Cultural Heritage Assessment:

REPAIR OR REPLACEMENT OF BRIDGES AND CULVERT STRUCTURES ON TRUNK ROADS 3305, 3501, 5801, DIVISIONAL ROAD 2307 AND MAIN ROAD 584, BEAUFORT WEST REGION, WESTERN CAPE PROVINCE

Prepared for:

Chameleon Environmental: Dr J Bothma

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Prepared by:

J A van Schalkwyk (D Litt et Phil),

- Heritage Consultant: ASAPA Registration No.: 164 - Principal Investigator: Iron Age, Colonial Period, Industrial Heritage.
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Report No: 2021/JvS/033

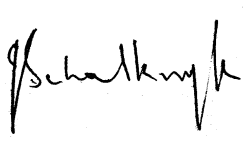
- Status: Final
- Date: May 2021
- Revision No: -
- Date: -

Submission of the report:

It remains the responsibility of the client to submit the report to the South African Heritage Resources Agency (SAHRA) or relevant Provincial Heritage Resources Agency (PHRA) by means of the online SAHRIS System.

Specialist competency:

Johan A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 40 years. Originally based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape Province, Northern Cape Province, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. Based on this work, he has curated various exhibitions at different museums and has published more than 70 papers, most in scientifically accredited journals. During this period, he has done more than 2000 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.



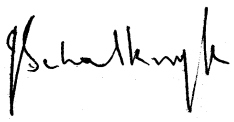
J A van Schalkwyk
Heritage Consultant
May 2021

SPECIALIST DECLARATION

I, J A van Schalkwyk, as the appointed independent specialist, in terms of the 2014 EIA Regulations (as amended), hereby declare that I:

- I act as the independent specialist in this application;
- I 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;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 (as amended) and any specific environmental management Act;
- 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 have no vested interest in the proposed activity proceeding;
- 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;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study 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 of the specialist



J A van Schalkwyk
May 2021

EXECUTIVE SUMMARY

Cultural Heritage Assessment:
REPAIR OR REPLACEMENT OF BRIDGES AND CULVERT STRUCTURES ON TRUNK ROADS 3305, 3501, 5801, DIVISIONAL ROAD 2307 AND MAIN ROAD 584, BEAUFORT WEST REGION, WESTERN CAPE PROVINCE

It is the intention of the Western Cape Department of Transport and Public Works to undertake repairs or replacements on 40 bridges and culvert structures located on the following roads in the larger Beaufort West region.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Chameleon Environmental* to conduct a cultural heritage assessment to determine if the proposed upgrading and repairs of the various bridges and culverts would have an impact on any sites, features or objects of cultural heritage significance.

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The investigation consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey that also included the interviewing of relevant people. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age occupation and a much later colonial farmer component, which eventually gave rise to a number of towns.

Identified sites

During the investigation of the bridges and culverts no sites, features or objects of cultural significance were identified.

- Only one of the bridges is older than 60 years (No. 38 – TR03501).
- None of the bridges exhibit unique design or engineering qualities.
- No significant event of person can be linked to any of the bridges or culverts.

Impact assessment and proposed mitigation measures

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.
- As the repairs and upgrades do not involve structural changes to any of the bridges and culverts, there would be no physical changes involved with any of them.
- As the repairs and upgrades are to take place on bridges and culverts located on existing roads, there would effectively be no increase in visual impacts.
- As the repairs and upgrades are to take place on bridges and culverts located on existing roads, the cumulative impacts would be nil.

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report.

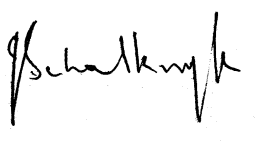
- For this proposed project, the assessment has determined that no sites, features or objects of cultural heritage significance occur in the project area, therefore no permits are required from SAHRA or the PHRA.
- If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the Proposed Project be allowed to continue on acceptance of the mitigation measures presented above and the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- The Palaeontological Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo) indicate that most of the project area has a high sensitivity of fossil remains to be found, for which a palaeontological assessment and protocol for finds is required. In the southern end of the N12 the sensitivity is rated as moderate and therefore only a desktop sturdy is required.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. The appropriate steps to take are indicated in Section 9 of the report, as well as in the **Management Plan: Burial Grounds and Graves, with reference to general heritage sites**, in the Addendum, Section 12.4.



J A van Schalkwyk
Heritage Consultant
May 2021

TECHNICAL SUMMARY

Project description	
Description	Repair and replace of bridges and culverts on trunk roads
Project name	Periodic Maintenance of bridges and culverts larger Beaufort West region

Applicant
Western Cape Department of Transport and Public Works

Environmental assessment practitioner
Dr J Bothma
Chameleon Environmental

Property details	
Province	Western Cape
Magisterial district	Beaufort West & Prince Albert
District Municipality	Central Karoo
Topo-cadastral map	3222AD, 3222BC, 3222DA, 3222DC, 3222BA, 3322AD, 3322BC
Farm name	Various
Closest town	Beaufort West

Development criteria in terms of Section 38(1) of the NHR Act	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 sq m	No
Development involving three or more existing erven or subdivisions	No
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 sq m	No
Any other development category, public open space, squares, parks, recreation grounds	No

Land use	
Previous land use	Road
Current land use	Road

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GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Bioturbation: The burrowing by small mammals, insects and termites that disturb archaeological deposits.

Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Debitage: Stone chips discarded during the manufacture of stone tools.

Factory site: A specialised archaeological site where a specific set of technological activities has taken place – usually used to describe a place where stone tools were made.

Historic Period: Since the arrival of the white settlers - c. AD 1830 - in this part of the country.

Holocene: The most recent time period, which commenced c. 10 000 years ago.

Iron Age (also referred to as **Early Farming Communities**)**:** Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Later Iron Age	AD 1300 - AD 1830

Midden: The accumulated debris resulting from human occupation of a site.

Mitigation, means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

National Estate: The collective heritage assets of the Nation.

Pleistocene: Geological time period of 3 000 000 to 20 000 years ago.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 500 000 - 250 000 Before Present
Middle Stone Age	250 000 - 40 000 - 25 000 BP
Later Stone Age	40-25 000 - until c. AD 200

Tradition: As used in archaeology, it is a seriated sequence of artefact assemblages, particularly ceramics.

ACRONYMS and ABBREVIATIONS

AD	Anno Domini (the year 0)
ASAPA	Association of Southern African Professional Archaeologists

BC	Before the Birth of Christ (the year 0)
BCE	Before the Common Era (the year 0)
BP	Before Present (calculated from 1950 when radio-carbon dating was established)
CE	Common Era (the year 0)
CRM	Cultural Resources Management
CS-G	Chief Surveyor-General
EAP	Environmental Assessment Practitioner
EIA	Early Iron Age
ESA	Early Stone Age
HIA	Heritage Impact Assessment
I & AP's	Interested and Affected Parties
ICOMOS	International Council on Monuments and Sites
LIA	Late Iron Age
LSA	Later Stone Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
WUL	Water Use Licence

COMPLIANCE WITH APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R982	**Addressed in the Specialist Report**
1. (1) A specialist report prepared in terms of these Regulations must contain-	
a) details of-	
i. the specialist who prepared the report; and	Front page
ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page i Addendum Section 5
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii
c) an 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 4
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 7
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 4
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 4
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 a site plan identifying site alternatives;	Section 7;
g) an identification of any areas to be avoided, including buffers;	Section 8
h) a 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 7 & 8
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 7
k) any mitigation measures for inclusion in the EMPr;	Section 8 & 10
l) any conditions for inclusion in the environmental authorisation;	Section 10
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9
n) a reasoned opinion-	
i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and	Section 10
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 8, 9 & 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	-
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	-
q) any other information requested by the competent authority.	-
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	-

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1. INTRODUCTION

1.1 Background

It is the intention of the Western Cape Department of Transport and Public Works to undertake repairs or replacements on 40 bridges and culvert structures located on the following roads in the larger Beaufort West region:

- TR3305 (N12) – 23 major culverts and 10 bridges;
- DR2307 – 2 major culverts;
- MR0584 – 1 major culvert;
- TR3501 (R61) – 2 major culverts; and
- TR5801 (R381) – 2 major culverts.

Chameleon Environmental was appointed to undertake the Basic Assessment and Water Use Licence process for the repairs or replacement on the identified bridges and culvert.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Chameleon Environmental* to conduct a cultural heritage assessment to determine if the proposed upgrading and repairs of the various bridges and culverts would have an impact on any sites, features or objects of cultural heritage significance.

This report forms part of the Basic Assessment process as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended and is intended for submission to the South African Heritage Resources Agency (SAHRA).

1.2 Terms and references

The aim of a full heritage impact assessment (HIA) investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives are to identify heritage resources (involving site inspections, existing heritage data and additional heritage specialists if necessary); assess their significances; assess alternatives in order to promote heritage conservation issues; and to assess the acceptability of the proposed development from a heritage perspective.

The result of this investigation is a HIA report indicating the presence/ absence of heritage resources and how to manage them in the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer may receive permission to proceed with the proposed development, on condition of successful implementation of proposed mitigation measures.

1.2.1 *Scope of work*

The aim of this study is to determine the cultural heritage significance of the 40 bridges and culvert structures where the repairs and replacements is to take place. This included:

- Conducting a desk-top investigation of the project area; and

- A visit to the proposed project area.

The project area includes the following structures:

- TR3305 (N12) – 23 major culverts and 10 bridges;
- DR2307 – 2 major culverts;
- MR0584 – 1 major culvert;
- TR3501 (R61) – 2 major culverts; and
- TR5801 (R381) – 2 major culverts.

The objectives were to:

- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance; and
- Provide guideline measures to manage any impacts that might occur during the proposed project's construction and implementation phases.

1.2.2 *Assumptions and Limitations*

The investigation has been influenced by the following:

- It is assumed that the description of the proposed project, provided by the client, is accurate;
- It is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is sufficient and that it does not have to be repeated as part of the HIA;
- It is assumed that the information contained in existing databases, reports and publications is correct.
- The unpredictability of buried archaeological remains;
- The vegetation cover encountered during a site visit can have serious limitations on ground visibility, obscuring features (artefacts, structures) that might be an indication of human settlement;
- No subsurface investigation (i.e. excavations or sampling) were undertaken, since a permit from SAHRA is required for such activities.

2. LEGISLATIVE FRAMEWORK

2.1 Background

HIAs are governed by national legislation and standards and International Best Practise. These include:

- South African Legislation
    - National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA);
    - Mineral and Petroleum Resources Development Act, 2002 (Act No. 22 of 2002) (MPRDA);
    - National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA); and
    - National Water Act, 1998 (Act No. 36 of 1998) (NWA).
- Standards and Regulations
    - South African Heritage Resources Agency (SAHRA) Minimum Standards;
    - Association of Southern African Professional Archaeologists (ASAPA) Constitution and Code of Ethics;
    - Anthropological Association of Southern Africa Constitution and Code of Ethics.

- International Best Practise and Guidelines
    - ICOMOS Standards (Guidance on Heritage Impact Assessments for Cultural World Heritage Properties); and
    - The UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (1972).

2.2 Heritage Impact Assessment Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the NHRA (Section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority, subject to the provisions of Section 38(8) of the NHRA. The NHRA, Section 38, contains requirements for Cultural Resources Management and prospective developments:

"38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50m in length;
(c) any development or other activity which will change the character of a site:
(i) exceeding 5 000 m^2 in extent; or
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or divisions thereof which have been consolidated within he past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

And:

"38 (3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

(a) The identification and mapping of all heritage resources in the area affected;
(b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;
(c) an assessment of the impact of the development on such heritage resources;
(d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
(e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
(f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
(g) plans for mitigation of any adverse effects during and after the completion of the proposed development."

3. HERITAGE RESOURCES

3.1 The National Estate

The NHRA defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
    - ancestral graves;
    - royal graves and graves of traditional leaders;
    - graves of victims of conflict;
    - graves of individuals designated by the Minister by notice in the Gazette;
    - historical graves and cemeteries; and
    - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
    - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
    - objects to which oral traditions are attached or which are associated with living heritage;
    - ethnographic art and objects;
    - military objects;
    - objects of decorative or fine art;
    - objects of scientific or technological interest; and
    - books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 Cultural significance

In the NHRA, Section 2 (vi), it is stated that ‘‘cultural significance’’ means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

- its importance in 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; and
- sites of significance relating to the history of slavery in South Africa.

A matrix (see Section 2 of Addendum) was developed whereby the above criteria were applied for the determination of the significance of each identified site. This allowed some form of control over the application of similar values for similar identified sites.

4. PROJECT DESCRIPTION

4.1 Site location

The repairs or replacements on the bridges and culvert structures are located on the following roads (Fig. 1 below):

- TR3305 (N12) – 23 major culverts and 10 bridges;
- DR2307 – 2 major culverts;
- MR0584 – 1 major culvert;
- TR3501 (R61) – 2 major culverts; and
- TR5801 (R381) – 2 major culverts.

