

HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED BULK WATER SUPPLY LINE FROM PIET-SE-KOP RESERVOIR TO TSHAMAHANSI AND WITRIVIER/PHAFOLA TO BAKENBERG, LIMPOPO PROVINCE

AS PART OF THE MOGALAKWENA WATER MASTER PLAN, MOGALAKWENA MUNICIPALITY,
LIMPOPO PROVINCE

Type of development:

Bulk Water Supply Line

Client:

Tekplan Environmental

Client info:

Danie Combrink

E – mail: tecoplan@mweb.co.za

Developer:

Mogalakwena Local Municipality



HCAC - Heritage Consultants

Private Bag X 1049

Suite 34

Modimolle

0510

Tel: 082 373 8491

Fax: 086 691 6461

E-Mail: jaco.heritage@gmail.com

Report Author:

Mr. J. van der Walt

Project Reference:

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9 November 2016	216105	Inclusion of Alternative 2
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REPORT OUTLINE

Appendix 6 of GN 982 of 4 December 2014 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 982 of 4 December 2014	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	<i>Declaration of Independence</i>
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(d) Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process	Section 3
(f) Specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(l) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) Description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment	Section 9
(k) Mitigation measures for inclusion in the EMPr	Section 9 and 10
(l) Conditions for inclusion in the environmental authorisation	Section 9 and 10
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 9 and 10
(n) Reasoned opinion - (i) as to whether the proposed activity or portions thereof should be authorised; and (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.2
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	BAR Appendix E
(q) Any other information requested by the competent authority	Section 10

Executive Summary

The Mogalakwena Municipality proposes the development of bulk water supply pipelines (approximately 20km), linking existing pipelines from Piet-se-kop reservoir to Tshamahansi and Witrivier/Phafola to Bakenberg, as part of the Mogalakwena water master plan. The project is located in the Mogalakwena Local Municipality, Waterberg District, Limpopo Province. The majority of the pipeline will mainly be constructed through old agricultural fields, next to existing roads, power lines and existing pipeline servitudes. The proposed route will traverse the following properties:

- The Remainder of the farm Macalacaskop 243 KR and the Remainder of the farm Turfspruit 241 KR.
- The farm Gillimberg 861 LR, farm Drenthe 778 LR, farm Groningen 779 LR, farm Vriesland 781, farm Vliegekraal 783 LR and farm Hellem Bricksteen 761 LR.

HCAC was appointed to conduct a Heritage Impact Assessment of the proposed project to determine the presence of cultural heritage sites and the impact of the proposed infrastructure on these non-renewable resources. Two alternatives (Alternative 1 & Alternative 2) for each route (Bakenberg section & Tshamahansi section) were assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the development footprint. Identified heritage resources were recorded as Field No using a handheld GPS and documented through written and photographic records.

During the survey 27 heritage features were recorded (both Bakenberg and Tshamahansi sections). These consist of cemeteries, Late Iron Age stone walled sites and find spots, stone walled ruins, stone cairns of unknown purpose and an African church classified as living heritage. In addition to the recorded heritage features low density scatters of isolated Stone Age artefacts were noted in the study area. These artefacts are classified as Middle Stone Age (MSA) and consist of flakes and Levalois type cores usually found in vertic soils and are not *in-situ*. These background scatters of artefacts do not constitute an archaeological site and are scattered too sparsely to be of any significance apart from noting their presence, which has been done in this report. This assessment is in line with the findings of a specialist Stone Age report (Du Piesanie & Hodgskiss 2015) for a portion of the Bakenberg Section as part of a mining right application.

The impact that alternative 1 will have on the recorded features are considered too high from a heritage perspective. The impacts resulting from alternative 2 can be mitigated to an acceptable level with the correct mitigation measures and management actions and it is therefore recommended that alternative two is authorised from a heritage perspective on the condition that the recommendations are implemented as part of the EMPr and based on approval from SAHRA. Below is a summary of the recorded finds and areas of impact. Green indicates no impact to the site, orange possible indirect impact and red indicates that the site will be directly impacted on by the development. Please refer to Section 9 & 10 for the proposed mitigation measures.

Field No	Type Site	Longitude	Latitude	Significance	Description	Location	Distance from Alt 1	Distance from Alt 2	Impact prior to mitigation	Impact after mitigation	Mitigation measures
582	Iron Age Find Spot	28° 53' 09.8916" E	23° 54' 03.5891" S	Medium Significance	Low density scatter of undecorated ceramics	Bakenberg Alternative 1	46 m	241 m	No direct impact	No direct impact to the site	Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
583	Iron Age Site	28° 52' 33.2832" E	23° 53' 58.1821" S	Medium – High Significance	Late Iron Age Stone walled site	Bakenberg Alternative 1	4 m	64 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
584	Stone Cairn	28° 52' 28.6788" E	23° 53' 57.4404" S	Unknown	Single Stone Cairn	Bakenberg Alternative 1	Direct impact	69 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
585	Cemetery	28° 52' 25.6764" E	23° 53' 56.9184" S	High Social Significance	Approximately 6 graves, oldest visible date 1971.	Bakenberg Alternative 1	Direct impact	69m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
586	Cemetery	28° 52' 24.0168" E	23° 53' 55.5035" S	High Social Significance	Approximately 21 graves orientated east west and north south, graves of adults and children.	Bakenberg Alternative 1	37 m	104 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
587	Cemetery	28° 52' 24.7835" E	23° 53' 54.6073" S	High Social Significance	Approximately 4 graves, three with granite head stone and one with a stone head stone. Oldest Visible date 1942	Bakenberg Alternative 1	65 m	131 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
588	Ruin	28° 52' 22.4941" E	23° 53' 56.8861" S	Low - Medium Significance	Several rectangular stone walled ruins.	Bakenberg Alternative 1	17 m	50m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
589	Cemetery	28° 52' 20.6652" E	23° 53' 56.0041" S	High Social Significance	Approximately 10 graves. Orientated east west and north south. Graves of adults and children. Grave dressings consist of granite and stone packed graves.	Bakenberg Alternative 1	Direct impact	69m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.

590	Cemetery	28° 52' 19.8119" E	23° 53' 55.7376" S	High Social Significance	Unknown number of graves	Bakenberg Alternative 1	Direct impact	69m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
591	Cemetery	28° 52' 18.8795" E	23° 53' 56.5297" S	High Social Significance	Large cemetery with an unknown number of graves on top of a possible iron age cattle kraal. Outside of this cluster several other badly marked stone packed graves occur.	Bakenberg Alternative 1	26 m	44 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
592	Stone walled Site	28° 52' 03.8639" E	23° 53' 50.8921" S	Medium Significance	Ephemeral stone packed wall.	Bakenberg Alternative 1	60 m	142 m	No direct impact	No direct impact to the site	Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
593	Stone Cairn	28° 51' 57.9852" E	23° 53' 51.1728" S	Unknown	Approximately 6 stone cairns over a large area.	Bakenberg Alternative 1	18 m	105 m	Direct impact if Alternative 1 is chosen, no impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
595	Iron Age Site	28° 48' 39.8197" E	23° 53' 14.3664" S	High significance	Later Iron Age stone walled site.	Bakenberg Alternative 1	14m	212m	Secondary impact - damage to site	No impact	Avoidance
597	Cemetery	28° 59' 34.7459" E	24° 05' 59.8595" S	High Social Significance	Single grave	Tshamahansi Alternative 1 and 2	26m	40m	Potential indirect impact if alternative 1 is used. No direct impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
598	Stone Cairn	28° 59' 36.5965" E	24° 06' 04.4208" S	Unknown	Elongated stone cairn	Tshamahansi Alternative 1 and 2	15m	29m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.

599	Stone Cairn	28° 59' 35.9411" E	24° 06' 04.4748" S	Unknown	Elongated stone cairn	Tshamahansi Alternative 1 and 2	2 m	11m	Direct Impact to site	No direct impact to the site	Avoidance and demarcation
600	Cemetery	28° 59' 36.8412" E	24° 06' 06.4799" S	High Social Significance	Cemetery with an unknown number of graves.	Tshamahansi Alternative 1 and 2	4 m	10 m	Direct Impact to site	No direct impact to the site	Due to space restriction as part of an existing servitude a 20 m buffer is not feasible. Preferential to relocation strict monitoring and demarcation of the site is recommended.
601	Cemetery	28° 59' 41.9459" E	24° 06' 15.0085" S	High Social Significance	Approximately 4 graves. Marked with yellow paint on cement slabs.	Tshamahansi Alternative 1 and 2	18m	30m	Direct impact if Alternative 1 is chosen, no impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
602	Cemetery	28° 59' 46.8457" E	24° 06' 24.5809" S	High Social Significance	Approximately 14 graves	Tshamahansi Alternative 1 and 2	22 m	33m	Potential indirect impact if alternative 1 is used. No direct impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
603	Stone walled Site	28° 59' 55.2877" E	24° 06' 42.1200" S	Low Significance	Small circular enclose, approximately 2 meters in diameter. Could mark a grave	Tshamahansi Alternative 1 and 2	15m	26m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
604	Stone Cairn	28° 59' 57.6960" E	24° 06' 47.3903" S	Unknown	Elongated ephemeral stone cairn orientated east to west	Tshamahansi Alternative 1 and 2	10m	21m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
605	Ruin	29° 00' 11.2285" E	24° 07' 20.0963" S	Low - Medium Significance	Collapsed rectangular stone walled structure with cement slab.	Tshamahansi Alternative 1 and 2	4m	21m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.

606	Living Heritage Site	29° 00' 11.5885" E	24° 07' 22.2203" S	Social Significance	African church under Marula trees.	Tshamahansi Alternative 1 and 2	20m	21m	Potential indirect impact if alternative 1 is used. Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
619	Cemetery	28° 53' 14.8523" E	23° 54' 19.5480" S	High Social Significance	Single grave of a child.	Bakenberg Alternative 2	382 m	28 m	Potential indirect impact if alternative 2 is used.	No direct impact to the site	Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
620	Stone walled Site	28° 52' 33.1465" E	23° 53' 59.7623" S	Low – Medium Significance	Large area with several ephemeral stone wall foundations of circular hut structures, rectangular structures and boundary walls	Bakenberg Alternative 2	44 m	15 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
622	Stone walled Site	28° 52' 17.5225" E	23° 53' 57.8867" S	Low – Medium Significance	Large area forming part of Field No 620 with several ephemeral stone wall foundations of circular hut structures, rectangular structures and boundary walls	Bakenberg Alternative 2	75 m	4 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
623	Stone walled Site	28° 51' 19.7280" E	23° 53' 48.7968" S	Low Significance	Several lower grinding stones and the ephemeral remains of some stone wall foundations.	Bakenberg Alternative 2	125 m	11m	Direct impact - damage/ destruction of site	Possible damage to site, recording and monitoring of heritage features.	Monitoring and a chance find procedure. The site is highly disturbed and occurs in an agricultural field.


The results of the paleontological desktop (Rossouw 2017) concluded: “ *that both pipeline footprints are located on unfossiliferous Bushveld Complex granites and within an area that has been previously disturbed by pipeline construction as in the case of the Tshamahanzi footprint. A 870m long section of the Tshamahanzi footprint is located in close proximity to an outcrop area of the Timeball Hill Formation (Transvaal Supergroup), which is composed of quartzite and finely-laminated ferruginous shale with thin stromatolitic carbonate interbeds. There is little chance of finding fossil material within the superficial overburden along the Bakenberg footprint mainly because of a lack of alluvium in the area. The likelihood of finding intact vertebrate fossil remains from superficial alluvial deposits where the Tshamahanzi footprint crosses the Rooisloot north of Mahwelereng is considered negligible due to a lack of suitably developed overbank sediments. As far as the palaeontological heritage is concerned, the proposed development may proceed with no further palaeontological assessments required, provided that all excavation activities are restricted to within the boundaries of the development footprint and that the ECO of the project adheres to recommendations with regard to chance fossil finds procedures.*” Please refer to the report conducted by Rossouw (2017).

Social consulting was conducted for this project as discussed in Section 3.3 and the Bakenberg Traditional Council registered as an interested and affected party and responded to the information provided. Mr L.P. Langa as representative (Bakenberg Traditional Council) indicated that their main interest in the matter is the provision of clean and adequate water to the Bakenberg Community. They support the project and that it should be implemented swiftly and without delay, however no heritage concerns were raised.

Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of the Mogalakwena Bulk Water Pipeline the line will, with the recommended mitigation measures and management actions, not impact any heritage resources directly. However this and other projects in the area could have an indirect impact on the heritage landscape. As the pipeline will be installed subsurface and for parts of the line it will be installed next to existing infrastructure, this minimises additional impact on the landscape.

In the long term, the construction of this and other projects in the area together with the economic benefits in terms of employment creation and provision of water will in time allow for more people to live and work around the project area and this together with construction activities could influence the sense of place of the study area in a negative way. However it should also be noted that projects such as these allow for the recording and identification of otherwise unknown heritage resources and through successful and responsible mitigation the archaeological record of the area will be added onto.

DECLARATION OF INDEPENDENCE

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I:</p> <ul style="list-style-type: none"> • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	22/02/2017

a) Expertise of the specialist

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

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

TABLE OF CONTENTS

REPORT OUTLINE.....	4
EXECUTIVE SUMMARY	5
A) EXPERTISE OF THE SPECIALIST.....	2
ABBREVIATIONS.....	6
GLOSSARY	6
1 INTRODUCTION AND TERMS OF REFERENCE:.....	7
1.1 TERMS OF REFERENCE.....	7
2 LEGISLATIVE REQUIREMENTS.....	14
3 METHODOLOGY	15
3.1 LITERATURE REVIEW.....	15
3.2 GENEALOGICAL SOCIETY AND GOOGLE EARTH MONUMENTS.....	15
3.3 PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT:.....	15
3.4 SITE INVESTIGATION.....	16
3.5 SITE SIGNIFICANCE AND FIELD RATING.....	19
3.6 IMPACT ASSESSMENT METHODOLOGY.....	20
3.7 LIMITATIONS AND CONSTRAINTS OF THE STUDY	21
4 DESCRIPTION OF SOCIO ECONOMIC ENVIRONMENTAL	21
5 DESCRIPTION OF THE PHYSICAL ENVIRONMENT:	22
6 RESULTS OF PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT:	23
7 LITERATURE / BACKGROUND STUDY:	23
7.1 GENERAL HISTORY OF THE AREA	23
7.2 EARLIER STONE AGE	24
7.3 MIDDLE STONE AGE.....	25
7.4 LATER STONE AGE.....	25
7.5 THE IRON AGE (AD 400 TO 1840)	25
8 FINDINGS OF THE SURVEY.....	27
9 DESCRIPTION OF IDENTIFIED HERITAGE RESOURCES:	28
9.1 SITE DISTRIBUTION MAP.....	34
9.2 IRON AGE. (FIELD NO 582, 583, 592, 595 AND 603).....	39
9.3 RUINS. (FIELD NO 588, 605, 620, 622 AND 623).	42
9.4 CEMETERIES (FIELD NO 585 – 591, 597, 600, 601, 602 AND 619).....	44
9.5 STONE CAIRNS (FIELD NO 584, 593, 598, AND 599).....	45

