

HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED WATER SUPPLY PIPELINES AND ASSOCIATED
INFRASTRUCTURE, AS PART OF THE MOGALAKWENA WATER MASTER
PLAN, MOKOPANE AREA, WATERBERG DISTRICT MUNICIPALITY

Type of development:

Water Infrastructure

Client:

Tekplan

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Project Reference:

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APPROVAL PAGE

Project Name	Mogalakwena Municipality: Industrial Wellfields Water Supply Project
Report Title	Heritage Impact Assessment for the proposed water supply pipelines and associated infrastructure, as part of the Mogalakwena Water Master Plan, Mogalakwena Municipality Area, Waterberg District Municipality
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	TBC

	Name	Qualifications and Certifications	Date
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Date	Report Reference Number	Description of Amendment

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REPORT OUTLINE

Appendix 6 of GNR 326 EIA Regulations (7 April 2017) as amended 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 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 1, 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 EIA report
(q) Any other information requested by the competent authority	Section 10

Executive Summary

HCAC was appointed to conduct a Heritage Impact Assessment for the Mogalakwena Municipality: Industrial Wellfields Water Supply Project, situated within the rural suburbs of Mokopane. The project will consist of the Mokopane High Line and the Sefakaola line. The Mokopane High Line entails the proposed construction of approx. 3,5km water supply pipelines (sizes with a diameter between 110mm and 160mm) linking 4 boreholes located adjacent to the Dorps River adjacent to the industrial area to the existing Mokopane High Reservoirs located on the hill to the east of Mokopane town. The Sefakaola Line comprises the Proposed construction of approx. 9km water supply pipelines (sizes with a diameter between 90mm and 160mm) linking 3 boreholes in the Sekgakgapeng and Phola Park areas to the existing Sefakaola Reservoirs as well as linking 4 boreholes located adjacent to the Mogalakwena River (located to the west of Sekgakgapeng and Moshate areas) to the existing Sefakaola Reservoirs and also a Water treatment facility covering an area of approx. 1 600m². The water treatment facility will be constructed adjacent to the existing Sefakaola Reservoirs to treat the borehole water before it is supplied to the system. The study area 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 study area.

The background study highlighted that the general area under investigation has a wealth of heritage sites dating from the Stone Age (Du Piesanie and Hodgekiss 2015 to the Iron Age (Huffman and Steele (1997) as well as grave sites. During the survey of the study area, Iron Age Scatters (FS 1 and 2), Stone walled enclosures (MIW 4 and 5) as well as three grave/ burial sites (MIW 1-3) were recorded. If any graves are located in future they should ideally be preserved *in-situ* or alternatively relocated according to existing legislation.

According to the SAHRIS paleontological sensitivity map, the area is of insignificant to high paleontological sensitivity, and an independent palaeontological study was undertaken by Bamford (2019). The study concluded that a Fossil Chance Find Protocol should be added to the EMPr, that no palaeontological site visit is required and that the project may proceed. In terms of the built environment of the area (Section 34) the proposed pipelines will not directly impact on structures as it will be installed subsurface in the road reserve. No public monuments are located within or close to the study area. Commercial, residential and road infrastructure developments surround the study area and the proposed development will not impact negatively on significant cultural landscapes or views as the pipeline will be installed subsurface. During the Public Participation process conducted for this project, no heritage concerns were raised.

To mitigate the impact of the proposed project on the recorded heritage resources the following recommendations apply as a condition of authorisation and as part of the EMPr and based on approval from SAHRA. Site specific recommendations should also be adhered to (Table 6).


General Recommendations:

- Located in a saddle of the Lekalakala Mountain is the existing Sefakaola Reservoirs and also the proposed location of the water treatment facility. **Scatters of ceramics are noted here possibly relating to an Iron Age Site that was destroyed by the existing reservoirs.** Soil cover is shallow in this area and no anthropogenic deposit noted; therefore, it is not feasible to conduct mitigation. However, construction activities relating to the proposed water treatment works will have to be monitored by an archaeologist;
- **Based on the current lay out some grave sites (e.g., MIW1, MIW2 and MIW3) could be impacted on indirectly. Due to the close proximity of the road and residential structures and the small impact area of the pipeline it is not possible that the pipeline can be adjusted, therefore the sites should be demarcated and retained *in-situ* and the areas should be monitored during construction;**

- Implementation of a chance find procedure for the project as outlined in Section 9.1 as well as a Fossil chance find procedure.

