.0719" E	25° 23' 12.4914" S	Broken down and overgrown labourer housing	Modern Ruin	No Heritage Significance	GP C
SCH022	30° 32' 19.6618" E	25° 23' 08.7181" S	Cement slab.	Recent	Low Significance	GP C
SCH023	30° 32' 32.1350" E	25° 23' 06.5767" S	Ephemeral walls possibly related to terracing at the farmstead. The area is very overgrown. The structures are not in use and dilapidated.	Historical structure	Low to medium significance	GP B
SCH025	30° 32' 56.3479" E	25° 23' 18.0584" S	Demolished remains of ruins with stone foundations with a possible more recent addition. The site is highly overgrown.	Historical homestead	Low to medium significance	GP B
SCH028	30° 35' 36.4740" E	25° 23' 43.9105" S	Recent homestead with a bridge crossing the river dating to 1966.	Historical homestead	Low significance	GP C
SCH030	30 19 11.2800	25 33 03.3264	Remnants of a small historical homestead approx. 20m from the roadside in an inaccessible area. The structures are stone built with multiple foundations scattered close to the standing feature. The small homestead is situated close to a stream that also has small stone built features that seem to have been built to prevent erosion.	Rectangular stone-built ruin, no roof only walling remain	Low to medium significance	GP B
SCH032	30° 23' 52.8431" E	25° 28' 13.7603" S	Remnants of a ruin approx. 10 m from the roadside within an inaccessible area on the other side of a large fence.	Historical homestead	Low to medium significance	GP B

Figure 8.2. General site conditions at SCH 005.

Figure 8.3. SCH 006 remains of a modern feature possibly related to road construction.

Figure 8.4. Modern ruin at SCH 013

Figure 8.5. Modern feature at SCH014

Figure 8.6. Modern feature possibly related to homestead at SCH023.

Figure 8.7. Stone packed foundations of a historical homestead at SCH025.

Figure 8.8. Bridge at SCH028

Figure 8.9. Remains of rectangular stone-built feature at SCH 030.

8.2 Archaeological resources (Section 35 of the NHRA)

Nineteen features were recorded with stone packed walls and Iron Age Artefacts. Due to dense vegetation accessibility and visibility was limited in many of these areas. The greater area is known for extensive stone walled settlements and these finds concur with previous finds by Van Schalkwyk (2007) and Van der Walt (2015).

Table 9. Archaeological sites located in the study area

Label	Longitude	Latitude	Description Report	Heritage Significance	Field Rating
SCH001	30° 17' 15.6374" E	25° 36' 09.0567" S	SCH001-SCH004 marks a cluster of packed stone walled features running along the proposed line. These stone walled features seem to form part of a much larger series of stone walled ruins that extent across the landscape in an eastern direction over the various hills. These extensive ruins can be seen on the historical imagery on Google earth. This area has a substantial grass cover making ground visibility here fairly low.	Medium significance	GP B
SCH002	30° 17' 13.7004" E	25° 36' 11.5733" S		Medium significance	GP B
SCH003	30° 17' 12.3497" E	25° 36' 15.9383" S		Medium significance	GP B
SCH004	30° 17' 10.8661" E	25° 36' 18.6989" S		Medium significance	GP B
SCH007	30° 25' 16.1510" E	25° 27' 24.6823" S	Ephemeral stone walling in an extensive thicket. The site is highly overgrown, and it is not possible to determine layout or time period.	Low to medium significance	GP B
SCH008	30° 25' 19.2299" E	25° 27' 16.1554" S	Remains of ephemeral walling. Probably robbed to build stone walls for garden landscaping/terraces at adjacent residential dwelling	Low to medium Significance	GP B
SCH009	30° 26' 55.9961" E	25° 26' 23.8724" S	Low density undiagnostic ceramic scatter and grinding stone exposed by trenching next to fence. No other cultural deposit visible	Low Significance	GP C
SCH010	30° 27' 55.7067" E	25° 26' 18.1566" S	Possible Iron Age ephemeral stone walls. The site is highly overgrown, and it is not possible to determine site layout or time period.	Low Significance	GP C
SCH011	30° 30' 01.9365" E	25° 24' 33.7955" S	Iron Age stone wall settlement within inaccessible thickets next to existing Schoemanskloof road. The road impacted on a section of the site.	Low Significance	GP C
SCH012	30° 30' 11.5146" E	25° 24' 22.8682" S	Early Iron Age site decorated ceramics could indicate Klingbeil ceramic facies. Sorghum lower grinder on site. The site is exposed by agricultural activities.	Medium significance	GP B
SCH015	30° 31' 16.3280" E	25° 23' 17.6289" S	Late Iron Age site with multiple sections of packed stone walling. The walls are ephemeral and highly overgrown limiting visibility and site layout, or time period could not be determined.	Low Significance	GP C
SCH016	30° 31' 12.2506" E	25° 23' 19.8473" S	Ephemeral stone walls next to road leading to modern dwelling. The walls are highly overgrown, and it is not possible to determine site layout or time period.	Low Significance	GP C
SCH017	30° 31' 07.9942" E	25° 23' 22.8554" S	Ephemeral stone wall in overgrown thicket.	Low Significance	GP C
SCH021	30° 32' 01.0940" E	25° 23' 07.1435" S	Ephemeral stone walling in an overgrown thicket. The walls are ephemeral and highly overgrown limiting visibility and site layout, or time period could not be determined.	Low to medium Significance	GP B
SCH026	30° 34' 12.4236" E	25° 23' 41.6793" S	Upper grinding stone, no other cultural material is noted.	Low significance	GP C

SCH027	30° 34' 23.4627" E	25° 23' 43.5511" S	Possible ephemeral walling forming terraces next to drainage line. The site is overgrown and difficult to determine if the linear looking stones are anthropogenic.	Low significance	GP C
SCH029	30° 36' 51.6729" E	25° 23' 53.3624" S	Low density scatter of undiagnostic ceramics exposed in agricultural field.	Low Significance	GP C
SCH031	30° 22' 47.0353" E	25° 28' 57.1871" S	Large area of multiple stone-built enclosures. The stone features extend far into the surrounding environment. These features are highly disturbed and overgrown making it difficult to determine layout and could contain Iron Age and historical components.	Medium significance	GP B
SCH033	30° 25' 22.8432" E	25° 27' 11.7899" S	Multiple areas of Circular stone walling on the edge of the road buffer. These features are highly disturbed with some areas having been cut through due to the construction of the road. The rest of these features continue into an inaccessible area on the other side of the road buffer fence line. Waypoints taken at multiple locations to indicate the closest existing features within the development area.	Low to medium significance	GP B

Figure 8.10. Stone walled feature at SCH 001.

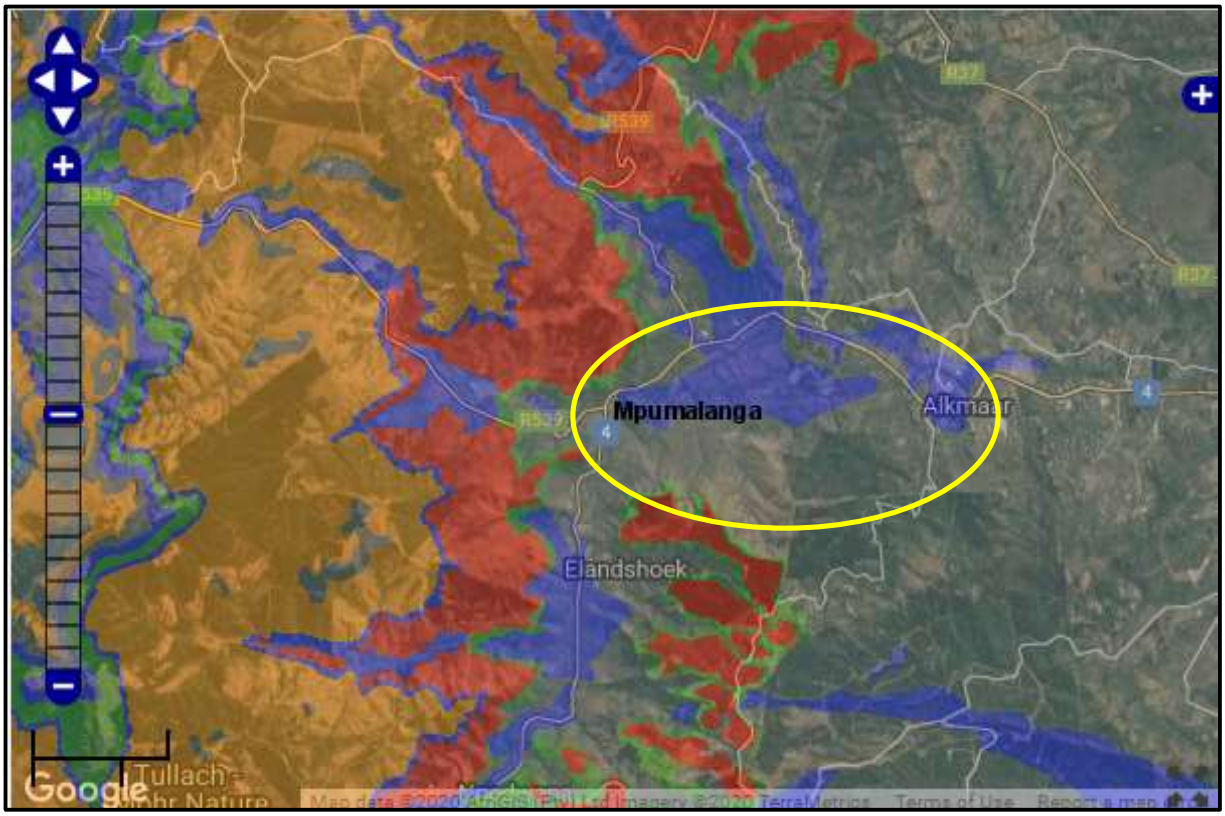
Figure 8.11. Stone packed feature at SCH002.

Figure 8.12. Ephemeral stone walling at SCH 003.

Figure 8.13. Stone packed walls at SCH 004.