9.6	CULTURAL LANDSCAPES, INTANGIBLE AND LIVING HERITAGE(FIELD NO 606).....	46
9.7	PALAEONTOLOGICAL RESOURCES	47
9.8	BATTLEFIELDS AND CONCENTRATION CAMPS.....	47
9.9	POTENTIAL IMPACT	48
10	RECOMMENDATIONS AND CONCLUSION	1
10.1	CHANCE FIND PROCEDURES	5
10.2	REASONED OPINION	7
11	REFERENCES.....	8
12	APPENDICES:.....	10
	CURRICULUM VITAE OF SPECIALIST	10
LIST OF FIGURES		
FIGURE 1.	PROVINCIAL MAP (1: 250 000 TOPOGRAPHICAL MAP).....	9
FIGURE 2:	REGIONAL MAP (1:50 000 TOPOGRAPHICAL MAP). TSHAMAHANSI SECTION.....	10
FIGURE 3.	REGIONAL MAP (1:50 000 TOPOGRAPHICAL MAP). BAKENBERG SECTION.	11
FIGURE 4.	SATELLITE IMAGE SHOWING THE TSHAMAHANSI SECTION (GOOGLE EARTH).	12
FIGURE 5.	SATELLITE IMAGE SHOWING THE BAKENBERG SECTION (GOOGLE EARTH).....	13
FIGURE 6:	BAKENBERG SECTION (ALTERNATIVE 1 & 2), TRACK LOGS OF THE SURVEY IN BLACK.....	17
FIGURE 7:	TSHAMAHANSI SECTION, TRACK LOGS OF THE SURVEY IN BLACK.	18
FIGURE 8.	EXISTING ROAD AT THE BAKENBERG SECTION.	31
FIGURE 9.	EXISTING PIPELINE CONSTRUCTION ACTIVITIES IN THE TSHAMAHANSI SECTION.	31
FIGURE 10.	GENERAL SITE CONDITIONS IN THE BAKENBERG SECTION.	32
FIGURE 11:	GENERAL SITE CONDITIONS.	32
FIGURE 12:	DORSAL VIEW OF MSA ARTEFACTS FOUND IN THE STUDY AREA MADE FROM FELSIC TUFF	33
FIGURE 13:	RECORDED SITES IN RELATION TO ALTERNATIVE 1 AT THE BAKENBERG SECTION.	34
FIGURE 14:	RECORDED SITES IN RELATION TO ALTERNATIVE 2 AT THE BAKENBERG SECTION.	35
FIGURE 15:	RECORDED SITES IN RELATION TO THE TSHAMAHANSI SECTION.	36
FIGURE 16.	PREVIOUSLY RECORDED SITES (DU PIESANIE AND HODGSKISS 2015) IN RELATION TO THE PROPOSED PROJECT.....	37
FIGURE 17.	CLOSE UP OF PREVIOUSLY RECORDED SITES (DU PIESANIE AND HODGSKISS 2015) IN RELATION TO THE PROPOSED DEVELOPMENT (ZOOMED IN VIEW)	38
FIGURE 18:	WALLING AT FIELD NO 583.	40
FIGURE 19:	ARTEFACTS FROM FIELD NO 583	40
FIGURE 20:	LIA SETTLEMENT AT FIELD NO 594	40
FIGURE 21.	STONE WALLED ENCLOSURE AT FIELD NO 603.....	41
FIGURE 22:	REMAINS OF RUIN AT FEATURE 1	42
FIGURE 23:	REMAINS OF RUIN AT FEATURE 2	42
FIGURE 24:	REMAINS OF RUIN FROM FEATURE 5	43
FIGURE 25:	LARGE MIDDEN AT FEATURE 5	43

FIGURE 26: STONE MARKED GRAVES AT FIELD NO 585.	44
FIGURE 27: GRAVE AT FIELD NO 589.	44
FIGURE 28: GRAVES AT FIELD NO 600.	44
FIGURE 29: GRAVES AT FIELD NO 601.	44
FIGURE 30: CAIRN AT FIELD NO 584.	45
FIGURE 31: CAIRN AT FIELD NO 593.	45
FIGURE 32: CAIRN AT FIELD NO 593.	46
FIGURE 33: CAIRN AT FIELD NO 599.	46
FIGURE 34: AFRICAN CHURCH.	47
FIGURE 35: HERITAGE SENSITIVE AREA TO BE AVOIDED ON THE BAKENBERG SECTION.	50

LIST OF TABLES

TABLE 1. SPECIALIST REPORT REQUIREMENTS.	4
TABLE 2: PROJECT DESCRIPTION	8
TABLE 3: INFRASTRUCTURE AND PROJECT ACTIVITIES	8
TABLE 4: SITE INVESTIGATION DETAILS	16
TABLE 5. MOGALAKWENA LM POPULATION WITH REFERENCE TO THE BAKENBERG AND TSHAMAHANSI AREA.	21
TABLE 6: RECORDED FEATURES AND COORDINATES	28
TABLE 7. IMPACT ASSESSMENT OF THE MOGALAKWENA BULK WATER SUPPLY LINE ALTERNATIVE 1.	48
TABLE 8. IMPACT ASSESSMENT OF THE MOGALAKWENA BULK WATER SUPPLY LINE ALTERNATIVE 2.	49

ABBREVIATIONS

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

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

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Heritage Contracts and Archaeological Consulting CC (**HCAC**) has been contracted by Tekplan Environmental to conduct a heritage walkthrough of the proposed infrastructure for the proposed water supply pipelines of approximately 20 km in length. The report forms part of the Basic Assessment Report (BAR) and Environmental Management Programme Report (EMPR) for the Mogalakwena Bulk Water Supply pipelines.

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

During the survey 27 heritage sites were identified. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regs section 40 (1) and (2), to be submitted to SAHRA. As such the Basic Assessment report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

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

Reporting

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

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

Table 2: Project Description

Size of farm and portions	The Remainder of the farm Macalacaskop 243 KR and the Remainder of the farm Turfspruit 241 KR referred to as the Tshamahansi section. The farm Gillimberg 861 LR, farm Drenthe 778 LR, farm Groningen 779 LR, farm Vriesland 781, farm Vliegekraal 783 LR and farm Hellem Bricksteen 761 LR referred to as the Bakenberg section.
Magisterial District	Waterberg District
1: 50 000 map sheet number	2328 DD; 2428BB; 2429AA.
Central co-ordinate of the development	Tshamahansi Section 24° 6'49.06"S 28°59'57.84"E Bakenberg Section 23°52'59.32"S 28°47'14.65"E

Table 3: Infrastructure and project activities

Type of development	Bulk Water Pipeline
Project size	Tshamahansi Section 3.2 km Bakenberg Section 16.6 km
Project Components	Proposed 3,2 km, 400mm diameter water pipeline, with a throughput of 163.15 l/s linking existing pipelines from the Piet-se-Kop reservoir to existing pipelines near Tshamahansi Village. Proposed 16,6 km, 600mm diameter water pipeline, with a throughput of 271.10l/s linking existing pipelines near Witrivier/Phafola to Bakenberg.

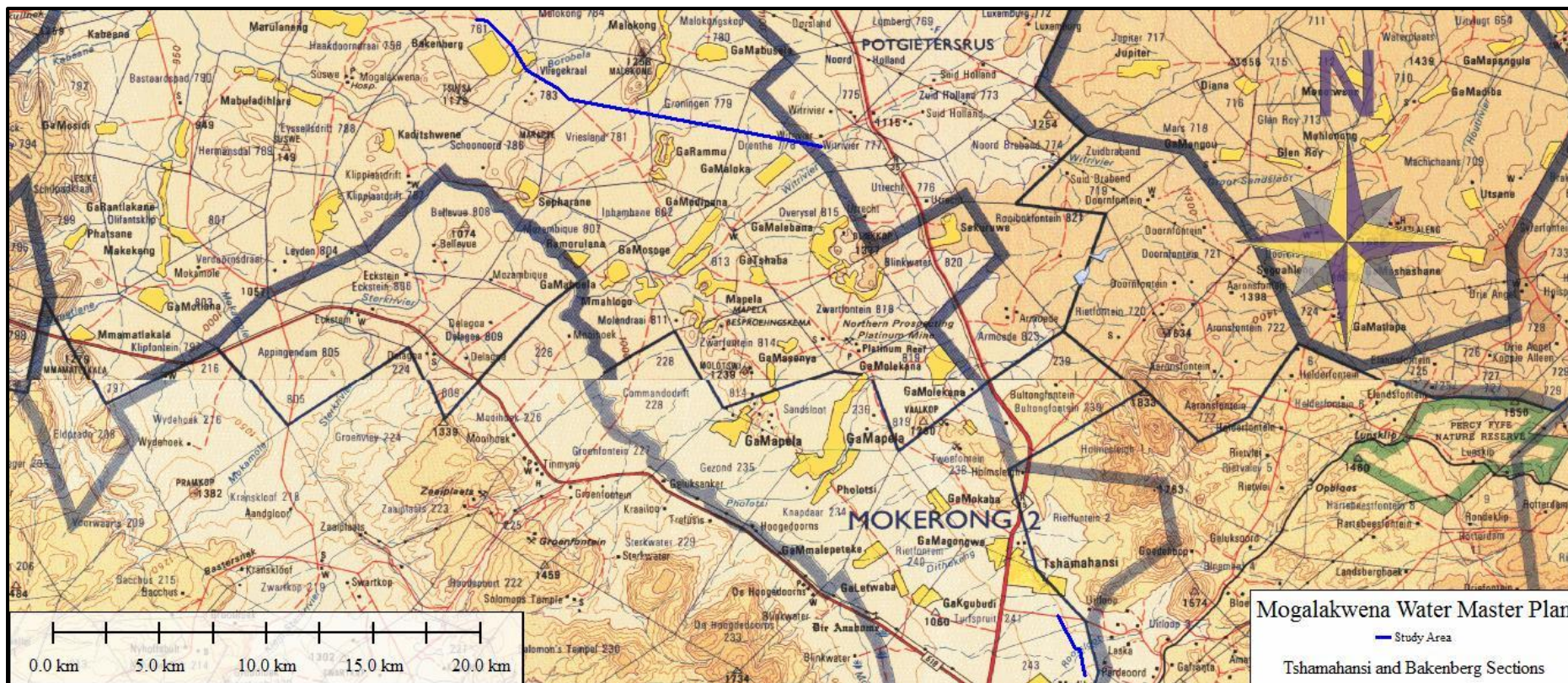


Figure 1. Provincial map (1: 250 000 topographical map)

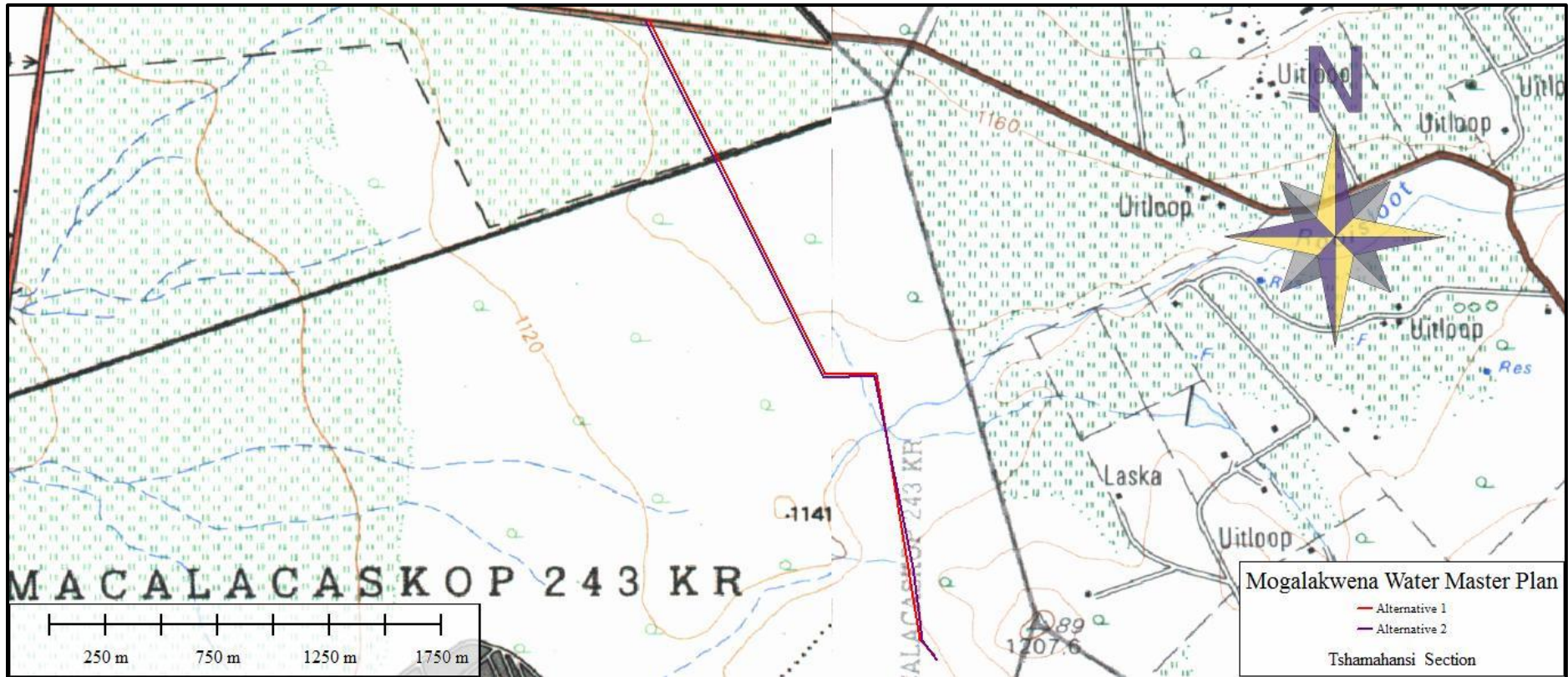


Figure 2: Regional map (1:50 000 topographical map). Tshamahansi Section.

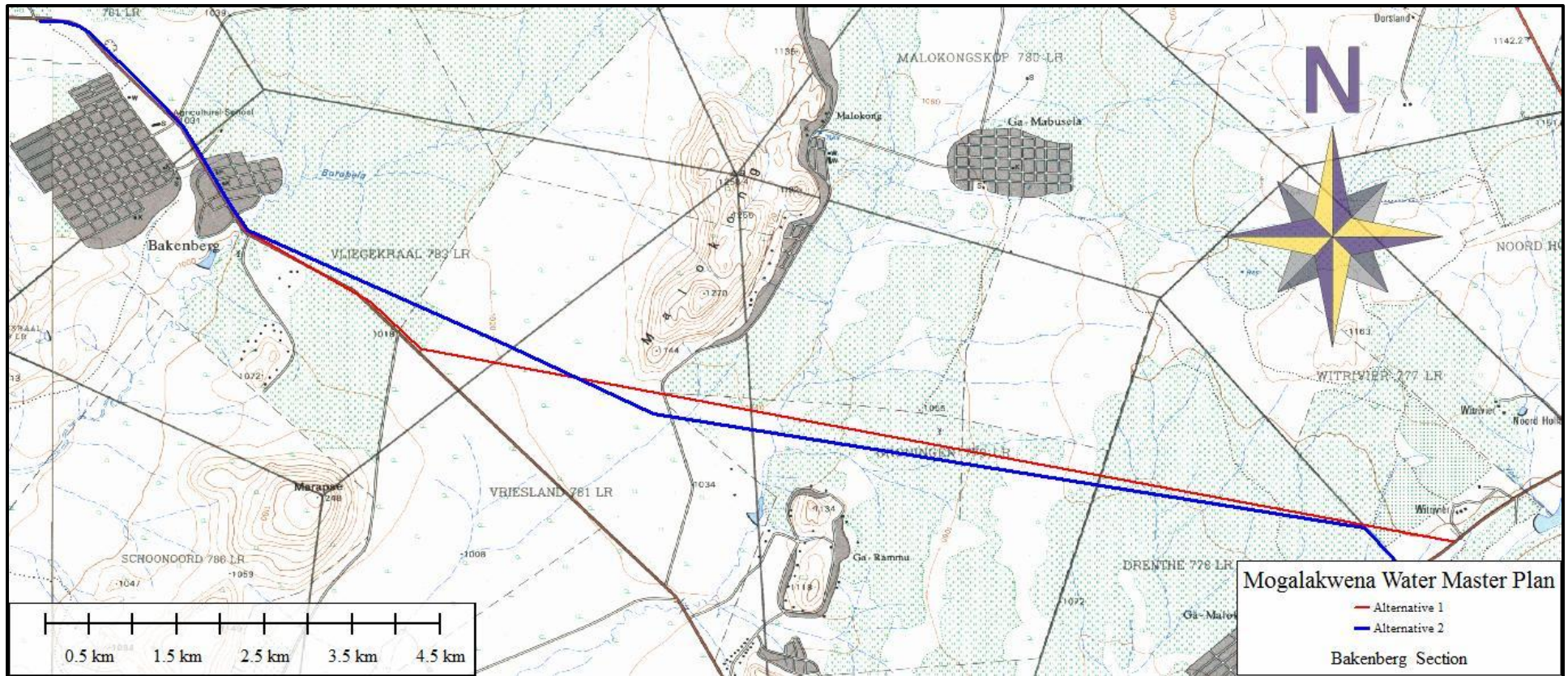


Figure 3. Regional map (1:50 000 topographical map). Bakenberg Section.