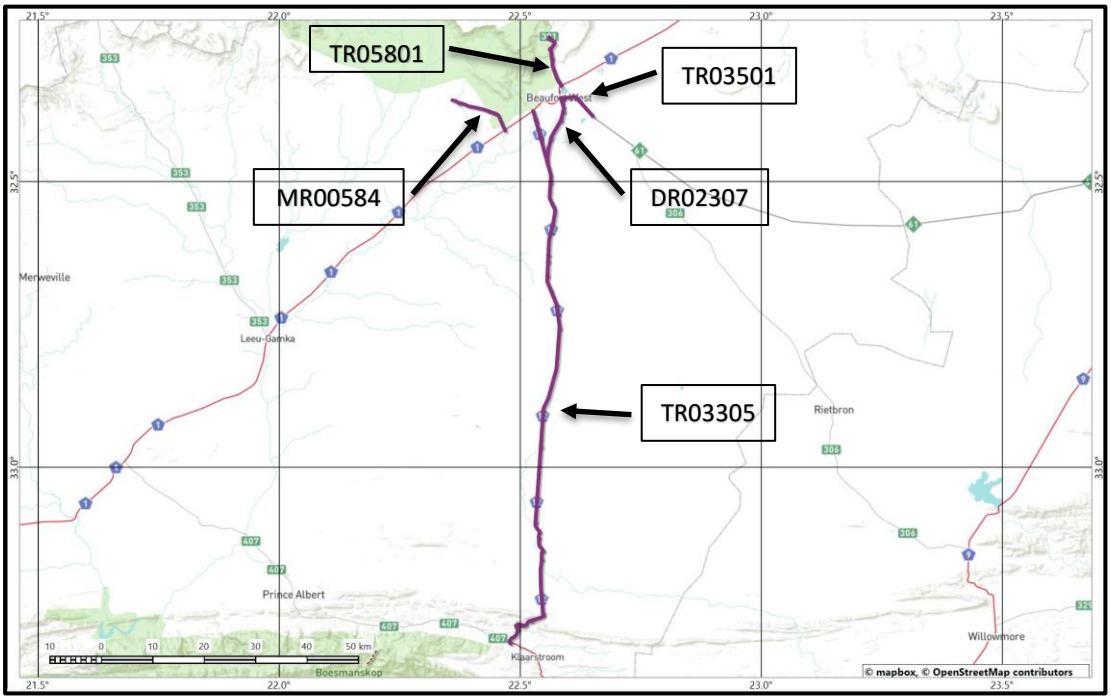


Figure 1. Location of the project area in regional context

The activities to be undertaken for each of the identified structures, as proposed by *BVI Consulting Engineers*, is presented in a spreadsheet format supplied by them and presented in Table 1 below. In this spreadsheet, they also indicated the date of construction and age of most of the structures, which is accepted as correct. This information was augmented by them plotting the various structures on aerial photographs, which was used in locating them during the site visit.

Table 1: The repair activities to be undertaken at the different structures

CONTRACT: C1183 - ENVIRONMENTAL ACTIVITIES										MAJOR ACTIVITIES IN WATER COURSE								
NO	ROAD NO.	LOCAL MUNICIPALITY	KM	STRUCTURE NUMBER	APPROXIMATE STRUCTURE FOOTPRINT (m²)	APPROXIMATE FOOTPRINT OF WORKS (m²)	ACTIVITY	WORK OUTSIDE ROAD RESERVE	TYPE OF ACTIVITY OUTSIDE ROAD RESERVE	REMOVAL OF SILTATION, DEBRIS AND VEGETATION, EXCAVATION (m3)	REMOVAL OF TREES (m3)	EXCAVATION WITHIN WATERCOURSE (m3)	BACKFILLING WITHIN WATERCOURSE (m3)	GABIONS (m3)	CONCRETE INVERT SLAB (m3)	RIP RAP (m3)	CONCRETE RIM LINING AND INVERT SLAB (m3)	FOOTING REPAIRS (m3)
1	TR3305	Prince Albert	1,00	B4374	667	3,3	Repair Bridge	No	-		10			.		20		
2	TR3305	Prince Albert	3,51	B4332	693	72	Repair Bridge	No	-	20	15							
3	TR3305	Prince Albert	3,77	B4331	667	33	Repair Bridge	No	-	10								
4	TR3305	Prince Albert	4,78	B4329	1524	88	Repair Bridge	No	-	25	15							
5	TR3305	Prince Albert	6,08	C11603	235	103	Repair Culvert	No	-	31								
6	TR3305	Prince Albert	10,10	C12303	123	43	Repair Culvert	No	-	11			15	12				
7	TR3305	Prince Albert	10,29	C12304	142	80	Repair Culvert	No	-	24								
8	TR3305	Prince Albert	10,34	B4035	445	15	Repair Bridge	Yes	Gabion wall					30				
9	TR3305	Prince Albert	17,51	C12305	152	49	Repair Culvert	No	-	10				31				
10	TR3305	Prince Albert	18,71	C12306	132	40	Repair Culvert	No	-	12								
11	TR3305	Prince Albert	21,14	B4033	1338	543	Repair Bridge	No	-	163								
12	TR3305	Prince Albert	21,61	C12307	174	82	Repair Culvert	NO	-	20			15	30				
13	TR3305	Prince Albert	22,43	C12308	270	107	Repair Culvert	No	-	32								
14	TR3305	Prince Albert	22,78	B4048	355	15	Repair Bridge	Yes	Gabion wall					30				
15	TR3305	Prince Albert	23,08	C12309	150	67	Repair Culvert	No	-	20								
16	TR3305	Prince Albert	43,39	B4040	666	267	Repair Bridge	No	-	80								
17	TR3305	Beaufort West	54,97	C11607	242	40	Repair Culvert	No	-	12								
18	TR3305	Beaufort West	55,56	C11608	105	100	Repair Culvert	No	-	30								
19	TR3305	Beaufort West	57,54	C11609	78	100	Repair Culvert	No	-	30								
20	TR3305	Beaufort West	59,79	C11610	200	202	Repair Culvert	No	-	53						10		
21	TR3305	Beaufort West	59,79	C11611	200	191	Repair Culvert	No	-			18	22	17	22			
22	TR3305	Beaufort West	64,16	C11613	120	53	Repair Culvert	No	-	16								
23	TR3305	Beaufort West	69,51	C11614	280	33	Repair Culvert	No	-	10								
24	TR3305	Beaufort West	72,12	C11615	85	56	Repair Culvert	No	-	15				11				
25	TR3305	Beaufort West	74,33	C11617	630	954	Repair Culvert	No	-			36	30	30	130			
26	TR3305	Beaufort West	76,86	C12315	74	133	Repair Culvert	No	-	40								
27	TR3305	Beaufort West	79,22	C11619	123	67	Repair Culvert	No	-	20								
28	TR3305	Beaufort West	80,09	C11620	110	67	Repair Culvert	No	-	20								
29	TR3305	Beaufort West	91,18	C11623	338	436	Repair Culvert	No	-					58	61			
30	TR3305	Beaufort West	95,75	B4145	591	503	Repair Bridge	No	-		10					200		
31	TR3305	Beaufort West	97,98	C12316	215	6	Repair Culvert	No	-					11				
32	TR3305	Beaufort West	101,78	C11624	227	67	Repair Culvert	No	-	20								
33	TR3305	Beaufort West	104,86	B4131A	986	20	Repair Bridge	No	-			10						
34	DR02307	Beaufort West	3,75	C11343	70	70	Repair Culvert	No	-	60						20		
35	DR02307	Beaufort West	6,83	C11348	115	23	Replace Culvert	No	-					45				
36	MR00584	Beaufort West	4,59	C11404	85	42	Repair Culvert	No	-					8				15
37	TR03501	Beaufort West	3,29	C11301	350	20	Repair Culvert	No	-					4				7
38	TR03501	Beaufort West	7,06	C11302	155	48	Repair Culvert	No	-	10								6
39	TR05801	Beaufort West	6,80	C11408	160	867	Repair Culvert	No	-	60							100	
40	TR05801	Beaufort West	7,74	C11409	550	682	Repair Culvert	Yes	Gabion protection					30			100	

5. STUDY APPROACH AND METHODOLOGY

5.1 Extent of the Study

This survey and impact assessment cover all facets of cultural heritage located in the project area as presented in Section 4 above and illustrated in Figure 1.

5.2 Methodology

5.2.1 Pre-feasibility assessment

The objectives of this review were to:

- Gain an understanding of the cultural landscape within which the project is located;
- Inform the field survey.

5.2.1.1 Survey of the literature
A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted – see list of references in Section 10.

- Information on events, sites and features in the larger region were obtained from these sources.

5.2.1.2 Survey of heritage impact assessments (HIAs)
A survey of HIAs done for projects in the region by various heritage consultants was conducted with the aim of determining the heritage potential of the area – see list of references in Section 10.

- Information on sites and features in the larger region were obtained from these sources.

5.2.1.3 Data bases
The *Heritage Atlas Database,* various SAHRA databases, the *Environmental Potential Atlas*, the *Chief Surveyor General* and the *National Archives of South Africa* were consulted.

- Database surveys produced a number of sites located in the larger region of the proposed development.

5.2.1.4 Other sources
Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Information of a very general nature were obtained from these sources.

5.2.1.5 Results

The results of the above investigation are presented in Table 1 and Figure 3 below – see list of references in Section 10 – and can be summarised as follows:

- Historic structures, inclusive of buildings, monuments and bridges, occur sporadically all over the larger urban area.

The information collected during the desktop study was used to accommodate and integrate all data generated during the field survey:

Previous experience in the documenting of bridges and culverts was drawn on to assist in assessing the identified structures (Van Schalkwyk 2009, 2010, 2011, 2012a, 2012b, 2015, 2018a, 2018b, 2018c, 2019, 2020a, 2020b, 2020c). In addition, information contained in a personal database (Heritage Atlas Database) was accessed to assist in classifying and evaluating the structures. These include road, railway and pedestrian bridges and culvert located across the country – in total 427.

In determining the significance of the structure or the possible impact the repairs and replacements might have, the following strategy was implemented:

- The structure itself was evaluated in terms of its typology, design qualities, materials used and age;
- The locality of all the bridge or culvert structures were investigated for remains of any previous structures that might have been replaced by the existing structure;
- The immediate surroundings of the various bridge and culvert structures were inspected for the presence of archaeological material such as tools dating to the Stone Age;
    - Unfortunately, in most cases the farm boundary fences prohibited access to the stream banks. In addition, in some cases dense riverine vegetation seriously limited ground visibility.

6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1 Regional overview

Except for the short section of Road TR03501, which is located on the eastern outskirts of Beaufort West town, the other roads are all located in a rural environment, predominantly agriculture (grazing), or nature conservation, i.e. where the MR00584 (west) and the TR05801 (east) skirts around the boundaries of the Karoo National Park.

A review of heritage impact assessments done in the larger region (Gribble 2020; Halkett 2009; Hart & Schietecatte 2013; Kaplan 2007, 2008; Orton 2010; Webley & Halkett 2015) indicates that stone tools dating to the Early (ESA), Middle (MSA) and Later (LSA) Stone Ages have been reported in the larger Beaufort West area. The material invariably occurs in secondary contexts, often associated with waterborne gravel, and is not in its original context. Consequently, they do not occur with any associated archaeological material or organic remains.

About 13 000 years ago occupation of the Karoo region intensified with the entrance of Khoisan groups who lived throughout the region when their way of life was disrupted and destroyed during the early 18th century by colonial expansion (Hart & Schietecatte 2013).

Trekboer expansion began early in the 1700s with the colonisation of the Cape south of the Cape Fold Belt mountains and by 1740 European stock farmers had begun to penetrate into the Great Karoo. By 1760 this expansion had reached as far as the Nieuweveldsberge in the Beaufort West district (Hart & Schietecatte 2013). People started to take up farms, most of which were very large, and, without exception were laid out around water sources, effectively alienating indigenous groups to access to water.

In order to stamp their authority on these trekboer farmers, the colonial government established two regional centres, Beaufort West and Graaf Reinett. In 1818 a new administrative centre was established at Beaufort West on the farm Hooyvlakte. It achieve municipal status on 3 February 1837, making it the oldest municipality in South Africa (Raper 2004).

Soon infrastructure such as roads and railways were more formally developed. The R61 is the 20th century replacement of an earlier wagon road or *Voortrekker* route that meandered from farm to farm linking the Beaufort West and Graaff Reinet districts in the 19th century (Hart & Schietecatte 2013). The railway from Cape Town reached the Beaufort West in 1880.