8.3 Paleontological Heritage (Section 35 of the NHRA)

According to the paleontological sensitivity of the study area based on the SAHRA Paleontological map no further studies are required (Figure 8-14).



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map

Figure 8.14. Paleontological sensitivity of the approximate study area as indicated on the SAHRA Palaeontological sensitivity map.

8.4 Burial sites and graves (Section 36 of the NHRA)

Four burial sites were recorded during the study characterized by both stone packed informal graves as well as gravestones with inscriptions in formal cemeteries. Graves are always of high social significance and due to the dense vegetation and the fact that graves can occur anywhere across the landscape more graves can be expected in the AoI.

Table 10. Burial sites identified in the survey.

Label	Longitude	Latitude	Description Report	Type Site	Heritage Significance	Field Rating
SCH018 / Grave Site 1	30° 31' 27.9866" E	25° 23' 15.1399" S	Stone packed foundations of dwelling with small cemetery of at least 5 graves with stone packed grave dressings.	Graves and homestead	High Social Significance	GP A
SCH019 / Grave Site 2	30° 31' 21.3984" E	25° 23' 17.5673" S	Graves of the Bos family located next to road. Inscriptions date the cemetery to 2016 with possible older graves present as well	Graves	High Social Significance	GP A
SCH020/ Grave Site 3	30° 32' 09.6939" E	25° 23' 05.4660" S	Small cemetery located in a bamboo thicket. Graves are marked by stone packed grave dressings and large stones as headstones	Graves	High Social Significance	GP A
SCH024/ Grave Site 4	30° 32' 27.7752" E	25° 23' 06.7570" S	Small cemetery located within thicket with 4 visible graves of the Schoeman family. The graves are marked by cement borders and headstones. Visible inscriptions date the cemetery to 1934.	Graves	High Social Significance	GP A

Figure 8.15. Stone packed grave at SCH018.

Figure 8.16. Grave of Nicolaas Jan Bas and Susanna C.M. Bos dating to 2016 at SCH 019

Figure 8.17. Overgrown stone packed grave at SCH020.

Figure 8.18. Grave of Petrus Schoeman at SCH024.

9 Potential Impact

Based on the current lay-out numerous heritage resources will be impacted on by the proposed road upgrade activities. Destruction of heritage resources is a direct and permanent impact and irreversible. Site-specific impacts will differ due to the extent and intensity of impact on resources with different levels of cultural significance. Potential impacts are outlined in Table 12 – 17. The sites are indicated in relation to the project impact area in Annexure B. The biggest impact will be on burial sites that will be located within the servitude of low traffic, gravel access roads and although this is potentially a high impact it can be mitigated to an acceptable level.

The anticipated impact of the project is medium to high prior to mitigation. With the implementation of the mitigation measures as indicated in Table 11 the impact can be mitigated to an acceptable level. No additional impacts are expected after the construction phase.

9.1 Pre-Construction phase

It is assumed that the pre-construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure needed for the construction phase. These activities can have a negative and irreversible impact on heritage features if any occur. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. Potential impacts include destruction or partial destruction of non-renewable heritage resources.

Table 11. Impact and mitigation measures for recorded resources.

Label	Longitude	Latitude	Type Site	Heritage Significance	Field Rating	Impact	Area	Mitigation
SCH001	30° 17' 15.6374" E	25° 36' 09.0567" S	IA – Stone walled cluster	Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH002	30° 17' 13.7004" E	25° 36' 11.5733" S	IA - Stone walled cluster	Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH003	30° 17' 12.3497" E	25° 36' 15.9383" S	IA - Stone walled cluster	Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH004	30° 17' 10.8661" E	25° 36' 18.6989" S	IA - Stone walled cluster	Medium significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH005	30° 17' 04.2132" E	25° 36' 13.6145" S	Possibly a historical feature	Low to medium significance	GP B	No direct Impact (40 m away from the overtaking lanes)	Access Road	No Mitigation

SCH006	30° 20' 04.1348" E	25° 32' 12.2322" S	Modern feature possibly related to road construction	No significance (recorded to avoid confusion)	GP C	Outside of the development footprint (59 m from the access road)	Access Road	No Mitigation
SCH007	30° 25' 16.1510" E	25° 27' 24.6823" S	Unknown likely IA	Low to medium significance	GP B	Direct	Access Road and road widening	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH008	30° 25' 19.2299" E	25° 27' 16.1554" S	Multicomponent - possibly IA and recent (Proximity to SCH033 causes a higher significance rating).	Low to medium Significance	GP B	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH009	30° 26' 55.9961" E	25° 26' 23.8724" S	IA- Ceramic Scatter	Low Significance	GP C	Direct	Access Road	Monitor during construction
SCH010	30° 27' 55.7067" E	25° 26' 18.1566" S	Possible IA terracing.	Low Significance	GP C	Direct	Access Road	The area should be cleared to confirm the presence of features. If features are found mapping and destruction permit. The area should be monitored during construction.
SCH011	30° 30' 01.9365" E	25° 24' 33.7955" S	IA – cluster of stone packed features	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.

SCH012	30° 30' 11.5146" E	25° 24' 22.8682" S	IA – possible EIA site with ceramic scatter	Medium significance	GP B	Direct	Access Roads	Test Pits
SCH013	30° 31' 25.8093" E	25° 23' 10.5456" S	Modern ruin	No Heritage Significance	GP C	Direct	Access Road	No Mitigation
SCH014	30° 31' 22.0719" E	25° 23' 12.4914" S	Modern Ruin	No Heritage Significance	GP C	Direct	Access Road	No Mitigation
SCH015	30° 31' 16.3280" E	25° 23' 17.6289" S	IA/ historical walling	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH016	30° 31' 12.2506" E	25° 23' 19.8473" S	IA/ historical walling	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH017	30° 31' 07.9942" E	25° 23' 22.8554" S	IA/ historical walling	Low Significance	GP C	Direct	Access Road	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.
SCH018	30° 31' 27.9866" E	25° 23' 15.1399" S	Graves and homestead	High Social Significance	GP A	Potential direct impact	Access Road	Retain in situ. Monitor during construction and operation.
SCH019	30° 31' 21.3984" E	25° 23' 17.5673" S	Graves	High Social Significance	GP A	Potential direct impact	Access Road	Retain in situ. Monitor during construction and operation.

SCH020	30° 32' 09.6939" E	25° 23' 05.4660" S	Graves	High Social Significance	GP A	Potential direct impact	Access Road	Retain in situ. Monitor during construction and operation.
SCH021	30° 32' 01.0940" E	25° 23' 07.1435" S	IA – ephemeral stone walling	Low to medium Significance	GP B	No direct Impact (20 m from access road)	Access Road	Indicate on development plans and avoid.
SCH022	30° 32' 19.6618" E	25° 23' 08.7181" S	IA – stone packed feature	Low Significance	GP C	No direct Impact (27 m from access road)	Access Road	Indicate on development plans and avoid.
SCH023	30° 32' 32.1350" E	25° 23' 06.5767" S	Historical structure	Low to medium significance	GP B	Direct	Access Road and road widening	Mapping and permitting
SCH024	30° 32' 27.7752" E	25° 23' 06.7570" S	Graves	High Social Significance	GP A	Potential direct impact	Access Road	Retain in situ. Monitor during construction and operation.
SCH025	30° 32' 56.3479" E	25° 23' 18.0584" S	Historical homestead	Low to medium significance	GP B	Direct impact	Access Road and road widening	Mapping and permitting
SCH026	30° 34' 12.4236" E	25° 23' 41.6793" S	IA -upper grinding stone	Low significance	GP C	Indirect impact (18 m from the access road)	Access Road	Monitor during construction
SCH027	30° 34' 23.4627" E	25° 23' 43.5511" S	Unknown likely IA	Low significance	GP C	Indirect impact (15 m from the access road)	Access Road	Monitor during construction
SCH028	30° 35' 36.4740" E	25° 23' 43.9105" S	Historical homestead	Low significance	GP C	No direct Impact	Access Road	Map on development plans and avoid structures.

SCH029	30° 36' 51.6729" E	25° 23' 53.3624" S	IA – Low density ceramic scatter	Low Significance	GP C	No direct Impact	Access Road	No Mitigation
SCH030	30 19 11.2800	25 33 03.3264	Rectangular stone-built ruin, no roof only walling remain	Low to medium significance	GP B	No direct Impact (60 m from the access road)	Road Widening Site	No Mitigation
SCH031	30° 22' 47.0353" E	25° 28' 57.1871" S	IA – stone walling	Medium significance	GP B	Within the impact area	Road Widening Site	Avoidance. If this is not possible Phase 2 mitigation and destruction permit.
SCH032	30° 23' 52.8431" E	25° 28' 13.7603" S	Historical homestead	Low to medium significance	GP B	Outside of the development footprint (12 m)	Road Widening Site	Indicate on development plans and avoid.
SCH033	30° 25' 22.8432" E	25° 27' 11.7899" S	IA – stone walling	Low to medium significance	GP B	Direct	Road Widening Site and access road	Avoidance. If this is not possible Phase 2 mitigation and destruction permit.