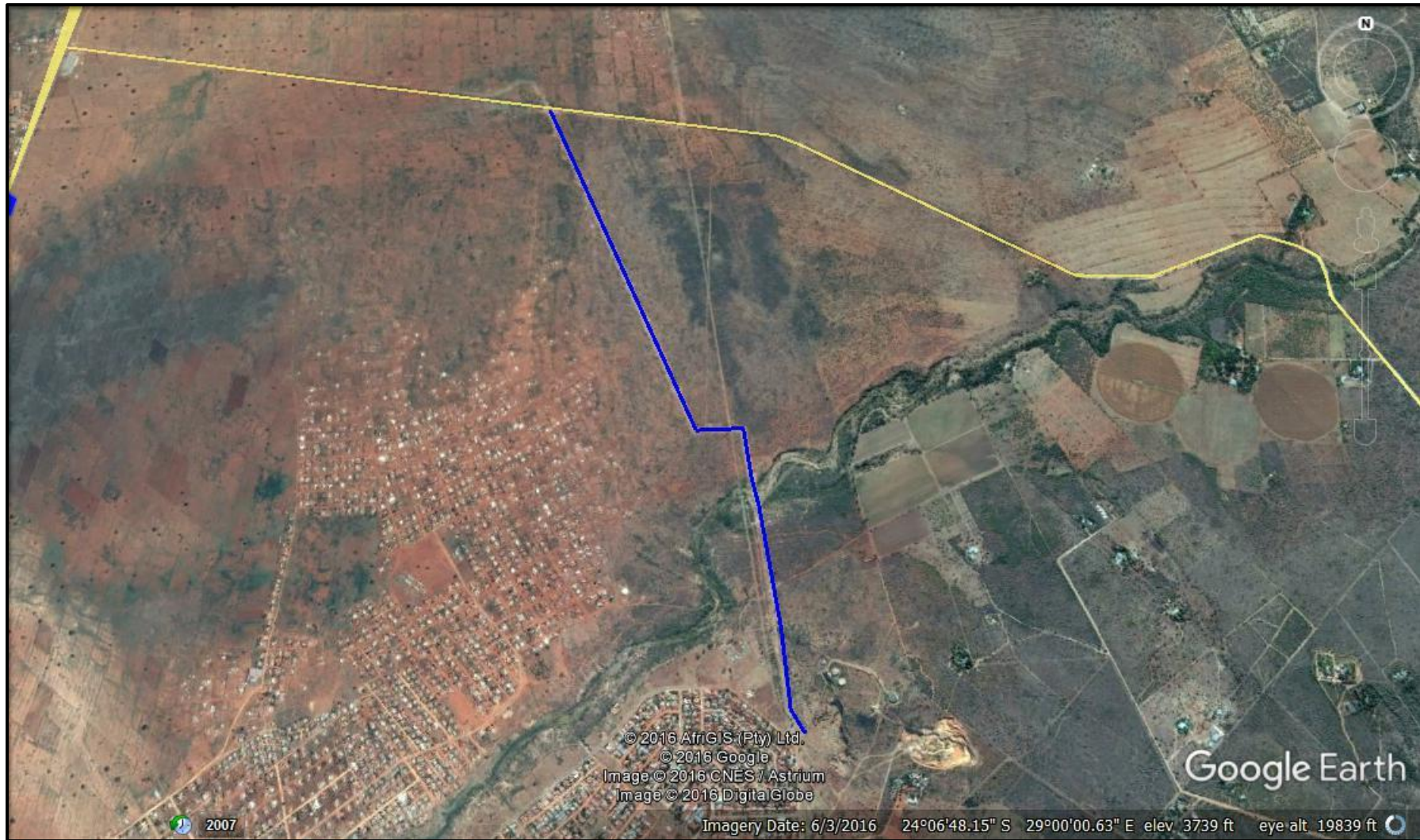


Figure 4. Satellite image showing the Tshamahansi Section (Google Earth).

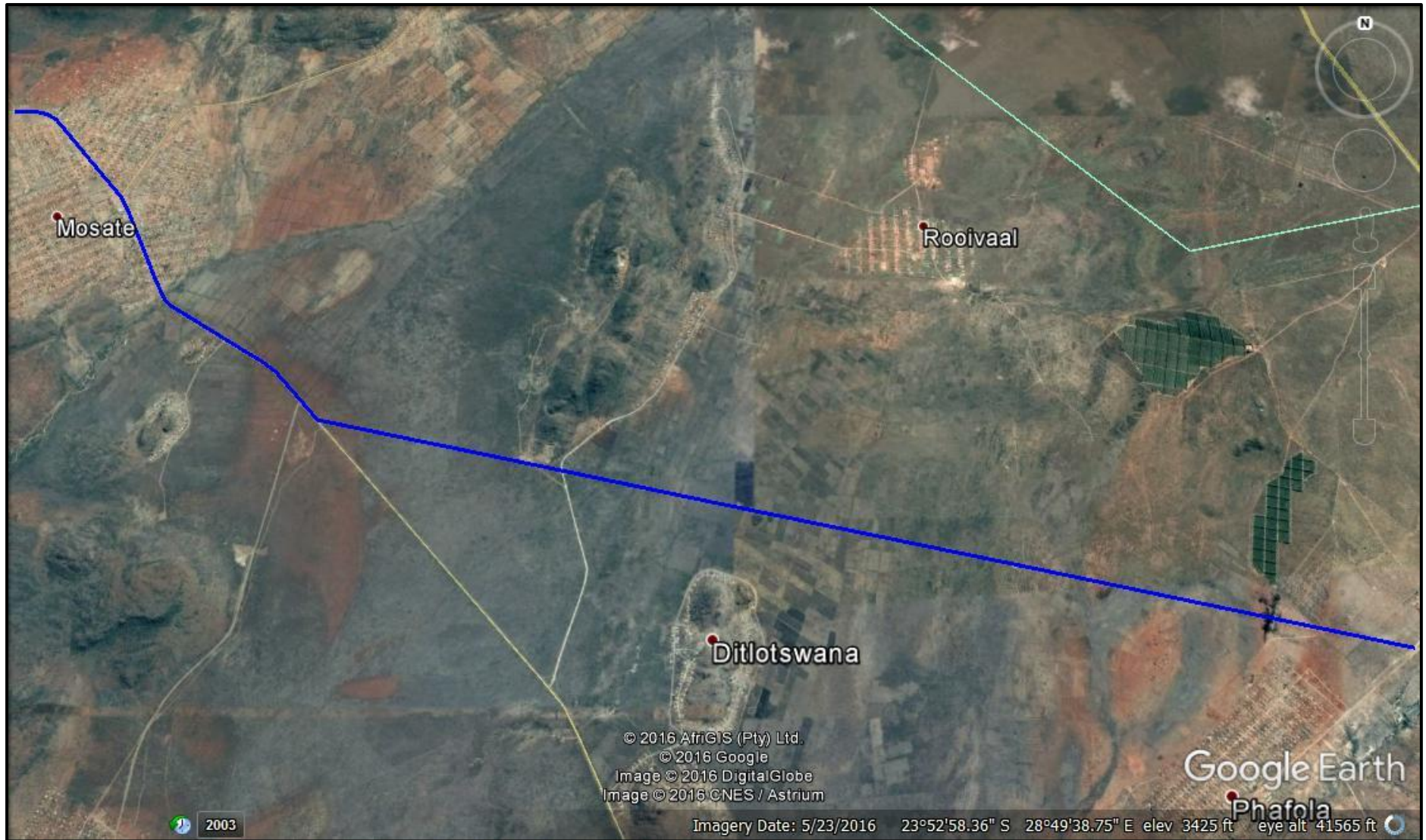


Figure 5. Satellite image showing the Bakenberg Section (Google Earth).

2 Legislative Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

3 METHODOLOGY

3.1 Literature Review

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

3.2 Genealogical Society and Google Earth Monuments

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

3.3 Public Consultation and Stakeholder Engagement:

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

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of a Basic Assessment Report (BAR).
- The compilation of a Comments and Response Report (CRR).

3.4 Site Investigation

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

Recorded heritage features were given a field number according to GPS waypoints. Site numbers for other projects in the area were retained and relevant reports referenced. Cairns consist of stone packed features of different sizes and shapes, of unknown purpose. Although unlikely some of these might represent grave dressings. Low density Stone Age scatters (between 3 - 5 artefacts per m²) were recorded as find spots or background scatter. Scatters higher than 5 artefacts per m² are labelled as sites. Scatters with densities less than 2 artefacts per m² were not recorded as they occur throughout the study area. Individual occurrences were not point plotted within the recorded scatters however an attempt was made at determining site extent. GPS readings are taken roughly in the middle of each identified heritage feature. Sites/heritage features were located during the physical walkthrough for the project that occurred over a period of three days and all the sites were mapped and georeferenced on 1:50 000 maps of the area. Site locations were recorded with a GPS Montana handheld device and coordinates were taken when an accuracy reading of less than 4 meters were obtained.

Table 4: Site Investigation Details

	Site Investigation
Date	29 & 30 September and 1 November 2016
Season	Summer –due to overgrazing archaeological visibility was high in certain areas although other areas where totally impregnable with <i>Dichrostachys cinerea</i> (Sickle Bush). The impact area was however sufficiently covered (Figure 10 and 11) to adequately record the presence of heritage resources.

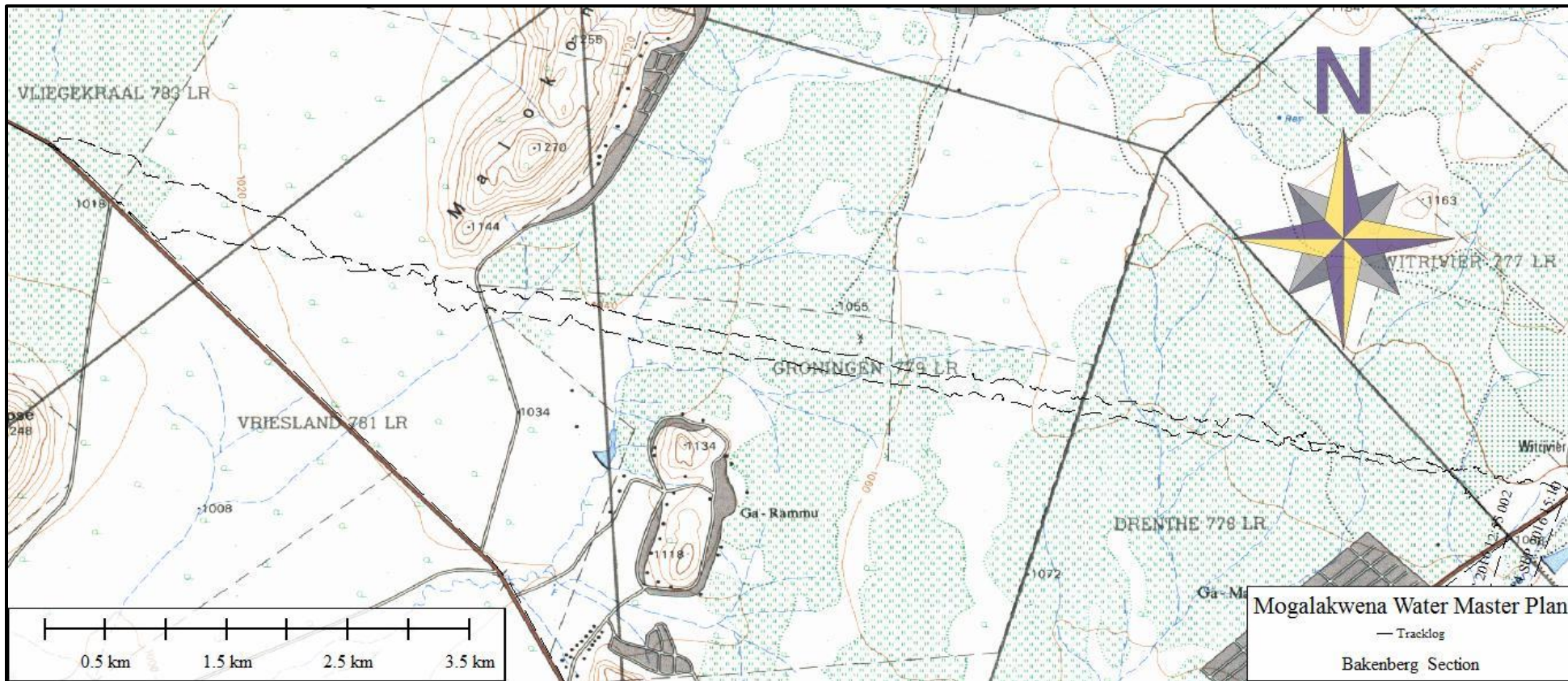


Figure 6: Bakenberg section (Alternative 1 & 2), track logs of the survey in black.