6.2 Site specific review

The topography of the largest section of the road is flat, gently rolling plains (Fig. 2). It is only in the northern section and the southernmost sections where the topography change to mountains.

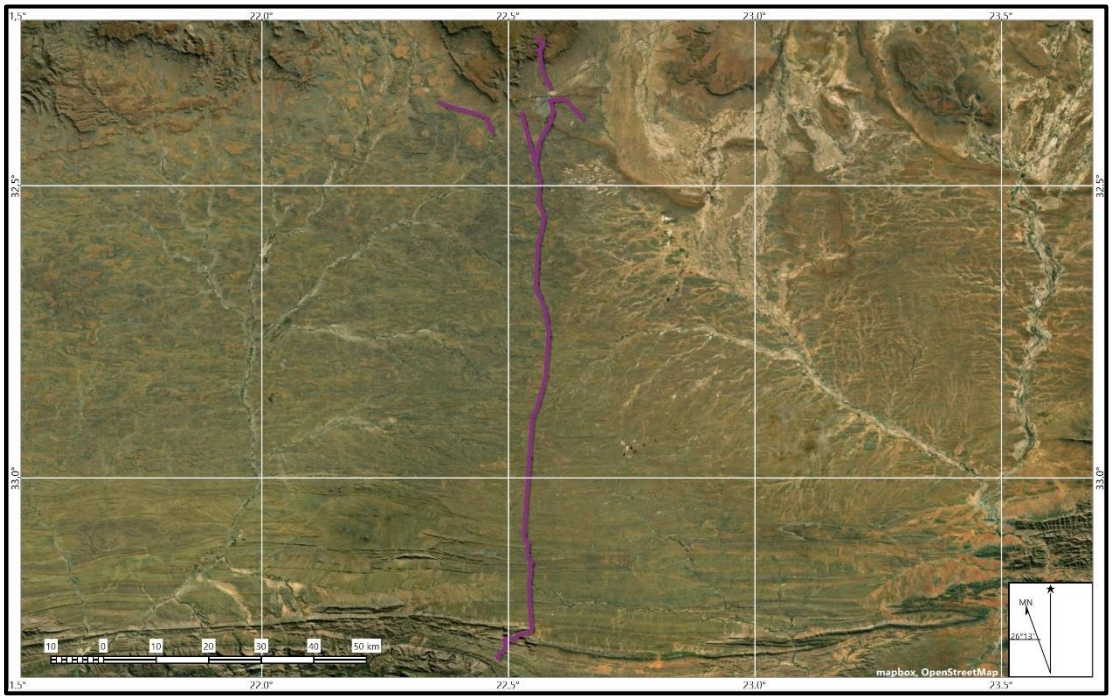
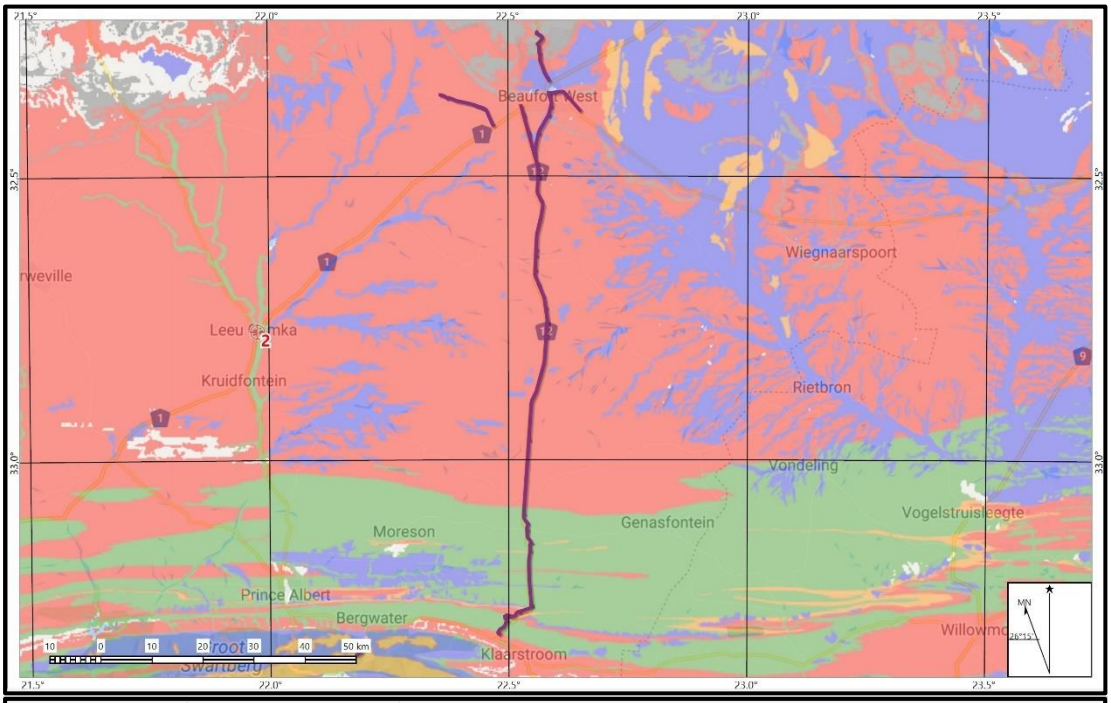


Figure 2. The topography of the various routes

The Palaeontological Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo) indicate that most of the project area (Fig. 3) has a high sensitivity of fossil remains to be found, for which a palaeontological assessment and protocol for finds is required.

In the southern end of the N12 the sensitivity is rated as moderate and therefore only a desktop sturdy is required.



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 3. The Palaeontological sensitivity of the project area

The report by Winter and Oberholzer (2014) identified and grade the scenic resources within the Western Cape. The aim of the framework study was so that cultural and scenic resources of significance could be identified and rated so that they could be included in all Spatial Development Frameworks (SDF's). Unfortunately, they do not refer to the N12 specifically and the various Appendices in which the information is contained is not available online.

The current N12, formerly the R29, was originally developed as national route only from Doornrivier to Cango Caves, a distance of 48 miles. Even as late as 1982 the N12 was still not recognised as a national route (Floor 1985).

Figure 4. The extent of the National Freeways by 1972
(After Floor 1985)

Deeds of Transfer (Fig. 5 & 6) for the various farms were scrutinised to determine if the original road alignments can be established. Unfortunately, in most cases, especially on the older diagrams, the roads were indicated in a very informal manner to be of any real use.

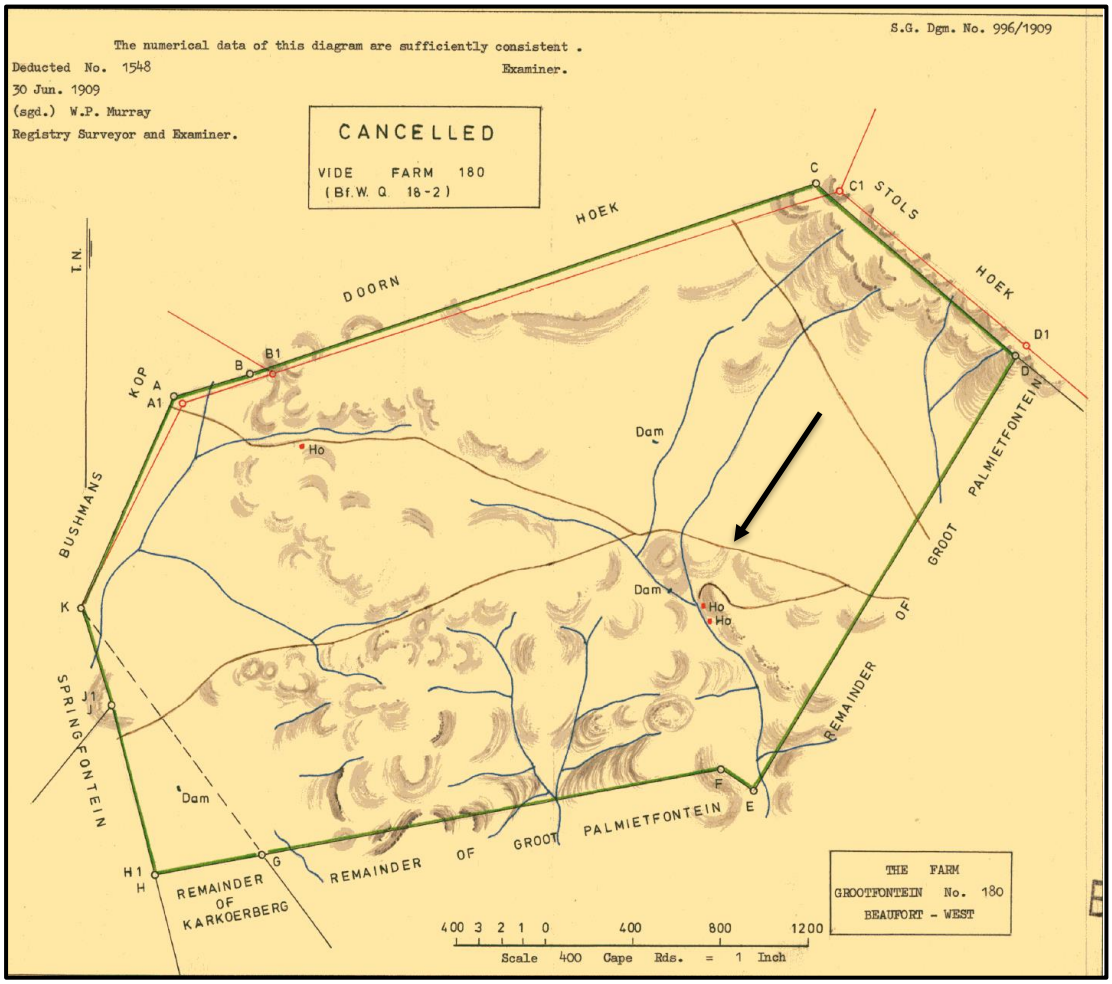


Figure 5. Location of Road MR00584 on the farm Grootfontein c. 1909
(CS-G diagram: 996/1909)

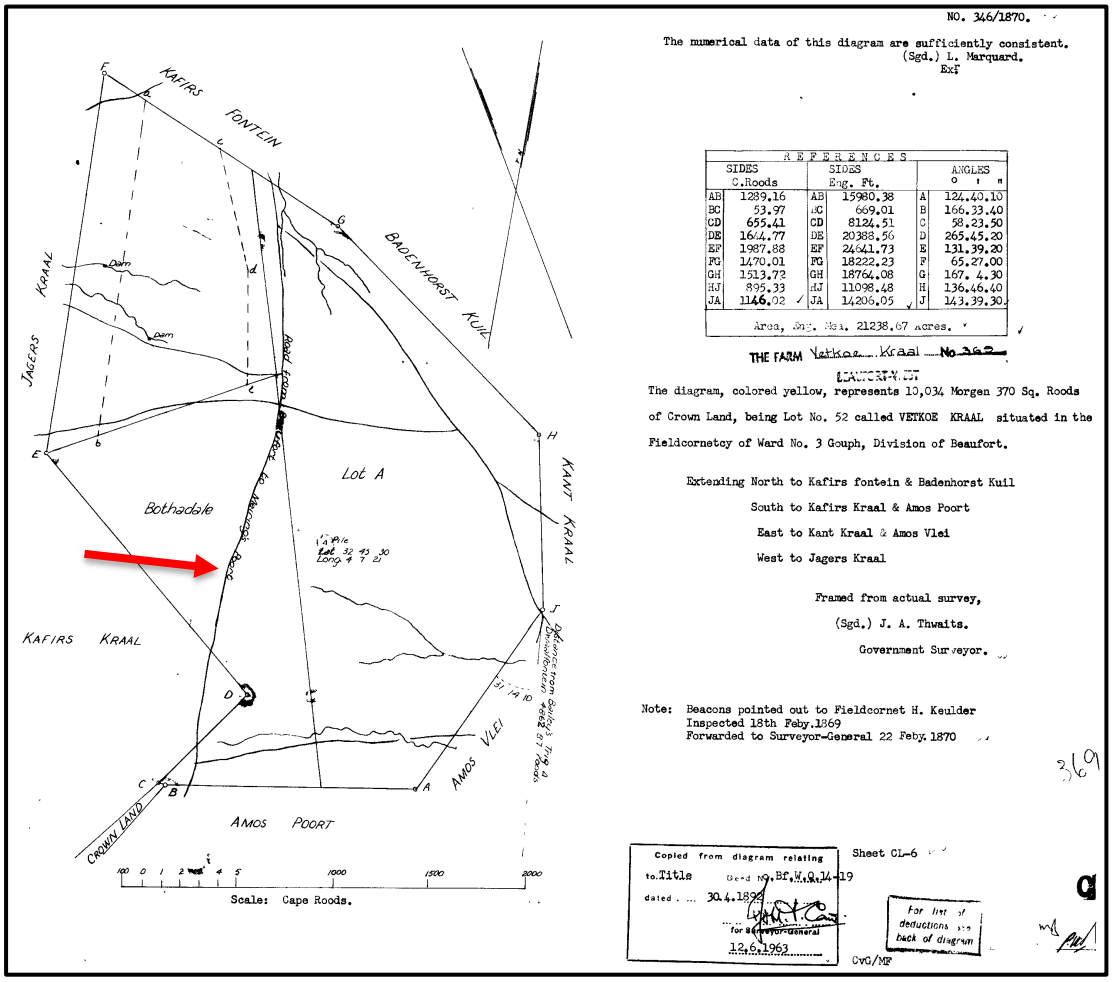


Figure 6. Location of Road TR03305 on the farm Vetkoe Kraal c. 1869
(CS-G diagram: 346/1870)

Similarly, historic aerial photographs were geo-rectified and the current roads were overlain on it. This showed clearly how, especially in the more mountainous regions, the alignments were straightened out. In some cases, these changes can still be seen on contemporary Google Earth images. In this manner it was possible to broadly determine the age of some sections of the roads (Fig. 7 & 8).