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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	30/10/2019

a) Expertise of the specialist

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

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Tanzania and Guinea. 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:

HCAC has been contracted by Tekplan Environmental Consulting to conduct a heritage impact assessment for the proposed water supply pipelines and associated infrastructure, as part of the Mogalakwena Water Master Plan, Mogalakwena Municipality Area, Waterberg District Municipality. The report forms part of the Basic Assessment Report (BA) and Environmental Management Programme Report (EMPR) for the project situated within the rural suburbs of Mokopane. The study area features two separate proposed pipelines, the Sefakaola Line situated towards the east of Mokopane roughly following the R101 and a small unnamed stream. The other the Mokopane High Line is situated towards the north-west of the town around a hill with existing water reservoirs at the top. (Figure 1 – 3).

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The base data is of high quality and relevant dates are included in section 3.4 and 7.1. The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey Iron Age ceramic scatters, stone walled sites as well as grave 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 Regulations 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 development footprint.

Reporting

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

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

Table 2: Project Description

Size of farm and portions	<p>Mokopane High Line: Erf 1225 Piet Potgietersrust Ext.3; Erven 4797, Remainder of 4750, 4796, 4794 and streets within Piet Potgietersrust Ext. 13; Portion 24, 26, 80 and 140 of the Farm Piet Potgietersrust Town and Townlands 44 KS.</p> <p>Sefakaola Line: Erf 2580 and streets within Sekgakgapeng (Portion 9 of the Farm Macalacaskop 243 KR); N11 Provincial Road (Remainder of the Farm Macalacaskop 243 KR); Streets within Phola Park (Portion 14 of the Farm Macalacaskop 243 KR); Erven 1858, 1904, 2079, 1749, 2078, 1991, 909 and streets within Moshate (Portion 13 of the Farm Macalacaskop 243 KR).</p>
Magisterial District	Mogalakwena Local Municipality (MLM)
1: 50 000 map sheet number	2428BB and 2429 AA

Table 3: Infrastructure and project activities

Type of development	Water Infrastructure
Project size	Linear Developments of around 3,5 and 9 km respectively
Project Components	<p>Mokopane High Line:</p> <ul style="list-style-type: none"> Proposed construction of approx. 3,5km water supply pipelines (sizes with a diameter between 110mm and 160mm) linking 4 boreholes located adjacent to the Dorps River adjacent to the industrial area to the existing Mokopane High Reservoirs located on the hill to the east of Mokopane town. <p>Sefakaola Line:</p> <ul style="list-style-type: none"> Proposed construction of approx. 9km water supply pipelines (sizes with a diameter between 90mm and 160mm) linking 3 boreholes in the Sekgakgapeng and Phola Park areas to the existing Sefakaola Reservoirs as well as linking 4 boreholes located adjacent to the Mogalakwena River (located to the west of Sekgakgapeng and Moshate areas) to the existing Sefakaola Reservoirs. A Water treatment facility covering an area of approx. 1 600m² will also be constructed adjacent to the existing Sefakaola Reservoirs to treat the borehole water before it is supplied to the system.