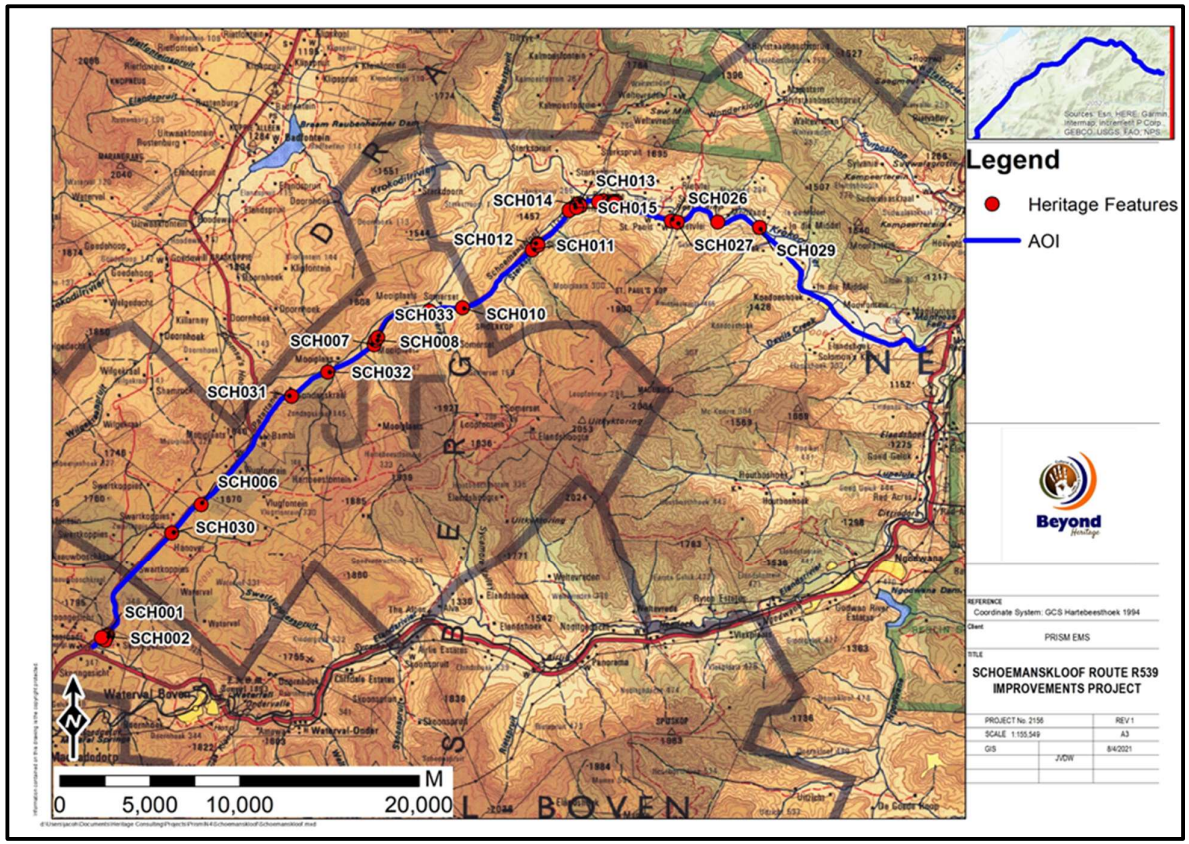


Figure 9.1. Sites in relation to the project area.

The significance of the identified impacts is determined by using the accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998.

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

9.2.1 Impact assessment – Structures and Ruins

It should be noted that recorded features SCH013 and SCH014 are modern ruins and of no heritage significance. Therefore, from a heritage point of view the impact on these structures is of no significance.

Table 12. Impact Assessment of structures and ruins that will be directly impacted on (Site SCH023 and SCH025)

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION						
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Structures and ruins	**Access Road and Road widening construction**	**6**	**5**	**3**	**5**	**5**	**4**	**96**	**MH**	**Medium**	**Negative**	**The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.**	**4**	**5**	**3**	**5**	**5**	**2**	**44**	**L**

Table 13. Impact Assessment of structures and ruins outside the development footprint (SCH005, SCH006, SCH022, SCH028, SCH030, SCH032)

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION						
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Structures and Ruins	Construction of access roads and	4	5	3	5	5	1	22	L	Low	Negative	The sites must be indicated on development plans and avoided.	2	5	3	5	5	1	20	L

	road widening,																		

9.2.2 Impact assessment – Archaeology

Table 14. Impact assessment of the proposed project on archaeological resources directly impacted on (Iron Age sites SCH009, SCH010,SCH011, SCH015, SCH016, SCH017)

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Archaeological Resources - Iron Age sites	Access Road and Road widening construction	6	5	3	5	5	4	96	MH	Medium	Negative	The area should be cleared, the features should be mapped after which a destruction permit should be applied for. The area should be monitored during construction.	4	5	3	5	5	2	44	L

Table 15. Impact assessment of the proposed project on archaeological resources indirectly impacted on (Iron Age sites SCH 26 and 27).

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Archaeological Resources - Iron Age sites	Construction of access roads and road widening,	4	5	3	5	5	3	66	M	Low	Negative	The sites must be indicated on development plans and monitored during construction	2	5	3	5	5	2	40	L

Table 16. Impact assessment of the proposed project on archaeological resources outside the impact area (SCH022 and SCH029)

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Archaeological Resources - Iron Age sites	Construction of access roads and road widening,	4	5	3	5	5	1	22	L	Low	Negative	The sites must be indicated on development plans and avoided.	2	5	3	5	5	1	20	L

9.2.3 Impact assessment – Burial sites

Table 17. Impact assessment of the proposed project on burial sites that will be directly impacted on (Sites SCH018, SCH019, SCH020, SCH024).

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Archaeological Resources – Burial Sites	Access Road and Road widening construction	6	5	3	5	5	5	120	High	Medium	Negative	• Retain *in-situ ;* • Consultation with NOK to obtain permission for encroachment onto burial sites. • Implementation of a DMP; • The area sites should be monitored during construction and operation.	4	5	3	5	5	3	66	M

10 Conclusion and recommendations

The study area is extensively disturbed by road developments and agricultural developments. The larger area is known for Iron Age sites and the presence of Iron Age sites in the study area was confirmed during the field survey together with structures and ruins (both modern and historical). The survey also recorded four areas with burial sites.

Graves are of high social significance and preserving the identified grave sites *in situ* is the preferred option. To preserve the graves *in-situ* with a buffer zone, the client considered moving the intersection, however, should the intersection be moved, the available intersection sight distance will reduce (below the SANRAL standard) and create an unsafe intersection point. The client is also limited by the surrounding topography and to retain the graves *in situ* deviation from the accepted buffer zones as stipulated by SAHRA will be required. To mitigate the lack of a safe buffer zone permission from the NOK will have to be obtained through social consultation for encroaching on the burial sites, a DHMP will have to be implemented and the area will have to be monitored during construction to ensure that the graves are not damaged. Plan drawings of the intersection design in relation to the grave sites are included as Annexure C.

According to the SAHRIS paleontological sensitivity map the area is of low paleontological sensitivity and no further studies are required.

The anticipated impact of the project is high prior to mitigation. With the implementation of the site-specific mitigation measures as indicated in Table 11 and the general recommendations below the impact can be mitigated to an acceptable level (medium). It is recommended that the proposed project is approved on the condition that the recommendations outlined under Section 10 are implemented as part of the EMPr and based on approval from SAHRA.

10.1 Recommendations for condition of authorisation

The following recommendations (Section 10.1, 10.2, 10.5 and 10.6) for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA:

Recommendations:

- Preservation of recorded heritage features *in-situ* if this is not possible mitigation measures for these sites are outlined in Table 2;
- If the recorded grave sites are to be retained *in-situ* without a 30 m buffer zone then a social consultation process in terms of Chapter XI of the NHRA Regulations, must be carried out to identify the descendants of the burials and to obtain permission to encroach on the identified graves;
- Should final adjustments be made to the preliminary access route alignments due to heritage sensitivities already found, a final heritage walkdown must be conducted for these sections where changes are made;
- Should additional heritage constraints be identified through the Public Participation Process of the BAR, these must be included in the Final EMPr for implementation during and after construction;
- Compilation of a Development Heritage Management Plan (DHMP) to ensure ongoing protection and management of recorded heritage resources; and
- Implementation of a chance find procedure for the project.

10.2 Chance Find Procedures

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the Site Environmental Control Officer (SECO) and/ or Contractor Environmental Control Officer (CECO) of the chance find and its immediate impact on operations. The CECO/ SECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.3 Reasoned Opinion

The anticipated impact of the project is medium to high prior to mitigation, with the implementation of the mitigation measures as indicated in Table 19 and the recommendations in the report the impact can be mitigated to an acceptable level. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation, as well as require additional layout changes.

10.5 Monitoring Requirements

Ideally, site monitoring should be conducted by an experienced archaeologist or heritage specialist. Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The CECO/ SECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief*: As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are the initial soil removal and subsequent earthworks during construction. The CECO/ SECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 18. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Clearing activities and construction	Entire project area	SECO and CECO	SECO to inspect proposed corridors of construction in advance of clearing. CECO to confirm the same when on site.	Proactively	• Apart from keeping the four burial sites identified in mind prior to clearing activities, the SECO is to inspect all proposed corridors of construction in advance of clearing. Should any finds be noted, the CECO must be informed. • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
					5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.
SCH009 SCH026 SCH027	Access Roads	SECO and CECO	SECO to monitor and record sites pre- and during construction. CECO to confirm the same when on site.	Proactively	• Measure levels of subsidence and compare with recorded baseline conditions; • Status quo will be recorded through photographs; • Results will be maintained; and • Results will be reported in the progress reporting.
SCH021 SCH022 SCH028 SCH032	Access Roads and road widening	SECO and CECO	SECO to monitor and record sites pre- and during construction on a bi-weekly basis. CECO to confirm the same when on site.	Pro Actively	• Measure levels of subsidence and compare with recorded baseline conditions; • Status quo will be recorded through photographs; • Results will be maintained; and • Results will be reported in the progress reporting.

10.6 Management Measures for inclusion in the EMPr

Individual site mitigation measures are included in Table 11 and should be implemented together with the chance find procedure detailed in Table 19.

Table 19. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Pre Construction and construction	Throughout the project	SECO and CECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	CECO monthly inspections and reports ECO Checklist and Report
Entire project area	Preservation of recorded heritage features *in-situ* if this is not possible mitigation measures for these sites are outlined in Table 11.	All phases	Throughout entire project	SECO and CECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	CECO monthly inspections and reports ECO Checklist and Report
Entire project area	Should final adjustments be made to the preliminary access route alignments due to heritage sensitivities already found, a final heritage walkdown must be conducted for these sections where changes are made	Preconstruction	Preconstruction	SECO and CECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	CECO monthly inspections and reports ECO Checklist and Report
Entire project area	Clear management actions must be encapsulated in the EMPR to ensure the ongoing preservation of heritage resources adjacent to the development and submitted to SAHRA for approval	Preconstruction	Preconstruction	Independent EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	Management actions incorporated in the EMPr for Construction.
Entire project area	Should additional heritage constraints be identified through the Public Participation Process of the BAR, these must be included in the	Pre Construction	Pre Construction	Independent EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section	Any additional heritage constraints included in the final

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
	Final EMPr for implementation during and after construction				34, 35, 36 and 38 of NHRA	EMPr for Construction.