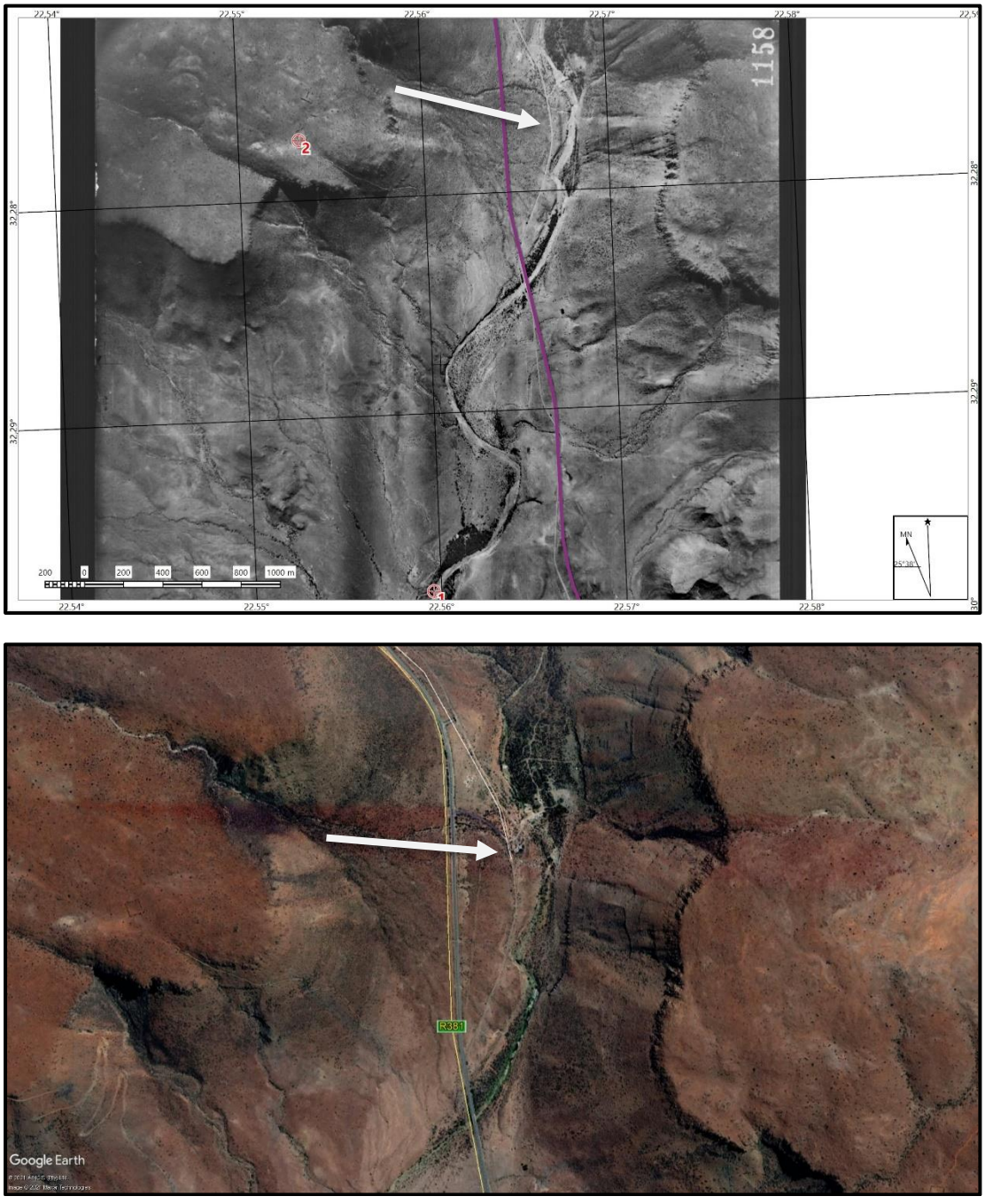
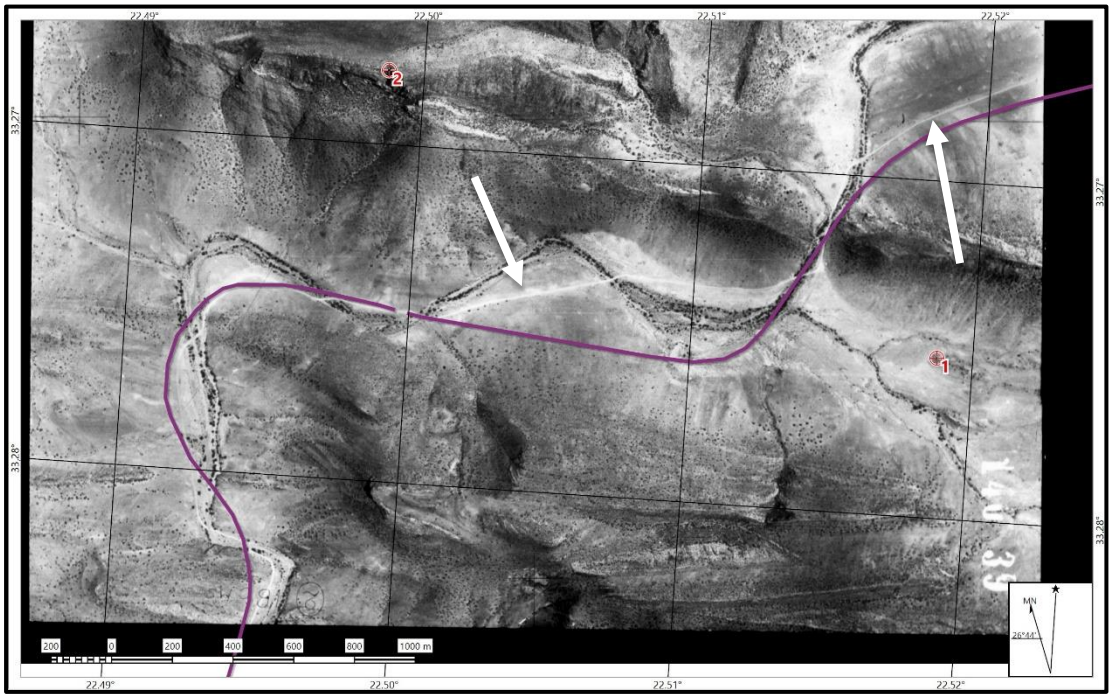


Figure 7. The old (1945) vs. the current alignment on the R381
(CS-G photo: 90_017_01158; Google Earth) (red wheel-crosses = calibration points)



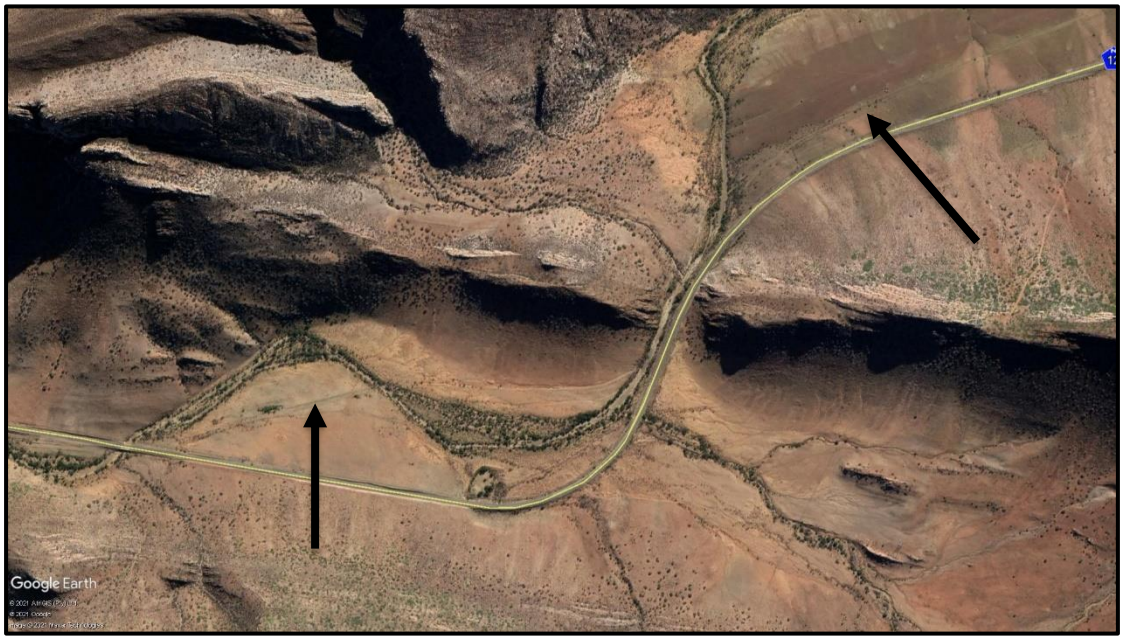


Figure 8. The old (1940) vs. the current alignment on the N12
(CS-G photo: 140_003_00005; Google Earth) (red wheel-crosses = calibration points)

Scrutiny of various sources, e.g. heritage impact assessments, publications and databases provided some information on the potential of heritage sies and features in the vicinity of the various roads.

A number of farm entrances occur sporadically along all routes. These range from being unobtrusive to somewhat elaborate, especially in the case where B&Bs or farm-stay services are offered. The ever-present electricity power lines and telephone lines (now mostly redundant) are located along the routes.

Geological: syncline – anticline folding

Historic stone walling

Figure 9. Features locate in close proximity of the current N12 alignment

7. BRIDGES AND CULVERTS ACCORDING TO THE DIFFERENT ROADS

7.1 Definitions

Bridge

A bridge is defined as a structure built to span a physical obstacle, such as a river, valley, or road, without closing the way underneath. Depending on the type of bridge, it can either have support structures above or below the bridge deck. Different types of bridges are beam bridges, truss bridges, arch bridges, suspension bridges and cable-stayed bridges. According to the United States Federal Highway Administration (FHWA) definition, a bridge is anything over 20 feet (6m) in length.

Culvert

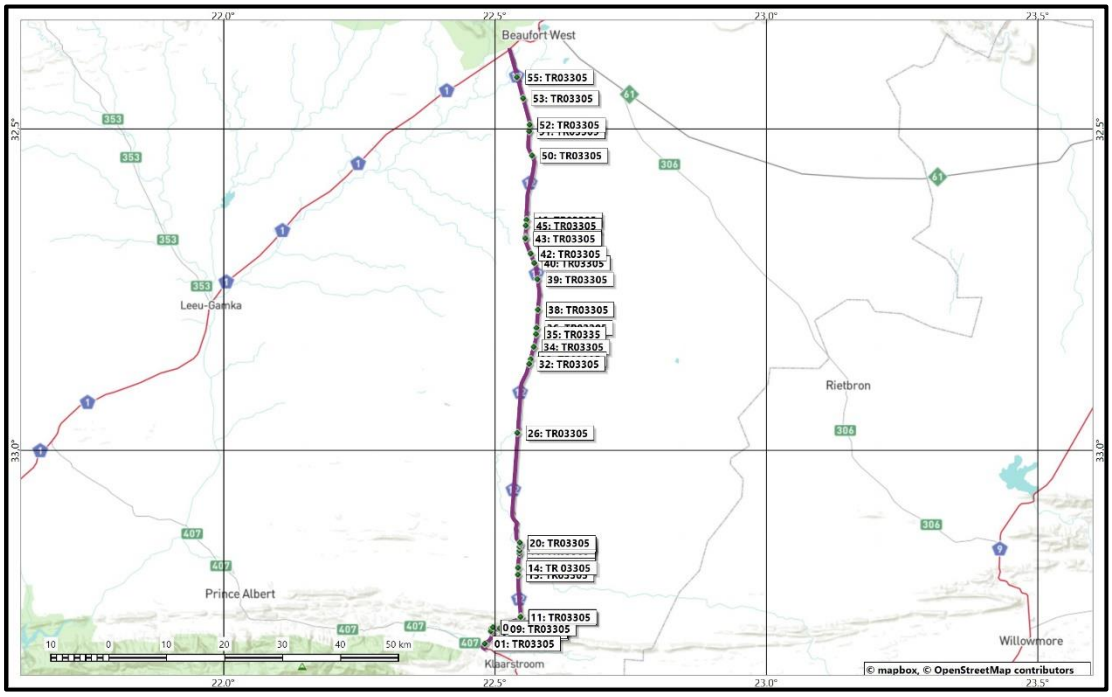
A culvert is defined as a tunnel structure that passes under roads or railways to provide cross drainage of water. Culverts generally have short spans and are usually embedded in the soil. The culvert and the soil around it bear the weight of the roadway/railway and the vehicles using it. Culverts are usually made of reinforced concrete, steel pipes or corrugated iron. Different types of culverts can be identified:

- Pipe culverts are usually circular and is commonly used on roads carrying low volumes of traffic;
- Box culverts are box-shaped, usually prefabricated off-site. It is popular in road design because the shape provides a rigid structure that is appropriate for short spans and in areas with poor soil conditions;
- Culverts can also be a bridge-like structure, usually constructed from cast concrete, can have wing walls, but are shorter than bridges and therefore do not usually have support columns.

