

HERITAGE IMPACT ASSESSMENT

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

MOGALAKWENA MUNICIPALITY WATER MASTER PLAN: PHASE 2A BULK WATER SUPPLY ZONE 1, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

Type of development:

Water Supply Line

Client:

Tekplan Environmental

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APPROVAL PAGE

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Aug 2017	Inclusion of additional mapping.

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REPORT OUTLINE

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

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of the GNR 326 EIA Regulations 7 April 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	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
(cA) an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	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
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 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, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.2
(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	Refer to BA report
(q) Any other information requested by the competent authority	Section 10

Executive Summary

HCAC was appointed to conduct a Heritage Impact Assessment of cluster 1 & 5 of the Phase 2A Bulk Water Supply Zone 1 as part of the Mogalakwena Municipality Water Master Plan. The development footprint was 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 features or artefacts were recorded as sites using a handheld GPS and documented through written and photographic records.

During the survey 29 heritage features were recorded (both Cluster 1 and Cluster 5 sections). These consist of cemeteries, Late Iron Age stone walled sites and find spots, rectangular stone walled ruins and Stone Age sites. 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 Levallois 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.

An independent paleontological study (Rossouw 2017) found that the cluster 1 and cluster 5 are located on un-fossiliferous Bushveld Complex granites and Waterberg Group arenites. There is little chance of finding fossil material within the superficial overburden in the Cluster 1 and 5 footprints mainly because of a lack of alluvium in the area. However, pipeline footprints located within 50 m of the Mogalakwena River and river crossings may affect suitably developed overbank sediments (superficial alluvial deposits) that could yield Quaternary vertebrate fossil remains. In terms of the palaeontological heritage no further palaeontological assessments is recommended by the palaeontologist, 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.

During the public participation process for the project no heritage concerns were raised. 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 cultural landscape.


The impacts on identified heritage resources in the study area resulting from this project can be mitigated to an acceptable level with the correct mitigation measures and management actions. Furthermore, the socio-economic benefits derived from this project outweigh the impact on heritage resources with the correct mitigation measures in place. It is therefore recommended the project is authorised from a heritage perspective on the condition that the recommendations as made in this report 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 as well as proposed mitigation measures. Please refer to Section 9 & 10 for the detailed mitigation measures.

Site Number	Type Site	Longitude	Latitude	Significance	Mitigation	Location
Site 1	Stone Age Site	28° 36' 11.2897" E	23° 57' 42.0623" S	Low to medium significance	Sampling	Cluster 1
Site 2	Possible graves	28° 37' 55.5960" E	23° 56' 48.0445" S	High social significance	Demarcate and avoid	Cluster 1
Site 3	Stone Age occurrences	28° 37' 54.2928" E	23° 56' 42.9685" S	Low Significance	No further mitigation required	Cluster 1
Site 4	Cemetery	28° 37' 52.5803" E	23° 53' 30.9671" S	High social significance	Demarcate and avoid	Cluster 1
Site 5	Cemetery	28° 40' 54.1524" E	23° 55' 25.6367" S	High social significance	Demarcate and avoid	Cluster 1
Site 6	Stone Age occurrence	28° 38' 04.7040" E	23° 51' 44.2655" S	Low Significance	No further mitigation required	Cluster 1
Site 7	Possible graves	28° 37' 21.0540" E	23° 51' 34.9309" S	High social significance	Demarcate and avoid	Cluster 1
Site 8	Stone Wall	28° 37' 20.0784" E	23° 51' 36.3959" S	Low significance	No further mitigation	Cluster 1
Site 9	Iron Age Site	28° 35' 15.1117" E	23° 53' 39.5485" S	Medium Significance	Rerouting pipeline if not possible excavation and monitoring	Cluster 1
Site 10	Iron Age Site	28° 42' 54.1333" E	23° 46' 47.2584" S	Medium Significance	Rerouting pipeline if not possible excavation, mapping and monitoring	Cluster 1
Site 11	Iron Age Find spot	28° 35' 15.9901" E	23° 53' 44.0590" S	Low Significance	Monitoring	Cluster 1

Site 12	Cemetery	28° 38' 20.8177" E	23° 43' 14.4119" S	High social significance	Demarcate and avoid	Cluster 1
Site 13	Cemetery	28° 38' 14.5860" E	23° 40' 27.8183" S	High social significance	Demarcate and avoid	Cluster 1
Site 14	Stone Walled Iron Age site	28° 43' 17.2307" E	23° 41' 47.9507" S	Low Significance	Demarcate and monitor	Cluster 1
Site 15	Ruin	28° 43' 02.9317" E	23° 42' 18.8497" S	Low Significance	Demarcate and avoid	Cluster 1
Site 16	Stone Age occurrences	28° 37' 18.7715" E	23° 48' 09.2591" S	Low Significance	No further mitigation required	Cluster 1
Site 17	Iron Age Find spot	28° 37' 57.9469" E	23° 47' 54.8591" S	Low Significance	No further mitigation required	Cluster 1
Site 18	Iron Age Find spot	28° 38' 07.7136" E	23° 48' 10.4761" S	Low Significance	No further mitigation required	Cluster 1
Site 19	Stone Age occurrences	28° 38' 19.2443" E	23° 48' 12.7872" S	Low Significance	No further mitigation required	Cluster 1
Site 20	Iron Age Find spot	28° 45' 05.9147" E	23° 45' 26.5032" S	Low Significance	No further mitigation required	Cluster 1
Site 21	Cemetery	28° 43' 19.0164" E	23° 46' 33.1537" S	High social significance	Demarcate and avoid	Cluster 1
Site 22	Cemetery	28° 43' 08.0687" E	23° 46' 54.7680" S	High social significance	Demarcate and avoid	Cluster 1
Site 23	Stone Age occurrences	28° 43' 11.0569" E	23° 45' 49.2659" S	Low Significance	No further mitigation required	Cluster 1
Site 24	Possible grave	28° 41' 48.3793" E	23° 44' 43.8145" S	High social significance	No further mitigation required	Cluster 1

Site 25	Cemetery	28° 43' 56.3125" E	23° 30' 24.0660" S	High social significance	Demarcate and avoid	Cluster 5
Site 26	Cemetery	28° 42' 53.1575" E	23° 27' 29.0051" S	High social significance	Demarcate and avoid	Cluster 5
Site 27	Cemetery	28° 40' 08.1985" E	23° 28' 52.3272" S	High social significance	Demarcate and avoid	Cluster 5
Site 28	Cemetery	28° 36' 43.8369" E	23° 27' 05.3541" S	High social significance	Demarcate and avoid	Cluster 5
Site 29	Cemetery	28°37'33.31"E	23°53'28.34"S	High social significance	Demarcate and avoid	Cluster 1

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	22/05/2017

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 the 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.

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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 for Cluster 1 and 5 of the Mogalakwena Water Master Plan. 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 29 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

Site Location and conditions	Figure 1 - 6
Size of farm and portions	The following properties are located within the two clusters: Cluster 1: Farm Olifantsklip 801 LR, Bastaardspad 790 LR, Schuurmanshoogte 792 LR, Raadslid 718 LR, Paulus 743 LR, Nelly 717 LR, Wydhoek 746 LR, Schrikfontein 715 LR, Haakdoorn Draai 711 LR, Kromkloof 744 LR, Elandsfontein 760 LR, Van Wykspan 759 LR, Zwartkop 742 LR, Eerste Geluk 741 LR, Cleremont 738 LR, Vlakfontein 739 LR, Madamefontein 721 LR, Sterkloop 720 LR, Rhenoster Trap 719 LR, Buffel Hoek 722 LR, Verdoornsdraai 803 LR, Leyden 804 LR, Klipfontein 797 LR, Hermansdal 789 LR, Klipplaatdrift 787 LR, Schilpadkraal 799 LR, Doornfontein 755 LR, Haakdoorndraai 758 LR, Ruigtevley 710 LR, Jakahalskuil 754 LR, Galakwyns Stroom 745 LR, Eysseldrif 788 LR, Hellem Bricksteen 761 LR, Tiberius 702 LR, Schoonoord 786 LR, Vier en Twintig Rivier LR. Cluster 5: Farm Magalakwin 414 LR, Rebone 386 LR, Elandsbosch 407 LR, Baines Kloof 410 LR, Salem 671 LR, Baviaanskrans 659 LR, Lennes 417 LR, Mulheim 416 LR, Verstooteeling 670 LR, Galakwin 415 LR, Treves 677 LR, Waterfall 676 LR, Emigration 419 LR, Sterkwater 668 LR, Steil Water 385 LR, Monte Christo 388 LR, Vley Pan 411 LR, Steil Loop 403 LR, Uitzicht 669 LR & Magalakwinstroom 401 LR.
Magisterial District	Waterberg District
1: 50 000 map sheet number	2328 BC, DA, DC; DB, DD.
Central co-ordinate of the development	Cluster 1: 23° 47' 11.3898" S, 28° 41' 24.4430" E Cluster 5: 23° 28' 18.0371" S, 28° 39' 37.4347" E

Table 3: Infrastructure and project activities

Type of development	Water Pipeline
Project size	Cluster 1 (Jakkalskuil/Kromkloof): 40 km Cluster 5 (Thabaleshoba): 102 km
Project Components	<p>Cluster 1 (Jakkalskuil/Kromkloof):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Proposed construction of approx. 40 reservoirs (sizes between 150m³ and 3 500m³) <input type="checkbox"/> Water treatment facility covering and area of approx. 5 000m² <input type="checkbox"/> Proposed construction of a 40km bulk water pipeline with a diameter of approx. 500mm from the Bakenberg area to the N11 near Tiberius and various other size pipelines (sizes with a diameter between 50mm and 355mm), measuring approx. 190km in length, linking boreholes with the treatment facility and bulk pipelines with the reservoirs. <input type="checkbox"/> The project will assist to supply water for the following areas: Mamatlakala, Lesodi, Makekeng, Skilpadskraal, Rantlakane, Leyden, Kaditshwene, Basterspan, Dikgokgopeng, Lusaka Ngon, Mabuladihlare, Mabula, Harmansdal, Marulaneng, Kabeane, Jakkalskuil, Bohwidi, Van Wykspan, Kromkloof, Galakwenastroom, Paulos, Wydhoek, Nelly, Skrikfontein, Raadslid, Malapila, Vlakfontein, Matebeleng, Diphichi, Ramosesane, Kgopeng & Buffelhoek <p>Cluster 5 (Thabaleshoba):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Proposed construction of approx. 19 reservoirs (sizes between 150m³ and 1 000m³) <input type="checkbox"/> Water treatment facility covering and area of approx. 5 000m² <input type="checkbox"/> Proposed construction of various size pipelines (sizes with a diameter between 110mm and 315mm), measuring approx. 102km in length, linking boreholes with the treatment facility and other pipelines with the reservoirs. <input type="checkbox"/> The project will assist to supply water for the following areas: Ga-Tlhako, Taueatswala, Rebone, Galakwena, Tipeng, Thabaleshoba, Uitzicht, Vergenoeg, Sodoma, Sethupulane, Lennes & Preezburg.

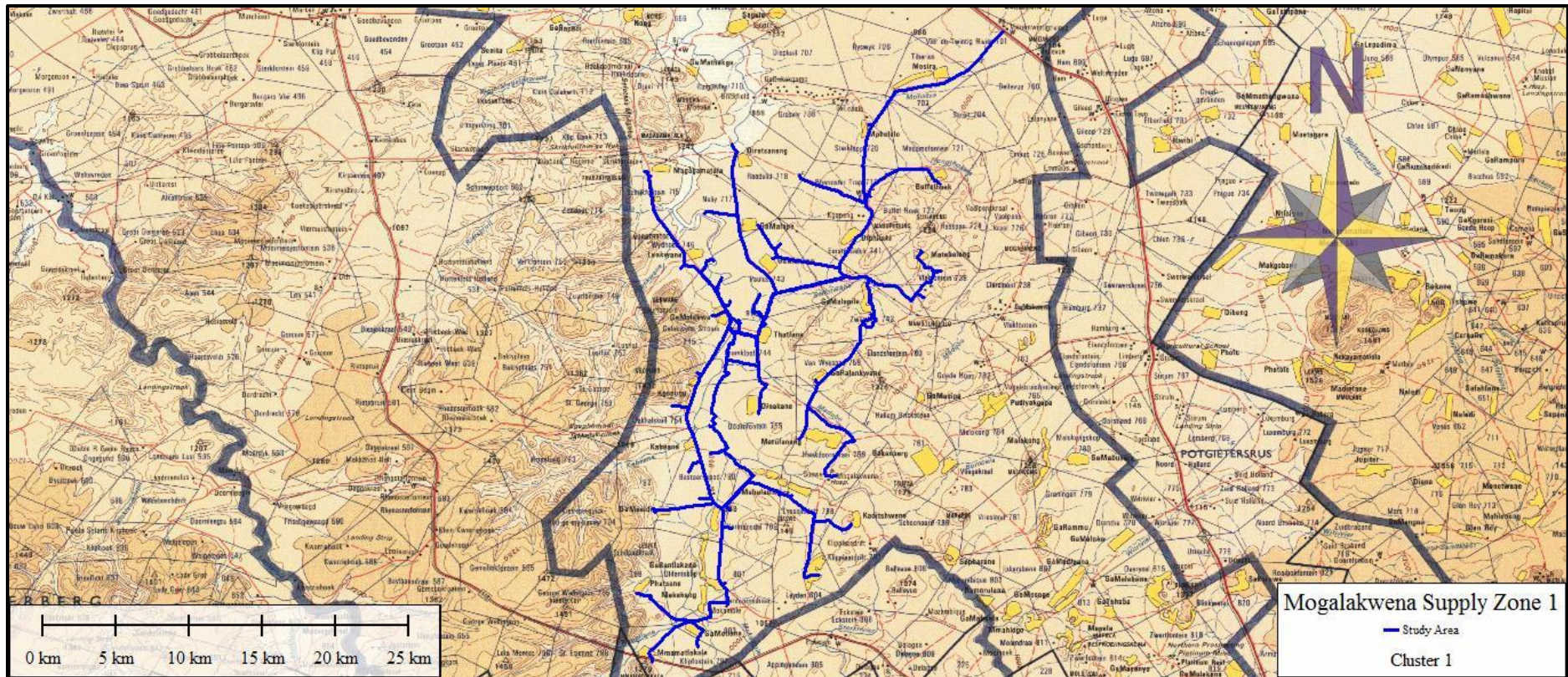


Figure 1. Cluster 1 Provincial map (1: 250 000 topographical map)