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12 Annexure A

Track logs of the survey from the western section ending in the eastern section are included in Figure 12. 1 to 12.5.

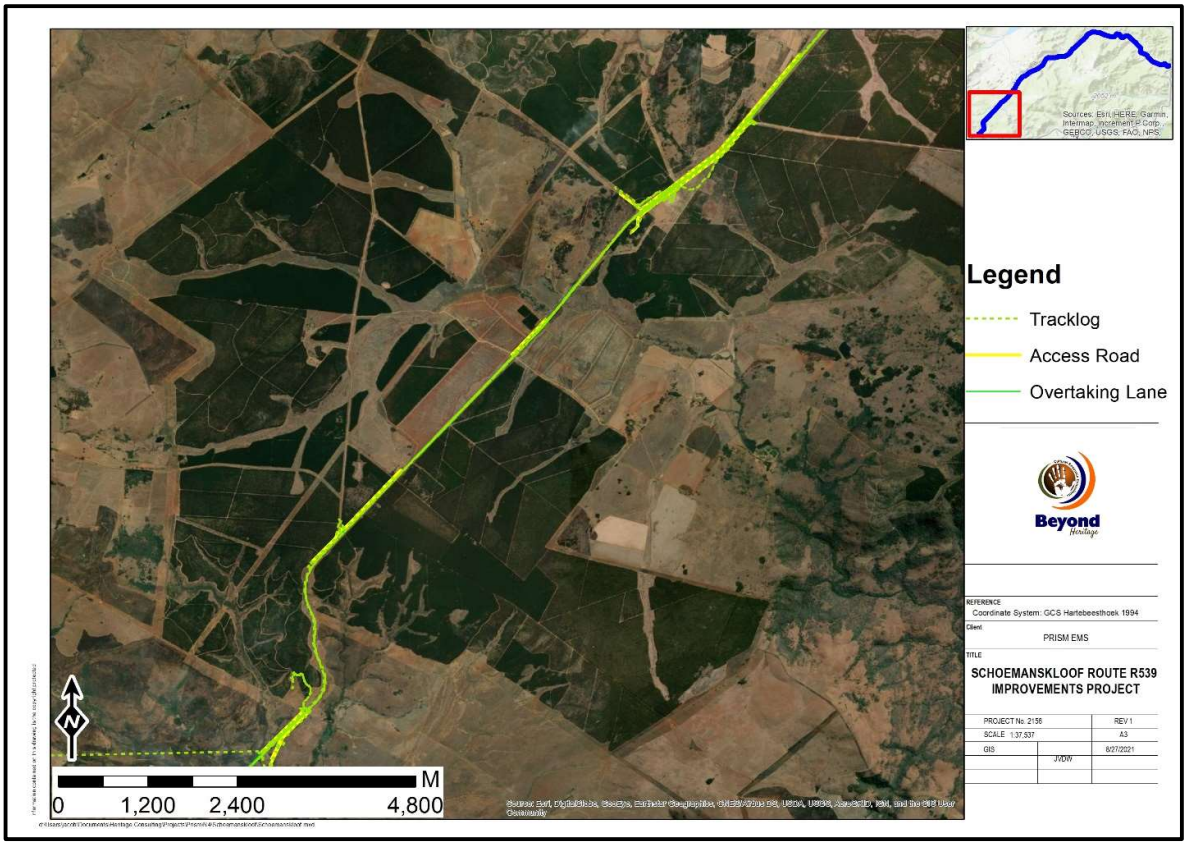

Figure 12.1. Track logs of the survey.

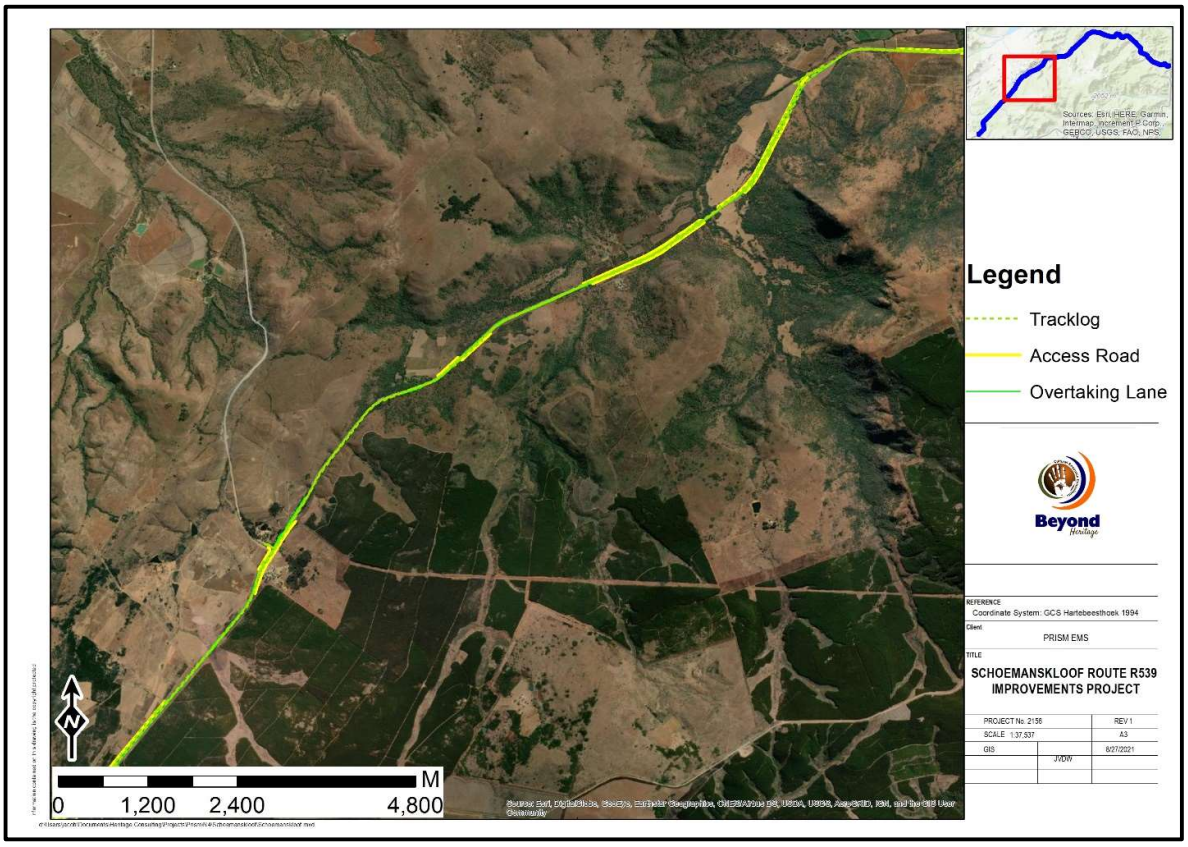

Figure 12.2. Track logs of the survey.

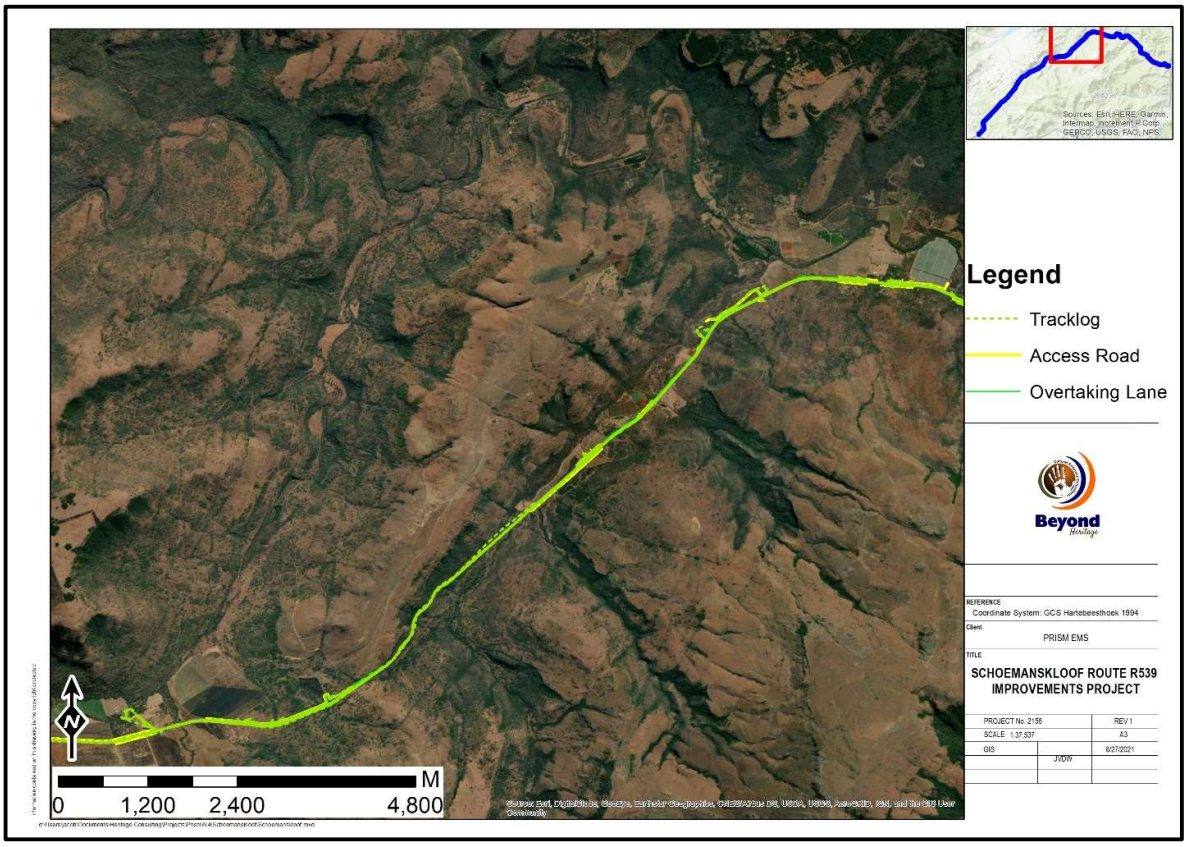

Figure 12.3. Track logs of the survey.