7.2 Culvert and bridges per route

TR03305

The N12 from Beaufort West to Oudtshoorn via Klaarstroom (formerly the R29)



Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
1	TR03305	1	B4374 / Groot River culvert	River bridge

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of two spans supported by a single column. Wing-walls occur on all four corners; and Armco guardrails on both sides of the deck.

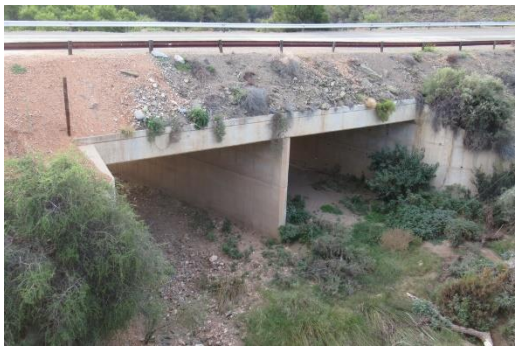
- Additional features are located in close proximity of the bridge. This include what is interpreted as old storm water channels on both sides of the road, as well as an old footpath/water channel base on the eastern side of the bridge – see images below. No water mills have been reported from this region.
  - Although both these feature types are located some distance from the bridge, no work outside of the road reserve that can have an impact on them can be allowed.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This bridge structure is probably not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only removal of trees and installation of rip rap.

References: Staples (2006)

Approach view



Eastern side

Western side

Downstream view

Storm water management

Storm water management

Terrace walling forming walkway

Top of walkway

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
2	TR03305	3.51	B4332 / Droë Kloof River no. 1	River bridge

Year completed	Age	Activity	Work outside reserve
1965	56	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of three spans supported by two columns. Wing-walls occur on all four corners; and concrete guardrails on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This bridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation and trees.	
References: -	


Approach view


Western side


Eastern side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
3	TR03305	3.77	B4331 / Droë Kloof River no. 2	River bridge

Year completed	Age	Activity	Work outside reserve
1965	56	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of three spans supported by two columns. Wing-walls occur on all four corners; and concrete guardrails on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This bridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation.
References: -

 Approach view	 Eastern side
 Western side	 Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
4	TR03305	4.78	B4329 / Droë Kloof River no. 4	River bridge

Year completed	Age	Activity	Work outside reserve
1965	56	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of five spans supported by four columns. Wing-walls occur on all four corners; and concrete guardrails on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This bridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation and trees.	
References: -	

Approach view


Eastern side


Western side


Upstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
5	TR03305	6.08	C11603 / Culvert at SV 6.08	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like culvert with wing-walls on all four corners; and Armco guardrails on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation.	
References: -	


Approach view


Eastern side


Western side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
6	TR03305	10.1	C12303 / 10.1 Culvert near Droogekloof	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation, as well as backfilling in the watercourse.	
References: -	


Approach view


Eastern side

Western side	Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
7	TR03305	10.29	C12304 / 10.29 Culvert near Droogekloof	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation.

References: -

Approach view

Eastern side

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
8	TR03305	10.34	B4035 / Droë Kloof River no. 6	River bridge

Year completed	Age	Activity	Work outside reserve
1963	58	Repair bridge	Gabion wall

Description: Typical beam bridge of re-enforced concrete, consisting of two spans supported by a single column. Wing-walls occur on all four corners; and Armco guardrails on concrete railings on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This ridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the installation of gabions.	
References: -	

Approach view

Eastern side

Railing

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
9	TR03305	17.51	C12305 / 17.51 Culvert near Zwartskraal	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation, as well as the installation of gabions.	
References: -	


Approach view


Eastern view


Western side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
10	TR03305	18.71	C12306 / 18.71 Culvert near Zwartskraal	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	

Description: Bridge like single span culvert with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation.	
References: -	

Approach view	Eastern side
 Western side	 Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
11	TR03305	21.14	B4033 / Traka River no. 1	River bridge

Year completed	Age	Activity	Work outside reserve
1963	58	Repair bridge	

Description: Typical beam bridge of re-enforced concrete, consisting of five spans supported by four columns. Wing-walls occur on all four corners; and Armco guardrails on concrete railings on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This bridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation.	
References: -	

	 Eastern side


Western side


Railings

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
12	TR03305	21.61	C12307 / 21.61 Culvert near Platdrif	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation, as well as backfilling within the water course.	
References: -	


Approach view


Eastern side


Western side

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
13	TR03305	22.43	C12308 / 22.43 Culvert near Dassiedraai River	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	


Approach view


Eastern side


Western side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
14	TR03305	22.78	B4048 / Dassiedraai River	River bridge

Year completed	Age	Activity	Work outside reserve
1963	58	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of a single span. Wing-walls occur on all four corners; and Armco guardrails on concrete railings on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This bridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the installation of gabions.
References: -

 Approach view	 Eastern side gabion repairs
 Western side	 Upstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
15	TR03305	23.08	C12309 / 23.08 Culvert near Dassiedraai River	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	

Approach view

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
16	TR03305	43.39	B4040 / Traka River no. 2	River bridge

Year completed	Age	Activity	Work outside reserve
1962	59	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of six spans supported by five columns. Wing-walls occur on all four corners; and Armco guardrails on concrete railings on both sides of the deck.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.

References: -

Approach view

Eastern side


Western side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
17	TR03305	54.97	C11607 / Amospoortjie River culvert no. 2	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1966	55	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; no guardrails on the deck. Used by farm-owner to access other side of the N12	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	


Approach view


Eastern side

Western side	Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
18	TR03305	55.56	C11608 / Culvert at SV 55.56	Major culvert

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	

Approach view

Eastern side

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
19	TR03305	57.54	C11609 / Culvert at SV 57.55	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; no guardrails on the deck.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	


Western side


Eastern side


Upstream view

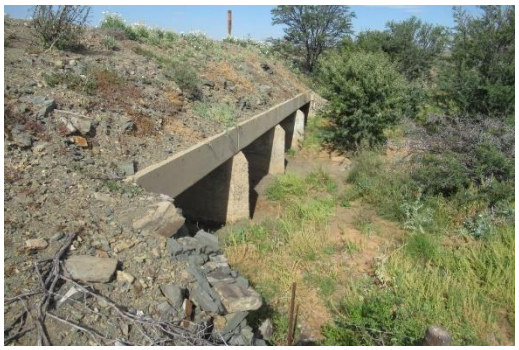

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
20	TR03305	59.79	C11610 / Amandelhoogte Stream Culvert no. 1	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1966	55	Repair culvert	

Description: Bridge like four single span culvert supported by three columns; with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	

Approach view



Eastern view

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
21	TR03305	60.92	C11611 / Amandelhoogte Stream culvert no. 2	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1965	56	Repair culvert	-

Description: Bridge like four single span culvert supported by three columns; with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the backfilling of the watercourse and installation of gabions and a concrete invert slab (flooring)	
References: -	

Approach view	Eastern side
 Western side	 Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
22	TR03305	64.17	C11613 / Culvert at SV 64.16	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; Armco barriers on deck. Farm-owner use culvert to access other side of the N12.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	

 Approach view	 Eastern side
	

Western side	Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
23	TR03305	69.51	C11614 / Amandelhoogte Stream no. 3	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like three span culvert supported by two columns; with wing-walls on all four corners; no guardrails on the deck. Armco barriers concrete railing on both sides of deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	

Approach view

Eastern side

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
24	TR03305	72.12	C11615 / Culvert at SV 72.12	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; Armco barriers on deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation, as well as the installation of gabions	
References: -	

Eastern side

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
25	TR03305	74.33	C11617 / Skeurfontein River	River bridge

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: : Typical beam bridge of re-enforced concrete, consisting of three spans supported by two columns. Wing-walls occur on all four corners; Armco guardrails on concrete railings on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the backfilling in the watercourse, installation of gabions and a concrete invert slab (flooring).	
References: -	

Approach view

Eastern side

Western side

Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
26	TR03305	76.86	C12315 / 76.86 Culvert on tributary Gemsbok Rivier	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; no barriers on deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	

Approach view

Eastern side


Western side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
27	TR03305	79.22	C11619 / Culvert at SV 79.21	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; Armco barriers on deck. Farm-owner use culvert to access other side of the N12.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.	
References: -	


Approach view


Eastern side


Western side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
28	TR03305	80.09	C11620 / Culvert at SV 80.09	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners; Armco barriers on deck.
Significance of site/feature Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.
References: -

Approach view

Eastern side

Western side

Upstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
29	TR03305	91.18	C11623 / Karee River	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like three span culvert supported by two columns. Wing-walls on all four corners; Armco guardrails on concrete railings on both sides of the deck.
Significance of site/feature Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the installation of gabions and a concrete invert slab (flooring).
References: -

 Approach view	 Eastern side
 Western side	 Upstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
30	TR03305	95.75	B4145 / Lombaardskraal River	River bridge

Year completed	Age	Activity	Work outside reserve
1964	5	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of three spans supported by two columns. Wing-walls occur on all four corners; Armco guardrails on concrete railings on both sides of the deck. What seems to be abandoned concrete beams are located under the bridge.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of trees and the installation of rip rap.	
References: -	

 Approach view	 Eastern side
 Redundant structures	 Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
31	TR03305	97.98	C12316 / 97.98 Culvert near Lombards Kraal	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: Bridge like two span culvert supported by a single column. Wing-walls on all four corners. No guardrails on deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the installation of gabions.	
References: -	

 Approach view	 Eastern view

Western side

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
32	TR03305	101.78	C11624	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Repair culvert	-

Description: Bridge like single span culvert with wing-walls on all four corners; no guardrails on deck.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This culvert structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.

References: -

Approach view

Eastern side

Western side

Upstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
33	TR03305	104.86	B4131A / Gamka River Tributary	River bridge

Year completed	Age	Activity	Work outside reserve
1963	58	Repair bridge	-

Description: Typical beam bridge of re-enforced concrete, consisting of five spans supported by four columns. Wing-walls occur on all four corners; Armco guardrails on concrete railings on both sides of the deck.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This bridge structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) involves the removal of siltation, debris and vegetation.

References: -

Approach view


Eastern side


Western side


Downstream view

Bridge number

In the engineering spreadsheet, Bridge B4131B is described, but is actually meant to be B4131A, as indicated by the chainage and number supplied.