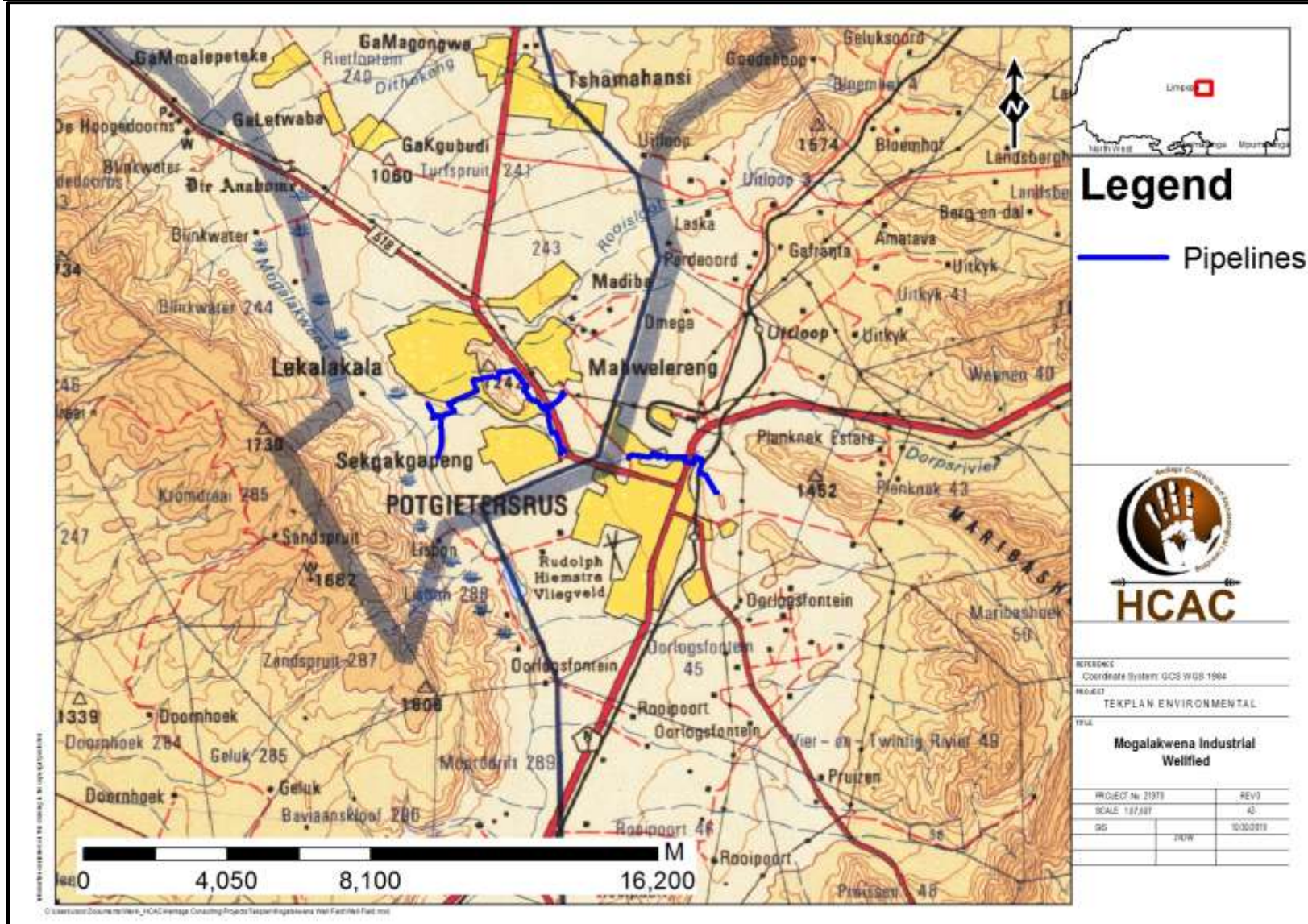


Figure 1. Provincial map (1: 250 000 topographical map) showing Sefakaola Line to left and the Mokopane High Line on the right (in blue)