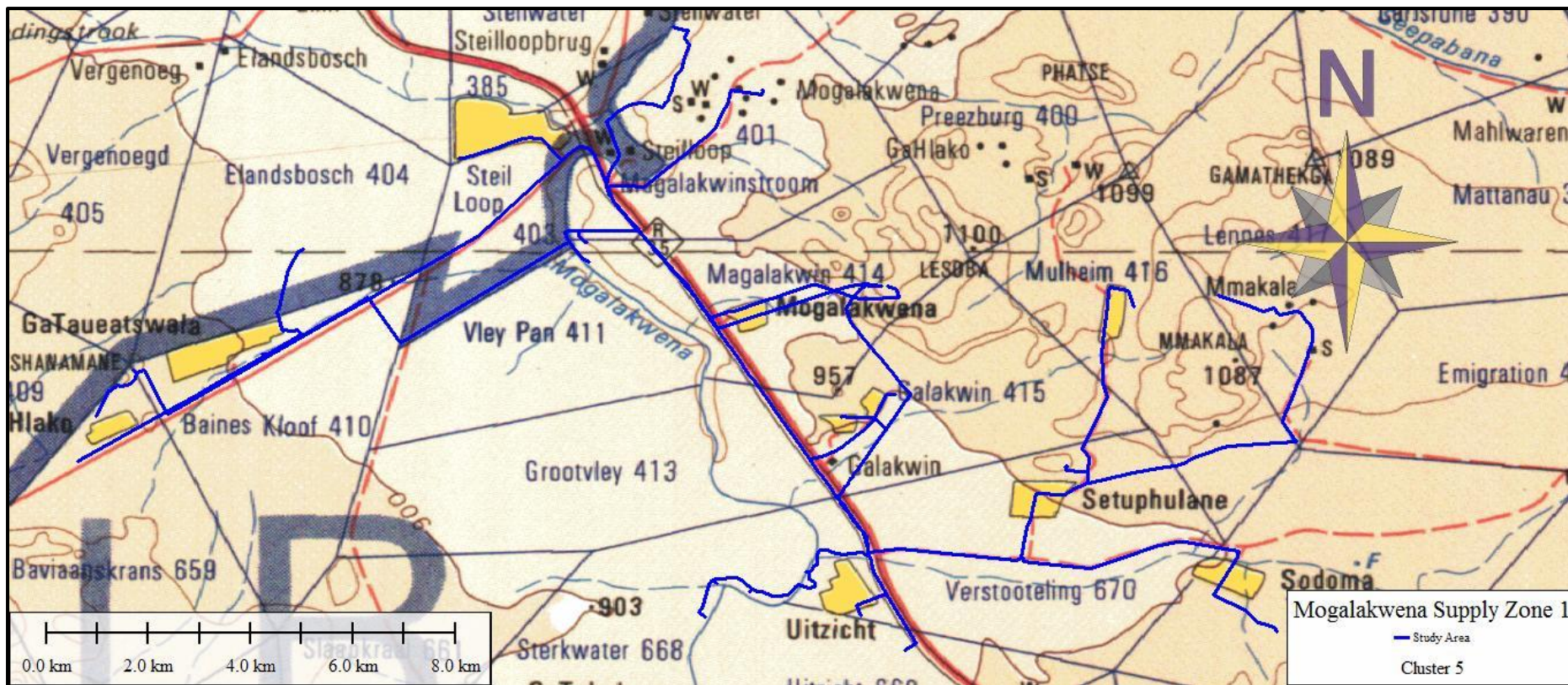


Figure 2: Cluster 5 Provincial map (1:250 000 topographical map).

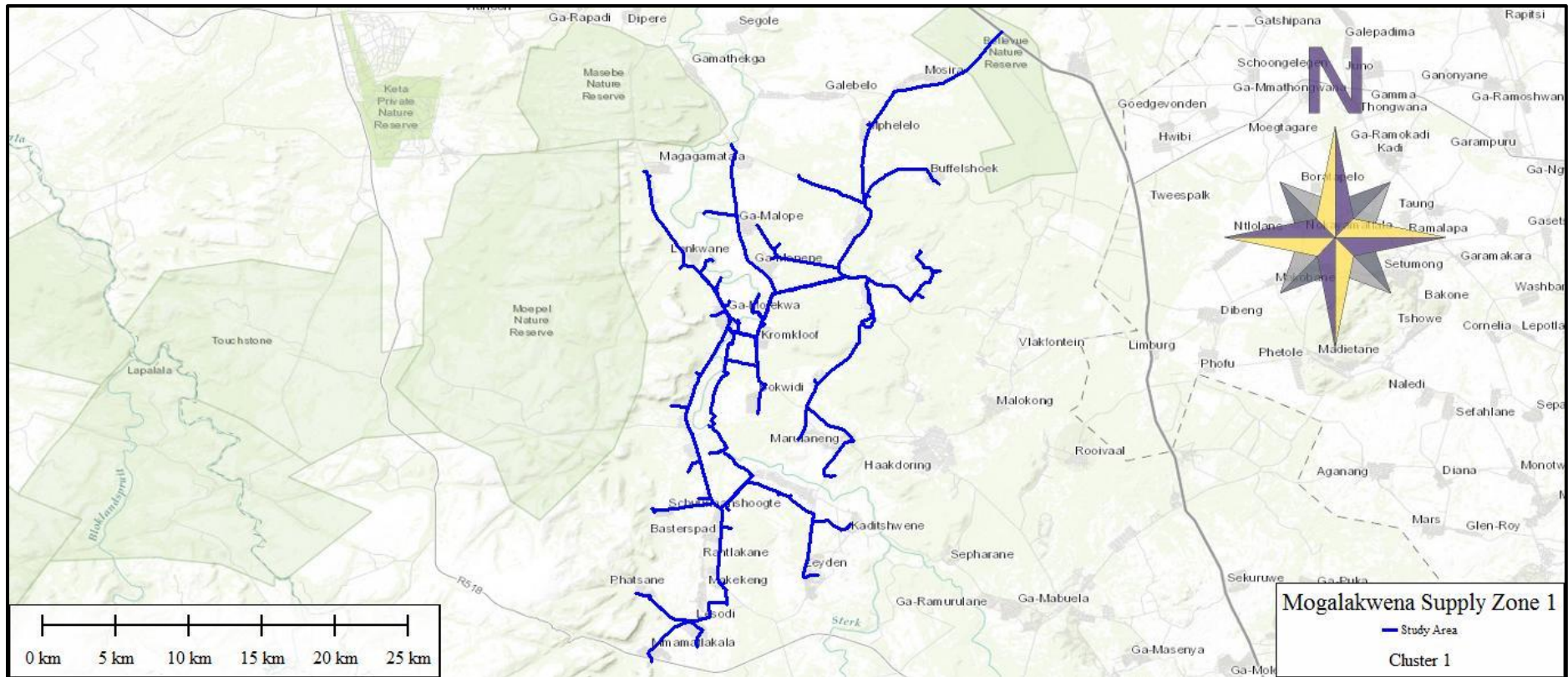


Figure 3. Cluster 1 regional map (1:50 000 topographical map).

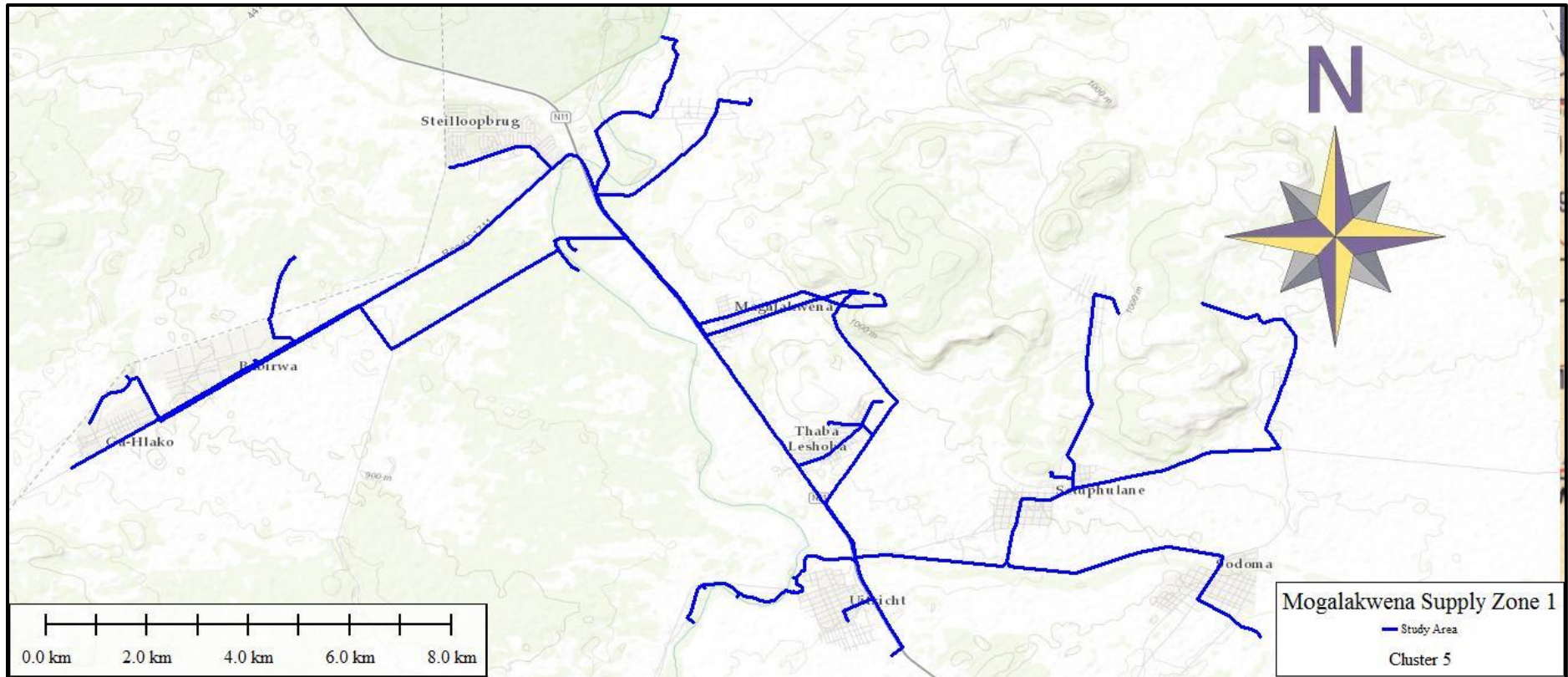


Figure 4. Cluster 5 Regional map (topographical map).

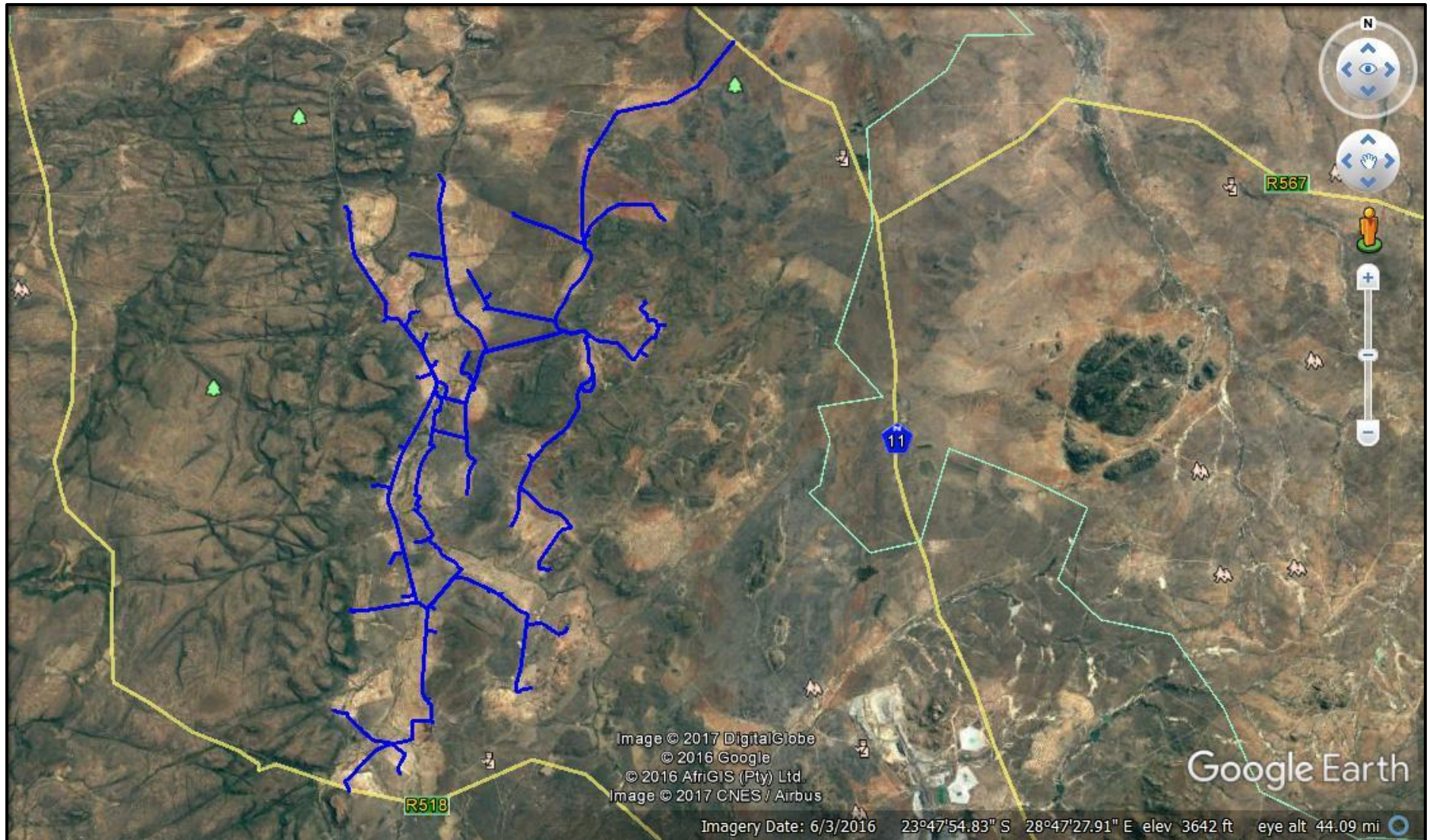


Figure 5. Satellite image showing Cluster 1 (Google Earth).

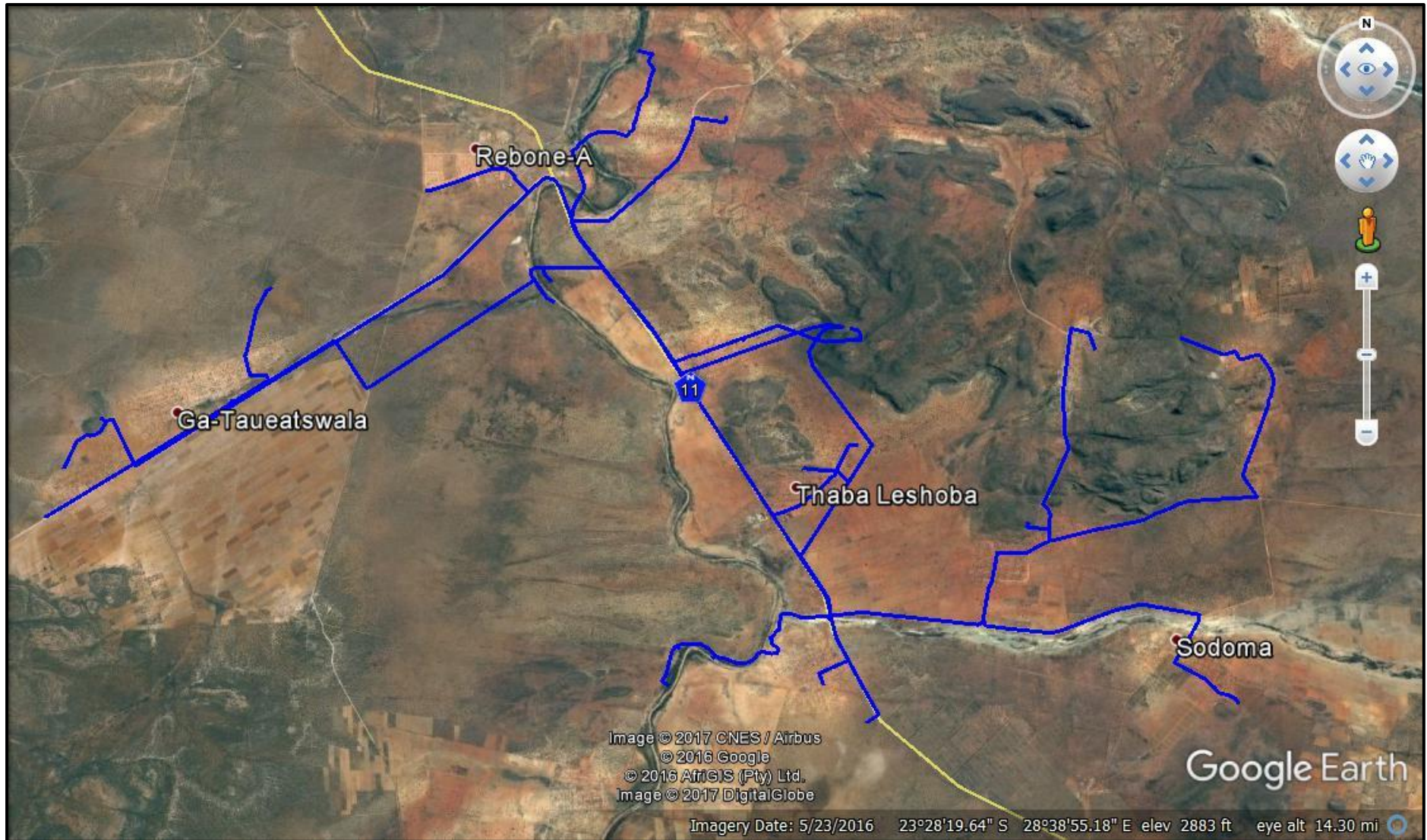


Figure 6. Satellite image showing Cluster 5 (Google Earth).