DR 02307

Extension of Bird Street, becoming Blyth Street, becoming a dirt road linking to the N1

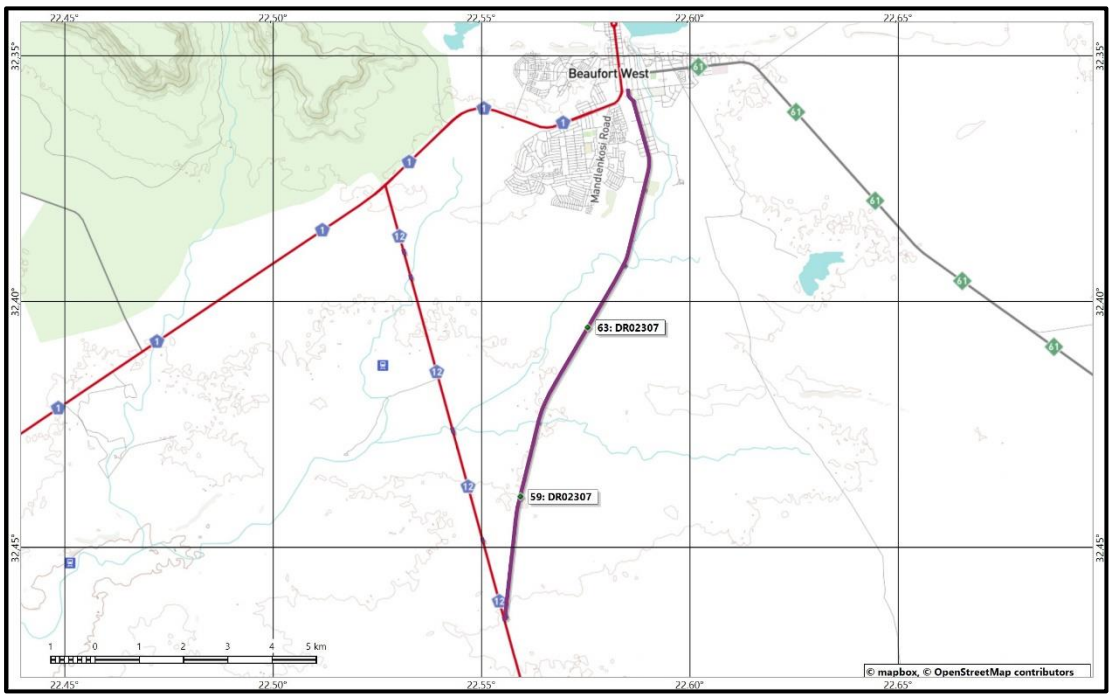


Figure 10. The DR02307 southwards from Beaufort West to join the N12

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
34	DR02307	3.75	C11343	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1999	22	Rehabilitate culvert	-

Description: Bridge like single span culvert; with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) the excavation for wing wall and the installation of rip rap.	
References: -	


Approach view


Western side


Eastern side


Downstream view

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
35	DR02307	6.83	C11348	Major Culvert (BC)

Year completed	Age	Activity	Work outside reserve
1956	65	Repair culvert	-

Description: Bridge like three span culvert supported by two columns; with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4B: Medium significance - Should be recorded before destruction
Reasoned opinion: This structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) the excavation for wing wall and the installation of rip rap.	
References: -	


Current works on adjacent culvert


Western side

 Eastern side	 Downstream view

MR00584

The road to Fraserburg (dirt road)

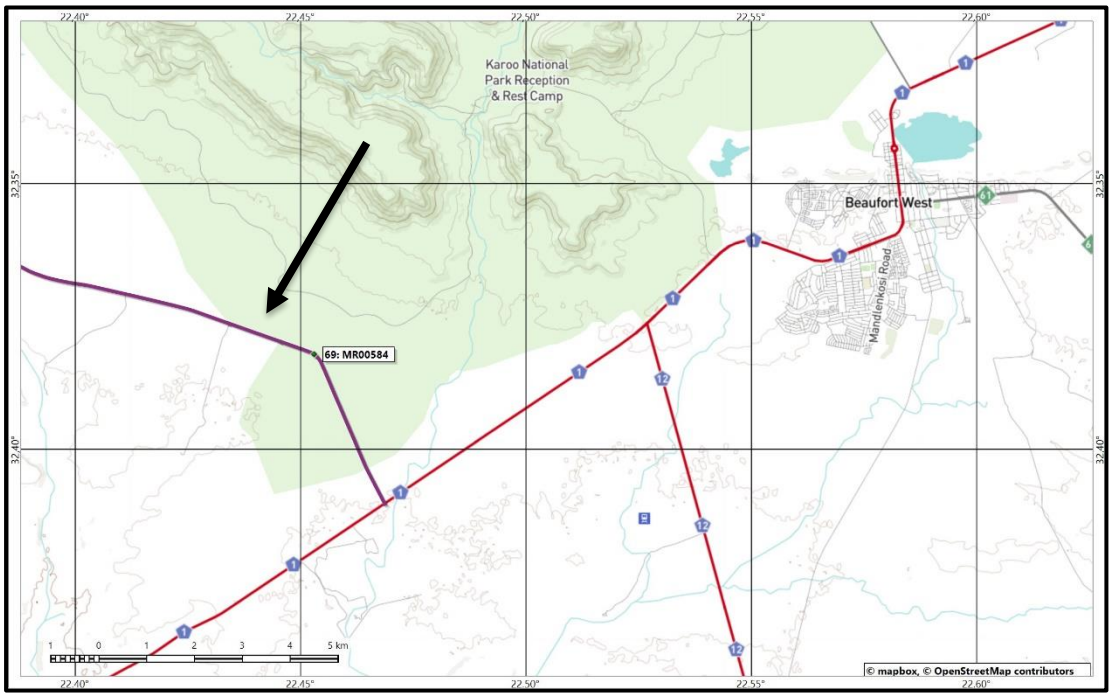


Figure 11. The road north-westwards from Beaufort West towards Fraserburg

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
36	MR00854	3.48	C11403	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
Unknown	-	Repair culvert	-

Description: A bridge-like box culvert with wing-walls, all of re-enforced concrete.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) only involves the installation of gabions.
References: -

 Approach view	 South side
 North side	

TR03501

This is the start of the R61 to going towards Aberdeen.

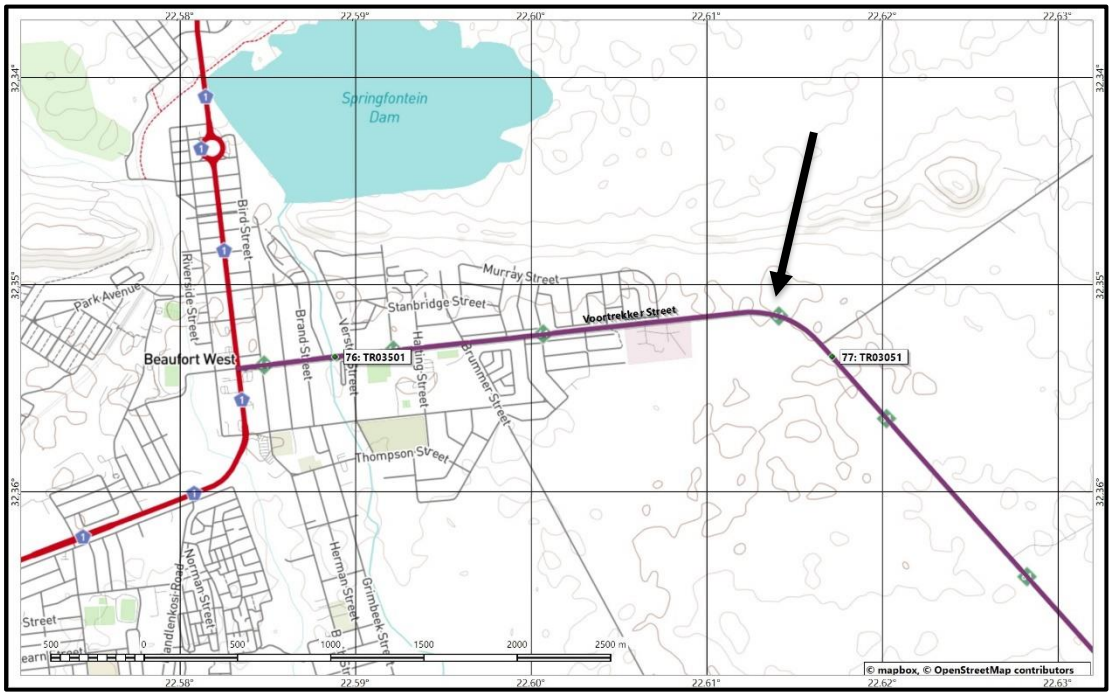


Figure 12. The R61 south-eastwards towards Aberdeen

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
37	TR03501	3.29	C11301 / Bulskop culvert	Major culvert (BC)

Year completed	Age	Activity	Work outside reserve
1960	62	Repair culvert	-

Description: Bridge like two span culvert supported by a single column; with wing-walls on all four corners; no guardrails on the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This culvert structure is 60 years old, but exhibit no unique design or engineering qualities. The proposed actions (see Table 1) involves the installation of gbiions. Therefore, there would be no structural changes made to the bridge.	
References: -	

 Approach view	 Western side

Eastern side

Earlier repairs

Culvert number: 11301

The number on the general layout plan was used to identify this structure as it differ from the one on the spreadsheet. Both documents were supplied by the consulting engineers.

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
38	TR03501	0.52	B2705 / Bridge over Kuils River	River bridge

Year completed	Age	Activity	Work outside reserve
1962	60	Repair culvert	-

Description: Typical beam bridge of re-enforced concrete, consisting of six spans supported by five columns. It has concrete railings on both sides of the deck. The date of the structure is indicated on pylons at both entrances to the bridge.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This bridge structure is 60 years old, but exhibit no unique design or engineering qualities. The proposed actions (see Table 1) involves only the removal of siltation, debris and vegetation and trees. Therefore, there would be no structural changes made to the bridge.	
References: -	

Approach view

Southern side

<table>
<tr><td> 
Northern side</td><td> 
Downstream view</td></tr>
<tr><td> 
Pylon, indicating the bridge date</td><td> 
Bridge number</td></tr>
</table>

TR05801

This is the R381 tar road to Loxton

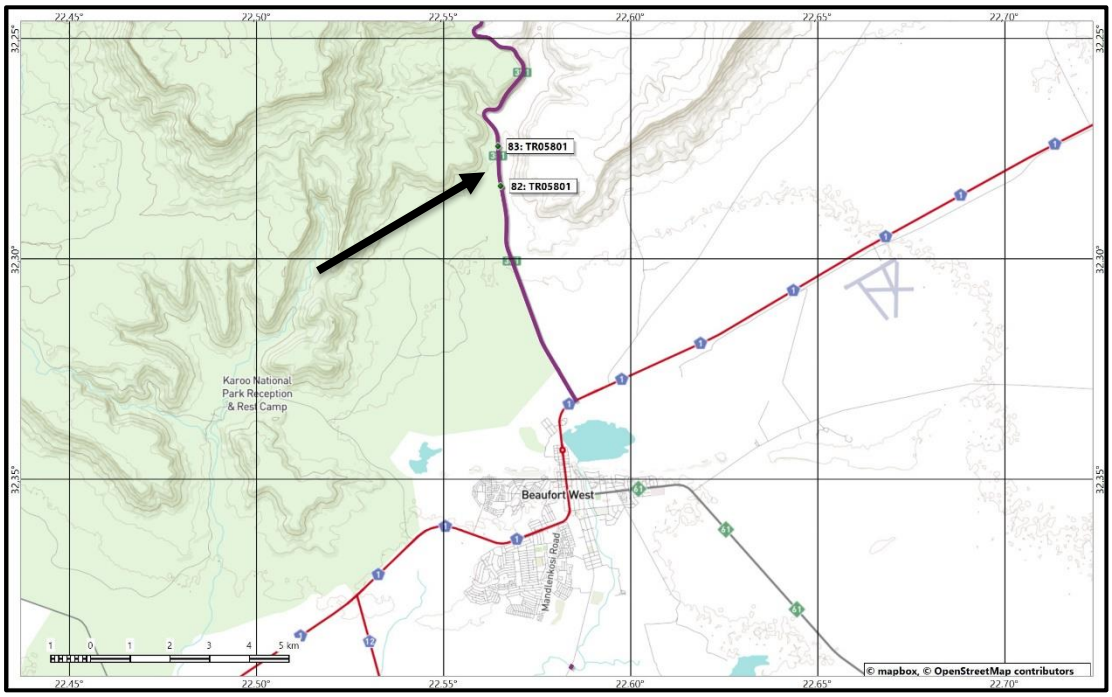


Figure 13. The R381 northwards from Beaufort West towards Loxton

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
39	TR05801	5.8	B4728 / Bridge over Gamka River	River bridge

Year completed	Age	Activity	Work outside reserve
1970	51	Repair culvert	-

Description: Typical beam bridge of re-enforced concrete, consisting of three spans supported by two columns. Wing-walls occur on all four corners; and concrete railing on both sides of the deck.	
Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording
Reasoned opinion: This structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) only involves gabion protection.	
References: -	

Approach view

Western side

Eastern side

Railings

Pylon, indicating the bridge date

Old road marker

Reference No.	Road No.	Chainage (Km)	Structure no. / name	Structure type
40	TR05801	6.81	C11408 / Armco culvert as Ko-Ka-Tsara	Major culvert (Armco)

Year completed	Age	Activity	Work outside reserve
1970	52	Repair culvert	Gabion protection

Description: Pipe culvert from corrugated iron, the shoulders of the road it clad with locally sourced stone. According to the engineering report, this structure is 51 years old, but by its looks it might be much younger.

Significance of site/feature	Generally protected 4C: Low significance - Requires no further recording

Reasoned opinion: This structure is not older than 60 years, exhibit no unique design or engineering qualities and the proposed actions (see Table 1) only involves the removal of siltation debris and vegetation.