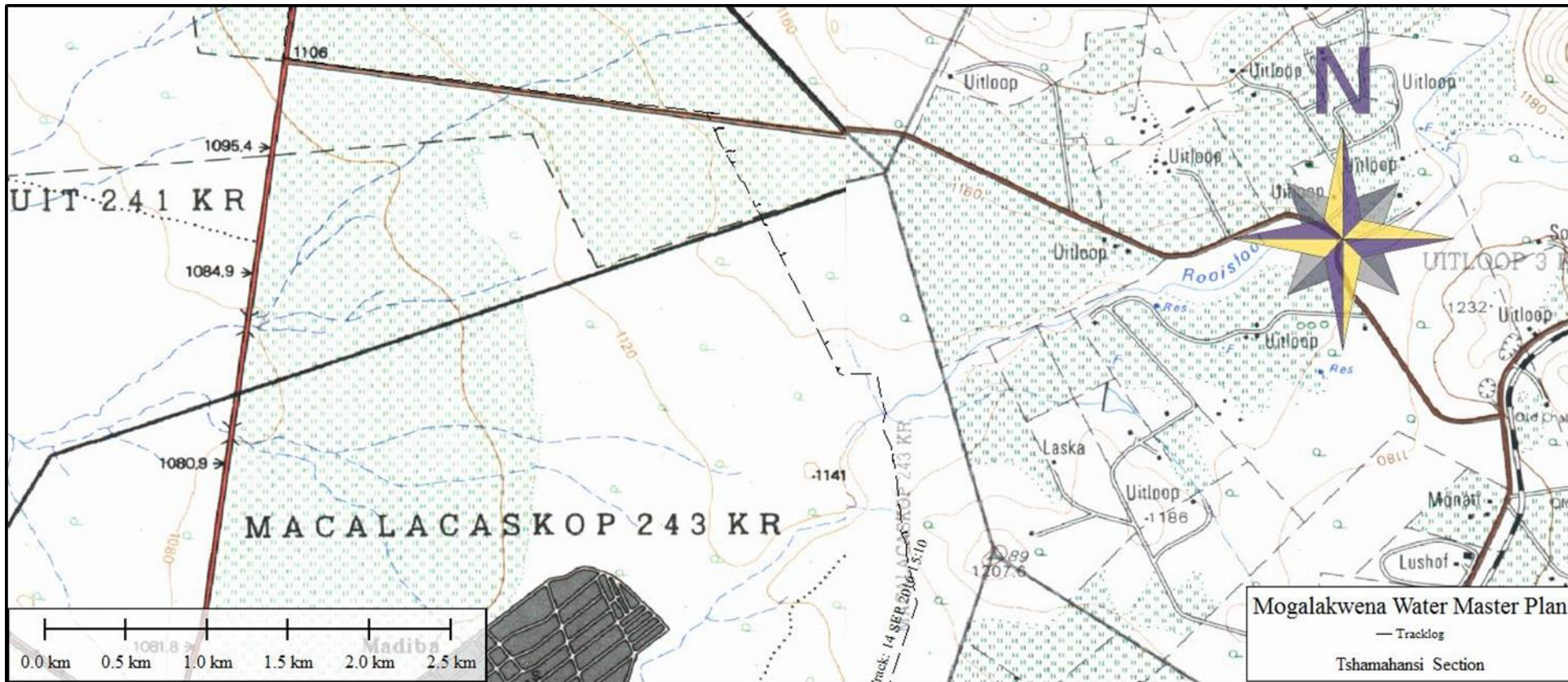


Figure 7: Tshamahansi section, track logs of the survey in black.

3.5 Site Significance and Field Rating

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

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

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

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

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

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

3.6 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
 - * the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
 - * the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
 - * medium-term (5-15 years), assigned a score of 3;
 - * long term (> 15 years), assigned a score of 4; or
 - * permanent, assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of archaeological artefacts, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey and the possible occurrence of unmarked graves and other cultural material cannot be excluded. Similarly the depth of the deposit of heritage sites could not be accurately determined due to its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light, which might change the results of this Impact Assessment.

4 Description of Socio Economic Environmental

The Mogalakwena Local Municipality (MLM) has a population of approximately 334,000 people with more than 75,000 households and an average household size of 4.4 people per household (2009 figures). The majority of people reside in the non-urban or rural areas of Mogalakwena LM, accounting for approximately 70% of the population. The largest town/settlements in the municipality are the urban towns of Mahwelereng (36,000 people) and Mokopane (27,500 people). The largest rural settlements, in order of largest, are:

- Tshamahansi
- Kgobudi
- Rural remainder farms Mogalakwena LM
- Kgobudi
- Marulaneng
- Sekgoboko
- Ga-Molekana

Table 5. Mogalakwena LM Population with reference to the Bakenberg and Tshamahansi area.

Settlement/town	Households (HH)	Population	HH density per km²	Type
<i>Bakenberg Basogadi</i>	77	341	30	<i>Rural</i>
<i>Bakenberg Kwanaite</i>	161	711	12	<i>Rural</i>
<i>Bakenberg Matlaba</i>	381	1689	11	<i>Rural</i>
<i>Bakenberg Mautjana</i>	175	775	20	<i>Rural</i>
<i>Bakenberg Mmotong</i>	533	2360	23	<i>Rural</i>
<i>Bakenberg Mothwathwase</i>	198	879	9	<i>Rural</i>
<i>Tshamahansi</i>	3028	13409	27	<i>Rural</i>

The entire municipal area has the capacity for cattle and game farming, with beef/cattle dominance in the Mapela/Bakenberg area (IDP 2010/2011). Livestock commodities in Mogalakwena Municipality include:

- Cattle farming
- Game farming
- Goat farming
- Chicken broilers and egg production
- Piggeries

As part of the Local Economic Development programme the following programme (amongst others) is a focus area based on the Mogalakwena Local Municipality Local Economic Development Plan:

Public Infrastructure Investment Programme:

This programme is aimed at the provision of physical, social and economic infrastructure within the socio-economic realms of the province. The core aspects associated with this are:

- Bulk infrastructure (Sewer, water and sanitation, electricity and communication)
- Social infrastructure such as housing, schools and hospitals, and
- Economic infrastructure such as freight and logistics.

MLM is a water scarce municipality and poverty alleviation through infrastructure creation is a focus area of the Local Economic Development Plan (MLM LED 2011 – 2016).

5 Description of the Physical Environment:

The project is located in the Mogalakwena Local Municipality area, Waterberg District, Limpopo Province (Figure 1). The proposed route traverses the following properties that were surveyed on foot and by vehicle (Figure 2 & 3):

- The Remainder of the farm Macalacaskop 243 KR and the Remainder of the farm Turfspruit 241 KR referred to as the Tshamahansi section.
- The farm Gillimberg 861 LR, farm Drenthe 778 LR, farm Groningen 779 LR, farm Vriesland 781, farm Vliegekraal 783 LR and farm Hellem Bricksteen 761 LR referred to as the Bakenberg section.

The study area falls within the bioregion described by Mucina *et al* (2006) as the Central Bushveld Bioregion with the vegetation described as Polokwane Plateau Bushveld. Land use in the impact area is characterized by townships and informal grazing and subsistence farming. The study area is characterised by turf and deep sandy to loamy soils. The Bakenberg section does however traverse a large section that was used for cultivation in the past while the Tshamahansi section entirely follows an existing pipeline servitude. In the Tshamahansi section the two alternatives run parallel to each other, 10 m apart. Vegetation cover in the area varies from open areas with sparse vegetation (Figure 10) to areas almost impregnable with thick *Dichrostachys cinerea* (Figure 11). The current Zoning of the study area is classified as:

Various: Agriculture (Undetermined) and informal residential (Bakenberg).

6 Results of Public Consultation and Stakeholder Engagement:

Adjacent landowners and the public at large were informed of the proposed activity as part of the BA process. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local news papers as part of the process. Consent was also obtained from local authorities of the area and an attendance register of meetings as well as consent letters from the chiefs are included as an appendix.

The Bakenberg Traditional Council registered as an interested and affected party and responded to the information provided. Mr L.P. Langa as representative (Bakenberg Traditional Council) indicated that their main interest in the matter is the provision of clean and adequate water to the Bakenberg Community. They support the project and that it should be implemented swiftly and without delay. He also indicated that Mr. M.P. Mashala and M.P. Tjatje be included as role-players in the process however no heritage concerns was raised.

7 Literature / Background Study:

7.1 General History of the area

By the 19th century, several local Ndebele communities occupied the region, one of the most prominent being the Kekana. Few Afrikaner people visited the Zoutpansberg Region before the first Voortrekker Leaders, Louis Tregardt (1783–1838) and Lang Hans van Rensburg crossed the Pietersburg Plateau during 1836. They were merely travelling through the area and only during 1848 did Andries Hendrik Potgieter (1792-1852) arrive to establish a permanent Afrikaner settlement in this part of the world. This was agreed with Tregardt ten years earlier. Andries Hendrik Potgieter set up the first Afrikaner settlement in Ohrigstad in 1845, some distance from Pietersburg. Later some Voortrekkers moved with Potgieter late in 1848 and settled in a town they called Zoutpansberg-dorp, about 100 km North West of the current town of Polokwane. This was later changed to Schoemansdal (www.sahistory.co.za).

“Swart” Barend Vorster and some other families settled to the north of the present town of Polokwane during the winter of 1847 in anticipation to the arrival of Potgieter. Potgieter moved to the Zoutpansberg but many Voortrekkers chose farmland on the plateau. Amongst those were ancestors of present day community leaders, including the Vorster, Duvenhage, Snyman, Vercueil and Grobler-families.

Meanwhile, the Volksraad, acting on a request from Potgieter, founded a town in Makapanspoort called Vredenburg. Later renamed Potgietersrus, it became the neighbor of Pietersburg, a town of similar size some 60km to the south, and part of the ZAR. Potgieter died in December 1852, and his son Piet Potgieter succeeded him in 1854.

There was tension between the Boers in and the local populations in the 1850's due to competition for land and the local trade (Tobias, 1945; Bonner, 1983; Delius & Trapido, 1983; Hofmeyr, 1988; Esterhuysen, et al., 2009; Esterhuysen, 2010; Morton, 2005). The clashes between the two groups culminated in the Mugombane siege of 1854 at Historic Cave in the Makapans Valley (Tobias, 1945). Hermanus Potgieter, brother of Piet, was killed during clashes with Chief Makapaan. Piet mobilized a command and drove Makapaan into hiding in a cave, where he was besieged. Both Makapaan and Piet Potgieter were killed in this battle, and Vredenburg was renamed Pietpotgietersrus in honour of the leader (www.sahistory.co.za).

After this siege in 1858 a second group of Ndebele, the Langa of Hlubi (Nguni) origin under the Chief Mankopane, were attacked by a Boer expedition. Around 800 Langa Ndebele were killed. After their defeat, Chief Mankopane settled on Thutlwane Hill which is today located on the farm Kromkloof 744 LR (Jackson, 1969; Jackson, 1982). After this the Ndebele wanted nothing to do with Boers or Europeans. Malaria in this area was a problem and many people left the area (www.sahistory.co.za).

In 1865 the Berlin Mission Station was given permission to establish a mission under W. Moschutz at the foot of Sefakaola Hill (Macalacaskop). Tensions between the Boers and Ndebele caused the mission stations abandonment and

it was later used by the Boers as a garrison where they could fire upon Mokopane's chiefdom, this resulted in the destruction of the mission station.

The mission was reoccupied in 1868 but in 1877, Mokopane exercised his authority and ousted the missionaries as he decided that it was a good vantage point for his enemies to spy on him. The chief erected an iron structure from the remains of the station as a symbol of his resistance to European interference.

Many colonial people living in Pietpotgietersrus died of malaria, and by April 1870 the town was abandoned. They returned in 1890 and Marabastad became the northernmost point of the ZAR. It was also the seat of the landdrost (www.sahistory.co.za).

In 1890, Mokopane died and his successor was Lekgobo Valtyn. Valtyn's view of literacy was different to that of Mokopane, who regarded writing as Boer Business and refused to adopt it (Hofmeyr, 1991). Valtyn regarded literature as a resource that could be exploited (Hofmeyr, 1991) and therefore he allowed the mission station to be rebuilt. In 1890, a township was unofficially established named after Chief Valtyn. By the early 20th century the Berlin Mission Society began to fence off portions of land which caused tension between local inhabitants and Europeans resulting in what was called 'The Fence War' (Hofmeyr, 1990).

Plans for the official establishment and expansion of a location are evident in a letter dated 6 January 1937 between the Controller of Native Settlements and the Deputy Director of Native Agriculture. It was discussed that the establishment of the Valtyn Location on the edge of Potgietersrus was intended to provide the town with a large cheap labour supply (National Archives and Record Service, 1996). Chief Kutter Seleka tried to mitigate this increased control over the land in the area in the early 1930's (Karodia *et al* 2013)

He proposed the purchase of farms bordering the location, in order to try and extend the pasture for cattle. The farm Rietfontein was eventually bought with the aid of a bond taken out at the Transvaal Consolidated Land and Exploration Company (Ltd) (TCLEC) by Chief Kutter Seleka and his people. The interest on the bond was set at 6% and the sum total of the bond was £1983 in November 1929 (Karodia *et al* 2013).

The present day settlements of Tshamahansi, Mahwereleng, GaMadiba, Maroteng and Masodi are situated on the three farms, Rietfontein, Turfspruit, and Macalacaskop that were originally expropriated from the local farmers (Karodia *et al* 2013).

7.2 Earlier Stone Age

Hominids began to make stone tools about 2.6 million years ago. Known as the Oldowan industry, most of the earliest tools were rough cobble cores and simple flakes. The flakes were used for such activities as skinning and cutting meat from scavenged animals. These early artefacts are difficult to recognize and have so far only been found in rock shelters such as the Sterkfontein Caves (Kuman, 1998) and also in Makapan Valley in the caves in this area. .

At about 1.4 million years ago hominids started producing more recognizable stone artefacts such as hand axes, cleavers and core tools (Deacon & Deacon, 1999). Among other things these Acheulian tools were probably used to butcher large animals such as elephants, rhinoceros and hippopotamus that had died from natural causes. Acheulian artefacts are usually found near the raw material from where they were quarried, at butchering sites, or as isolated finds. However, isolated finds have little value. Therefore, the project is unlikely to disturb a significant site.

Evidence suggests that the region surrounding the project area has been inhabited during all periods of the Stone Age, including the Early Stone Age (ESA), Middle Stone Age (MSA) and Later Stone Age (LSA). This is most evident and extensively documented at the Cave of Hearths in the Makapans Valley some 20 km to the east (McNabb & Binyon, 2004; Phillipson, 2005). Fourie (2002) reported on a possible ESA core found on the surface to the west of the study area.

Makapans Valley was declared a World Heritage Site in 2005. The UNESCO website states the following: "Fossils found in the many archaeological caves of the Makapan Valley have enabled the identification of several specimens of early hominids, more particularly of Paranthropus, dating back between 4.5 million and 2.5 million years, as well as evidence of the domestication of fire 1.8 million to 1 million years ago." (UNESCO, 2013).

The proposed development is not expected to have a visual impact on the Makapans Valley and the development is located in the servitude of other developments in the area and is not expected to have an impact on the World Heritage Site.

7.3 Middle Stone Age

By the beginning of the Middle Stone Age (MSA), tool kits included prepared cores, parallel-sided blades and triangular points hafted to make spears (Volman, 1984). MSA people had become accomplished hunters by this time, especially of large grazing animals such as wildebeest, hartebeest and eland.

These hunters are classified as early humans, but by 100,000 years ago, they were anatomically fully modern. The oldest evidence for this change has been found in South Africa, and it is an important point in debates about the origins of modern humanity. In particular, the degree to which behaviour was fully modern is still a matter of debate. The repeated use of caves indicates that MSA people had developed the concept of a home base and that they could make fire. These were two important steps in cultural evolution (Deacon & Deacon, 1999). Previous impact assessments (Huffman, 1997; Fourie, 2002; Pistorius, 2002; Roodt, 2007; Roodt, 2008a; Roodt, 2008b) conducted in the greater study area have all reported stone tool scatters associated with the MSA and LSA. These finds are commonly associated with water sources, such as rivers and pans.

7.4 Later Stone Age

By the beginning of the Later Stone Age (LSA), human behaviour was undoubtedly modern. Uniquely human traits, such as rock art and purposeful burials with ornaments, became a regular practice. These people were the ancestors of the San (or Bushmen).

San rock art has a well-earned reputation for aesthetic appeal and symbolic complexity (Lewis-Williams, 1981). In addition to art, LSA sites contain diagnostic artefacts, including microlithic scrapers and segments made from very fine-grained rock (Wadley, 1987). Spear hunting probably continued, but LSA people also hunted small game with bows and poisoned arrows. Important LSA deposits have been excavated in Oliboompoort Cave (Mason, 1962) and other sites in the Waterberg to the West (Van der Ryst, 1998). According to Bergh (1999) some rock paintings, are known 20 to 30 km north east of Mokopane and the Archaeological database at Wits also have paintings on record to the east of the study area on the Planknek Mountain range. Scatters of Stone Age artefacts in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters. As there are no caves in the study area, there is a low possibility of finding sites of high significance in the area.