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 numerical site numbers. 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 site. Sites/heritage features were located during the physical walkthrough for the project that occurred over a period of 6 days conducted by two professional archaeologists (Jaco van der Walt and Marko Hutten). All the sites were mapped and georeferenced on 1:50 000 maps or aerial imagery 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	28 – 30 April 2017 11 – 13 May 2017
Season	Summer –due to overgrazing archaeological visibility was high in certain areas although other areas were totally impregnable with <i>Dichrostachys cinerea</i> (Sickle Bush) or thick vegetation especially along the riparian zone. The impact area was however sufficiently covered (Figure 7 and 8) to adequately record the presence of heritage resources.

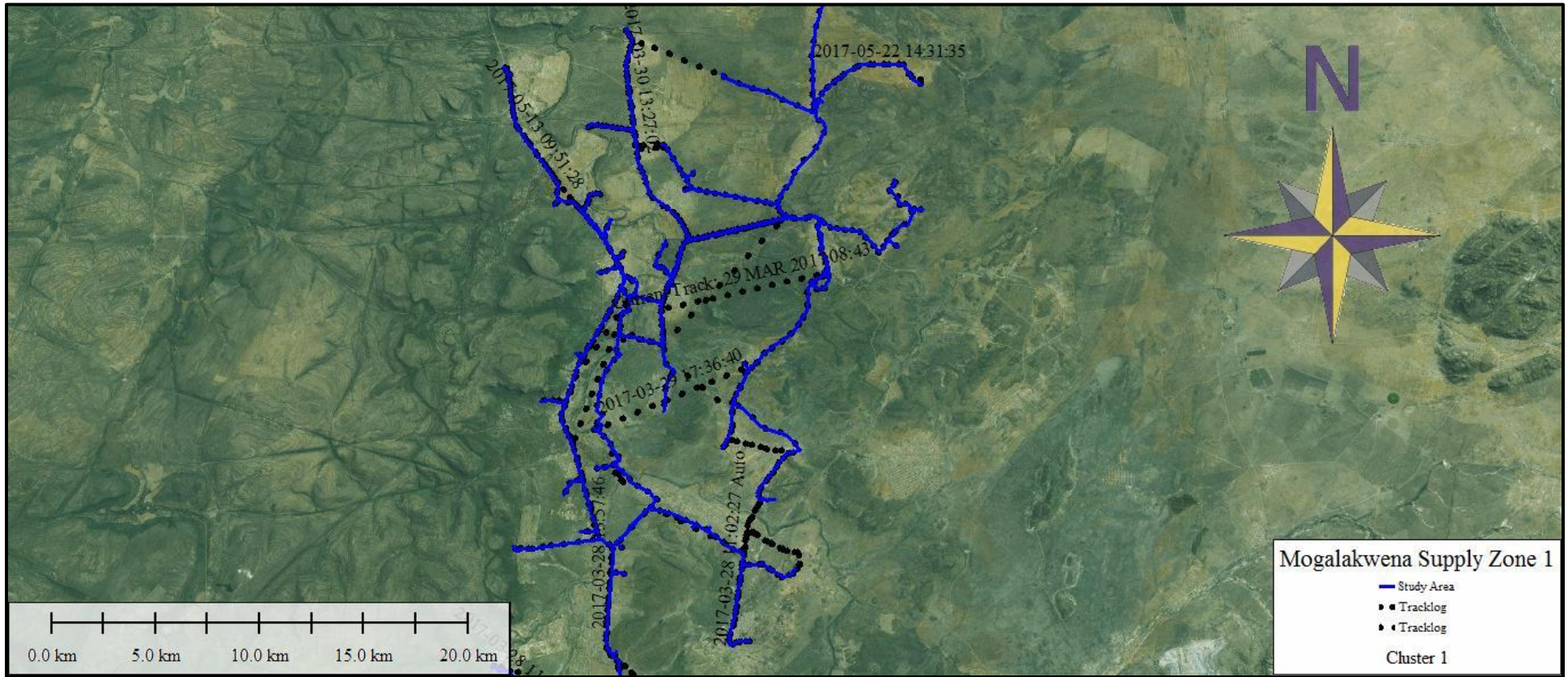


Figure 7: Cluster 1: Track logs of the survey in black.

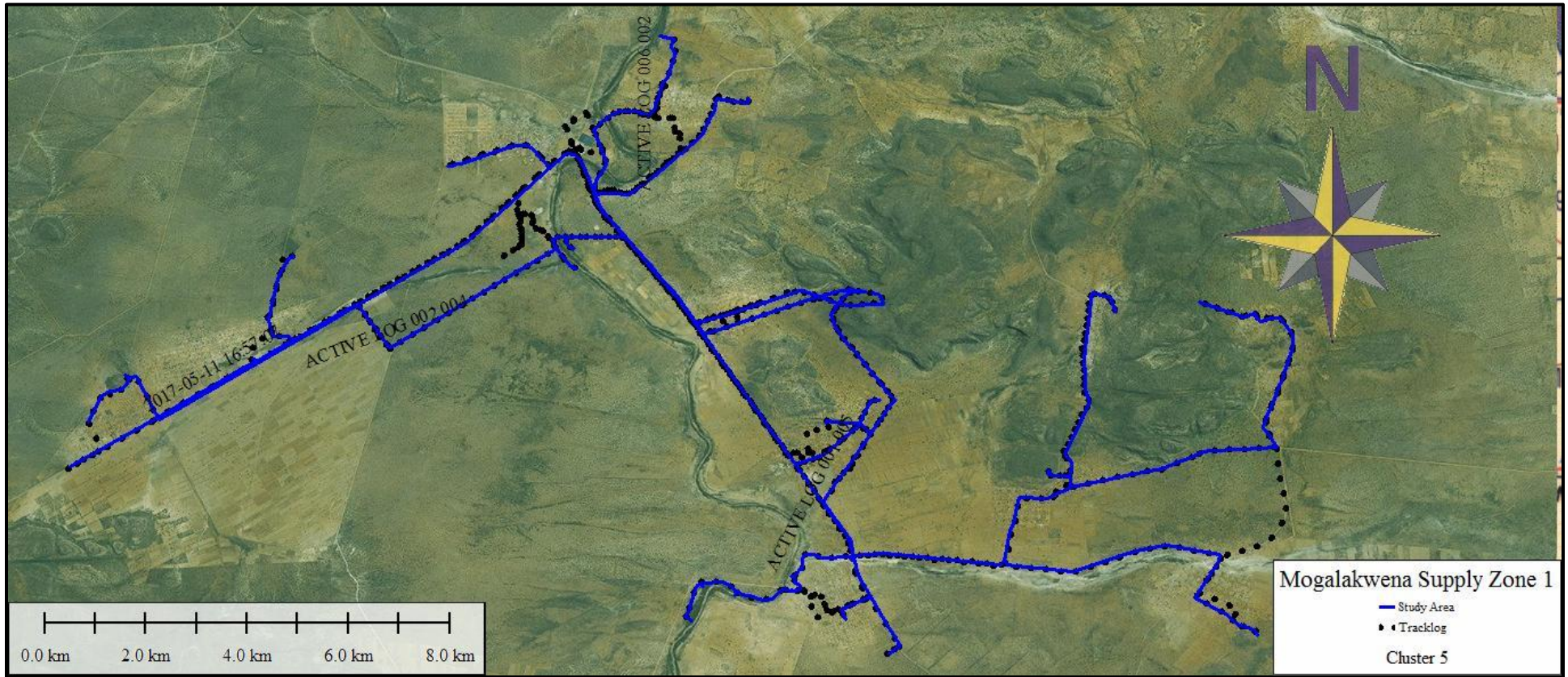


Figure 8: Cluster 5: Track logs of the survey in black.

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 its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys, however due to the extent of this project small sections might have not been physically walked. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio Economic 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 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 & 2). The proposed route traverses approximately 142 km in the two clusters that were surveyed on foot and by vehicle (Figure 7 & 8). The study area falls within the bioregion described by Mucina *et al* (2006) as the Central Bushveld Bioregion with the vegetation for cluster 1 described as Makhado Sweet Bushveld and cluster 5 described as Roodeberg Bushveld. Land use in the impact area is characterized by townships and informal grazing and subsistence farming. The study area is characterised by vertic and deep sandy to loamy soils. According to the 1:1,000,000 Geological Map cluster 1 & 5 consist of medium-grained, porphyritic, unfoliated syeno-granite occurring as several small stocks with granite and diabase in cluster 1.

The majority of pipelines will be constructed next to existing roads in informal townships, power lines, old agricultural fields and existing pipelines to existing reservoirs (Figure 9 – 12). Large sections of both clusters traverse old agricultural fields that were used for cultivation in the past that would have destroyed surface indications of heritage sites. Vegetation cover in the area varies from open areas with sparse vegetation to areas almost impregnable with thick *Dichrostachys cinerea* (Figure 13 - 16). The current Zoning of the study area is classified as various: Agriculture (Undetermined) and informal residential.



Figure 9. Pipeline route in-between houses



Figure 10. Existing infrastructure



Figure 11. Existing infrastructure



Figure 12. Existing infrastructure



Figure 13. Old agricultural fields



Figure 14. General site conditions



Figure 15. Dense vegetation cover



Figure 16. Vegetation cover

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 newspapers as part of the process. No heritage issues or concerns were raised during this process.

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 chieftom, 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)

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 57 km to the south 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).

The Pietersburg lithic industry occurs in the Limpopo province and is epitomized by large elongated products, including long points that are usually unifacial and manufactured on blades (Mason 1962; Sampson 1974). Cores and end products are often made on hornfels (Mason 1962; Sampson 1974), a rock that sometimes occurs in large blocks that allow the knapping of long blades or flakes. Other rocks that occur in large pieces, such as quartzite, were also used, suggesting that the appearance of Pietersburg assemblages may, to a degree, be influenced by available rocks.

Some known sites in the Waterberg are a small rock shelter with MSA and LSA components, North Brabant, (Schoonraad and Beaumont 1968, Van der Ryst 1998). MSA material was also recorded from a rock shelter at Schurfpoot 112 KR and Goergap 113 KR on the Waterberg plateau (van der Ryst 1998). Olieboomspoot rock shelter is an MSA site of considerable significance (Mason 1962) that underlies a long LSA sequence (van der Ryst 2006).

Relatively few MSA sites have been studied on the Waterberg plateau and none is dated (Wadley *et al* 2016). In contrast, several late LSA sites have been excavated (van der Ryst 1998). The hiatus between MSA and LSA occupations on the plateau requires further research; LSA settlements are not present before the late eleventh/early twelfth century AD when Iron Age agropastoralists also entered the region (van der Ryst 1998; Wadley 2016).

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 Olieboomspoot 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.

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, few sites are on record.

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).

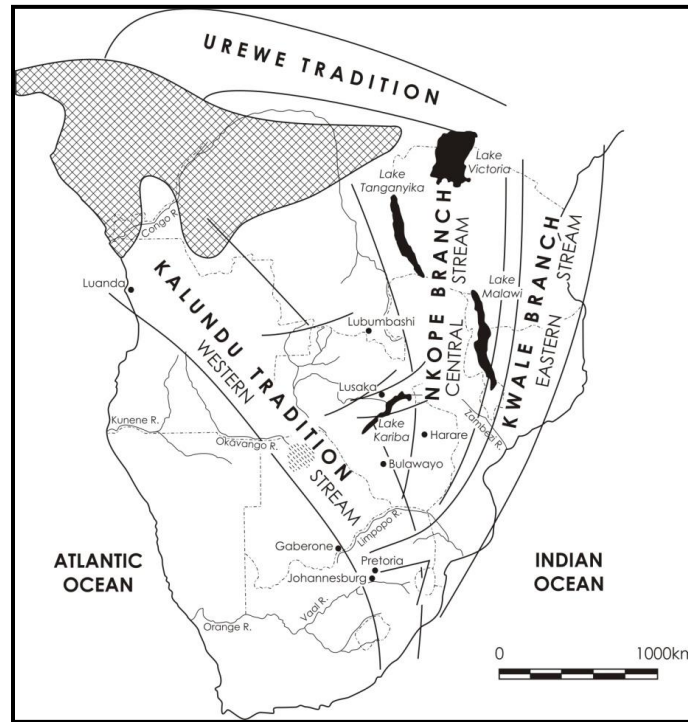


Figure 17. Movement of Bantu speaking farmers (Huffman 2007)

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 (2008); Tomose (2013), 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 infrastructure for the proposed water supply pipelines for Cluster 1 and 5 of the Mogalakwena Water Master Plan. The majority of pipelines will be constructed next to existing roads, power lines and existing pipelines. Vegetation cover in the area varies from open areas with sparse vegetation to areas almost impregnable with thick *Dichrostachys cinerea* and *Tarchonanthus camphoratus* that hampered archaeological visibility in some areas.

During the survey twenty-nine sites were recorded in total (Table 6). These sites consist of cemeteries, Late Iron Age stone walled sites and find spots and Middle Stone Age open air sites. In addition to the recorded sites low density scatters of isolated MSA artefacts made from mafic rocks (possibly felsic tuff, diabase and granite) were noted in the study area also recorded as sites. Site 3 consists of MSA broken points and blades at an erosion donga. Artefact density is less than 2 per m². Site 16 and 19 consists of flakes with faceted platforms typical of the MSA. No formal tools were observed at these locations with an artefact density of less than 2 artefacts per 4m². 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.

Several Iron Age find spots (Site 11, 17, 18 & 20) were also recorded; these consist of widely dispersed scatters of undecorated ceramics. Although they do not constitute a living or habitation site these occurrences were also recorded as sites. No other features were noticed in these areas (i.e. middens or structures) and these occurrences are therefore of no significance apart from noting their presence, which has been done in this report.