References: -

Approach view

Downstream view

Western outlet

Eastern inlet

8. IMPACT ASSESSMENT RATINGS AND MITIGATION MEASURES

8.1 Impact assessment

Heritage impacts are categorised as:

- Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries;
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment;
- Cumulative impacts that are combinations of the above.

Table 2: Impact assessment

Beaufort West Bridges and Culverts		
Impact assessment		
As no structural changes are planned for any of the identified bridges or structures, as well as the fact that work will take place inside the road reserve, there would not be any impact resulting from the repair and upgrade activities		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Intensity	Minor (2)	Minor (2)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (8)
Status (positive or negative)	Neutral	Neutral
Reversibility	n/a	n/a
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	n/a	
Mitigation: None required		
Cumulative impact: None		

8.2 Mitigation measures

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

- For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.

8.3 Visual impact assessment

As the repairs and upgrades are to take place of bridges and culverts located on existing roads, there would effectively be no increase in visual impacts.

8.4 Cumulative Impacts

As the repairs and upgrades are to take place of bridges and culverts located on existing roads, the cumulative impacts would be nil.

9. MANAGEMENT MEASURES

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

Sources of risk were considered with regards to development activities defined in Section 2(viii) of the NHRA that may be triggered and are summarised in Table 3A and 3B below. These issues formed the basis of the impact assessment described. The potential risks are discussed according to the various phases of the project below.

9.1 Objectives

- Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities.

The following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

9.2 Control

In order to achieve this, the following should be in place:

- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.
- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

Table 3A: Construction Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	The identified risk is damage or changes to resources that are generally protected in terms of Sections 27, 28, 31, 32, 34, 35, 36 and 37 of the NHRA that may occur in the proposed project area.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	**Mitigation: Action/control**	**Responsibility**	**Timeframe**
1. Removal of Vegetation 2. Construction of required infrastructure,	See discussion in Section 9.1 above	Environmental Control Officer	During construction only

e.g. access roads, water pipelines			
Monitoring	See discussion in Section 9.2 above		

Table 3B: Operation Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	It is unlikely that the negative impacts identified for pre-mitigation will occur if the recommendations are followed.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	**Mitigation: Action/control**	**Responsibility**	**Timeframe**
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

9.3 Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report. For this proposed project, the assessment has determined that no sites, features or objects of heritage significance occur in the project area. Therefore, no permits are required from SAHRA or the PHRA.

- If heritage features are identified during construction, as stated in the management recommendations, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

10. CONCLUSIONS AND RECOMMENDATIONS

It is the intention of the Western Cape Department of Transport and Public Works to undertake repairs or replacements on 40 bridges and culvert structures located on the following roads in the larger Beaufort West region.

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The investigation consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey that also included the interviewing of relevant people. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age occupation and a much later colonial farmer component, which eventually gave rise to a number of towns.

<u>Identified sites</u>

During the investigation of the bridges and culverts no sites, features or objects of cultural significance were identified.

- Only one of the bridges is older than 60 years (No. 38 – TR03501).
- None of the bridges exhibit unique design or engineering qualities.
- No significant event of person can be linked to any of the bridges or culverts.

Impact assessment and proposed mitigation measures

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.
- As the repairs and upgrades do not involve structural changes to any of the bridges and culverts, there would be no physical changes involved with any of them.
- As the repairs and upgrades are to take place on bridges and culverts located on existing roads, there would effectively be no increase in visual impacts.
- As the repairs and upgrades are to take place on bridges and culverts located on existing roads, the cumulative impacts would be nil.

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report.

- For this proposed project, the assessment has determined that no sites, features or objects of cultural heritage significance occur in the project area, therefore no permits are required from SAHRA or the PHRA.
- If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the Proposed Project be allowed to continue on acceptance of the mitigation measures presented above and the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- The Palaeontological Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo) indicate that most of the project area has a high sensitivity of fossil remains to be found, for which a palaeontological assessment and protocol for finds is required. In the southern end of the N12 the sensitivity is rated as moderate and therefore only a desktop sturdy is required.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. The appropriate steps to take are indicated in Section 9 of the report, as well as in the **Management Plan: Burial Grounds and Graves, with reference to general heritage sites**, in the Addendum, Section 12.4.

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11.3 Archival sources, maps and aerial photographs

1: 50 000 Topographic maps

Google Earth
Aerial Photographs: Chief Surveyor-General
http://artefacts.co.za
https://csg.esri-southafrica.com
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https://sahris.sahra.org.za/map/palaeo
http://*vmus*.adu.org.za

12. ADDENDUM

1. Indemnity and terms of use of this report

The findings, results, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and the author reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although all possible care is taken to identify all sites of cultural importance during the investigation of project areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. The author of this report will not be held liable for such oversights or for costs incurred as a result of such oversights.

Although the author exercises due care and diligence in rendering services and preparing documents, he accepts no liability and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

2. Assessing the significance of heritage resources and potential impacts

A system for site grading was established by the NHRA and further developed by the South African Heritage Resources Agency (SAHRA 2007) and has been approved by ASAPA for use in southern Africa and was utilised during this assessment.

2.1 *Significance of the identified heritage resources*

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. SITE EVALUATION			
1.1 Historic value			
Is it important in the community, or pattern of history			
Does it have strong or special association with the life or work of a person, group or organisation of importance in history			
Does it have significance relating to the history of slavery			
1.2 Aesthetic value			
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group			
1.3 Scientific value			
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage			
Is it important in demonstrating a high degree of creative or technical achievement at a particular period			
1.4 Social value			
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons			
1.5 Rarity			
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage			
1.6 Representivity			
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects			
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class			
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.			
2. Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific community			
3. Field Register Rating			
1.	National/Grade 1: High significance - No alteration whatsoever without permit from SAHRA		
2.	Provincial/Grade 2: High significance - No alteration whatsoever without permit from provincial heritage authority.		
3.	Local/Grade 3A: High significance - Mitigation as part of development process not advised.		

4.	Local/Grade 3B: High significance - Could be mitigated and (part) retained as heritage register site	
5.	Generally protected 4A: High/medium significance - Should be mitigated before destruction	
6.	Generally protected 4B: Medium significance - Should be recorded before destruction	
7.	Generally protected 4C: Low significance - Requires no further recording before destruction	

2.2 *Significance of the anticipated impact on heritage resources*

All impacts identified during the HIA stage of the study will be classified in terms of their significance. Issues would be assessed in terms of the following criteria:

Nature of the impact
A description of what causes the effect, what will be affected and how it will be affected.

Extent
The physical **extent**, wherein it is indicated whether:
- 1 - The impact will be limited to the site;
- 2 - The impact will be limited to the local area;
- 3 - The impact will be limited to the region;
- 4 - The impact will be national; or
- 5 - The impact will be international.

Duration
Here it should be indicated whether the lifespan of the impact will be:
- 1 - Of a very short duration (0–1 years);
- 2 - Of a short duration (2-5 years);
- 3 - Medium-term (5–15 years);
- 4 - Long term (where the impact will persist possibly beyond the operational life of the activity); or
- 5 - Permanent (where the impact will persist indefinitely).

Magnitude (Intensity)
The magnitude of impact, quantified on a scale from 0-10, where a score is assigned:
- 0 - Small and will have no effect;
- 2 - Minor and will not result in an impact;
- 4 - Low and will cause a slight impact;
- 6 - Moderate and will result in processes continuing but in a modified way;
- 8 - High, (processes are altered to the extent that they temporarily cease); or
- 10 - Very high and results in complete destruction of patterns and permanent cessation of processes.

Probability
This describes the likelihood of the impact actually occurring and is estimated on a scale where:
- 1 - Very improbable (probably will not happen);
- 2 - Improbable (some possibility, but low likelihood);
- 3 - Probable (distinct possibility);
- 4 - Highly probable (most likely); or
- 5 - Definite (impact will occur regardless of any prevention measures).

Significance
The significance is determined through a synthesis of the characteristics described above (refer to the formula below) and can be assessed as low, medium or high:

S = (E+D+M) x P; where
S = Significance weighting

E = Extent
D = Duration
M = Magnitude
P = Probability

Significance of impact		
Points	Significant Weighting	Discussion
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area.
31-60 points	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated.
> 60 points	High	Where the impact must have an influence on the decision process to develop in the area.

Confidence
This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Status
- The status, which is described as either positive, negative or neutral.

Reversibility
- The degree to which the impact can be reversed.

Mitigation
- The degree to which the impact can be mitigated.

Nature:		
	Without mitigation	With mitigation
Construction Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Operation Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Reversibility		
Irreplaceable loss of resources?		
Can impacts be mitigated		

3. Mitigation measures

- *Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.*

Impacts can be managed through one or a combination of the following mitigation measures:

- Avoidance
- Investigation (archaeological)
- Rehabilitation
- Interpretation
- Memorialisation
- Enhancement (positive impacts)

For the current study, the following mitigation measures are proposed, to be implemented only if any of the identified sites or features are to be impacted on by the proposed development activities:

- (1) Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources. The site should be retained *in situ* and a buffer zone should be created around it, either temporary (by means of danger tape) or permanently (wire fence or built wall). Depending on the type of site, the buffer zone can vary from
    - 10 metres for a single grave, or a built structure, to
    - 50 metres where the boundaries are less obvious, e.g. a Late Iron Age site.

- (2) Archaeological investigation/Relocation of graves: This option can be implemented with additional design and construction inputs. This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated. Mitigation is to excavate the site by archaeological techniques, document the site (map and photograph) and analyse the recovered material to acceptable standards. This can only be done by a suitably qualified archaeologist.
    - This option should be implemented when it is impossible to avoid impacting on an identified site or feature.
    - This also applies for graves older than 60 years that are to be relocated. For graves younger than 60 years a permit from SAHRA is not required. However, all other legal requirements must be adhered to.
        - Impacts can be beneficial – e.g. mitigation contribute to knowledge

- (3) Rehabilitation: When features, e.g. buildings or other structures are to be re-used. Rehabilitation is considered in heritage management terms as an intervention typically involving the adding of a new heritage layer to enable a new sustainable use.
    - The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
    - Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
        - Conservation measures would be to record the buildings/structures as they are (at a particular point in time). The records and recordings would then become the 'artefacts' to be preserved and managed as heritage features or (movable) objects.
        - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (4) Mitigation is also possible with additional design and construction inputs. Although linked to the previous measure (rehabilitation) a secondary though 'indirect' conservation measure would be to use the existing architectural 'vocabulary' of the structure as guideline for any new designs.
    - The following principle should be considered: **heritage informs design**.
        - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (5) No further action required: This is applicable only where sites or features have been rated to be of such low significance that it does not warrant further documentation, as it is viewed to be fully documented after inclusion in this report.
    - Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage/remains are destroyed.

4. Management Plan: Burial Grounds and Graves, with reference to general heritage sites

1. Background

Burial grounds and graves are viewed as having high emotional and sentimental value and accordingly always carry a high cultural heritage significance rating. Best practice principles dictate that they should preferably be preserved *in situ*. It is only when it is unavoidable and the site cannot be retained, that the graves should be exhumed and relocated after all due processes had been successfully implemented.

For retaining the burial sites and graves, the SAHRA Burial Grounds and Graves (BGG) unit requires a detailed Heritage Management Plan (HMP) clearly outlining a grave management plan that provides details of grave management and access protocols. In addition, the HMP should also provide detailed change finds protocol or procedures in the case of the identification human remains.

The primary aim of the Burial Grounds and Graves Management Plan therefore is to assist in the implementation of mitigation measures to reduce potential negative impacts through the modification of the proposed project development design.

2. Legal Implications

South Africa's unique and non-renewable archaeological and palaeontological heritage sites, inclusive of burial grounds and graves, are 'generally' protected in terms various laws and by-laws:

- Nationally: National Heritage Resources Act, No. 25 of 1999;
- Provincially: KwaZulu-Natal Heritage Act, No. 4 of 2008.

In addition, the following also refer specifically to burial grounds and graves:
- Human Tissue Act, No. 65 of 1983;
- Section 46 of the National Health Act, No. 61 of 2003;
- Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925)
- By-laws:
    - R363 of 2013: Regulations Relating to the Management of Human Remains
    - Local Authorities Notice 34 of 2017, Cemeteries, Crematoria and Funeral Undertakers By-Laws as per Provincial Gazette of 7 April 2017 No. 2800.

In terms of the National Heritage Resources Act, No. 25 of 1999, graves and burial grounds are divided into the following categories:
- Ancestral graves;
- Royal graves and graves of traditional leaders;
- Graves of victims of conflict;
- Graves of individuals designated by the Minister by notice in the Gazette;
- Historical graves and cemeteries; and
- Other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

For KwaZulu-Natal, the KwaZulu-Natal Heritage Act No. 4 of 2008, graves and burial grounds are divided into the following categories:
- Clause 34: Clause 34 seeks to generally protect, against damage or alteration, graves of victims of conflict.
- Clause 35: Clause 35 seeks to generally protect, against damage or alteration, traditional burial places.