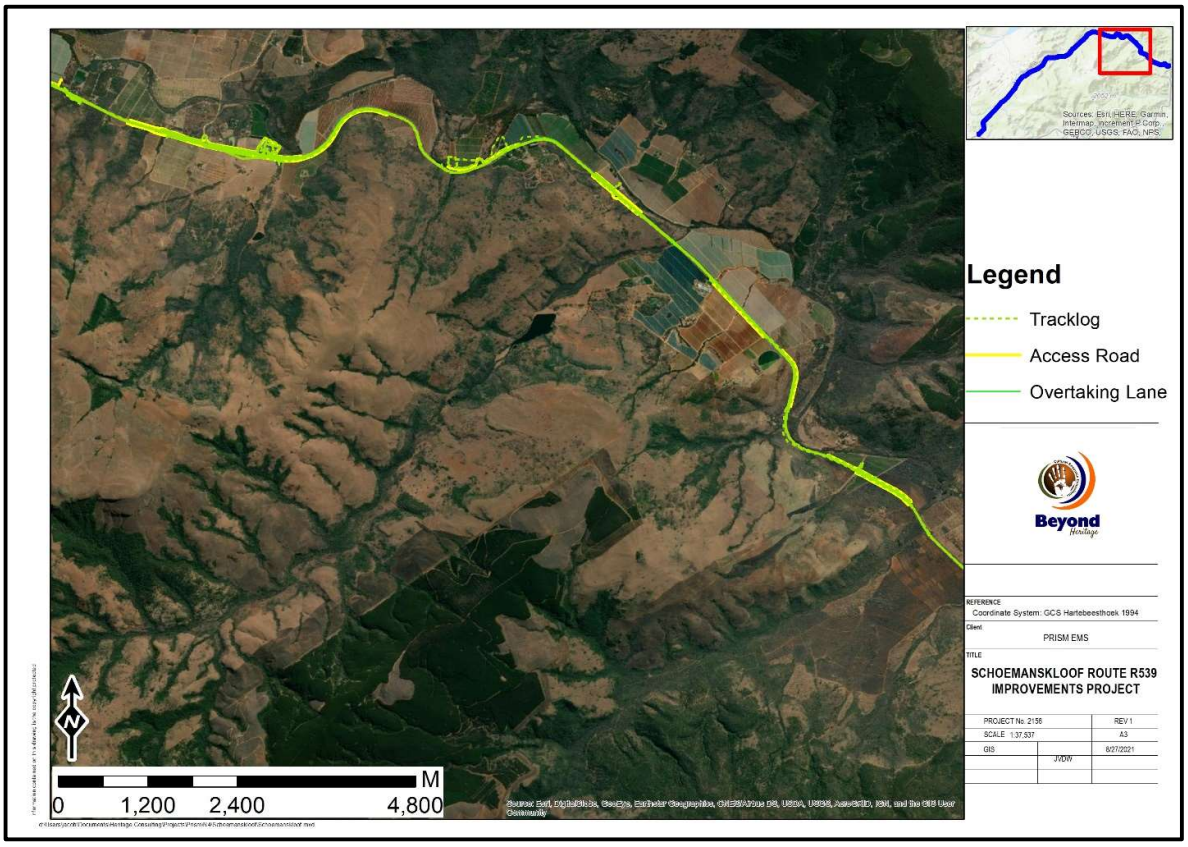

Figure 12.4. Track logs of the survey.

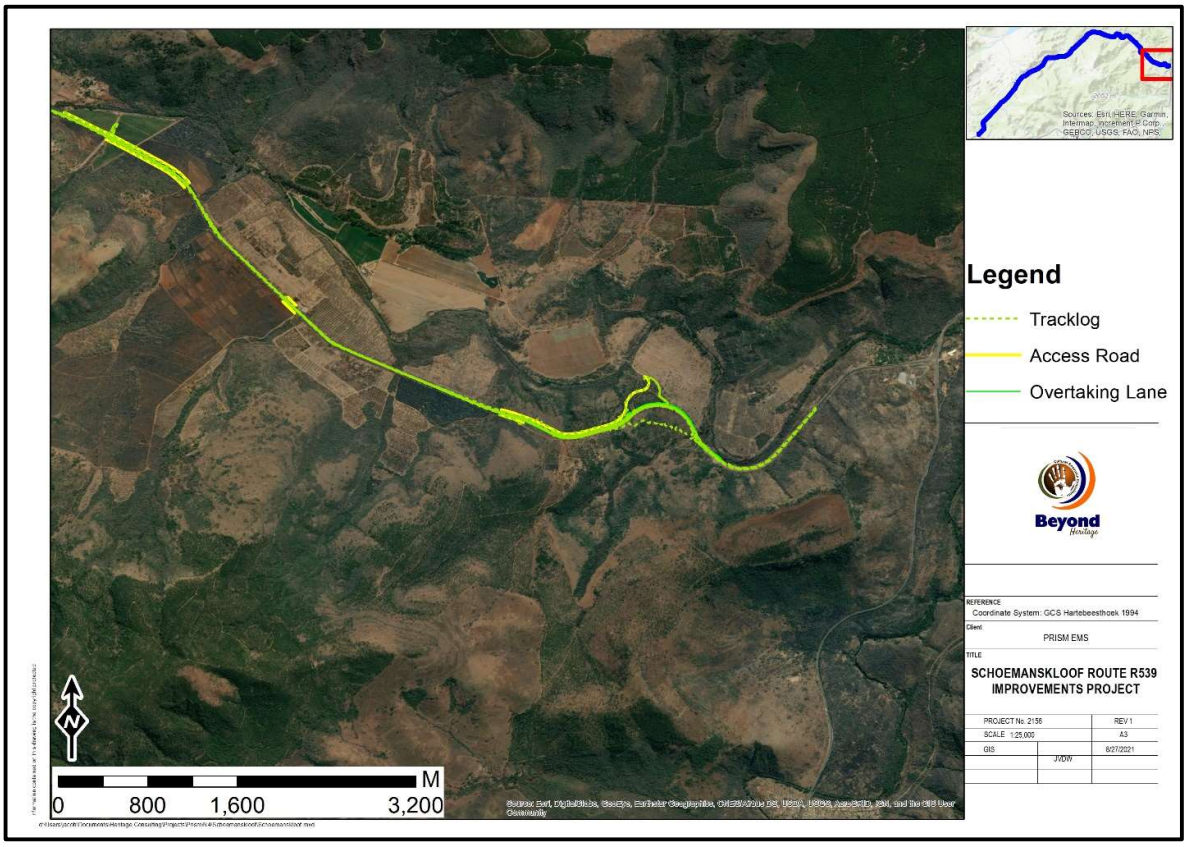

Figure 12.5. Track logs of the survey.

13 Annexure B

Impact of the project on the recorded resources.

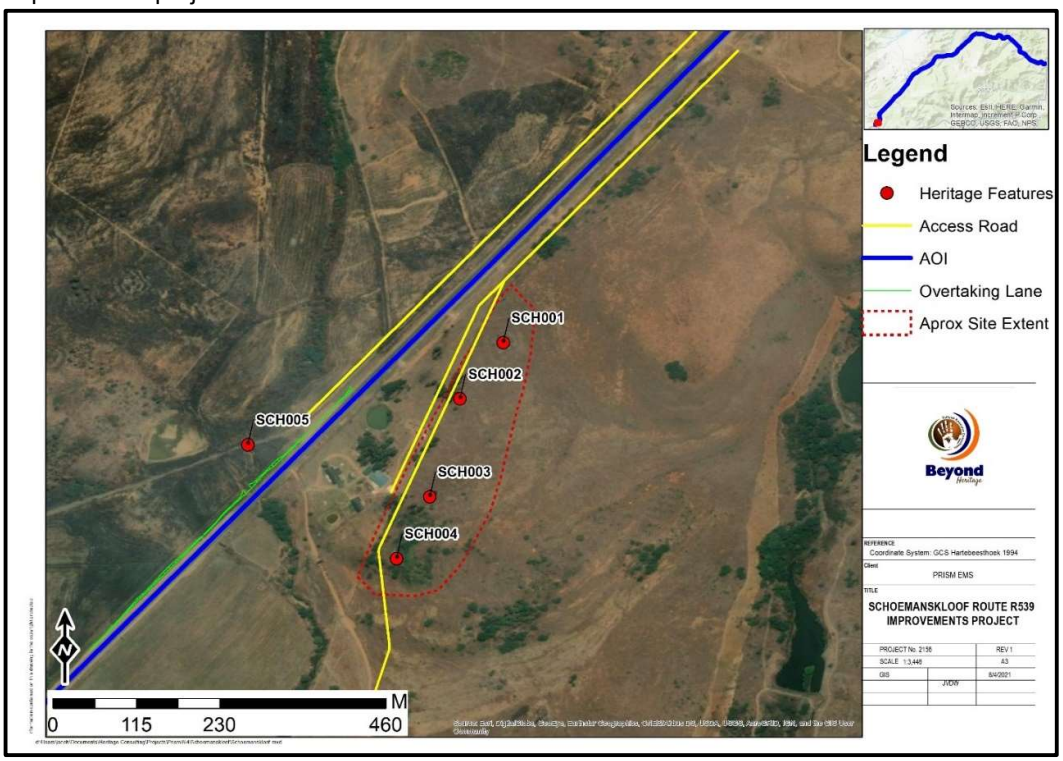

Figure 13.1. Site 1 – 5 in relation to the proposed project.