Several graves occur within residential stands bordering the pipeline in villages, these were not recorded as the pipeline will not impact directly on these graves within existing stands. Twenty-Five sites are located along cluster 1 (Figure 18) and 4 sites along cluster 5 (Figure 19). Appendix A includes mapping of the reservoirs, clusters and sites (Figure 52 - 80). A short feature description follows in Section 9 of this report with recommendations included in Section 10.



Figure 18. Dorsal view of artefacts from find spot Site 3



Figure 19. Artefacts from find spots Site 19 & 20

9 Description of Identified Heritage Resources:

Table 5: Recorded features and coordinates

Site Number	Type Site	Longitude	Latitude	Significance	Mitigation	Location
Site 1	Stone Age Site	28° 36' 11.2897" E	23° 57' 42.0623" S	Low to medium significance	Sampling	Cluster 1 Direct Impact
Site 2	Possible graves	28° 37' 55.5960" E	23° 56' 48.0445" S	High social significance	Reroute line. Demarcate and avoid	Cluster 1 Direct impact
Site 3	Stone Age occurrences	28° 37' 54.2928" E	23° 56' 42.9685" S	Low Significance	No further mitigation required	Cluster 1 22 m to the east of the line. Possible indirect impact.
Site 4	Cemetery	28° 37' 52.5803" E	23° 53' 30.9671" S	High social significance	Demarcate and avoid	Cluster 1 24 m South east of the line, Possible indirect impact
Site 5	Cemetery	28° 40' 54.1524" E	23° 55' 25.6367" S	High social significance	Demarcate and avoid	Cluster 1 26 m to the east of the line. Possible indirect impact.
Site 6	Stone Age occurrence	28° 38' 04.7040" E	23° 51' 44.2655" S	Low Significance	No further mitigation required	Cluster 1 4 m south of the line. Direct impact
Site 7	Possible graves	28° 37' 21.0540" E	23° 51' 34.9309" S	High social significance	Reroute line Demarcate and avoid	Cluster 1 5 m south east of the line Direct impact
Site 8	Stone Wall	28° 37' 20.0784" E	23° 51' 36.3959" S	Low significance	No further mitigation	Cluster 1 13 me south east of the line Possible indirect impact
Site 9	Iron Age Site	28° 35' 15.1117" E	23° 53' 39.5485" S	Medium Significance	Reroute line Demarcate and avoid	Cluster 1 7 m to the east of the line Direct impact.

Site 10	Iron Age Site	28° 42' 54.1333" E	23° 46' 47.2584" S	Medium Significance	Excavation, mapping and monitoring. Destruction permit will be required.	Cluster 1 Direct impact
Site 11	Iron Age Find spot	28° 35' 15.9901" E	23° 53' 44.0590" S	Low Significance	Monitoring	Cluster 1 20 m to the south of the line Possible indirect impact.
Site 12	Cemetery	28° 38' 20.8177" E	23° 43' 14.4119" S	High social significance	Demarcate and avoid	Cluster 1 40 m west of the line Possible indirect impact
Site 13	Cemetery	28° 38' 14.5860" E	23° 40' 27.8183" S	High social significance	Demarcate and avoid	Cluster 1 13 m South West of the line Indirect impact
Site 14	Iron Age Stone Wall	28° 43' 17.2307" E	23° 41' 47.9507" S	Low Significance	Demarcate and monitor	Cluster 1 10 m south east of the line Indirect impact
Site 15	Ruin	28° 43' 02.9317" E	23° 42' 18.8497" S	Low Significance	Demarcate and avoid	Cluster 1 19 m east of the line Possible indirect impact
Site 16	Stone Age occurrences	28° 37' 18.7715" E	23° 48' 09.2591" S	Low Significance	No further mitigation required	Cluster 1 Direct impact
Site 17	Iron Age Find spot	28° 37' 57.9469" E	23° 47' 54.8591" S	Low Significance	No further mitigation required	Cluster 1 22 m east No impact
Site 18	Iron Age Find spot	28° 38' 07.7136" E	23° 48' 10.4761" S	Low Significance	No further mitigation required	Cluster 1 13 m south
Site 19	Stone Age occurrences	28° 38' 19.2443" E	23° 48' 12.7872" S	Low Significance	No further mitigation required	Cluster 1 2m south of the line Direct impact

Site 20	Iron Age Find spot	28° 45' 05.9147" E	23° 45' 26.5032" S	Low Significance	No further mitigation required	Cluster 1 Direct impact
Site 21	Cemetery	28° 43' 19.0164" E	23° 46' 33.1537" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 1 3m south of the line Direct impact
Site 22	Cemetery	28° 43' 08.0687" E	23° 46' 54.7680" S	High social significance	Demarcate and avoid	Cluster 1 33 m north of the line No impact
Site 23	Stone Age occurrences	28° 43' 11.0569" E	23° 45' 49.2659" S	Low Significance	No further mitigation required	Cluster 1 Direct impact
Site 24	Possible grave	28° 41' 48.3793" E	23° 44' 43.8145" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 1 2m south of the line Direct impact
Site 25	Cemetery	28° 43' 56.3125" E	23° 30' 24.0660" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 Direct impact
Site 26	Cemetery	28° 42' 53.1575" E	23° 27' 29.0051" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 Direct impact
Site 27	Cemetery	28° 40' 08.1985" E	23° 28' 52.3272" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 10m east of the line Indirect impact
Site 28	Cemetery	28° 36' 43.8369" E	23° 27' 05.3541" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 Direct impact
Site 29	Cemetery	28°37'33.31"E	23°53'28.34"S	High social significance	Demarcate and avoid	Cluster 1 36 m north of the line No impact

9.1 Site Distribution Map

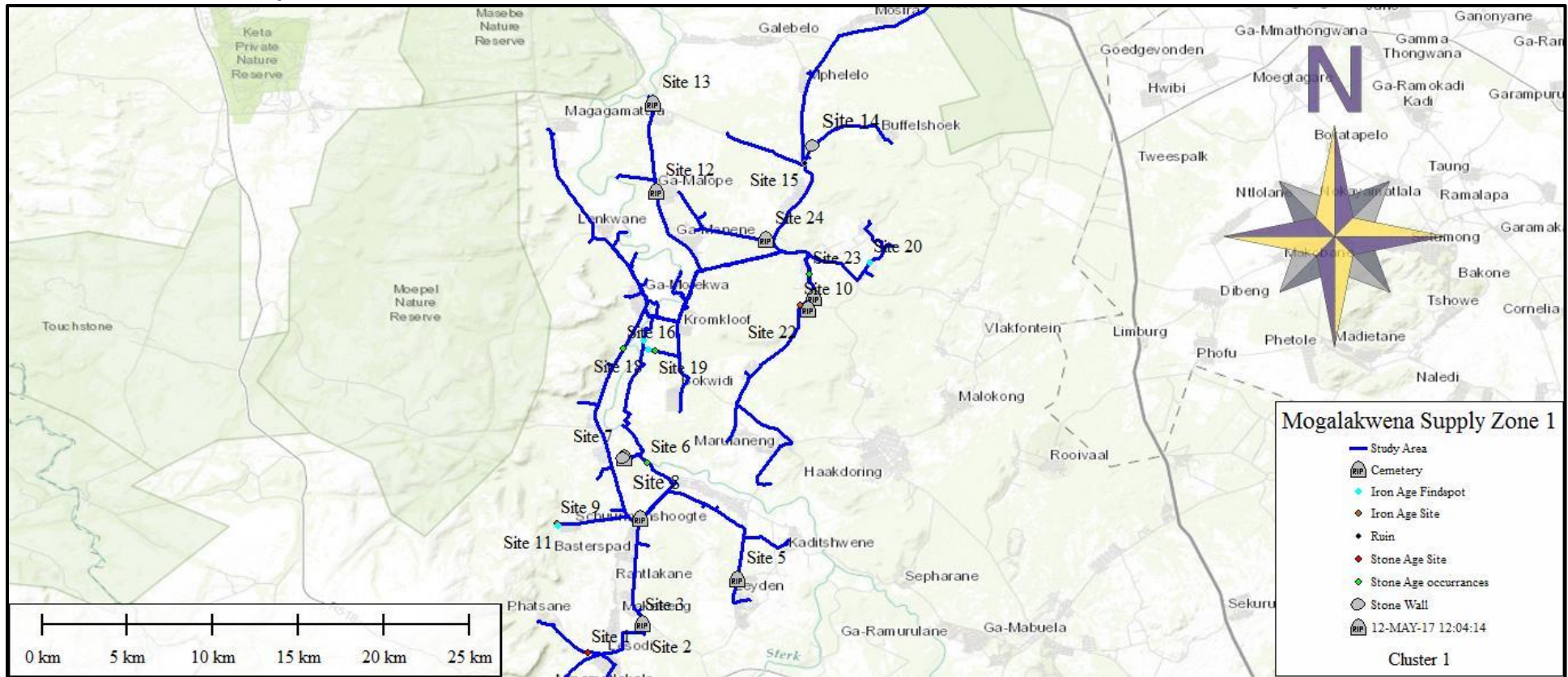


Figure 20. Recorded sites in relation to Cluster 1.

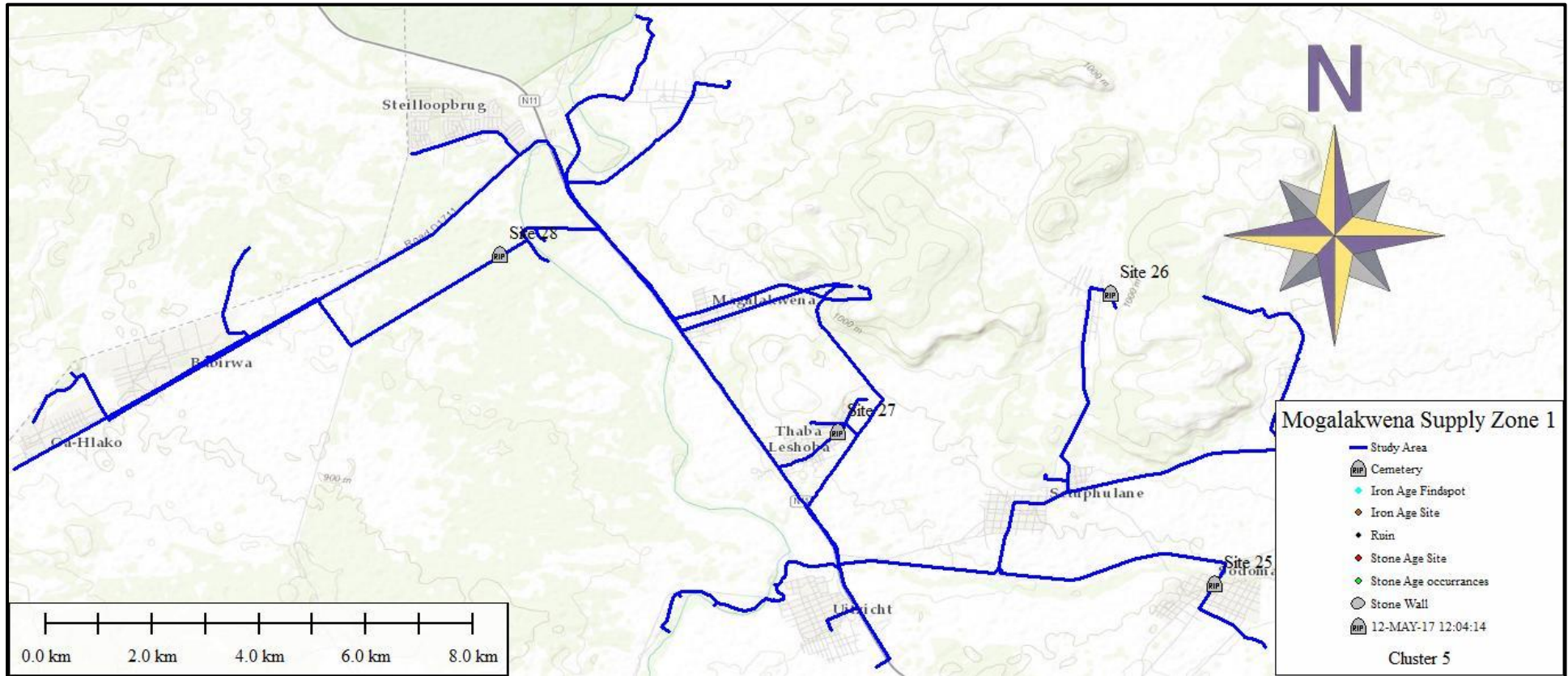


Figure 21. Recorded sites in relation to Cluster 5.

9.1 Stone Age Sites (Site 1 and 6)

Field Number	Site 1 and 6
Type of Site	Stone Age
Geographical Setting	Low laying areas on river bank with sand deposit.
Current Condition of site	Undisturbed.
Description and type of artefacts, approximate age and significant features of the site.	<p>Site 1 MSA/LSA</p> <p>A medium density scatter of stone tools was identified at this location (\pm 5-10 artefacts in m²). The site is situated to the south of the D3515 gravel road and to the east of the Mmetlane intermittent stream. The artefacts were found within a complex of developing dongas and erosion gullies. The erosion along these gullies and dongas exposed the artefacts in an area that measures approximately 50m in diameter. The site will extend along the stream as raw material is abundant here.</p> <p>The artefacts consist mainly of stone tools from the Middle Stone Age with a few Late Stone Age flakes. The MSA component consists mostly of broken points and elongated blades and scrapers on Mafic rocks. This is consistent with the so-called Pietersburg lithic industry (Wadley <i>et al</i> 2016) dating to in the Waterberg.</p> <p>Site 6 Low -medium density MSA scatter</p> <p>A low to medium density scatter of stone tools was identified at this location (\pm 5-8 artefacts per m²). The site is situated approximately 100m south of the Mogalakwena River and also on the southern side of the proposed pipe line alignment. The artefacts were found in an area that was exposed by sheet erosion.</p> <p>The artefacts are classified as MSA and consist mainly of utilised and re-touched flakes, blades and scrapers.</p>
Site Extent	<p>Site 1 size: Approximately 50m in diameter.</p> <p>Site 6 size: Approximately 30m x 20m in size.</p>
Depth and stratification of the site	Unknown but deposit is unlikely.



Figure 22. Stone tool scatter at Site 1.



Figure 23. General site conditions at Site 1.



Figure 24. General site conditions – Site 6



Figure 25. Stone Age artefacts at Site 6

Statement of Significance	Relatively few MSA sites have been studied on the Waterberg plateau and none is dated (Wadley <i>et al</i> 2016). Therefore, the sites are of low to medium significance.
Field Rating (Recommended grading or field significance) of the site:	Generally Protected B (GP.B).
Recommendations	These open-air sites occur along the river banks and will be directly impacted on. It is recommended that a surface sample is taken for analysis to positively ascribe the techno complex.