- Clause 40: Clause 40 seeks to give special protection to graves of members of the Royal Family listed in the schedule.

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

- Destroy, damage, alter, exhume or remove from its original position of otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- Destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- Bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Marked graves younger than 60 years do not fall under the protection of the NHRA (Act No. 25 of 1999) with the result that exhumation, relocation and reburial can be conducted by a register undertaker. This will include logistical aspects such as social consultation, purchasing of plots in cemeteries, procurement of coffins, etc.

Marked graves older than 60 years are protected by the NHRA (Act No. 25 of 1999) an as a result an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. Unmarked graves are by default regarded as older than 60 years and therefore also falls under the NHRA (Act No. 25 of 1999, Section 36).

For graves in KwaZulu-Natal permission is required as follows:

- Clause 34: Approval of the Council must first be sought;
- Clause 35: Approval of the Council must first be sought;
- Clause 40: Nothing is stated in the Act.

3. Management Plan

3.1 *Definitions*

Heritage Site Management: Heritage site management is the control of the elements that make up physical and social environment of a site, its physical condition, land use, human visitors, interpretation, etc. Management may be aimed at preservation or, if necessary, at minimizing damage or destruction or at presentation of the site to the public. A site management plan is designed to retain the significance of the place. It ensures that the preservation, enhancement, presentation and maintenance of the place/site is deliberately and thoughtfully designed to protect the heritage values of the place (from: *SAHRA Site management plans: guidelines for the development of plans for the management of heritage sites or places*).

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

3.2 *Heritage management plan (HMP)*

3.2.1 Phase 1: Site identification and verification

This part of the process usually take place during the Phase 1 heritage impact assessment and is discussed in Section 7 of the main body of the HIA.

Locality and identification:

- The location of the identified site (e.g. farm name, GPS coordinates) is given;

- Determination of the number of graves and the date range of the burials.

The physical condition of the site is also described in terms of:
- The condition of the burial grounds and graves, e.g. has the headstones been pushed over;
- The approximate number of graves and the date range of the graves;
- Is the site fenced off;
- Is there access to the site, in the case it is fenced off;
- Has the site recently been visited by next of kin or other individuals;
- The status of the vegetation cover on the site.

3.2.2 Phase 2: Determination of the potential impact on the identified sites

Identified impacts on the graves and burial sites are calculated and discussed in Section 8.1 of the main body of the HIA.

The second phase consists of information that should be collected in order to develop the conservation management plan. This includes:
- The needs of the client;
- External needs, i.e. the next of kin;
- Requirements for the maintenance of the cultural significance.

From the above an evaluation is made of the impact of the proposed development project on the status of each of the identified burial grounds and graves.

3.2.3 Phase 3: Mitigation measures

Proposed mitigation measures for each identified burial ground or graves are developed and is discussed in the main body of the HIA (Section 8.2).

The main aim of the mitigation measures, as far as is feasible, is to remove any physical, direct impacts on the burial grounds and graves.

- A minimum buffer of 20m must be established around known burial grounds and graves for the duration of the mining/construction phase. This is relevant where the burial site has been static for a considerable period of time and has already been fenced off;
- In cases the burial site is still in use and might expand in the future and is not fenced off, a minimum buffer of 100m should be implemented;
- In the case where blasting takes place during mining activities, the buffers should increase correspondingly to 200m;
- The buffers must be clearly demarcated, and signage placed during the construction/mining period;
- Access to the graves should be allowed to the descendants. However, they should adhere to the managing authorities' conditions regarding permissions, appointments, health, environment and safety.
- The areas with graves should be kept clean and the grass short so that visitors may enter it without any concerns.
    - However, this might create problems as in many cases not all graves are well-marked, carrying the possibility that they might inadvertently be damaged and therefore contractors/land-owners might not be will to accept this responsibility. The descendants should therefore be held responsible for the maintenance of the site.

- Sites that are located close to access/haul roads might need additional mitigation. All personnel and especially drivers of heavy haul vehicles should be informed where these sites are, and they should keep to the speed limits (usually 30km/h on mining sites);
- Any change in the development layout, future development plans, condition of the grave sites and individual graves should immediately be reported to the heritage inspector/SAHRA for guidance;
- Relevant strategies should be put in place for the managing of the burial grounds and graves after the closure of the mine or the completion of the project. It needs to be stated that the land-owner or developer always will be responsible for the preservation of the site. Therefore, measures should be put in place to ensure that the site is handled appropriately after closure, which, in essence would entail the continuation measures already put in place;

3.3 *Management strategy*

A general approach to this is set out in Section 9 of the main body of the HIA report and is equally applicable to general heritage sites and feature as well as to burial grounds and graves.

A strategy for the implementation of the conservation plan is developed:

- A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts;
- Known sites must be demarcated and fenced off and signage placed during the construction/mining period;
- This management strategy should be applicable to the construction, operation as well as the post operation phases of the development/mining activities.
- Relevant strategies should be put in place for the managing of the burial grounds and graves after the closure of the mine or the completion of the project. It needs to be stated that the land-owner or developer always will be responsible for the preservation of the site. Therefore, measures should be put in place to ensure that the site is handled appropriately after closure, which, in essence would entail the continuation measures already put in place;
- The managing authority should be able to regularly inspect the sites in order to ensure that construction and other such activities do not damage the graves;
    - SAHRA and the relevant PHRA are the competent authorities responsible for the regulation of the HMP in terms of the national legislative framework. The NHRA states:

        36(1) *Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make the necessary arrangement for their conservation as they see fit.*

4. Relocation of graves

Once it has been decided to relocate particular graves, the following steps should be taken:

- Notices of the intention to relocate the graves need to be put up at the burial site for a period of 60 days. This should contain information where communities and family members can contact the developer/archaeologist/public-relations officer/undertaker. All information pertaining to the identification of the graves needs to be documented for the application of a SAHRA permit. The notices need to be in at least 3 languages, English, and two other languages. This is a requirement by law.
- Notices of the intention needs to be placed in at least two local newspapers and have the same information as the above point. This is a requirement by law.
- Local radio stations can also be used to try contact family members. This is not required by law, but is helpful in trying to contact family members.
- During this time (60 days) a suitable cemetery need to be identified close to the development area or otherwise one specified by the family of the deceased.

- An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account. This is a requirement by law.
- Once the 60 days has passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement by law.
- Once the permit has been received, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any items found in the grave.

Information needed for the SAHRA permit application:

- The permit application needs to be done by an archaeologist.
- A map of the area where the graves have been located.
- A survey report of the area prepared by an archaeologist.
- All the information on the families that have identified graves.
- If graves have not been identified and there are no headstones to indicate the grave, these are then unknown graves and should be handled as if they are older than 60 years. This information also needs to be given to SAHRA.
- A letter from the landowner giving permission to the developer to exhume and relocate the graves.
- A letter from the new cemetery confirming that the graves will be reburied there.
- Details of the farm name and number, magisterial district and GPS coordinates of the gravesite.

5. Defining next of kin

An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding relocation of graves.

Anthropologically speaking three type of kin are distinguished: patrilineal (called *agnates*), maternal (*uterine* kin) and kin by marriage (*affines*). All three categories have their important part to play in social life.

In terminologies used in the west the close-knit group of family members is clearly marked off from other kin - family terms, such as ‘father’, ‘mother’, ‘brother’ and ‘sister’ are never used for aunts, uncles and cousins.

In many non-western societies this is not the case and the family is merged with the wider group of kin and the family terms are applied much more widely. Next of kin for the Southern Bantu-language speakers is based on a classificatory system where a man uses a term to refer to three significant relatives – his father, his father’s brother and his mother’s brother.

For example, a man (A) may call his father’s brother (i.e. uncle) also a father. All of that latter person’s children will then also be called his (A) brothers and sisters, prohibiting him from marrying any of them (however, *vide* preferred marriages). In Anthropology this system is referred to as the Iroquois system (with reference to the North American Indian tribe where it was first described). When a man calls his father’s brother ‘father’ a suffix is usually added to indicate whether he is an elder or junior brother (e.g. (*ra)mogolo* = elder brother; (*ra)ngwane* = junior brother; also (*ra)kgadi* = younger sister; (*ma)lome* = mother’s brother)(SePedi terminology is used).

Consultants having to relocate graves might find it confusing if they do not have insight into this complex system of kinship, where, for example a single individual can have more than one father or mother.

5. Chance find procedures

A general approach to this is set out in Section 9 of the main body of the HIA report and is equally applicable to general heritage sites and features as to burial grounds and graves.

- A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts;
- An appropriately qualified heritage consultant should be identified to be called upon if any possible heritage resources or artefacts are identified;
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities be halted;
- The qualified archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and impact on the heritage resource;
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered;
- Should the heritage consultant conclude that the find is a heritage resource protected in terms of the NHRA (1999) Sections 34, 35, 37 and NHRA (1999) Regulations (Regulation 38, 39, 40), he or she should notify SAHRA and/or the relevant PHRA;
- Based on the comments received from SAHRA and/or the PHRA, the heritage consultant would present the relevant terms of reference to the client for implementation;
- Construction/Operational activities can commence as soon as the site has been cleared and signed off by the archaeologist.

6. Curriculum vitae

Johan Abraham van Schalkwyk

Personal particulars

Date of birth:	14 April 1952
Identity number:	520414 5099 08 4
Marital status:	Married; one daughter
Nationality:	South African

Current address: home

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Qualifications

1995 DLitt et Phil (Anthropology), University of South Africa
1985 MA (Anthropology), University of Pretoria
1981 BA (Hons), Anthropology, University of Pretoria
1979 Post Graduate Diploma in Museology, University of Pretoria
1978 BA (Hons), Archaeology, University of Pretoria
1976 BA, University of Pretoria

Non-academic qualifications

12th HSRC-School in Research Methodology - July 1990
Dept. of Education and Training Management Course - June 1992
Social Assessment Professional Development Course - 1994
Integrated Environmental Management Course, UCT - 1994

Professional experience

Private Practice
2017 - current: Professional Heritage Consultant

National Museum of Cultural History
1992 - 2017: Senior researcher: Head of Department of Research. Manage an average of seven researchers in this department and supervise them in their research projects. Did various projects relating to Anthropology and Archaeology in Limpopo Province, Mpumalanga, North West Province and Gauteng. Headed the Museum's Section for Heritage Impact Assessments.
1978 - 1991: Curator of the Anthropological Department of the Museum. Carried out extensive fieldwork in both anthropology and archaeology

Department of Archaeology, University of Pretoria
1976 - 1977: Assistant researcher responsible for excavations at various sites in Limpopo Province and Mpumalanga.

Awards and grants

1. Hanisch Book Prize for the best final year Archaeology student, University of Pretoria - 1976.
2. Special merit award, National Cultural History Museum - 1986.
3. Special merit award, National Cultural History Museum - 1991.
4. Grant by the Department of Arts, Culture, Science and Technology, to visit the various African countries to study museums, sites and cultural programmes - 1993.
5. Grant by the USA National Parks Service, to visit the United States of America to study museums, sites, tourism development, cultural programmes and impact assessment programmes - 1998.
6. Grant by the USA embassy, Pretoria, under the Bi-national Commission Exchange Support Fund, to visit cultural institutions in the USA and to attend a conference in Charleston - 2000.
7. Grant by the National Research Foundation to develop a model for community-based tourism - 2001.

8. Grant by the National Research Foundation to develop a model for community-based tourism - 2013. In association with RARI, Wits University.

Publications
Published more than 70 papers, mostly in scientifically accredited journals, but also as chapters in books.

Conference Contributions
Regularly presented papers at conferences, locally as well as internationally, on various research topics, ranging in scope from archaeology, anthropological, historical, cultural historical and tourism development.

Heritage Impact Assessments
Since 1992, I have done more than 2000 Phase 1 and Phase 2 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.

Latest publications
Van Schalkwyk, J.A. 2020. A cognitive approach to ordering of the world: some case studies from the Sotho- and Tswana-speaking people of South Africa. In Whitley, D.S., Loubser, J.H.N. & Whitelaw, G. (eds.) *Cognitive Archaeology. Mind, Ethnography, and the Past in South African and Beyond*. London: Routledge. Pp. 184-200.

Namono, C. & Van Schalkwyk, J.A. 2020. Appropriating colonial dress in the rock art of the Makgabeng plateau, South Africa. In Wingfield, C., Giblin, J. & King, R. (eds) *The pasts and presence of art in South Africa: Technologies, Ontologies and Agents*. University of Cambridge: McDonald Institute for Archaeological Research. Pp. 51-62.