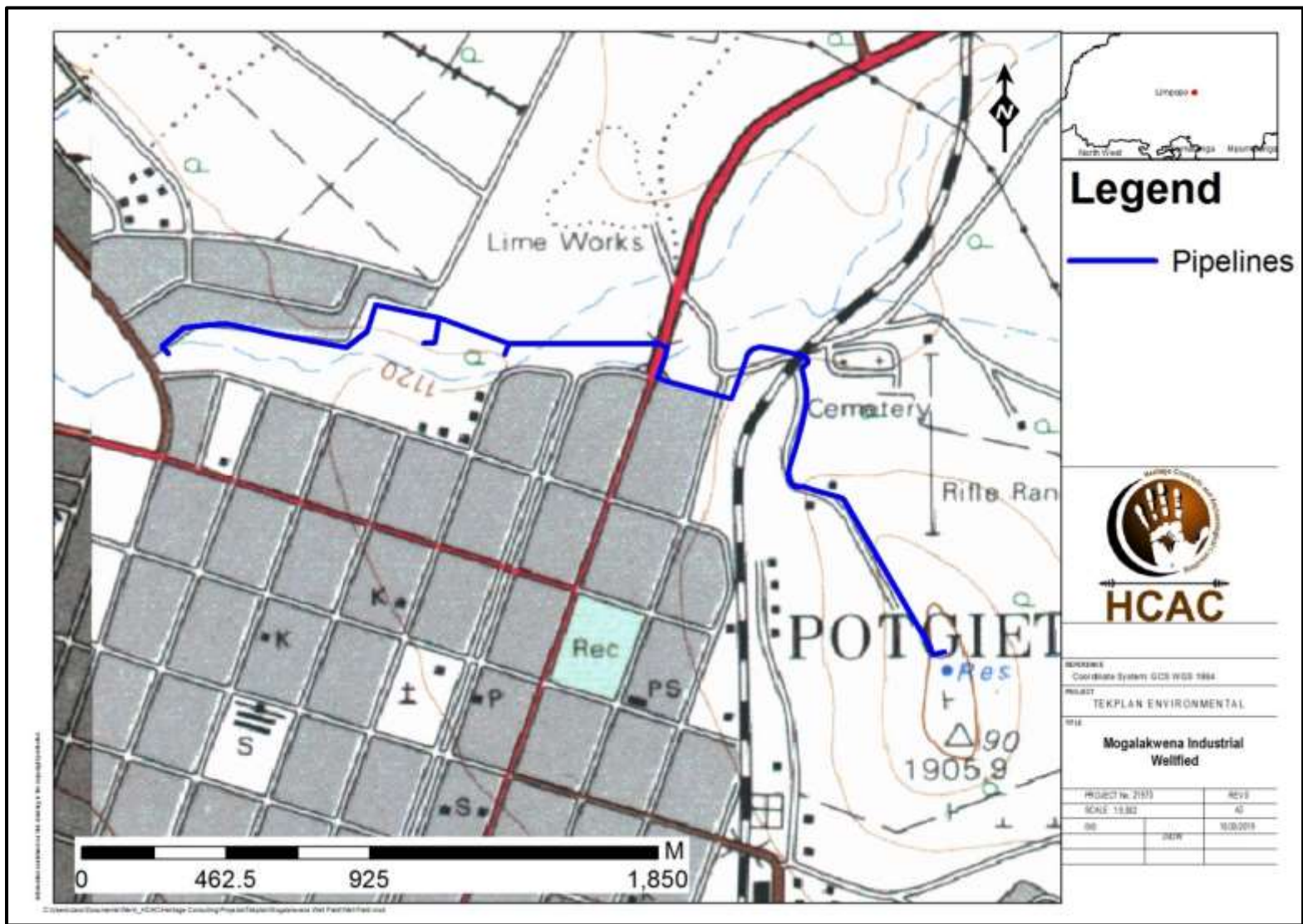


Figure 2: Regional map (1:50 000 topographical map) of the Mokopane High Line.