9.2 Late Iron Age. (Site 9, 10 & 14).

Site Number	Site 9, 10 & 14
Type of Site	Archaeological
Geographical Setting	Site 9 & 14 low laying area. Site 10 on hill summit
Current Condition of site	Site 9 & 14 impacted on by severe sheet erosion, Site 10 is well preserved.
Description and type of artefacts, approximate age and significant features of the site.	<p>Site 9 Iron Age site with Furnace</p> <p>This site is marked by an open clearing in thick <i>Dichrostachys cinerea</i> (Sickle Bush). The clearing measures approximately 40 meter in diameter and was subjected to sheet erosion resulting in highly weathered ceramics that is scattered across the site. On the norther side of the clearing is the remains of a partially washed away furnace. Only the base of the furnace is intact with three rocks located at the bottom. A <i>tuyre</i> fragment was also found on the site.</p> <p>Site 10 Stone walled site on summit of hill.</p> <p>A ephemeral stone walled site was identified at this location. The proposed pipe line alignment and reservoir will impact directly on the site. The identified site consists of numerous sections of low stone packed walling which forms enclosures, terraces, scallops and other demarcated areas. The stone walling is low and only serves as an indicator for the demarcation of the different living areas of the settlement identified here. The area was overgrown with vegetation and it was difficult to identify</p>

	<p>specific features, site layout or the exact extent of the site. The site covers an area of approximately 100m x 150m.</p> <p>Site 14 Low stone walling in between stands</p> <p>An extensive stone walled site was identified at this location. The site is situated to the south-eastern side of the proposed pipe line alignment and on the northern fringes of Kgopeng Village. It is also situated in between two of the last two stands of the village</p> <p>The identified site consists of numerous sections of low stone packed walling which forms enclosures, terraces, scallops and other demarcated areas. The stone walling is low and only serves as an indicator for the demarcation of the different living areas of the settlement identified here. These stone walling continues along the proposed pipe line route and numerous sections of stone walling are visible close to the proposed alignment. These walls all formed part of an extensive settlement at the foot of a ridge directly to the east of the proposed alignment. The settlement is marked by several Euphorbias growing in areas where there are concentrations of stone walling. The stone walled settlement continues for approximately 1km along the proposed pipe line route.</p>
<p>Depth and stratification of the site</p>	<p>Unknown</p>
	
<p>Figure 26. <i>Tuyere</i> fragment at Site 9</p>	<p>Figure 27. Undecorated ceramics from Site 9</p>
	
<p>Figure 28. Site 10 – Stone walling</p>	<p>Figure 29: Site conditions Site 10</p>



Figure 30. General site conditions Site 14



Figure 31. Ceramics at Site 14

<p>Statement of Significance</p>	<p>Site 9 Iron Age site with Furnace. Due to the high degree of sheet erosion that impacted on the site and the lack of features on site the site is of low to medium significance</p> <p>Site 10 Stone walled site on summit of hill. The site layout is well preserved and therefore of medium significance.</p> <p>Site 14 Ephemeral stone walled settlement. The site is not very well preserved and impacted on by the existing water lines and road that impacted on the site and therefore of low to medium significance.</p>
<p>Field Rating (Recommended grading or field significance) of the site:</p>	<p>Generally Protected B</p>
<p>Recommendations</p>	<p>Site 9 Iron Age site with Furnace. Rerouting pipeline to the north where no other features were recorded during the survey.</p> <p>Site 10 Stone walled site on summit of hill. This site will be directly impacted on and should be mapped, test excavated and monitored during construction.</p> <p>Site 14 Stone walled settlement. The existing walling should be demarcated and earth works in this area must be monitored (Figure 32).</p>

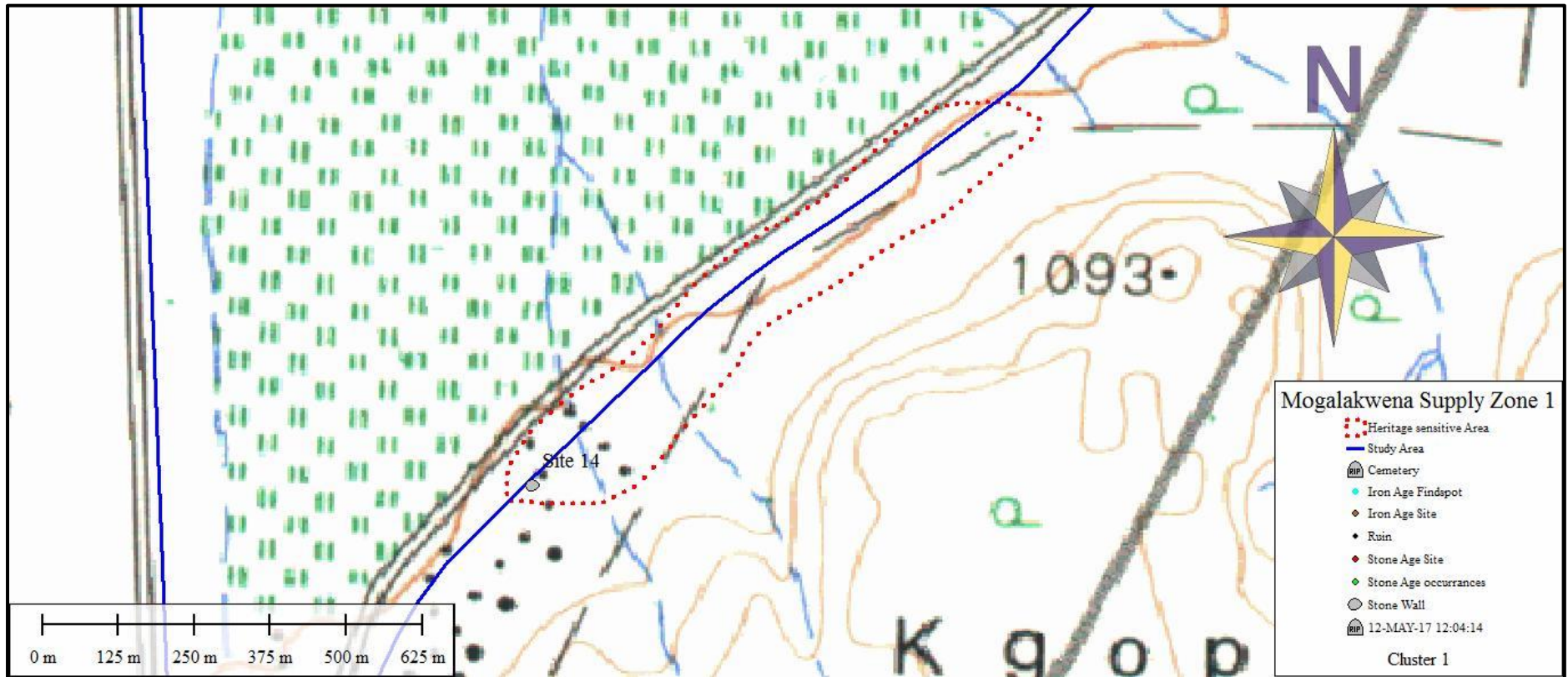


Figure 32. Area to be monitored during construction at Site 14

9.3 Ruins (Site 8 and 15).

Site Number	Site 8, 15
Type of Site	Recent/historical
Geographical Setting	Low laying areas at base of hill.
Current Condition of site	Dilapidated
Description and type of artefacts, approximate age and significant features of the site.	<p>Site 8 Low stone walling</p> <p>A single line of low stone walling was identified at this location. It is situated next to and on the south-eastern side of the proposed pipe line alignment. The identified stone wall measures approximately 25m in length and was straight. It did not connect up with any other structure or feature. The function of this stretch of stone wall is unclear at this stage but could be modern.</p> <p>Site 15 Stone built house</p> <p>A stone built house was identified at this location. It is situated next to and on the eastern side of the proposed pipe line alignment. The house was stone built with mud used as mortar. It measures approximately 4m x 7m in size. It was plastered and painted, but it is in a dilapidated state at this time.</p>
Depth and stratification of the site	Unknown



Figure 33. General site conditions Site 8



Figure 34. Walling at Site 8

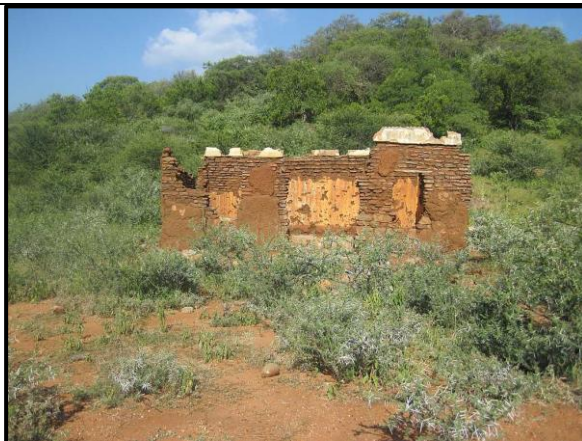


Figure 35. Site 15 viewed from the west



Figure 36. Stone lintel in window



Figure 37. Remains of ruin from Site 15

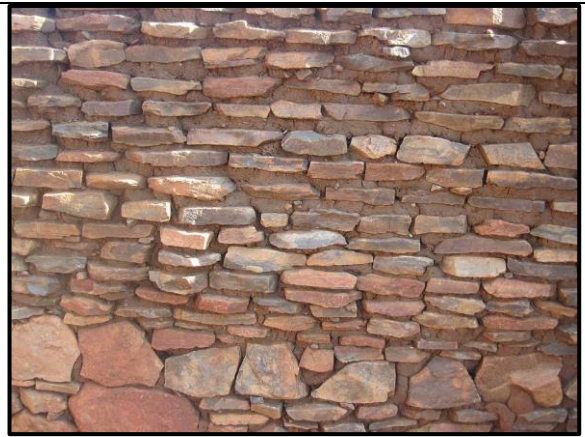


Figure 38. Construction technique at Site 15

<p>Statement of Significance</p>	<p>Site 8: The walling is probably from the recent past and do not form part of any structure or feature and are therefore of low significance.</p> <p>Site 15: The site could be older than 60 years and would then be protected by the NHRA. Sites like these might also contain unmarked graves therefore the site is of low to medium significance.</p>
<p>Field Rating (Recommended grading or field significance) of the site:</p>	<p>Site 8: Generally Protected C (GP.C).</p> <p>Site 15: Generally Protected B (GP. B).</p>
<p>Recommendations</p>	<p>No further action is necessary for Site 8 prior to construction.</p> <p>Site 15 will not be directly impacted on but should be demarcated and avoided.</p>

9.4 Cemeteries and grave sites (Site 4,5, 12, 13, 21, 22, 25, 26 and 27).

Site Number	Site 4, 5, 12, 13, 21, 22, 25, 26 and 27
Type of Site	Recent and historical graves as well as possible 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.	<p>Graves occur throughout the study area and numerous burial sites and cemeteries have been recorded in the survey. 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.</p> <p>Site 4</p> <p>A cluster with three graves and another cluster with four graves were identified at this location. The two clusters with graves are situated on the western side of the D3521 tar road and on the eastern side of the proposed pipe line alignment</p> <p>The two clusters of graves are not fenced and are situated approximately 10m from each other. The first cluster with three informal graves has oval shaped outlines of packed rocks as grave dressings. Two of these graves were placed next to each other and were orientated from north to south. The third grave was placed next to them, but was orientated from west to east. All of these graves have large rocks placed upright to serve as headstones.</p> <p>The cluster with four graves has two graves with formal granite and cement dressings. They also have inscribed headstones. The other two graves only have oval shaped mounds of packed rocks as dressings. These two graves have large rocks placed upright to serve as headstones. The graves were placed two next to each other and another two were placed in front of the first two. All of these graves were orientated from west to east</p> <p>Site 5</p> <p>A single possible grave was identified at this location. It is situated on the western side of the D4380 tar road and on the western side of the proposed pipe line alignment. It is situated within or on the edge of an old quarry.</p> <p>The grave has a rock placed upright at the western end to serve as headstone and a rock placed at the eastern end to show the extent of the grave. It was orientated from west to east. No other features or artefacts are associated with this possible grave.</p> <p>Site size: Approximately 2m x 2m in size.</p> <p>Site 12</p> <p>A cemetery was identified at this location. It is the Ga-Malope Village Cemetery and it is situated on the western side of the village, its access road and the proposed pipe line alignment. The cemetery is fenced off and was locked during the time of investigation.</p> <p>Site size: Approximately 100m x 100m.</p> <p>Site 13</p> <p>Two graves were identified at this location. The graves are situated next to and on the south-western side of the proposed pipe line alignment. The two graves were placed end to end next to each other. They are both crudely fenced off.</p> <p>The first grave has a granite and cement grave dressing with an inscribed headstone. It is the grave of Ramadimetsa Meriam Ramaru who died in 1983. The second grave has an informal oval shaped mound of packed rocks as dressing. This grave does not have a headstone.</p> <p>Site size: Approximately 4m x 8m in size.</p>

	<p>Site 21</p> <p>Family cemetery at the foot of a hill. The cemetery is fenced and the graves are orientated east to west. Several graves belong to the Malapile family. Three graves have stone dressings and no headstones. The remaining graves all have granite headstones.</p> <p>Site 22</p> <p>A single fenced grave belonging to Molokomme Matsobane Mathews who passed away in 1978.</p> <p>Site 25</p> <p>Three formal graves were identified at this location. The graves are situated within the road reserve of one of the unpaved roads within Sodoma village. They are also situated within the proposed pipe line alignment route.</p> <p>The graves are situated right next to the fence of the bordering stand and they are also crudely fenced off. A Shepherds Tree is situated next to the graves and covers most of them. The three graves were placed next to each other and are orientated from west to east. Two of the graves were placed right next to each other to form a double grave with a double grave dressing. The third grave is separate from the two other graves. All three graves have formal granite and gravel dressings, although some damage has occurred and two of the headstones are not in place anymore.</p> <p>The three graves belong to the Mmatlou family and dates from the 1930's to the middle of 1940. The grave dressings are a much more recent addition. According to a passer-by the related Mmatlou family doesn't stay in the area any more.</p> <p>Site 26</p> <p>A large cemetery was identified at this location. It is situated on the eastern side of Preezberg Village and is the official Preezberg Village cemetery. A part of the cemetery is situated within the proposed pipe line alignment route.</p> <p>The cemetery measures approximately 100m x 100m in size and is fenced off and was locked at the time of the field visit. It hosted approximately 120 graves of which most have formal granite and cement dressings. A few other graves have more informal rock packed dressings. The cemetery is currently in use with new graves evident in between the other graves.</p> <p>Site 27</p> <p>Another large cemetery was identified at this location. It is situated on the south-eastern fringes of Thaba Leshoba Village. It is situated next to a newly upgraded tar road and on the south-eastern side of the proposed pipe line alignment. The cemetery is fenced off and locked and measures approximately 100m x 100m in size. There are approximately 100 graves within this cemetery.</p> <p>Most of the graves have formal, granite headstones and dressings and most of them are orientated from west to east. The cemetery is currently in use with new graves evident in between the graves with headstones and dressings.</p> <p>Site 28</p> <p>Another large cemetery was identified at this location. It is situated approximately 1km south of the D1711 tar road from Steilloopbrug to Marken and also approximately 1.5km south of Rebone Village. The cemetery is situated adjacent and directly to the north of the proposed pipe line alignment.</p> <p>This cemetery is also fenced off and was locked at the time of the field visit. The fenced off area measures approximately 500m x 350m in size. The fenced off area is Portion 5 of the Farm Steil Loop 403 on the latest topo maps. Only a small section of this fenced off area is taken up by graves which suggest that it was only recently proclaimed as a cemetery. The formal grave dressings mostly looked new and fresh graves with no dressings were also noted. As the cemetery was locked, it made accurate documentation of the number of graves and the dates of the graves impossible.</p>
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Figure 39. Grave at Site 4



Figure 40. Grave at Site 5



Figure 41. Formal Cemetery at Site 12



Figure 42. General site conditions Site 13



Figure 43. Graves at Site 21



Figure 44. Grave at Sites 22



Figure 45. Grave at Site 25



Figure 46. Graves at Site 26



Figure 47. Graves at Site 27.