7.5 The Iron Age (AD 400 to 1840)

Bantu-speaking people moved into Eastern and Southern Africa about 2,000 years ago (Mitchell, 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. The first 1,000 years is called the Early Iron Age followed by the Middle and Late Iron Age.

As mixed farmers, Iron Age people usually lived in semi-permanent settlements consisting of pole-and-daga (mud mixed with dung) houses and grain bins arranged around a central area for cattle (Huffman, 1982). Usually, these settlements with the 'Central Cattle Pattern' (CCP) were sited near water and good soils that could be cultivated with an iron hoe. For the project area, archaeological sites such as these may occur.

Close to the study area Iron Age people have inhabited Malokong Hill for a long period. The sites are relatively well preserved and are associated with the Mabusela clan (Kusel 2005). According to the most recent archaeological cultural distribution sequences by Huffman (2007), the study area falls within the distribution area of various cultural groupings originating out of both the Urewe Tradition (eastern stream of migration) and the Kalundu Tradition (western stream of migration).

The facies that may be present are:

- Urewe Tradition:** Kwale branch- Mzonjani facies AD 450 – 750 (Early Iron Age).
Moloko branch- Icon facies AD 1300 - 1500 (Late Iron Age)
- Kalundu Tradition:** Happy Rest sub-branch - Doornkop facies AD 750 - 1000 (Early Iron Age)
Eiland facies AD 1000 – 1300 (Middle Iron Age)
Klingbeil facies AD 1000 - 1200 (Middle Iron Age)
Letaba facies AD 1600 - 1840 (Late Iron Age)

Based on previous CRM work in the area e.g. Huffman, (1997); Fourie (2002); Pistorius (2002); Kusel (2005) Roodt (2007); Roodt (2008a & b); Van Schalkwyk, (2011) as well as Karodia and Higgitt (2013), Du Piesanie & Hodgskiss (2015) and the Archaeological database at Wits the project area may possibly produce sites that span from the Early Iron Age through to the Late Iron Age (LIA). Most notably *Eiland and Moloko facies* ceramics and LIA Ndebele stone walling some of which was excavated by Huffman and Steele (1997).

Du Piesanie & Hodgskiss (2015) also recorded numerous Stone Age occurrence (of negligible significance), Farming community sites (Iron Age) as well as grave sites.

8 Findings of the Survey

This report focuses on the proposed bulk water supply pipelines linking existing pipelines from Piet-se-kop reservoir to Tshamahansi and Witrivier/Phafola to Bakenberg, as part of the Mogalakwena water master plan. The proposed route follows existing infrastructure such as roads (Figure 8) and existing water supply lines (Figure 9). Two alternatives for each route were assessed, referred to as the Bakenberg section and the Tshamahansi section. The Bakenberg section does however traverse a large section that was used for cultivation in the past while the Tshamahansi section entirely follows existing pipeline servitude. In the Tshamahansi section the two alternatives run parallel to each other, 10 m apart. Vegetation cover in the area varies from open areas with sparse vegetation (Figure 10) to areas almost impregnable with thick *Dichrostachys cinerea* (Figure 11).

During the survey twenty seven sites were recorded in total (Table 5). These sites consist of cemeteries, Late Iron Age stone walled sites and find spots, ruins, stone cairns of unknown purpose and an African church classified as living heritage.

In addition to the recorded sites low density scatters of isolated MSA artefacts (Figure 12) made from felsic tuff were noted in the study area especially in areas with vertic soils. The geomorphological processes associated with these vertic soils suggest that these tools are not *in-situ*. These background scatters of artefacts do not constitute an archaeological site and the artefacts are scattered too sparsely to be of any significance apart from noting their presence, which has been done in this report.

Thirteen sites are located along Alternative 1 of the Bakenberg section (Figure 13) and 10 sites along the Tshamahansi section (Figure 15). 4 Sites are located along Alternative 2 of the Bakenberg Section (Figure 14). A short feature description follows in Section 9 of this report with recommendations included in Section 10.

*Several small stone heaps are found across the area that was not recorded (e.g. S23° 53' 51.1" E28° 51' 56.5") possibly associated with subsistence farming and clearing of agricultural fields. It is recommended that through the social process the presence of unmarked and informal graves should be determined and that these sites should be mitigated accordingly. Several linear stone walls are found in the study area delineating old agricultural fields. These features are recent and not of significance and were not recorded.

A survey for a magnetite mine (Du Piesanie & Hodgskiss 2015) in the Bakenberg section of the pipeline covered a large area where both alternative 1 and 2 traverses. Finds in this area constitute Stone Age occurrences given a negligible heritage rating by the authors and the Iron Age site of Molongong Hill also recorded by Kusel (2005). None of these recorded features will be impacted on by either alternative 1 or 2 of the Bakenberg Section (Figure 16 & 17).

9 Description of Identified Heritage Resources:

Table 6: Recorded features and coordinates

Field No	Type Site	Longitude	Latitude	Elevation	Significance	Description	Location
582	Iron Age Find Spot	28° 53' 09.8916" E	23° 54' 03.5891" S	1098.8012 7	Medium Significance	Low density scatter of undecorated ceramics	Bakenberg Alternative 1
583	Iron Age Site	28° 52' 33.2832" E	23° 53' 58.1821" S	1094.1654 1	Medium – High Significance	Late Iron Age Stone walled site	Bakenberg Alternative 1
584	Stone Cairn	28° 52' 28.6788" E	23° 53' 57.4404" S	1094.5795 9	Unknown	Single Stone Cairn	Bakenberg Alternative 1
585	Cemetery	28° 52' 25.6764" E	23° 53' 56.9184" S	1094.7866 2	High Social Significance	Approximately 6 graves, oldest visible date 1971.	Bakenberg Alternative 1
586	Cemetery	28° 52' 24.0168" E	23° 53' 55.5035" S	1094.2706 3	High Social Significance	Approximately 21 graves orientated east west and north south, graves of adults and children.	Bakenberg Alternative 1
587	Cemetery	28° 52' 24.7835" E	23° 53' 54.6073" S	1093.4549 6	High Social Significance	Approximately 4 graves, three with granite head stone and one with a stone head stone. Oldest Visible date 1942	Bakenberg Alternative 1
588	Ruin	28° 52' 22.4941" E	23° 53' 56.8861" S	1092.6070 6	Low - Medium Significance	Several rectangular stone walled ruins.	Bakenberg Alternative 1
589	Cemetery	28° 52' 20.6652" E	23° 53' 56.0041" S	1093.1595 5	High Social Significance	Approximately 10 graves. Orientated east west and north south. Graves of adults and children. Grave dressings consist of granite and stone packed graves.	Bakenberg Alternative 1
590	Cemetery	28° 52' 19.8119" E	23° 53' 55.7376" S	1092.1998 3	High Social Significance	Unknown number of graves	Bakenberg Alternative 1
591	Cemetery	28° 52' 18.8795" E	23° 53' 56.5297" S	1092.0880 1	High Social Significance	Large cemetery with an unknown number of graves on top of a possible iron age cattle kraal. Outside of this cluster several other badly marked stone packed graves occur.	Bakenberg Alternative 1
592	Stone Walled site	28° 52' 03.8639" E	23° 53' 50.8921" S	1087.0144	Medium Significance	Ephemeral stone packed wall.	Bakenberg Alternative 1
593	Stone Cairn	28° 51' 57.9852" E	23° 53' 51.1728" S	1085.8418	Unknown	Approximately 6 stone cairns over a large area.	Bakenberg Alternative 1
595	Iron Age Site	28° 48' 39.8197" E	23° 53' 14.3664" S	1037.0639 7	High significance	Later Iron Age stone walled site.	Bakenberg Alternative 1

597	Cemetery	28° 59' 34.7459" E	24° 05' 59.8595" S	1154.1243 9	High Social Significance	Single grave	Tshamahans i Alternative 1 and 2
598	Stone Cairn	28° 59' 36.5965" E	24° 06' 04.4208" S	1154.1644 3	Unknown	Elongated stone cairn	Tshamahans i Alternative 1 and 2
599	Stone Cairn	28° 59' 35.9411" E	24° 06' 04.4748" S	1153.4040 5	Unknown	Elongated stone cairn	Tshamahans i Alternative 1 and 2
600	Cemetery	28° 59' 36.8412" E	24° 06' 06.4799" S	1152.9156 5	High Social Significance	Cemetery with an unknown number of graves.	Tshamahans i Alternative 1 and 2
601	Cemetery	28° 59' 41.9459" E	24° 06' 15.0085" S	1154.8979 5	High Social Significance	Approximately 4 graves. Marked with yellow paint on cement slabs.	Tshamahans i Alternative 1 and 2
602	Cemetery	28° 59' 46.8457" E	24° 06' 24.5809" S	1152.6087 7	High Social Significance	Approximately 14 graves	Tshamahans i Alternative 1 and 2
603	Stone Walled Site	28° 59' 55.2877" E	24° 06' 42.1200" S	1143.8936 8	Low Significance	Small circular enclose, approximately 2 meters in diameter. Could mark a grave	Tshamahans i Alternative 1 and 2
604	Stone Cairn	28° 59' 57.6960" E	24° 06' 47.3903" S	1142.2211 9	Unknown	Elongated ephemeral stone cairn orientated east to west	Tshamahans i Alternative 1 and 2
605	Ruin	29° 00' 11.2285" E	24° 07' 20.0963" S	1144.3338 6	Low - Medium Significance	Collapsed rectangular stone walled structure with cement slab.	Tshamahans i Alternative 1 and 2
606	Living Heritage Site	29° 00' 11.5885" E	24° 07' 22.2203" S	1142.9163 8	Social Significance	African church under Marula trees.	Tshamahans i Alternative 1 and 2
619	Cemetery	28° 53' 14.8523" E	23° 54' 19.5480" S	1091.697	High Social Significance	Single grave of a child.	Bakenberg Alternative 2
620	Stone Walled Site	28° 52' 33.1465" E	23° 53' 59.7623" S	1092.297	Low – Medium Significance	Large area with several ephemeral stone wall foundations of circular hut structures, rectangular structures and boundary walls	Bakenberg Alternative 2
622	Stone Walled Site	28° 52' 17.5225" E	23° 53' 57.8867" S	1085.105	Low – Medium Significance	Large area forming part of Field No 620 with several ephemeral stone wall foundations of circular hut structures, rectangular structures and boundary walls	Bakenberg Alternative 2

623	Stone Walled Site	28° 51' 19.7280" E	23° 53' 48.7968" S	1085.115	Low Significance	Several lower grinding stones and the ephemeral remains of some stone wall foundations.	Bakenberg Alternative 2
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Figure 8. Existing road at the Bakenberg section.



Figure 9. Existing pipeline construction activities in the Tshamahansi section.



Figure 10. General site conditions in the Bakenberg section.



Figure 11: General site conditions.



Figure 12: Dorsal view of MSA artefacts found in the study area made from felsic tuff .

9.1 Site Distribution Map

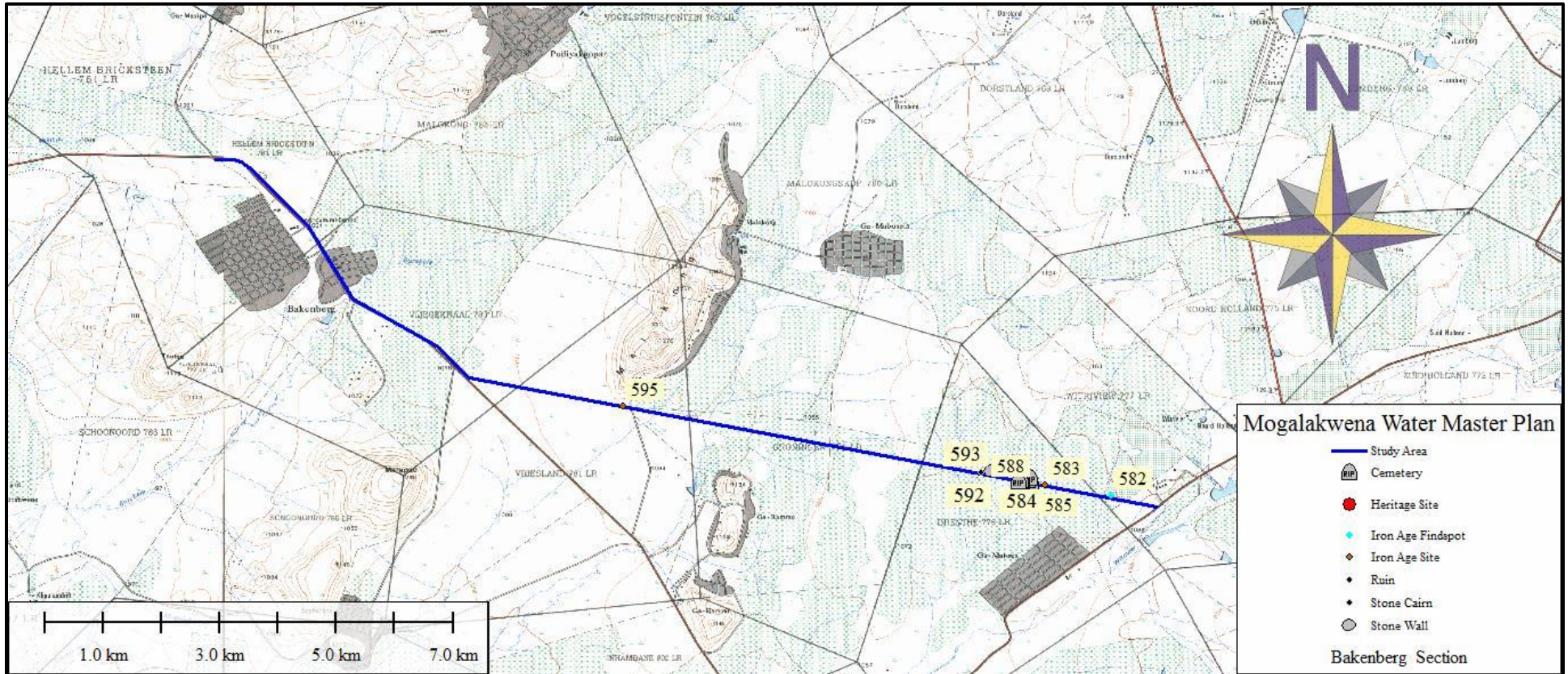


Figure 13: Recorded sites in relation to Alternative 1 at the Bakenberg section.