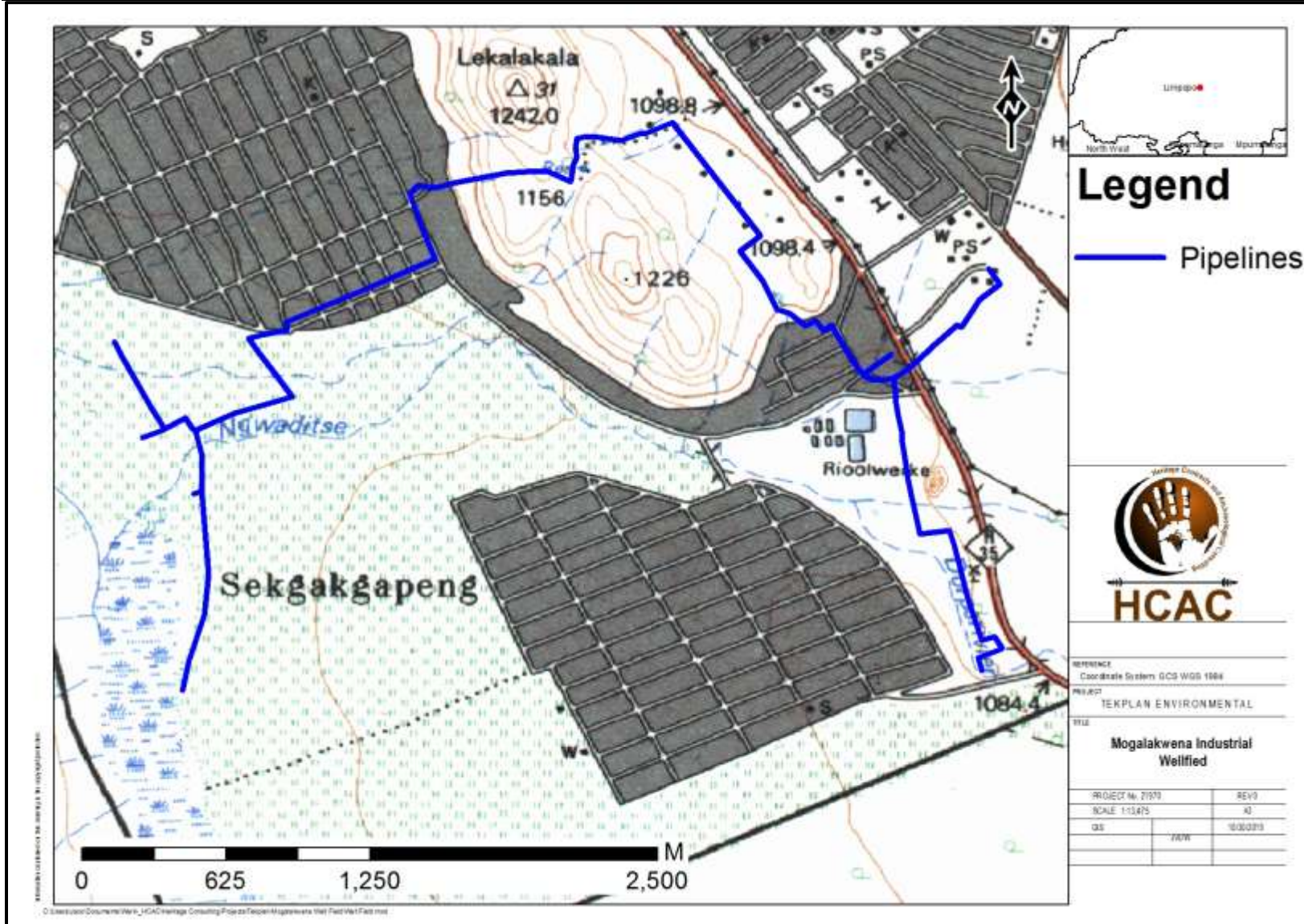


Figure 3. 1:50 000 Topographical map of the Sefakaola Line

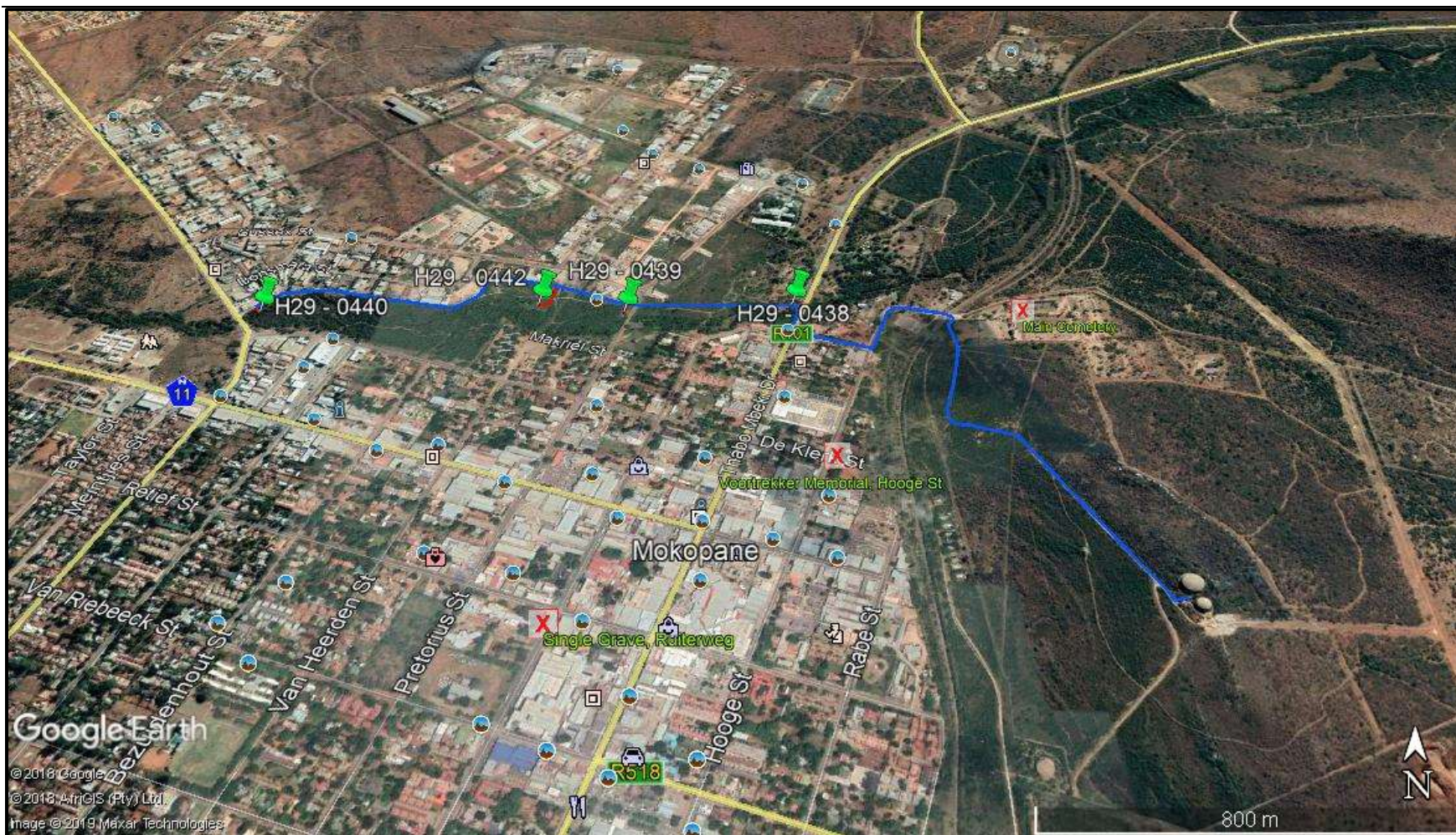


Figure 4. Google Earth Image of the Mokopane High Line.



Figure 5. Google Earth image of the Sefakaola Line

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.

Table 4: Site Investigation Details

	Site Investigation
Date	The 25th October 2019
Season	Spring /Summer –vegetation in the study area is low although township developments changed the character of the site hampering archaeological visibility. Access issues resulted that some boreholes were not physically assessed but only visually. The impact area was however sufficiently covered (Figure 6) to adequately record the range of heritage resources in the study area.