Figure 48. Fenced off cemetery at Site 28.

<p>Statement of Significance</p>	<p>High social significance.</p>
<p>Field Rating (Recommended grading or field significance) of the site:</p>	<p>Generally Protected A (GP.A).</p>
<p>Recommendations</p>	<p>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 20meter buffer and the pipeline rerouted in these areas. These rerouted areas will have to be assessed by an archaeologist.</p>

9.5 Stone Cairns (Site 2, 7 and 24).


Site Number	Site No 2, 7, 24
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>Site 2</p> <p>Five possible graves were identified at this location. The graves were placed in a line next to each other along a previously ploughed field and a fence around the ploughed field.</p> <p>The graves have stone packed mounds of rocks as dressings and were orientated from east to west. The graves were not maintained and are overgrown with grass and other vegetation. The graves don't have any headstones or identifications. They were also damaged to some extent and no further information was available on these graves at the time of the investigation.</p> <p>Site size: Approximately 20m x 5m.</p> <p>Site 7</p> <p>Three to five possible graves were identified at this location. These possible graves are situated next to and on the south-eastern side of the proposed pipe line alignment. They were identified in a cluster situated underneath a collection of trees. The possible graves have oval shaped mounds of packed rocks as dressings, but most of these dressings were so disturbed that it was difficult to identify them.</p> <p>No other features or artefacts were identified with these possible graves.</p> <p>Site size: Approximately 15m x 10m in size.</p> <p>Site 24</p> <p>Possible rectangular grave with packed with small upright stones. More graves could be present.</p>
Depth and stratification of the site	Unknown but deposit is likely.



Figure 49. General site conditions at Site 2 .



Figure 50. General site conditions at Site 7

	
<p>Figure 51. Possible grave at Site 24</p>	
<p>Statement of Significance</p>	<p>Unknown. If these are just stone cairns related to results of field clearing or recent construction activities it is of Low significance.</p> <p>If these cairns represent graves they are of High Social Significance.</p>
<p>Field Rating (Recommended grading or field significance) of the site:</p>	<p>Generally Protected C (GP.C). If it is graves Generally Protected A (GP.A).</p>
<p>Recommendations</p>	<p>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.</p>

9.6 Cultural Landscapes, Intangible and Living Heritage

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.

9.7 Palaeontological Resources

The results of the paleontological desktop (Rossouw 2017) concluded: “ *The desktop investigation indicates that both pipeline footprints are located on unfossiliferous Bushveld Complex granites and Waterberg Group arenites. There is little chance of finding fossil material within the superficial overburden within the vicinity of the Cluster 1 and 5 footprints mainly because of a lack of alluvium in the area. However, pipeline footprints located within 50 m of the Mogalakwena River and river crossings may affect suitably developed overbank sediments (superficial alluvial deposits) that could yield Quaternary vertebrate fossil remains. 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.

Table 6. Impact Assessment of Cluster 1 and 5

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 (4)	Not Probable (2)
Significance	52 (Medium to high)	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 number of sites that will be impacted by the line (Site 2,7,9, 21, 24, 25, 26, 27,28), the line will have to be rerouted in order to avoid these sites and the sites will have to be demarcated during construction. The line cannot be rerouted at Site 1 and Site 10. At Site 1 a surface sample should be collected and analysed. Site 10 will have to be mapped, test excavated and monitored. It is also recommended that Site 14 should be monitored during construction.		
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 Cluster 1 and Cluster 5 of the Mogalakwena Master Plan 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 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.

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 water supply lines the project will, with the recommended mitigation measures and management actions, be mitigated to an acceptable level. 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 Mogalakwena Municipality Water Master Plan: Phase 2A Bulk Water Supply Zone 1 (Cluster 1 & 5). During the survey 29 heritage features were recorded. Twenty-Five sites are located along cluster 1 (Figure 18) and 4 sites along cluster 5. These consist of cemeteries, Late Iron Age stone walled sites and find spots, rectangular stone walled ruins and Stone Age sites. 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 Levallois 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.

An independent paleontological study (Rossouw 2017) found that cluster 1 and cluster 5 are located on un-fossiliferous Bushveld Complex granites and Waterberg Group arenites. There is little chance of finding fossil material within the superficial overburden in the Cluster 1 and 5 footprints mainly because of a lack of alluvium in the area. However, pipeline footprints located within 50 m of the Mogalakwena River and river crossings may affect suitably developed overbank sediments (superficial alluvial deposits) that could yield Quaternary vertebrate fossil remains. In terms of the palaeontological heritage no further palaeontological assessments is recommended by the palaeontologist, 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.

The need for potable water is a major concern for the communities living in the area. The socio-economic benefits of the project outweigh the impact by the project provided that the correct management and mitigation measures are employed. 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 EMP.

Where grave sites were recorded adjacent areas was surveyed (20 m away from the proposed alignment) in order to ensure that the pipeline could be rerouted without additional impact on heritage resources.

The impact of the proposed project on the recorded sites can be mitigated to an acceptable level as detailed in the table below.

Table 7. Recommended mitigation measures on sites.

Site Number	Type Site	Longitude	Latitude	Significance	Mitigation	Location
Site 1	Stone Age Site	28° 36' 11.2897" E	23° 57' 42.0623" S	Low to medium significance	Sampling and analyses	Cluster 1 Direct Impact
Site 2	Possible graves	28° 37' 55.5960" E	23° 56' 48.0445" S	High social significance	Reroute line. Demarcate and avoid	Cluster 1 Direct impact
Site 3	Stone Age occurrences	28° 37' 54.2928" E	23° 56' 42.9685" S	Low Significance	No further mitigation required	Cluster 1 22 m to the east of the line. Possible indirect impact.
Site 4	Cemetery	28° 37' 52.5803" E	23° 53' 30.9671" S	High social significance	Demarcate and avoid	Cluster 1 24 m South east of the line, Possible indirect impact
Site 5	Cemetery	28° 40' 54.1524" E	23° 55' 25.6367" S	High social significance	Demarcate and avoid	Cluster 1 26 m to the east of the line. Possible indirect impact.
Site 6	Stone Age occurrence	28° 38' 04.7040" E	23° 51' 44.2655" S	Low Significance	No further mitigation required	Cluster 1 4 m south of the line. Direct impact
Site 7	Possible graves	28° 37' 21.0540" E	23° 51' 34.9309" S	High social significance	Reroute line Demarcate and avoid	Cluster 1 5 m south east of the line Direct impact
Site 8	Stone Wall	28° 37' 20.0784" E	23° 51' 36.3959" S	Low significance	No further mitigation	Cluster 1 13 m south east of the line Possible indirect impact
Site 9	Iron Age Site	28° 35' 15.1117" E	23° 53' 39.5485" S	Medium Significance	Rerouting pipeline, if not possible excavation and monitoring	Cluster 1 7 m to the east of the line Direct impact.
Site 10	Iron Age Site	28° 42' 54.1333" E	23° 46' 47.2584" S	Medium Significance	Excavation, mapping and monitoring. Destruction permit will be required.	Cluster 1 Direct impact
Site 11	Iron Age Find spot	28° 35' 15.9901" E	23° 53' 44.0590" S	Low Significance	Monitoring	Cluster 1 20 m to the south of the line Possible indirect impact.
Site 12	Cemetery	28° 38' 20.8177" E	23° 43' 14.4119" S	High social significance	Demarcate and avoid	Cluster 1 40 m west of the line Possible indirect impact
Site 13	Cemetery	28° 38' 14.5860" E	23° 40' 27.8183" S	High social significance	Demarcate and avoid	Cluster 1 13 m South West of the line

						Indirect impact
Site 14	Iron Age Stone Walled site	28° 43' 17.2307" E	23° 41' 47.9507" S	Low Significance	Demarcate and monitor	Cluster 1 10 m south east of the line Indirect impact
Site 15	Ruin	28° 43' 02.9317" E	23° 42' 18.8497" S	Low Significance	Demarcate and avoid	Cluster 1 19 m east of the line Possible indirect impact
Site 16	Stone Age occurrences	28° 37' 18.7715" E	23° 48' 09.2591" S	Low Significance	No further mitigation required	Cluster 1 Direct impact
Site 17	Iron Age Find spot	28° 37' 57.9469" E	23° 47' 54.8591" S	Low Significance	No further mitigation required	Cluster 1 22 m east No impact
Site 18	Iron Age Find spot	28° 38' 07.7136" E	23° 48' 10.4761" S	Low Significance	No further mitigation required	Cluster 1 13 m south
Site 19	Stone Age occurrences	28° 38' 19.2443" E	23° 48' 12.7872" S	Low Significance	No further mitigation required	Cluster 1 2m south of the line Direct impact
Site 20	Iron Age Find spot	28° 45' 05.9147" E	23° 45' 26.5032" S	Low Significance	No further mitigation required	Cluster 1 Direct impact
Site 21	Cemetery	28° 43' 19.0164" E	23° 46' 33.1537" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 1 3m south of the line Direct impact
Site 22	Cemetery	28° 43' 08.0687" E	23° 46' 54.7680" S	High social significance	Demarcate and avoid	Cluster 1 33 m north of the line No impact
Site 23	Stone Age occurrences	28° 43' 11.0569" E	23° 45' 49.2659" S	Low Significance	No further mitigation required	Cluster 1 Direct impact
Site 24	Possible grave	28° 41' 48.3793" E	23° 44' 43.8145" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 1 2m south of the line Direct impact
Site 25	Cemetery	28° 43' 56.3125" E	23° 30' 24.0660" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 Direct impact
Site 26	Cemetery	28° 42' 53.1575" E	23° 27' 29.0051" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 Direct impact
Site 27	Cemetery	28° 40' 08.1985" E	23° 28' 52.3272" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 10m east of the line Indirect impact
Site 28	Cemetery	28° 36' 43.8369" E	23° 27' 05.3541" S	High social significance	Reroute pipeline Demarcate and avoid	Cluster 5 Direct impact
Site 29	Cemetery	28°37'33.31"E	23°53'28.34"S	High social significance	Demarcate and avoid	Cluster 1



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, the proposed project can continue as the impacts of this project can be mitigated to an acceptable level. The following socio-economic benefits 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, numerous employment opportunities will be created.

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:

12.1 Mapping

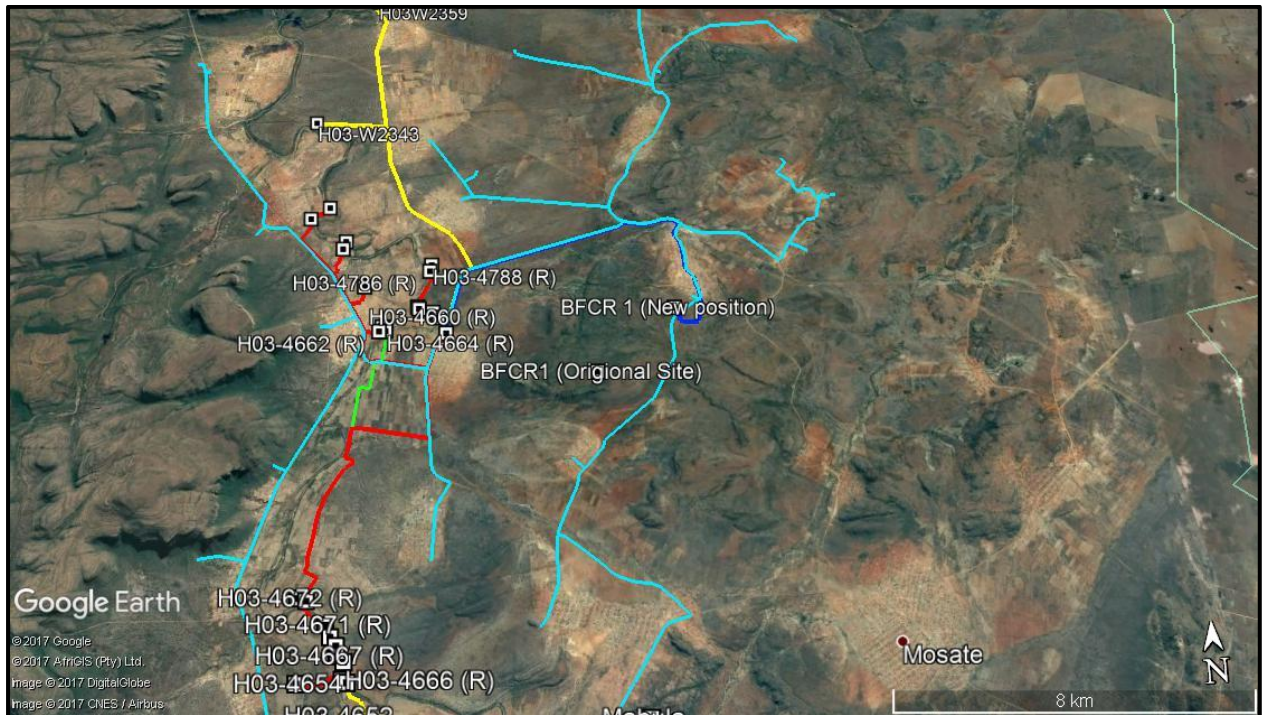


Figure 52. Overview of reservoirs

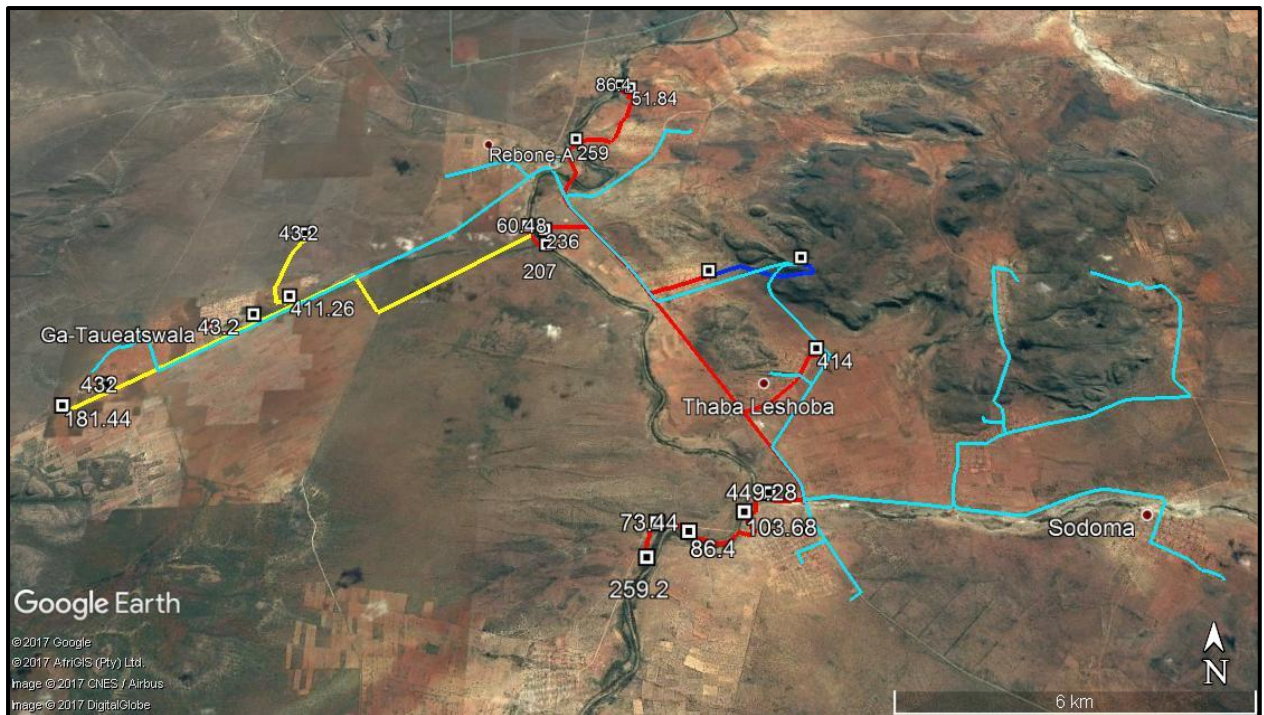


Figure 53. Cluster 5 Reservoirs

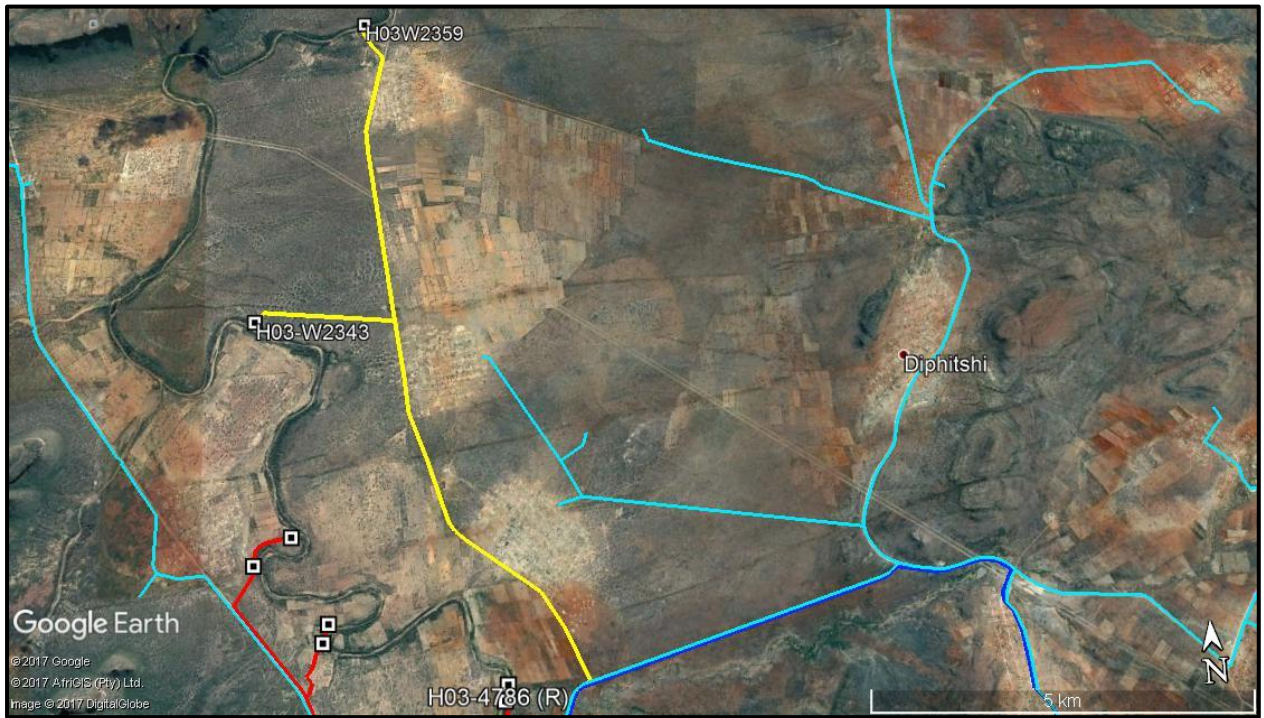


Figure 54. Reservoir 1

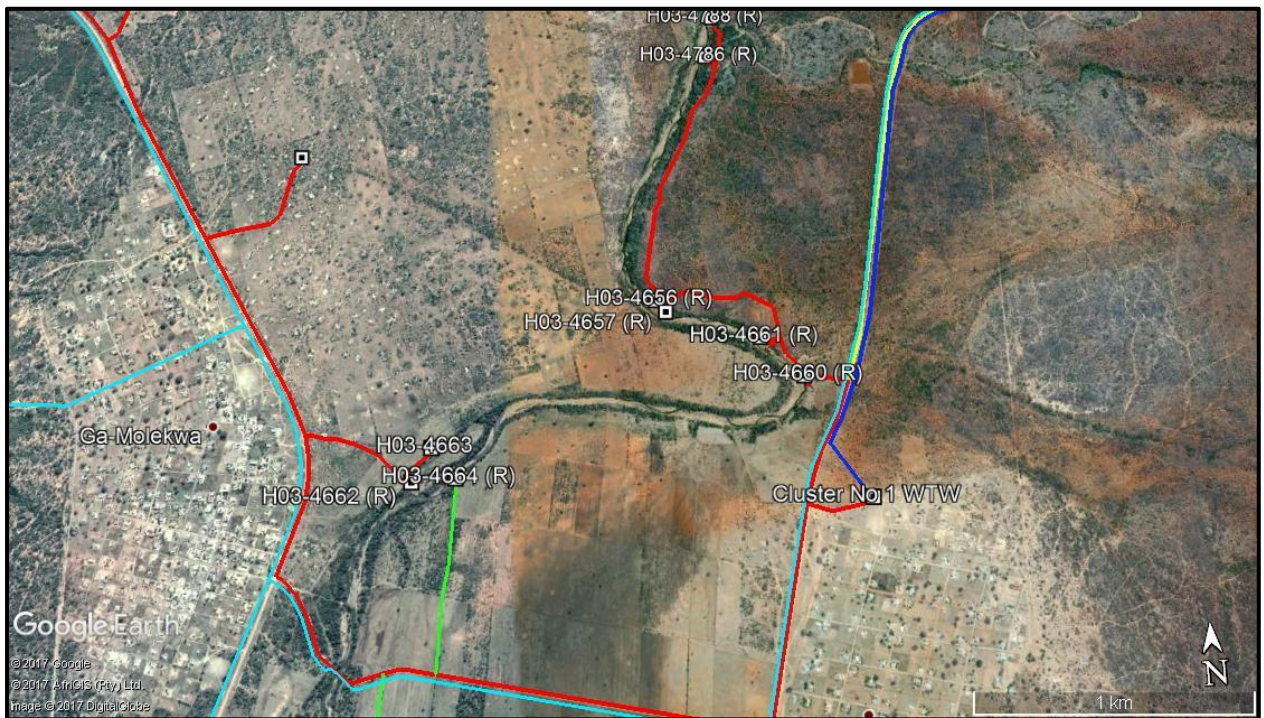


Figure 55. Reservoir 2

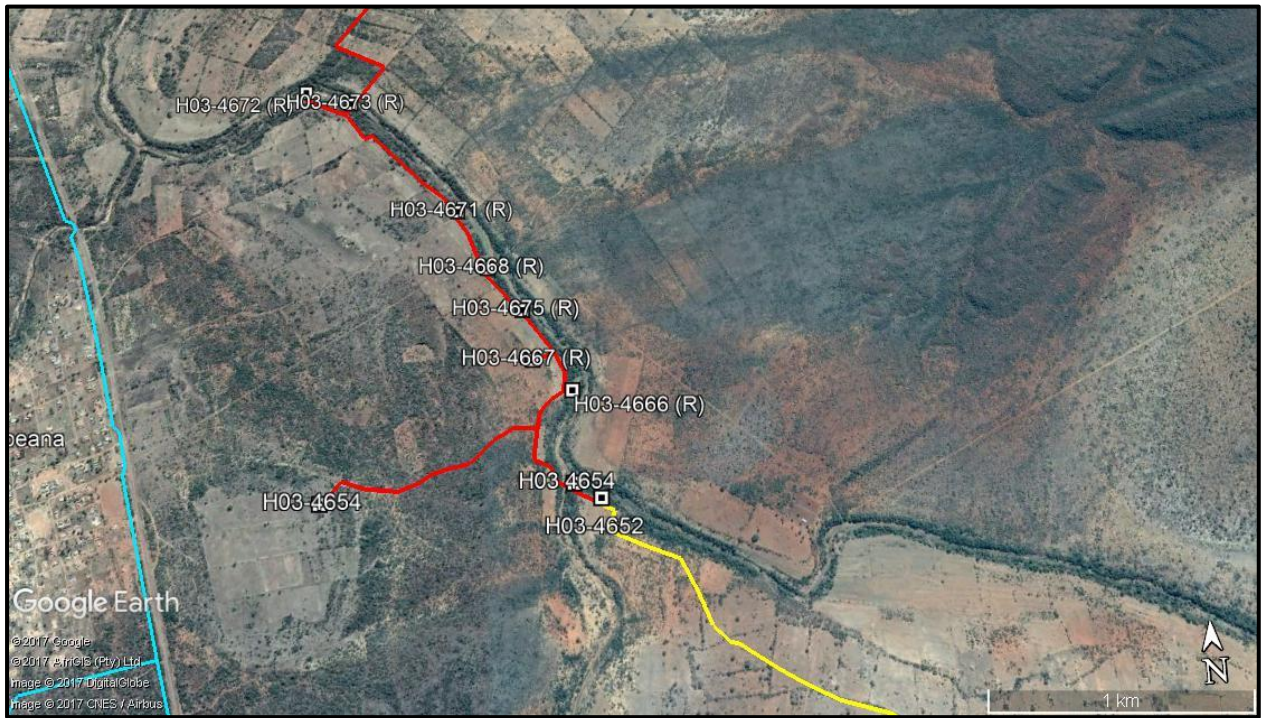


Figure 56. Reservoir 3



Figure 57. Reservoir 4



Figure 58. Site 1



Figure 59. Site 2 and 3



Figure 60. Site 4

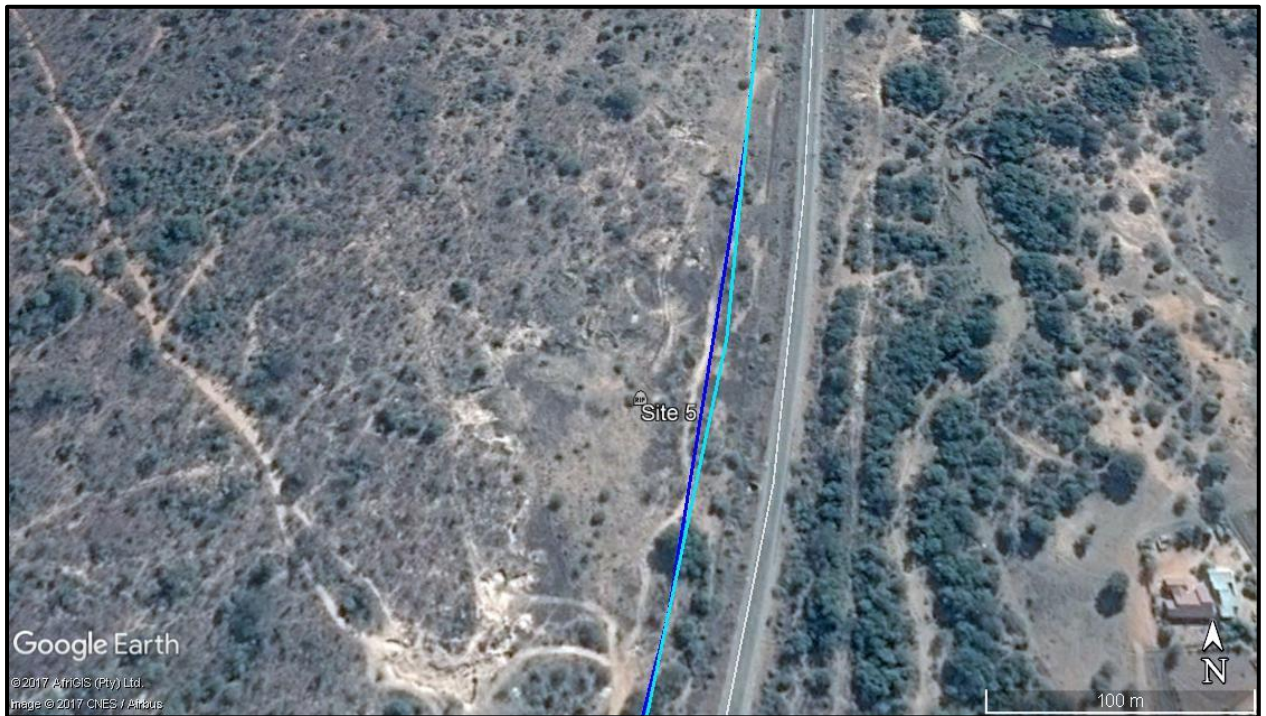


Figure 61. Site 5



Figure 62. Site 6

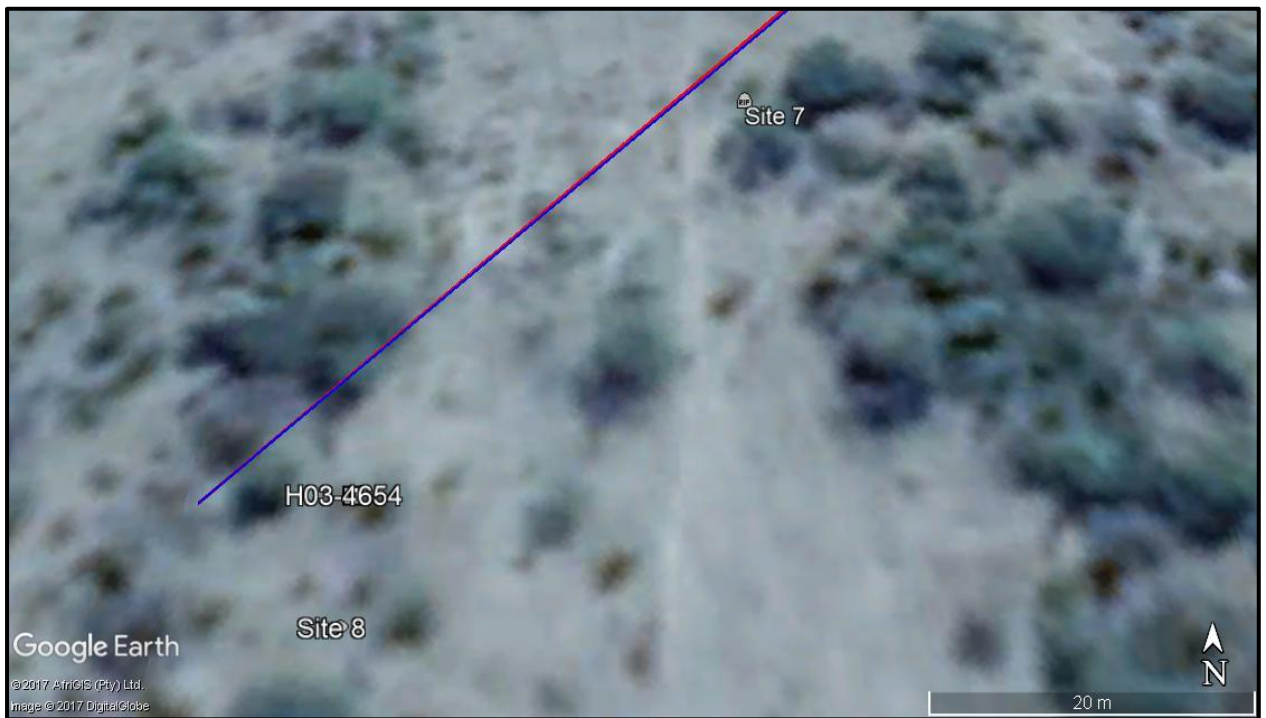


Figure 63. Site 7 and 8



Figure 64. Site 9 and 11



Figure 65. Site 10



Figure 66. Site 12



Figure 67. Site 13



Figure 68. Site 14



Figure 69. Site 15



Figure 70. Site 16