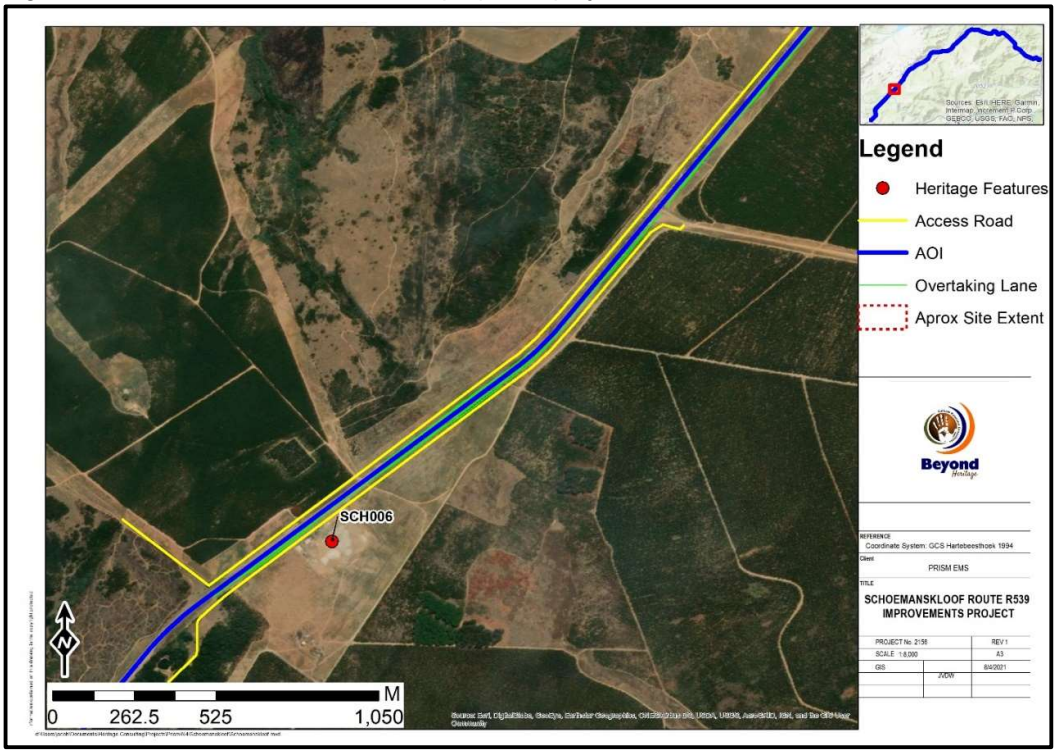

Figure 13.2. Site 6 in relation to the project.

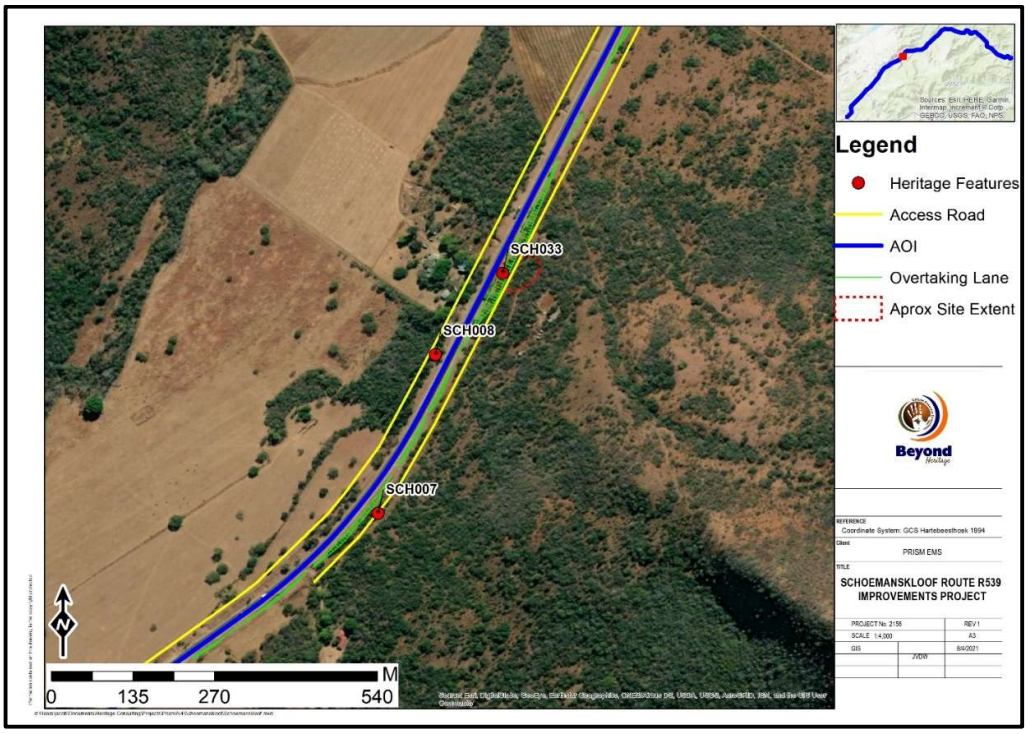

Figure 13.3. Site 7, 8 and 33 in relation to the project.

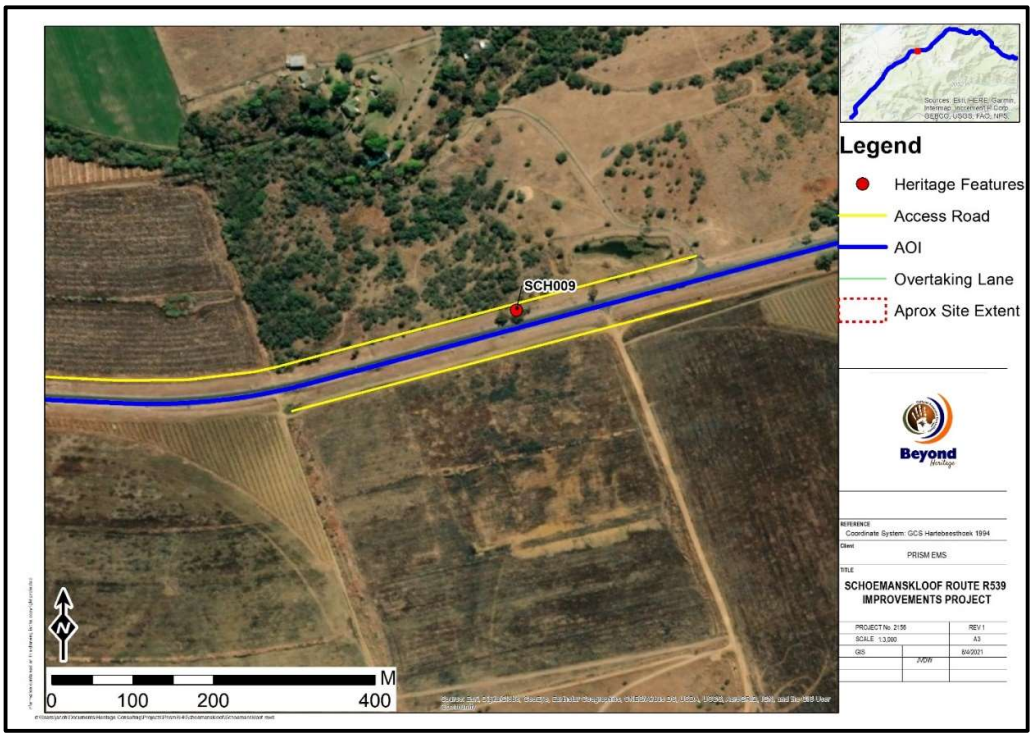

Figure 13.4. Site 9 in relation to the project.

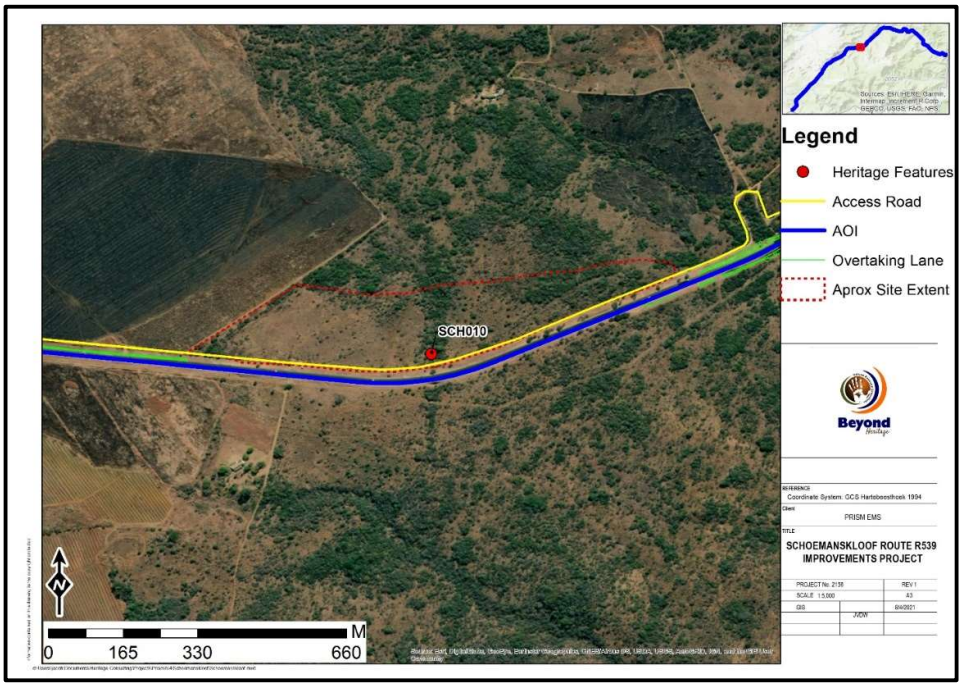

Figure 13.5. Site 10 in relation to the project.