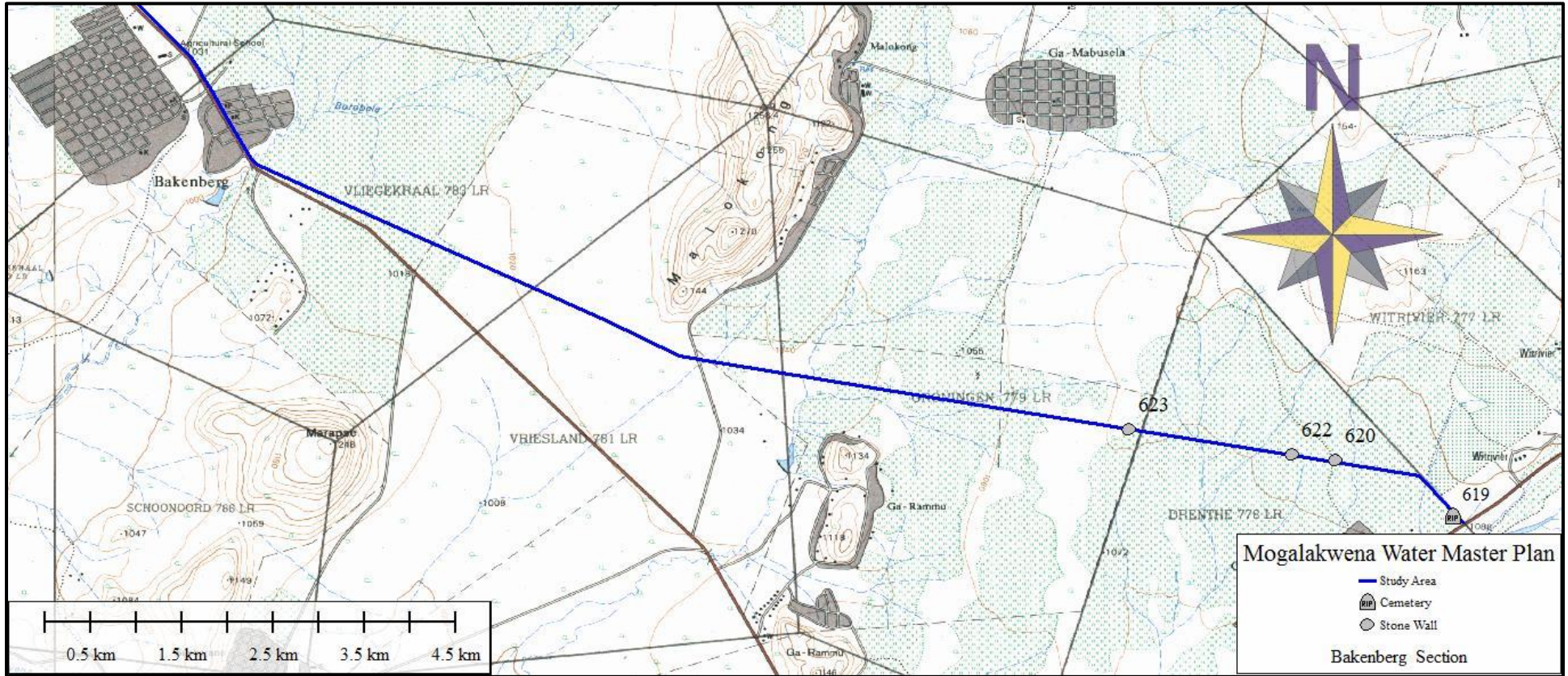


Figure 14: Recorded sites in relation to Alternative 2 at the Bakenberg section.

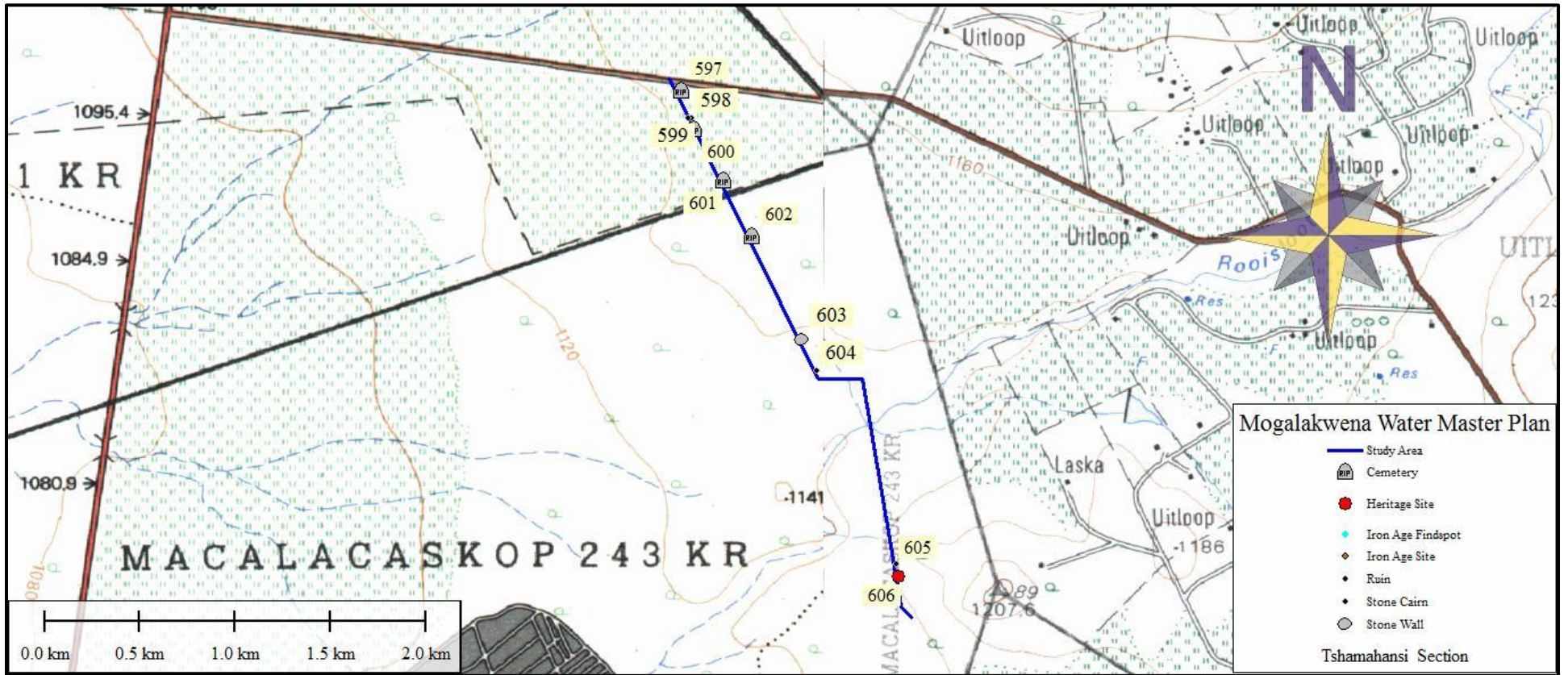


Figure 15: Recorded sites in relation to the Tshamahansi section.

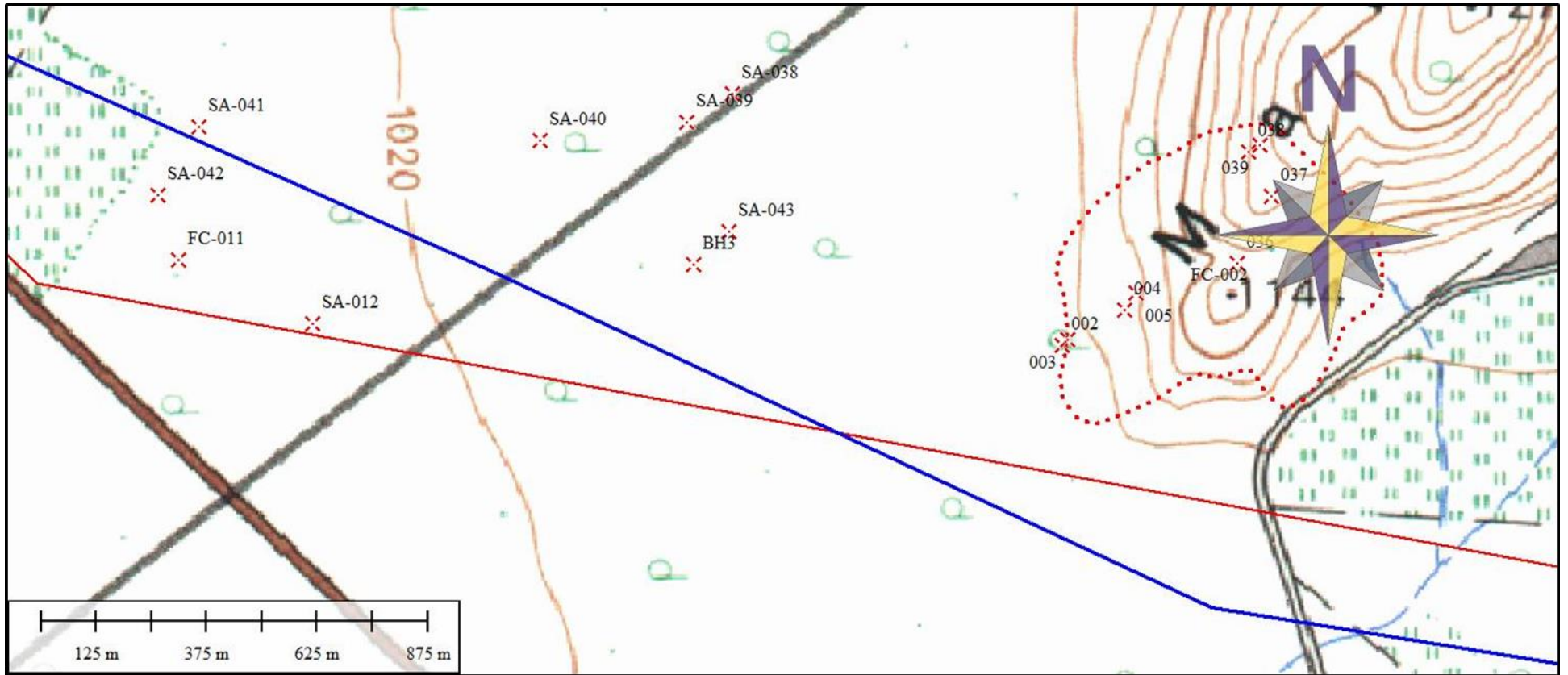


Figure 16. Previously recorded sites (du Piesanie and Hodgskiss 2015) in relation to the proposed project.

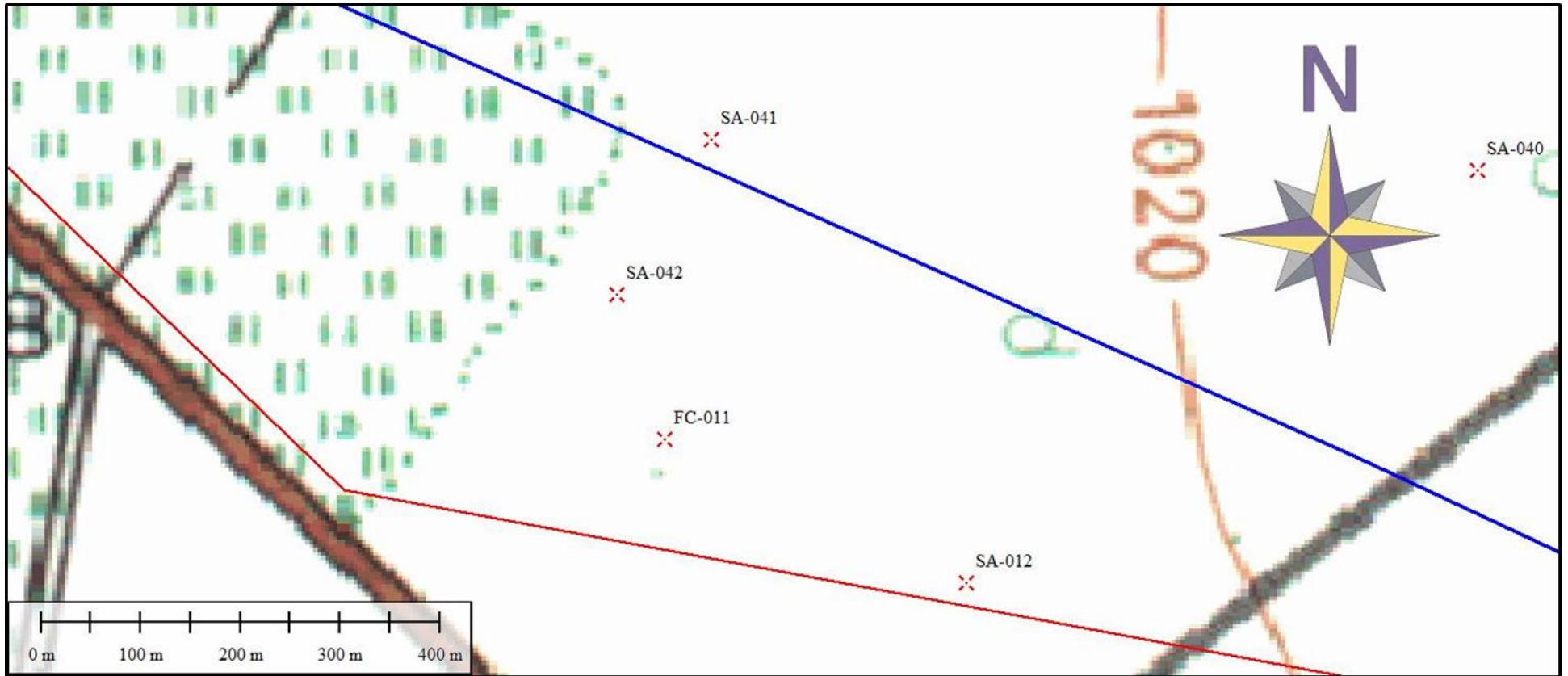


Figure 17. Close up of previously recorded sites (du Piesanie and Hodgskiss 2015) in relation to the proposed development (Zoomed in view)

9.2 Iron Age. (Field No 582, 583, 592, 595 and 603).

Field Number	582, 583, 592, 595 and 603
Type of Site	Archaeological
Geographical Setting	Low laying areas characterised by turf and alluvial sands.
Current Condition of site	In good condition apart from Field No 595 and 603
Description and type of artefacts, approximate age and significant features of the site.	<p>582 consist of a low density scatter of undecorated ceramics. No other cultural material is noted here and no cultural deposit is recorded. This feature is seen as an isolated find spot and does not constitute a site and is probably related to the larger settlement at 583. 583 is an extensive Late Iron Age Stone walled site marked by various enclosures and kraals (Figure 11). Undecorated pottery (Figure 12) is found in abundance at the site. The site is marked by a cluster of aloes and is overgrown, making it impossible to determine site layout. 592 consist of ephemeral walling, almost linear in an area marked by turf. It is possible that this site is part of a more recent/historical activity.</p> <p>595 is another large LIA stone walled settlement. The site is located at the foot of a small granite hill and mining here impacted on the site. A large section is however still intact (Figure 13). 603 consist of a small circular enclosure measuring approximately two meters in diameter (Figure 14). It is not certain if this feature can be classified as Iron Age and it could very well be a recent grave site.</p>
Estimation or measurement of site extent	<p>582 Cultural material is scattered over an area of 10X 10 meters.</p> <p>583 approximately 50 x 34 meters.</p> <p>592 approximately 15 x 10 meters.</p> <p>595 approximately 80 x 50 meters</p> <p>603 2 meter in diameter.</p>
Depth and stratification of the site	Unknown



Figure 18: Walling at Field No 583.