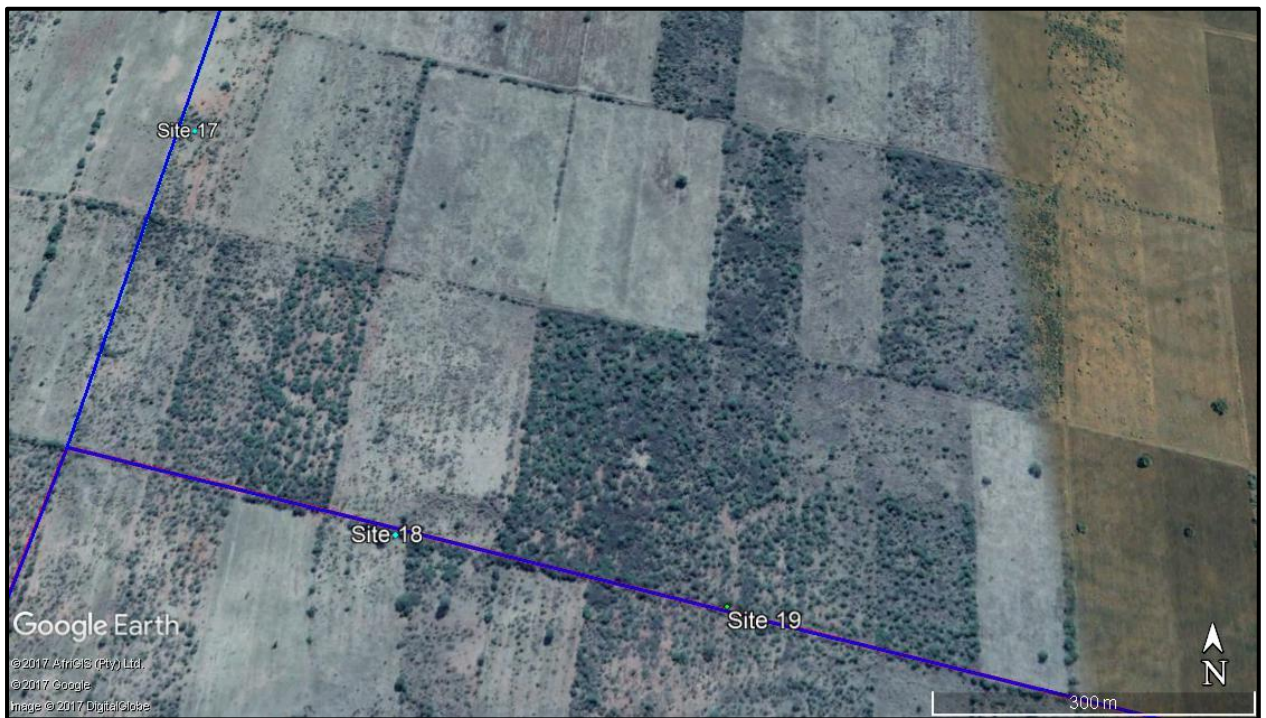


Figure 71, Site 17, 18 and 19.



Figure 72. Site 20.

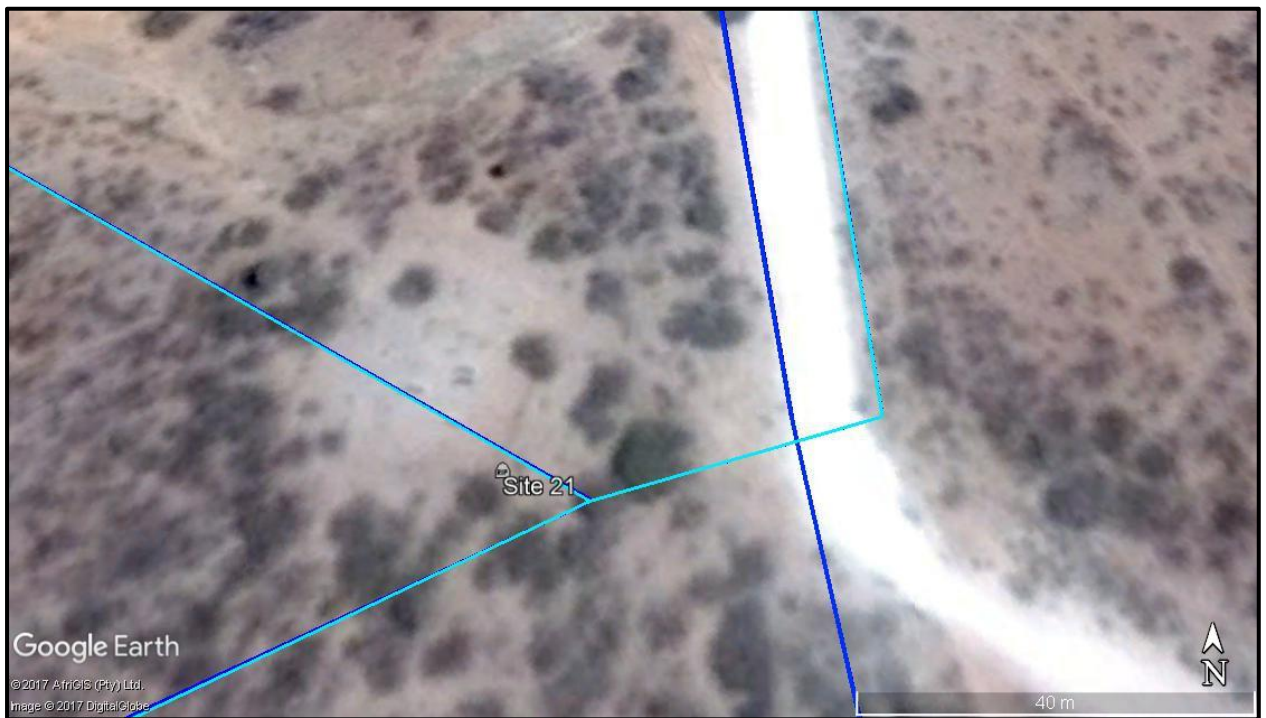


Figure 73. Site 21

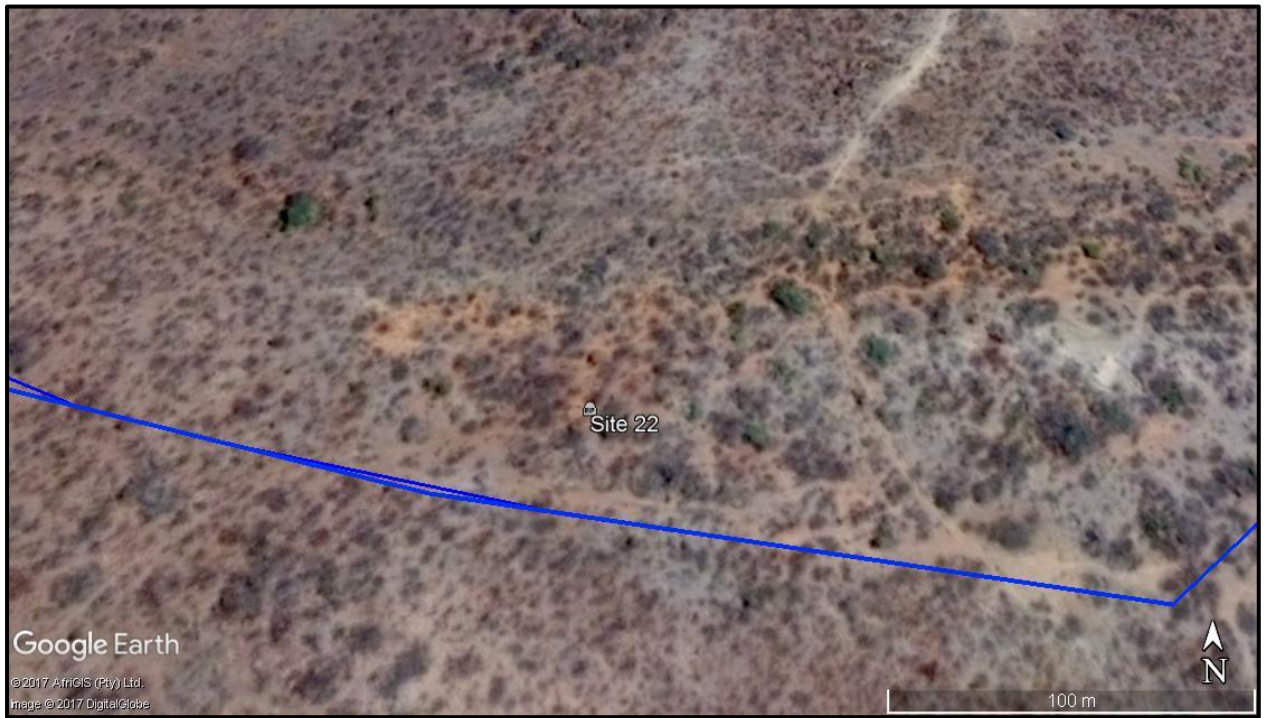


Figure 74. Site 22

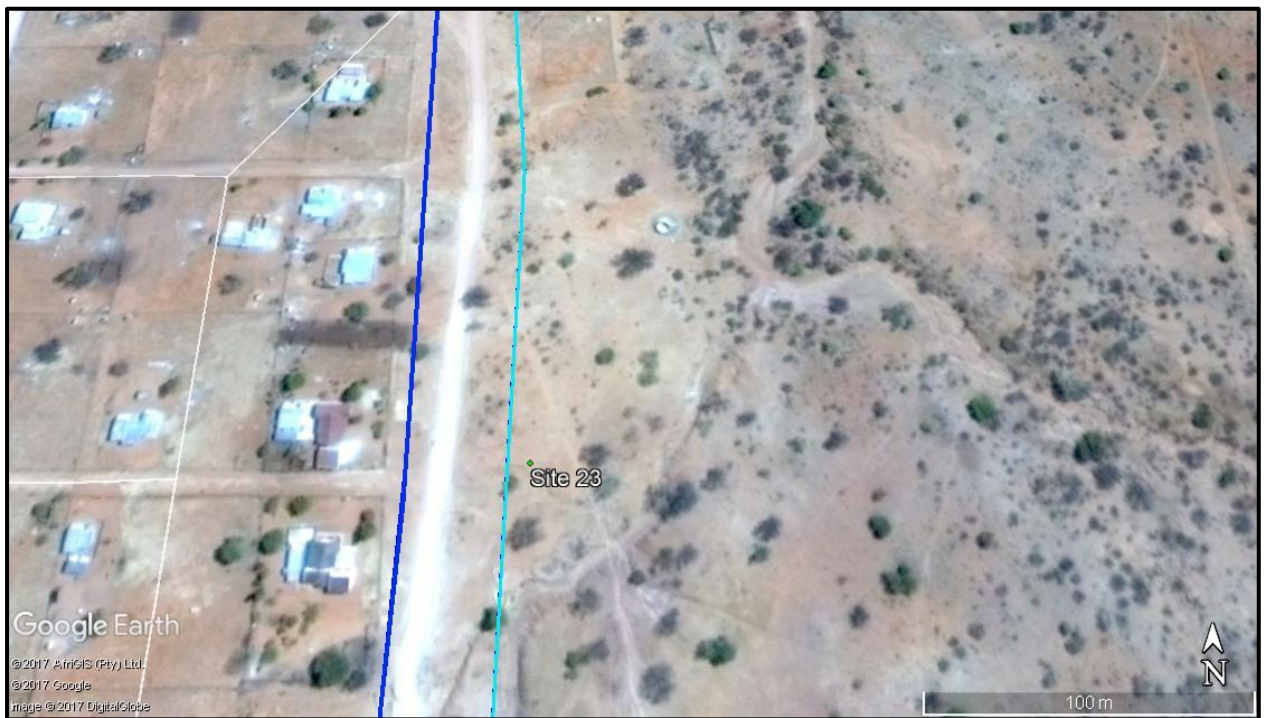


Figure 75. Site 23



Figure 76. Site 24



Figure 77. Site 25



Figure 78. Site 26

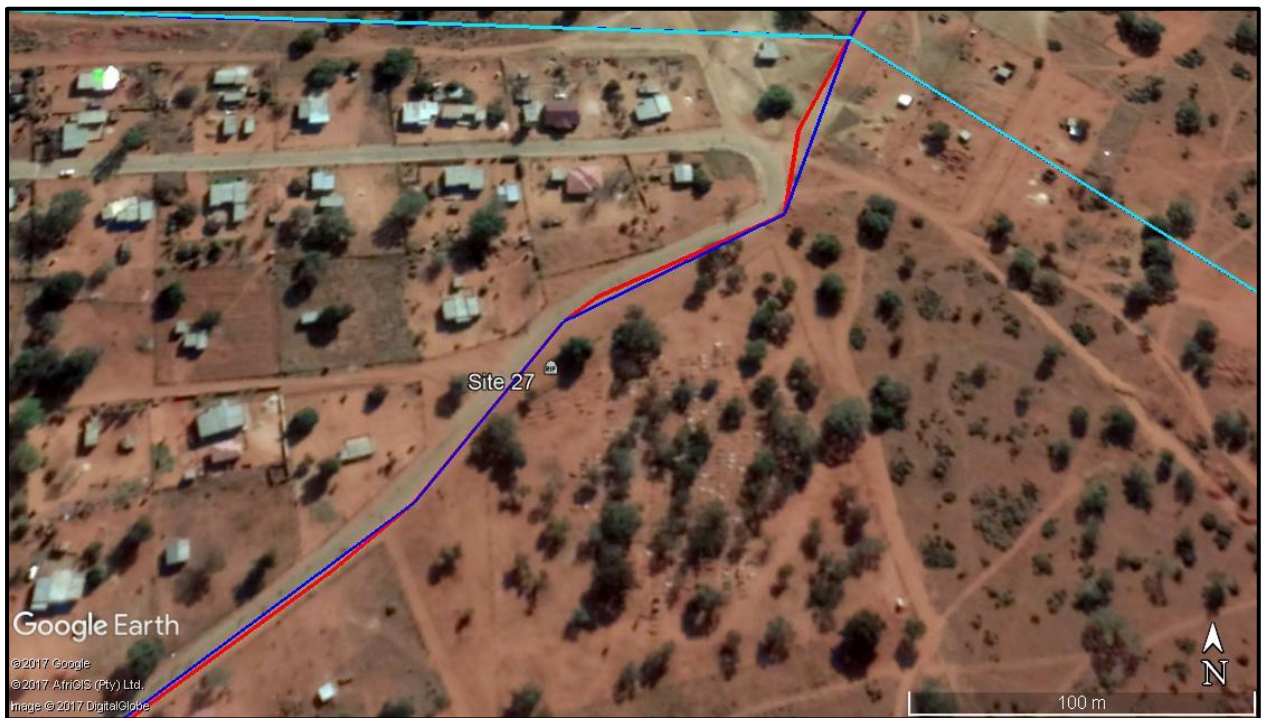


Figure 79. Site 27



Figure 80. Site 28

12.2 Curriculum Vitae of Specialist

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Archaeologist

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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 Chlookop 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:

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