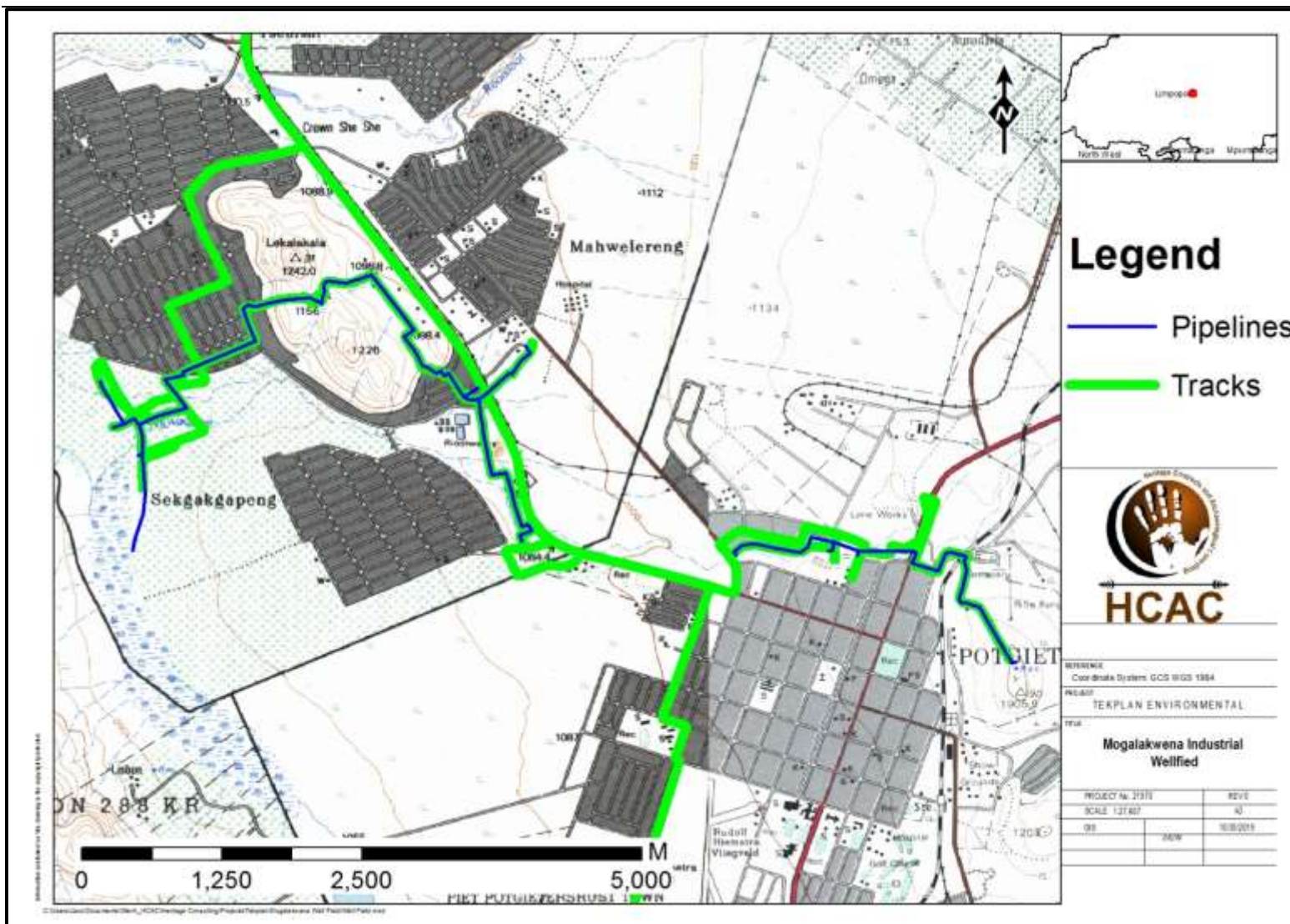


Figure 6: Track logs of the survey in green.

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. Also the possible occurrence of graves and other cultural material not recorded cannot be excluded. Similarly, the depth of the deposit of heritage sites cannot be accurately determined due its subsurface nature. This report only dealt with the footprint area of the proposed development and consisted of non-intrusive surface surveys. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4. Description of Socio-Economic Environment

According to StatsSA 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).

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 Mogalakwena Municipality: Industrial Wellfields Water Supply Project is situated within the rural suburbs of Mokopane. The study area features two separate proposed pipelines, one situated towards the east of Mokopane roughly following the R101 and a small unnamed stream. The other proposed pipeline is situated towards the north-west of the town around a hill with existing water reservoirs at the top.