Figure 19: Artefacts from Field No 583



Figure 20: LIA settlement at field no 594



Figure 21. Stone walled enclosure at field no 603

<p>Statement of Significance</p>	<p>582 – Due to the lack of archaeological features or deposit – low significance.</p> <p>583 – due to the fact that features and possibly archaeological deposit occur here – medium significance.</p> <p>592 – Very ephemeral and no other artefacts – low significance.</p> <p>595 due to the fact that features and possibly archaeological deposit occur here – medium significance. However due to the association of these features with the Malokong site SAHRA requires a higher rating of high significance for site 595. The rating for Site 582 and 592 is thus increased to medium significance. Site 583 would be increased to medium high.</p> <p>603 this could possibly be a grave and would then be of high social significance.</p>
<p>Field Rating (Recommended grading or field significance) of the site:</p>	<p>583 & 595. Generally Protected A (GP.A).</p> <p>582 & 592. Generally Protected B (GP.B).</p> <p>603 If it is a grave Generally Protected A (GP.A) otherwise Generally Protected C (GP.C).</p>
<p>Recommendations</p>	<p>583 & 595. Preservation <i>in situ</i>.</p> <p>582 & 592. No further action necessary. 592 is also well outside of the pipeline servitude.</p> <p>603 If impacted on it must be determined if this is grave through social consultation.</p>

9.3 Ruins. (Field No 588, 605, 620, 622 and 623).

Field Number	Field No 588, 605, 620, 622 and 623.
Type of Site	Recent/historical
Geographical Setting	Low laying areas and hilltop.
Current Condition of site	Collapsed.
Description and type of artefacts, approximate age and significant features of the site.	<p>Field No 588 is located close to several sets of graves and is possibly associated with these graves. The site is characterised by several (approximately 4) rectangular structures (Figure 15 & 16) clustered and are built with stone with another single structure (Figure 17) located slightly away from the cluster. These walls are all collapsed. No middens or other features are noted in these areas.</p> <p>Field No 605 is another stone walled ruin that is also associated with a large cement slab (Figure 18) and seems to be more recent in nature. These walls are also collapsed.</p> <p>Field No 620 and 622 forms part of one site. This area is characterised by several ephemeral stone walls, foundations of houses and boundary wall. According to a cattle herder these are the remains of some of the first settlements in the area.</p> <p>Field No 623 consists of at least two lower grinders and ephemeral stone walls impacted on by agricultural activities.</p>
Estimation or measurement of site extent	<p>The structures at Field No 588 & 605 measures approximately 4 x 6 meters.</p> <p>The residential settlement at field no 620 and 622 measures approximately 400 meters along the proposed pipe line.</p>
Depth and stratification of the site	Unknown



Figure 22: Remains of ruin at Feature 1



Figure 23: Remains of ruin at Feature 2







Figure 24: Remains of ruin from Feature 5

Figure 25: Large midden at Feature 5

Statement of Significance	Low significance
Field Rating (Recommended grading or field significance) of the site:	Generally Protected C (GP.C).
Recommendations	<p>Although these sites are of low significance it must be kept in mind that sites like these might contain unmarked graves and it is recommended that these sites are preserved and demarcated with danger tape during the construction period. If these sites cannot be preserved the lack of graves on these sites should be confirmed during the social consultation process. The site could be of significance to the local community and it is recommended that consent from the chief is obtained to alter the sites. The age of the structures should also be determined. If graves are present on the site these should be protected <i>in situ</i> and if this is not possible relocated with the required permits. A chance find procedure must be included in the EMP to monitor and mitigate accidental finds. It is recommended that site 620 – 622 should preferably be avoided altogether and that the pipeline should be realigned to ensure that the site is not impacted on.</p> <p>Graves are of high social significance.</p>

9.4 Cemeteries (Field No 585 – 591, 597, 600, 601, 602 and 619).

Field Number	Field No 585 – 591, 597, 600, 601, 602 and 619).
Type of Site	Recent and historical graves.
Geographical Setting	Low laying areas.
Current Condition of site	Well preserved.
Description and type of artefacts, approximate age and significant features of the site.	Graves occur throughout the study area and 16 cemeteries have been recorded in the survey including in excess of 70 graves. It is expected that more graves occur throughout the study area and this should be confirmed during the public participation process. Isolated graves occur between the recorded clusters and informal and unmarked graves are expected.
	
Figure 26: Stone marked graves at Field No 585.	Figure 27: Grave at Field No 589.
	
Figure 28: Graves at Field No 600.	Figure 29: Graves at Field No 601
Statement of Significance	High social significance.
Field Rating (Recommended grading or field significance) of the site:	Generally Protected A (GP.A).
Recommendations	Although it is possible to relocate graves (adhering to all legal requirements) this must be seen as a last resort. It is rather recommended that the cemeteries are preserved <i>in situ</i> with a 20 meter buffer and the pipeline rerouted in these areas. These rerouted areas will have to be assessed by an archaeologist.

9.5 Stone Cairns (Field No 584, 593, 598, and 599).

Field Number	Field No 584, 593, 598, and 599).
Type of Site	Modern
Geographical Setting	Low laying areas with sand deposit.
Current Condition of site	Undisturbed.
Description and type of artefacts, approximate age and significant features of the site.	<p>Field No 584: Elongated stone cairn. Orientated east/west approximately 1.5 meters long. Could possibly be a grave (Figure 23).</p> <p>Field No 593: At least 6 cairns scattered over an area of approximately 65 meters. Could be the result of clearing fields for agricultural purposes (Figure 24 and 25).</p> <p>Field No 598: Elongated stone cairn measuring approximately 1.5 meter.</p> <p>Field No 599: Stone cairn could be the result of activities relating to the existing pipelines in this area (Figure 26).</p>
Depth and stratification of the site	Unknown but deposit is likely.



Figure 30: Cairn at Field No 584.



Figure 31: Cairn at Field No 593.



Figure 32: Cairn at Field No 593.



Figure 33: Cairn at Field No 599.

Statement of Significance	Unknown. If these are just stone cairns related to results of field clearing or recent construction activities it is of Low significance. If these cairns represent graves they are of High social Significance.
Field Rating (Recommended grading or field significance) of the site:	Generally Protected C (GP.C). If it is graves Generally Protected A (GP.A).
Recommendations	The cairns are of unknown purpose and it is recommended that these sites should be avoided. If this is not possible the possibility of these being graves should be investigated during the social consultation process.

9.6 Cultural Landscapes, Intangible and Living Heritage (Field No 606).

An African church is located under a Marula tree and is marked by red and white cloth wrapped around the trees and very little ground cover. The site is of significance to the local community and is classified as living heritage. The site will not be directly impacted on by the line. It is recommended that the leaders of the church should be informed about the project. The greater study area is part of an interesting cultural landscape with, rich in heritage resources dating back to the Stone Age, Iron Age and historical period. Long term impact on the cultural landscape is considered to be negligible as the water supply line will be installed subsurface and in many areas following existing servitudes. Visual impacts to scenic routes and sense of place are also considered to be low as the line follows existing development servitudes and will be subsurface.



Figure 34: African Church.

9.7 Palaeontological Resources

The results of the paleontological desktop (Rossouw 2017) concluded: “ *that both pipeline footprints are located on unfossiliferous Bushveld Complex granites and within an area that has been previously disturbed by pipeline construction as in the case of the Tshamahanzi footprint. A 870m long section of the Tshamahanzi footprint is located in close proximity to an outcrop area of the Timeball Hill Formation (Transvaal Supergroup), which is composed of quartzite and finely-laminated ferruginous shale with thin stromatolitic carbonate interbeds. There is little chance of finding fossil material within the superficial overburden along the Bakenberg footprint mainly because of a lack of alluvium in the area. The likelihood of finding intact vertebrate fossil remains from superficial alluvial deposits where the Tshamahanzi footprint crosses the Rooisloot north of Mahwelereng is considered negligible due to a lack of suitably developed overbank sediments. As far as the palaeontological heritage is concerned, the proposed development may proceed with no further palaeontological assessments required, provided that all excavation activities are restricted to within the boundaries of the development footprint and that the ECO of the project adheres to recommendations with regard to chance fossil finds procedures.*” Please refer to the report conducted by Rossouw (2017).

9.8 Battlefields and Concentration Camps

There are no battlefields or related concentration camp sites located in the study area.

9.9 Potential Impact

9.9.1 Pre-Construction phase:

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

9.9.2 Construction Phase

During this phase the impacts and effects are similar in nature but more extensive than the pre-construction phase. These activities can have a negative and irreversible impact on all of the recorded heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.9.3 Operation Phase:

No impact is envisaged for the recorded heritage resources during this phase.

The impacts of Alternative 1 on heritage resources of the area are considered very high and it is recommended that this Alternative should not be considered for the development.

Table 7. Impact Assessment of the Mogalakwena Bulk Water Supply Line Alternative 1.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	With mitigation (Preservation/ excavation of site)
Extent	Regional (4)	Regional (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (6)	Probable (3)
Significance	90 (High)	39 (Medium)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	No	Yes
Mitigation:		
The sites indicated under Bakenberg Alternative 1 in Table 1 in red and orange will be directly impacted on and damaged/ destroyed. In order to minimise the impacts the line can be rerouted to avoid heritage sensitive areas and recorded sites.		
Cumulative impacts:		
Other authorised projects (e.g., mining) in the area would have a high cumulative impact on the heritage landscape. The added impact of the Mogalakwena Bulk Water Pipeline Alternative 1 is high due to the destruction of heritage		

resources. This option should be avoided.

Residual Impacts:

If sites are destroyed this results in the depletion of archaeological record of the area.

From a heritage point of view Alternative 2 is the preferred option. The impacts of Alternative 2 are assessed below:

Table 8. Impact Assessment of the Mogalakwena Bulk Water Supply Line Alternative 2.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.

	Without mitigation	With mitigation (Preservation/ excavation of site)
Extent	Regional (4)	Regional (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (3)
Probability	Probable (3)	Not Probable (2)
Significance	39 (Medium)	24 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	No	Yes

Mitigation:

Most of the recorded sites will not be directly impacted on as per the current alignment and will be preserved. There is however a cluster of sites on the Bakenberg section (Figure 35) that will be impacted on and the line should be moved to the south in this area to preserve this cluster of sites *in-situ*. Some sites in the Tshamahansi section (Field No 599 & 600) will have a secondary impact and the line cannot be moved due to an existing pipeline servitude. These sites will have to be demarcated and strictly monitored.

Cumulative impacts:

Other authorised projects (e.g., mining and pipeline projects) in the area could have a cumulative impact on the heritage landscape. The added impact of the Mogalakwena Bulk Water Pipeline is seen as negligible as the pipeline will be installed subsurface and for parts of the line it will be installed next to existing infrastructure, therefore minimising additional impacts on the cultural landscape. The impact on physical heritage sites can also be mitigated through preservation of the sites. The recorded sites will not be impacted on visually as the bulk water supply line will be installed in existing servitudes and will be installed subsurface.

Residual Impacts:

If sites are destroyed this results in the depletion of archaeological record of the area. However if sites are recorded/mitigated or preserved this adds to the record of the area and can be seen as a positive impact.

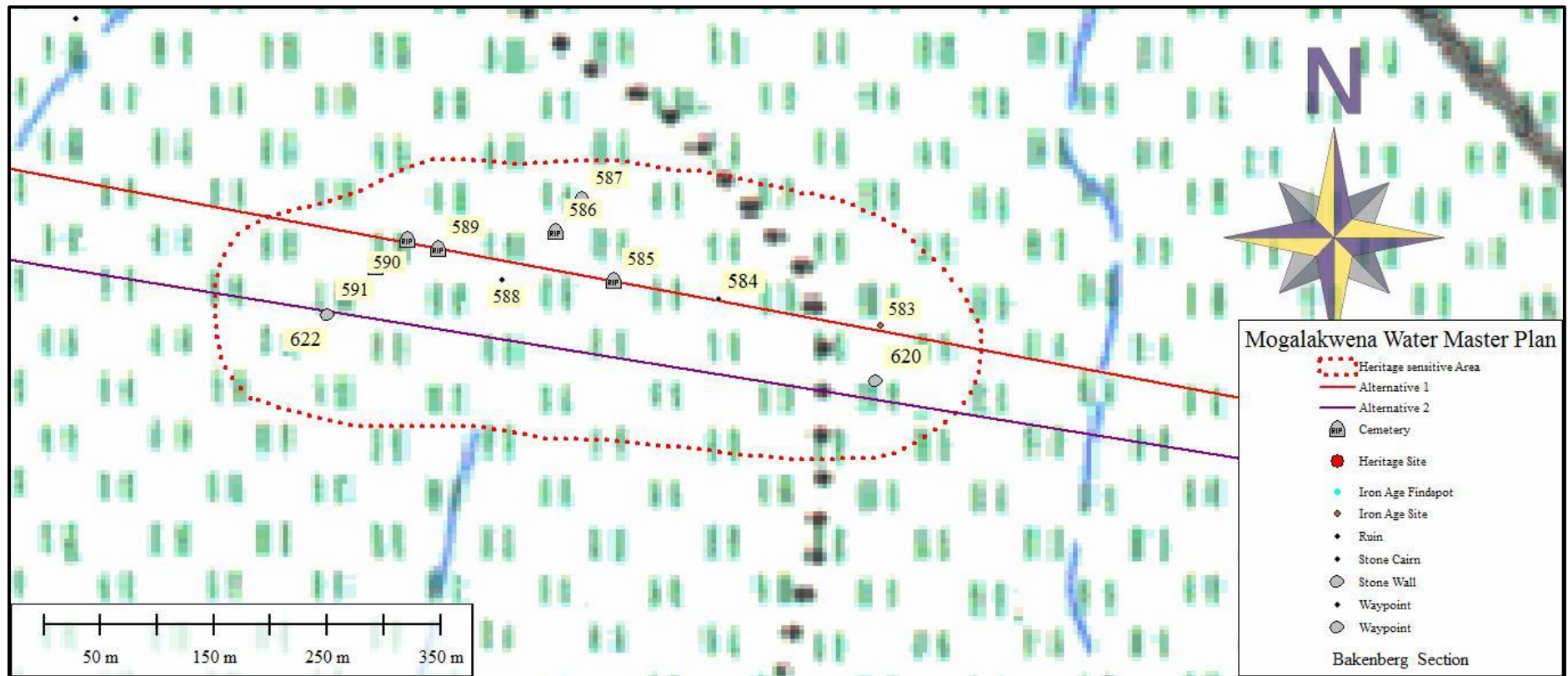


Figure 35: Heritage sensitive area to be avoided on the Bakenberg section.

Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of the Mogalakwena Bulk Water Pipeline the line will, with the recommended mitigation measures and management actions, not impact any heritage resources directly. However this and other projects in the area could have an indirect impact on the heritage landscape. As the pipeline will be installed subsurface and for parts of the line it will be installed next to existing infrastructure, this minimises additional impact on the landscape.

In the long term, the construction of this and other projects in the area together with the economic benefits in terms of employment creation and provision of water will in time allow for more people to live and work around the project area and this together with construction activities could influence the sense of place of the study area in a negative way. However it should also be noted that projects such as these allow for the recording and identification of otherwise unknown heritage resources and through successful and responsible mitigation the archaeological record of the area will be added onto.

10 Recommendations and conclusion

HCAC was appointed by Tekplan Environmental to undertake a Heritage Impact Assessment as part of the basic assessment for the project. The assessment focuses on the proposed bulk water supply pipelines linking existing pipelines from Piet-se-kop reservoir to Tshamahansi and Witrivier/Phafola to Bakenberg, as part of the Mogalakwena water master plan. Two alternatives (Alternative 1 and Alternative 2) for each route were assessed, referred to as the Bakenberg section and the Tshamahansi section. During the survey 23 heritage features were recorded for Alternative 1 (both Bakenberg and Tshamahansi sections). These consist of cemeteries, Late Iron Age stone walled sites and find spots, stone walled ruins, stone cairns of unknown purpose and an African church classified as living heritage. The impact on heritage resources from Alternative 1 is considered to be too high and a second alternative was also assessed (Alternative 2). From a heritage perspective Alternative two is the preferred option.

For Alternative two, 13 features were recorded on both the Bakenberg and Tshamahansi sections. These features consist of cemeteries, ephemeral stone walls and rectangular foundations, stone cairns of unknown purpose. An additional site, an African church classified as living heritage was also recorded well away from the pipeline. The impact of Alternative 2 on the recorded sites can be mitigated to an acceptable level as explained below.

Four sites have been recorded on the Bakenberg Section of Alternative 2. An area of heritage sensitivity has been identified on the Bakenberg section (Figure 35) and it is recommended that the line is rerouted to the south in this area to avoid these sites. This will ensure that there is no direct impact on these sites. This area has been extensively disturbed by previous agricultural activities and no sites were noted south of the buffer area during the field survey. It is recommended that the rerouting in this area is conducted in the presence of the archaeologist to ensure that a sufficient buffer zone is kept in this heritage sensitive area. Alternative 2 will not impact on other recorded sites for the Magnetite Mine project (Du Piessanie and Hodgskiss 2015) and this is illustrated by Figure 15 and 16. The specialist Stone Age report (Hodgskiss 2015) findings of the Stone Age occurrences (not classified as sites by the Author) concurs with the findings of this assessment that these isolated stone artefacts are of negligible value.