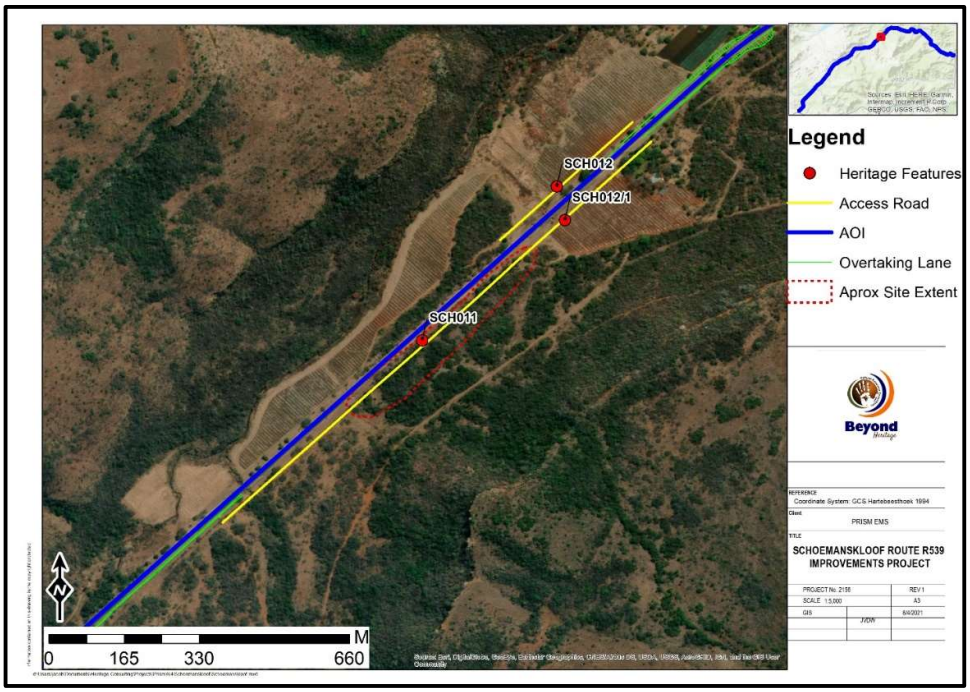

Figure 13.6. Site 10 and 11 in relation to the project.

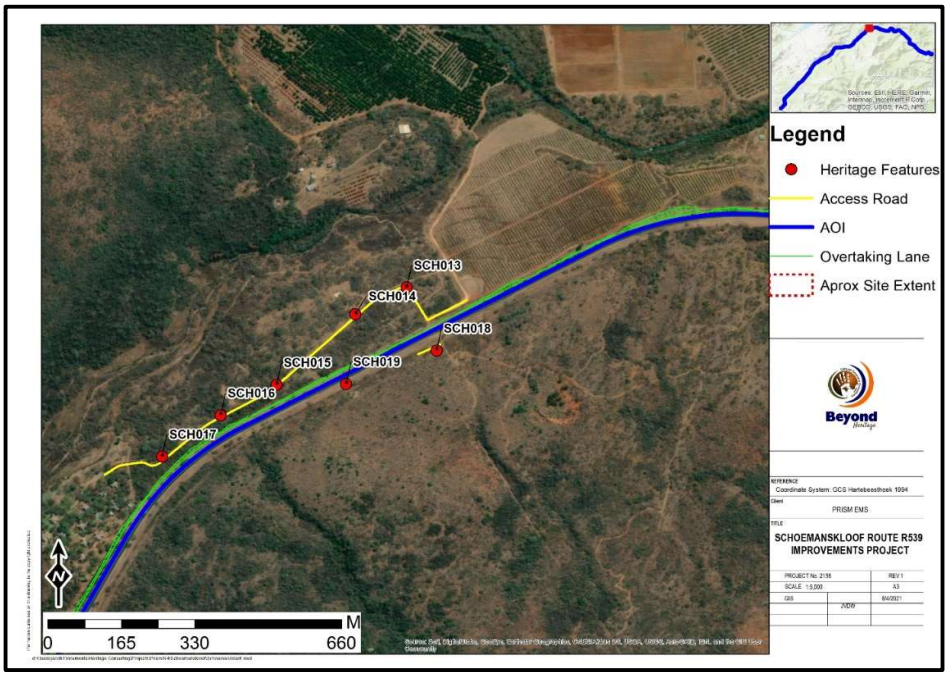

Figure 13.7. Site 13 – 19 in relation to the development.

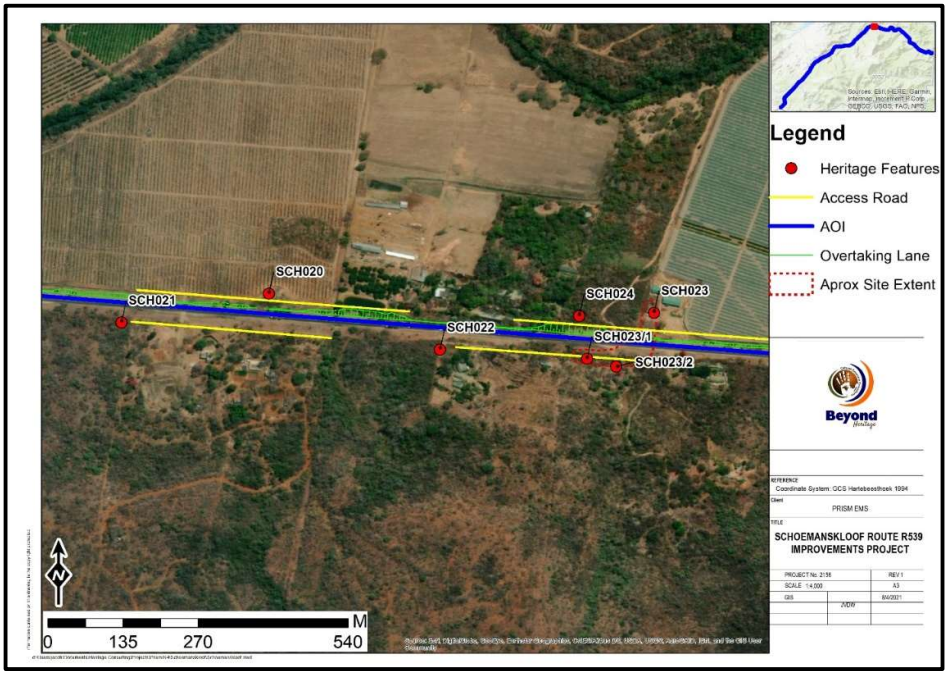

Figure 13.8. Site 20 – 24 in relation to the project.

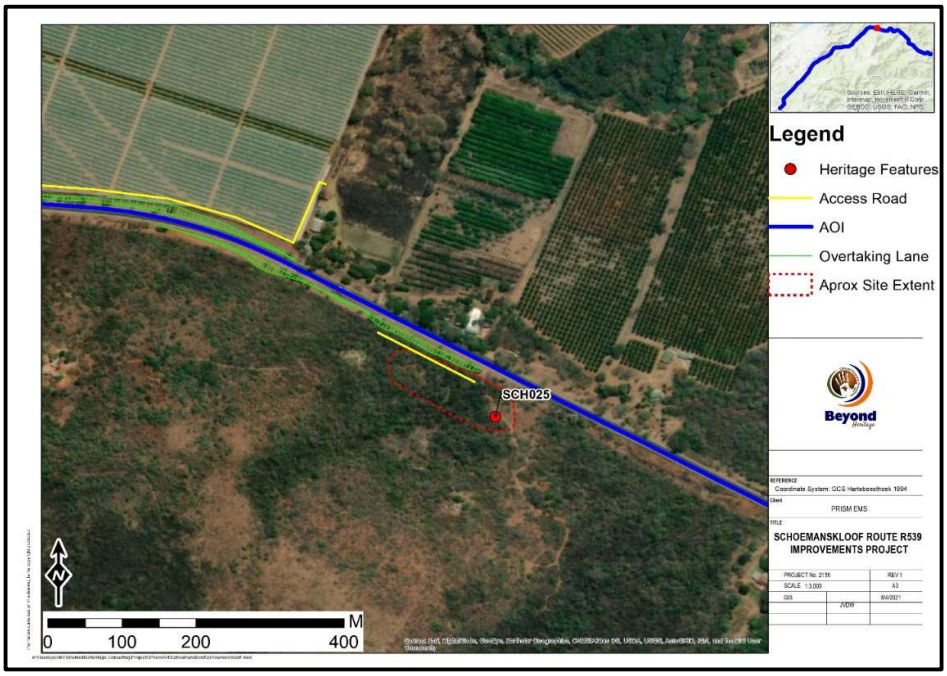

Figure 13.9. Site 25 in relation to the development.

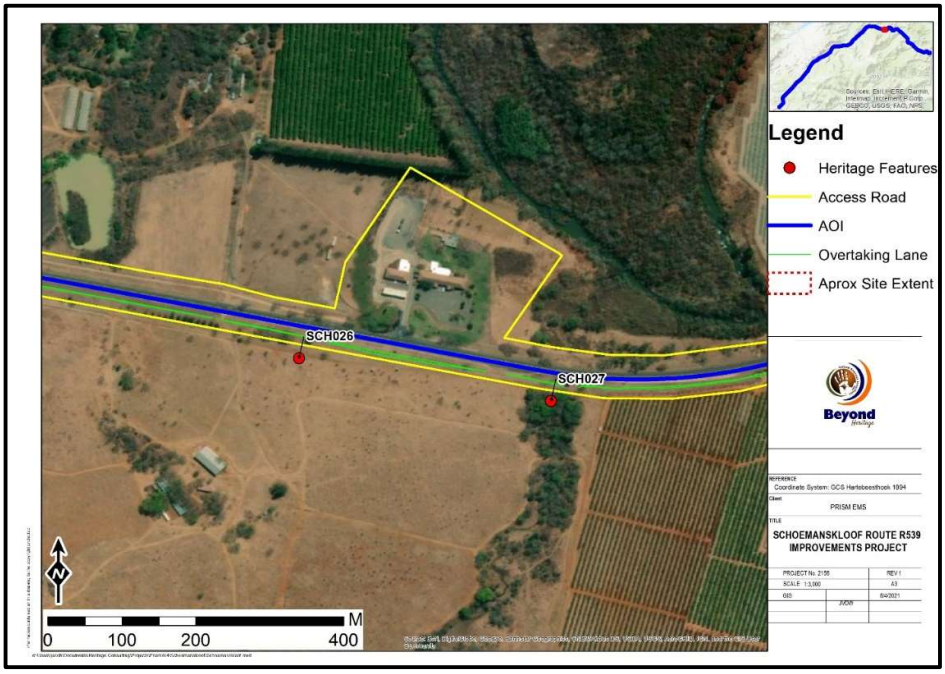

Figure 13.10. Site 26 and 27 in relation to the development.