The cumulative impact of Alternative 2 in the Bakenberg section is seen as negligible as the above recommendations will ensure the *in situ* preservation of recorded heritage sites in this area. Therefore the project **will not** be a major contributing factor on the cumulative impacts resulting from the existing authorised projects (granite Mining on Molokong hill and Pamish Magnetite Mine (SAHIS Case ID 7331)).

Due to an existing pipeline servitude in the Tshamahansi section there is a restriction on space and a 20 meter buffer zone around recorded heritage features in this area will not be feasible. The impacts from Alternative 2 in the Tshamahansi section is slightly higher but can also be mitigated to an acceptable

level. Of the 10 sites recorded in the Tshamahansi section only 2 will be directly impacted on (Field number 599 and 600). Field number 599 is a stone cairn of unknown purpose and it is recommended that the community liaison officer should consult with the community and determine whether this site represents a grave. The site should be demarcated and monitored very strictly to ensure that it is not directly or indirectly damaged during the construction of the pipeline. Relocation should be seen as a last resort. Field number 600 is an existing cemetery and must be demarcated within the construction zone and strictly monitored by the ECO.

The need for potable water in the area is a major concern for surrounding communities as highlighted by the Bakenberg Traditional Council during the public participation process (please refer to Section 6 as well as Appendix E of the BAR). The socio economic benefits of the project outweigh the impact by Alternative 2 provided that the correct management and mitigation measures are employed.

The proposed project will not have any impact on the paleontological resources of the area (Rossouw 2017) and it is therefore recommended that Alternative 2 can be authorised based on approval from SAHRA and that the recommendations and mitigation measures as outlined in this report are included in the EMPr.

Field No	Type Site	Longitude	Latitude	Significance	Location	Distance from Alt 1	Distance from Alt 2	Impact prior to mitigation	Impact after mitigation	Mitigation measures
582	Iron Age Find Spot	28° 53' 09.8916" E	23° 54' 03.5891" S	Medium Significance	Bakenberg Alternative 1	46 m	241 m	No direct impact	No direct impact to the site	Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
583	Iron Age Site	28° 52' 33.2832" E	23° 53' 58.1821" S	Medium – High Significance	Bakenberg Alternative 1	4 m	64 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
584	Stone Cairn	28° 52' 28.6788" E	23° 53' 57.4404" S	Unknown	Bakenberg Alternative 1	Direct impact	69 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
585	Cemetery	28° 52' 25.6764" E	23° 53' 56.9184" S	High Social Significance	Bakenberg Alternative 1	Direct impact	69m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
586	Cemetery	28° 52' 24.0168" E	23° 53' 55.5035" S	High Social Significance	Bakenberg Alternative 1	37 m	104 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
587	Cemetery	28° 52' 24.7835" E	23° 53' 54.6073" S	High Social Significance	Bakenberg Alternative 1	65 m	131 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
588	Ruin	28° 52' 22.4941" E	23° 53' 56.8861" S	Low - Medium Significance	Bakenberg Alternative 1	17 m	50m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
589	Cemetery	28° 52' 20.6652" E	23° 53' 56.0041" S	High Social Significance	Bakenberg Alternative 1	Direct impact	69m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
590	Cemetery	28° 52' 19.8119" E	23° 53' 55.7376" S	High Social Significance	Bakenberg Alternative 1	Direct impact	69m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.

591	Cemetery	28° 52' 18.8795" E	23° 53' 56.5297" S	High Social Significance	Bakenberg Alternative 1	26 m	44 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
592	Stone walled Site	28° 52' 03.8639" E	23° 53' 50.8921" S	Medium Significance	Bakenberg Alternative 1	60 m	142 m	No direct impact	No direct impact to the site	Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
593	Stone Cairn	28° 51' 57.9852" E	23° 53' 51.1728" S	Unknown	Bakenberg Alternative 1	18 m	105 m	Direct impact if Alternative 1 is chosen, no impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
595	Iron Age Site	28° 48' 39.8197" E	23° 53' 14.3664" S	High significance	Bakenberg Alternative 1	14m	212m	Secondary impact - damage to site	No impact	Avoidance
597	Cemetery	28° 59' 34.7459" E	24° 05' 59.8595" S	High Social Significance	Tshamahansi Alternative 1 and 2	26m	40m	Potential indirect impact if alternative 1 is used. No direct impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
598	Stone Cairn	28° 59' 36.5965" E	24° 06' 04.4208" S	Unknown	Tshamahansi Alternative 1 and 2	15m	29m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
599	Stone Cairn	28° 59' 35.9411" E	24° 06' 04.4748" S	Unknown	Tshamahansi Alternative 1 and 2	2 m	11m	Direct Impact to site	No direct impact to the site	Avoidance and demarcation
600	Cemetery	28° 59' 36.8412" E	24° 06' 06.4799" S	High Social Significance	Tshamahansi Alternative 1 and 2	4 m	10 m	Direct Impact to site	No direct impact to the site	Due to space restriction as part of an existing servitude a 20 m buffer is not feasible. Preferential to relocation strict monitoring and demarcation of the site is recommended.

601	Cemetery	28° 59' 41.9459" E	24° 06' 15.0085" S	High Social Significance	Tshamahansi Alternative 1 and 2	18m	30m	Direct impact if Alternative 1 is chosen, no impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
602	Cemetery	28° 59' 46.8457" E	24° 06' 24.5809" S	High Social Significance	Tshamahansi Alternative 1 and 2	22 m	33m	Potential indirect impact if alternative 1 is used. No direct impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
603	Stone walled Site	28° 59' 55.2877" E	24° 06' 42.1200" S	Low Significance	Tshamahansi Alternative 1 and 2	15m	26m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
604	Stone Cairn	28° 59' 57.6960" E	24° 06' 47.3903" S	Unknown	Tshamahansi Alternative 1 and 2	10m	21m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
605	Ruin	29° 00' 11.2285" E	24° 07' 20.0963" S	Low - Medium Significance	Tshamahansi Alternative 1 and 2	4m	21m	Direct impact if Alternative 1 is chosen, Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
606	Living Heritage Site	29° 00' 11.5885" E	24° 07' 22.2203" S	Social Significance	Tshamahansi Alternative 1 and 2	20m	21m	Potential indirect impact if alternative 1 is used. Indirect impact for Alternative 2.	No direct impact to the site	Alternative 2 should be used. Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.
619	Cemetery	28° 53' 14.8523" E	23° 54' 19.5480" S	High Social Significance	Bakenberg Alternative 2	382 m	28 m	Potential indirect impact if alternative 2 is used.	No direct impact to the site	Contractors should be made aware of known heritage sites in the area. Monitoring by the ECO.

620	Stone walled Site	28° 52' 33.1465" E	23° 53' 59.7623" S	Low – Medium Significance	Bakenberg Alternative 2	44 m	15 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
622	Stone walled Site	28° 52' 17.5225" E	23° 53' 57.8867" S	Low – Medium Significance	Bakenberg Alternative 2	75 m	4 m	Direct impact - damage/ destruction of site	No direct impact to the site	Reroute the alignment to the south to avoid the heritage sensitive area.
623	Stone walled Site	28° 51' 19.7280" E	23° 53' 48.7968" S	Low Significance	Bakenberg Alternative 2	125 m	11m	Direct impact - damage/ destruction of site	Possible damage to site, recording and monitoring of heritage features.	Monitoring and a chance find procedure. The site is highly disturbed and occurs in an agricultural field.

General

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

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

The term 'heritage resource' includes structures, archaeology, paleontology, meteors, and public monuments as per the South African National Heritage Resources Act (Act No. 25 of 1999) (NHRA) Sections 34, 35, and 37.

Procedures specific to burial grounds and graves as defined under NHRA Section 36 will be discussed separately as these require the implementation of separate criteria for Chance Find procedures.

10.1 Chance Find Procedures

The following procedural guidelines must be considered in the event that previously unknown heritage resources or burial grounds and graves are exposed or found during the life of the project.

Initial Identification and/or Exposure (Chance Find)

If during the construction, operations, or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, find any artefact of cultural significance, this person must cease work at the site of the find. They must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.

The initial procedure when such sites are found aim to avoid any further damage. If during the construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance the following steps and reporting structure must be observed in both instances:

- The person or group (identifier) who identified or exposed the heritage resource or burial ground must cease all activity in the immediate vicinity of the site;
- The identifier must immediately inform the senior on-site Manager of the discovery;
- The senior on-site Manager must make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area and ensure that the site is secured and control access;
- The senior on-site Manager will inform the ECO and Health and Safety (HS) officer of the chance find and its immediate impact on operations. The ECO will then contact the project archaeologist.

- **Chance Find Procedures: Heritage Resources**

In the event that previously unidentified heritage resources are identified and/or exposed during construction or operation of the project, the following steps must be implemented subsequent to those outlined above:

- The project archaeologist must be notified of the discovery;
- The project archaeologist will visit the site for a field based assessment of the finds and appropriate mitigation measures will then be presented to the developer;
- Should the specialist 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), the project archaeologist will notify the South African Heritage Resources Agency (SAHRA) and/or the Limpopo Provincial Heritage Resources Agency (LIHRA) on behalf of the developer; and
- Based on the comments received from SAHRA and/or LIHRA, the project archaeologist will provide the developer with a Terms of References Report and relevant associated costs if necessary.

Chance Find Procedures: Burials and Graves

In the event that previously unidentified burial grounds and graves are identified and/or exposed during construction or operation of the project, the following steps must be implemented subsequent to those outlined above:

- The project archaeologist must immediately be notified of the discovery in order to take the required further steps:
 - The local South African Police Service (SAPS) will be notified on behalf of the developer;
 - The project archaeologist will inspect the exposed burial and determine in consultation with the SAPS if any additional graves may exist in the vicinity as well as the temporal context of the remains, i.e.:
 - forensic
 - authentic burial grave (informal or older than 60 years, NHRA (1999) Section 36); or
 - archaeological (older than 100 years, NHRA (1999) Section 38);
- Should the specialist conclude that the find is a heritage resource protected in terms of the NHRA (1999) Section 36 and NHRA (1999) Regulations (Regulation 38, 39, 40), the project archaeologist will notify SAHRA and/or LIHRA on behalf of the developer;
- SAHRA/LIHRA may require that an identification of interested parties, consultation and /or grave relocation take place;
- Consultation must take place in terms of NHRA (1999) Regulations 39, 40, 42; and 5. Grave relocation must take place in terms of NHRA (1999) Regulations 34.

10.2 Reasoned Opinion

From a heritage perspective Alternative two is the preferred option as the impacts of this alternative can be mitigated to an acceptable level. The following socio economic benefits as per the Consultative Basic Assessment report also outweigh the negative impacts of the development if the correct mitigation measures are employed:

- The pipelines will supply potable water to numerous villages and communities.
- During construction of the pipelines, contractors have to spend 30% of the project value on local emerging enterprises.

The Bakenberg Traditional Council registered as an interested and affected party and responded to the information provided. Mr L.P. Langa as representative (Bakenberg Traditional Council) indicated that their main interest in the matter is the provision of clean and adequate water to the Bakenberg Community. They support the project and that it should be implemented swiftly and without delay. The socioeconomic benefits of the project are regarded as being positive and with the correct mitigation measures outweigh the negative impact of the subsurface pipeline on heritage resources.

If during the pre-construction phase or during construction, any archaeological finds are made (e.g. graves, stone tools, and skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds. Due to the subsurface nature of archaeological material and graves the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded, but can be easily mitigated by preserving the sites *in-situ* within the development.

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12 Appendices:**Curriculum Vitae of Specialist**

Jaco van der Walt
Archaeologist

jaco.heritage@gmail.com
+27 82 373 8491
+27 86 691 6461

Education:

Particulars of degrees/diplomas and/or other qualifications:

Name of University or Institution: University of Pretoria
Degree obtained : BA Heritage Tourism & Archaeology
Year of graduation : 2001

Name of University or Institution: University of the Witwatersrand
Degree obtained : BA Hons Archaeology
Year of graduation : 2002

Name of University or Institution : University of the Witwatersrand
Degree Obtained : MA (Archaeology)
Year of Graduation : 2012

Name of University or Institution : University of Johannesburg
Degree : PhD
Year : Currently Enrolled

EMPLOYMENT HISTORY:

2011 – Present: **Owner – HCAC (Heritage Contracts and Archaeological Consulting CC).**
2007 – 2010 : **CRM Archaeologist**, Managed the Heritage Contracts Unit at the University of the Witwatersrand.
2005 - 2007: **CRM Archaeologist**, Director of Matakoma Heritage Consultants
2004: **Technical Assistant**, Department of Anatomy University of Pretoria
2003: **Archaeologist**, Mapungubwe World Heritage Site
2001 - 2002: **CRM Archaeologists**, For R & R Cultural Resource Consultants, Polokwane
2000: **Museum Assistant**, Fort Klapperkop.

Countries of work experience include:

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho and Zambia.

SELECTED PROJECTS INCLUDE:

Archaeological Impact Assessments (Phase 1)

Heritage Impact Assessment Proposed Discharge Of Treated Mine Water Via The Wonderfontein Spruit Receiving Water Body Specialist as part of team conducting an Archaeological Assessment for the Mmamabula mining project and power supply, Botswana

Archaeological Impact Assessment Mmamethlake Landfill

Archaeological Impact Assessment Libangeni Landfill

Linear Developments

Archaeological Impact Assessment Link Northern Waterline Project At The Suikerbosrand Nature Reserve

Archaeological Impact Assessment Medupi – Spitskop Power Line,

Archaeological Impact Assessment Nelspruit Road Development

Renewable Energy developments

Archaeological Impact Assessment Karoshoek Solar Project

Grave Relocation Projects

Relocation of graves and site monitoring at Chloorkop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.

Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.

Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal

Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booyensdal Platinum Mine, Steelpoort, Limpopo Province. Principle investigator Prof. T. Huffman

Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.

Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.

Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159
Accreditation:
 - Field Director Iron Age Archaeology
 - Field Supervisor Colonial Period Archaeology, Stone Age
 Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
 - J van der Walt, A Meyer, WC Nienaber
 - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
- 'n Reddingsondersoek na Anglo-Boereoorlog-ammunisie, gevind by Ifafi, Noordwes-Provinsie. South-African Journal for Cultural History 16(1) June 2002, with A. van Vollenhoven as co-writer.
- Fieldwork Report: Mapungubwe Stabilization Project.
 - WC Nienaber, M Hutten, S Gaigher, J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
 - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
 - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province .
 - J van der Walt, P Birkholtz, W. Fourie
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008
- Ceramic analysis of an Early Iron Age Site with vitrified dung, Limpopo Province South Africa.
 - J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008

- Bantu Speaker Rock Engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga (*In Prep*)
 - J van der Walt and J.P Celliers
- Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011
- Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Bantu-Speaker Rock engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga. J.P Celliers and J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Pleistocene hominin land use on the western trans-Vaal Highveld ecoregion, South Africa, Jaco van der Walt.
 - J van der Walt. Poster presented at SAFA, Toulouse, France. Biennial Conference 2016

REFERENCES:

1. Prof Marlize Lombard Senior Lecturer, University of Johannesburg, South Africa
E-mail: mlombard@uj.ac.za
2. Prof TN Huffman Department of Archaeology Tel: (011) 717 6040
University of the Witwatersrand
3. Alex Schoeman University of the Witwatersrand
E-mail: Alex.Schoeman@wits.ac.za