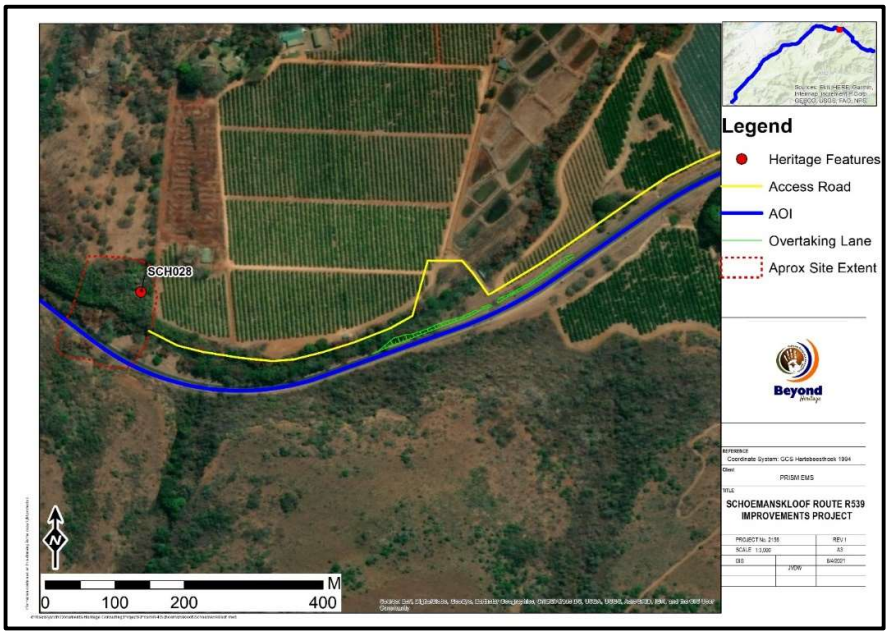

Figure 13.11. Site 28 in relation to the project

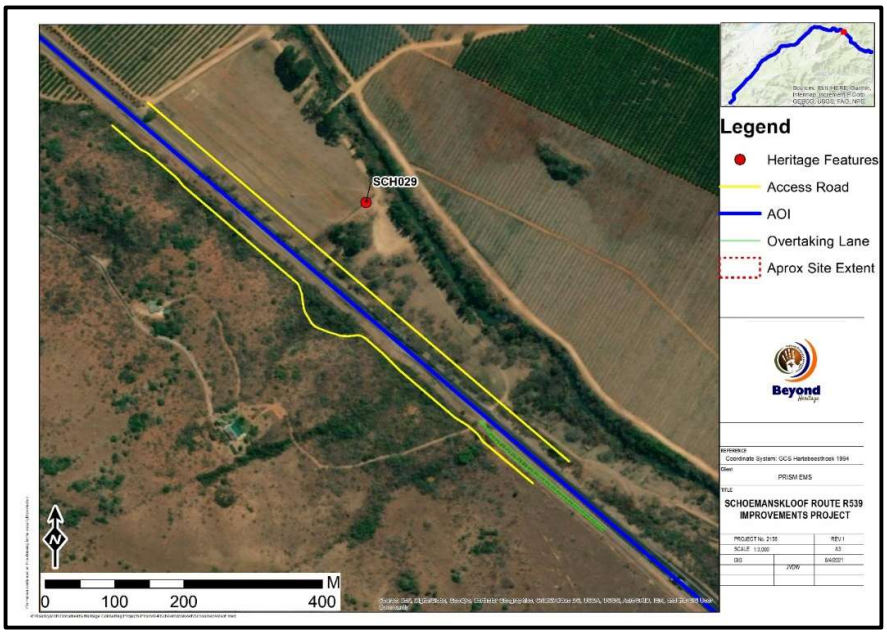

Figure 13.12. Site 29 in relation to the project.

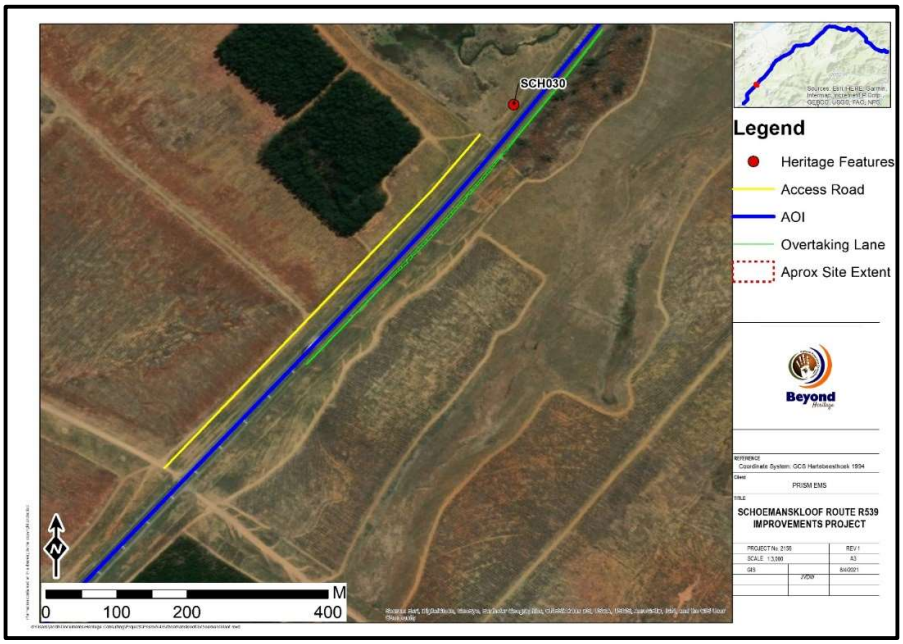

Figure 13.13. Site 30 in relation to the project.

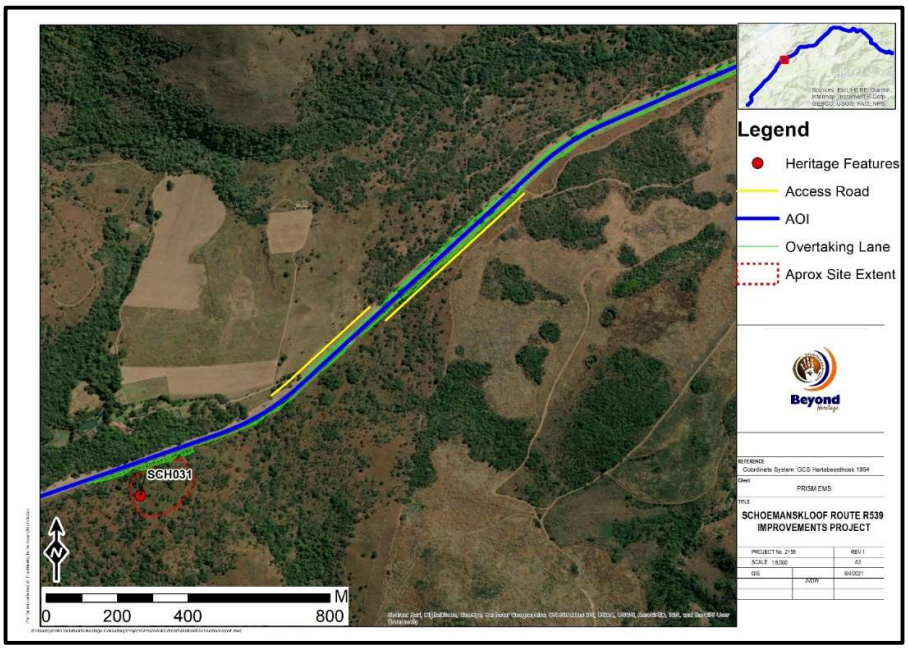

Figure 13.14. Site 31 in relation to the project.

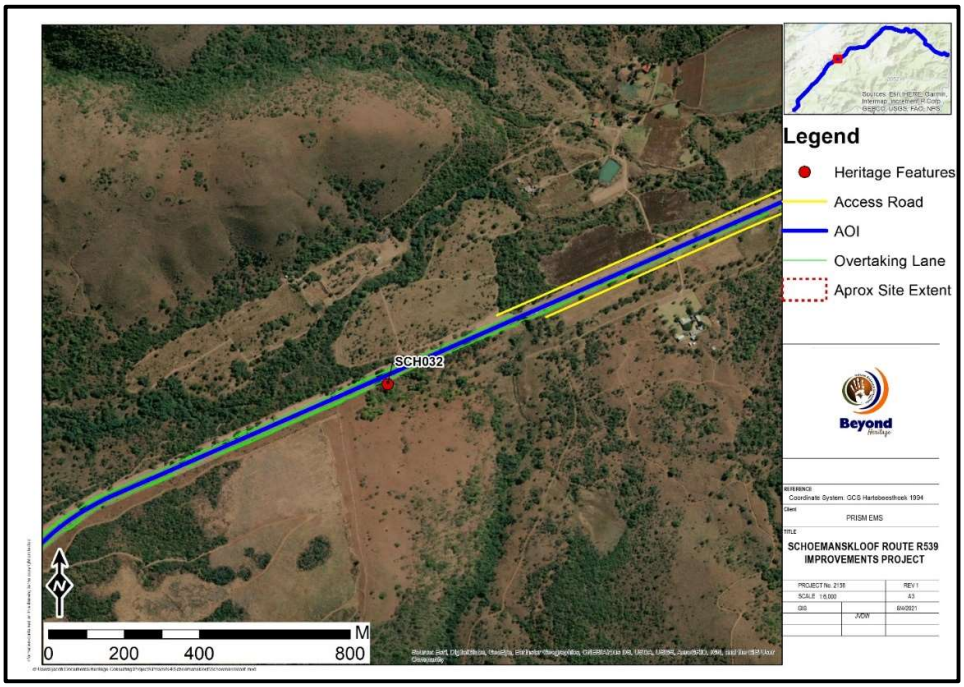

Figure 13.15. Site 32 in relation to the project.

14 Annexure C

Plan drawings of burial sites in relation to the proposed development