The study area falls within the bioregion described by Mucina *et al* (2006) as the Central Bushveld Bioregion with the vegetation described as Makhado Sweet 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. In terms of the lithology of the area the western section consists of Magnetite gabbro with magnetite layers, the central section of Gabbro, norite and the eastern section of Shale, mud rock, minor limestone/dolomite, chert, basalt, tuff, pyroclastics and hornfels.

The majority of pipelines will be constructed next to existing roads or within pipeline servitudes (Figure 7– 10). Vegetation cover in the area varies from open areas with sparse vegetation to areas almost impregnable with thick *Dichrostachys cinerea*. The current Zoning of the study area is classified as various: Agriculture (Undetermined) and informal residential.



Figure 7. General site conditions.



Figure 8. General site conditions – extensive dumping



Figure 9. General site conditions – impenetrable vegetation.



Figure 10. General site conditions.

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.

7. Literature / Background Study:

a. Literature Review

Based on previous CRM work in the larger 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. A more recent study by van der Walt (2017) recorded 29 heritage features. These consist of cemeteries, Late Iron Age stone walled sites and find spots, rectangular stone walled ruins and Stone Age sites.

Genealogical Society and Google Earth Monuments

Neither the Genealogical Society nor the monuments database at Google Earth (Google Earth also include some archaeological sites and historical battlefields) have any recorded sites in the study area.

b. Background of the greater study area

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

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

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

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

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

In 1865 the Berlin Mission Station was given permission to establish a mission under W. Moschutz at the foot of Sefakaola Hill (Macalacaskop). Tensions between the Boers and Ndebele caused the mission stations abandonment and it was later used by the Boers as a garrison where they could fire upon Mokopane's chiefdom, this resulted in the destruction of the mission station.

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

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

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

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

c. 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.

d. 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 Schurfpoort 112 KR and Goergap 113 KR on the Waterberg plateau (van der Ryst 1998). Olieboomspoor 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 agro pastoralists also entered the region (van der Ryst 1998; Wadley 2016).

e. 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 Olieboomspoor 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.

f. 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).

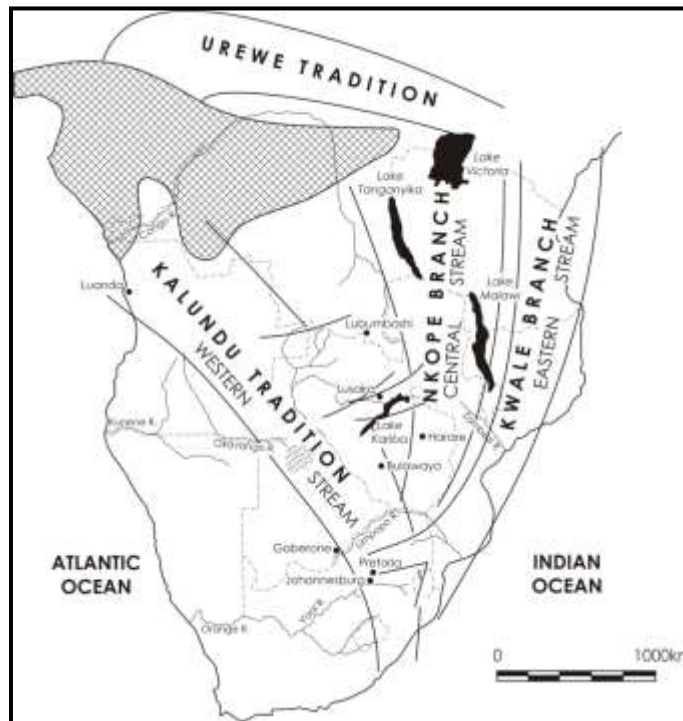


Figure 11. Movement of Bantu speaking farmers (Huffman 2007)

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)

g. Cultural Landscape

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. This study area has been part of rural township areas that has been developed to some extent and is characterised by township development, road development, previous water infrastructure developments and in some areas farming activities such as cultivation.

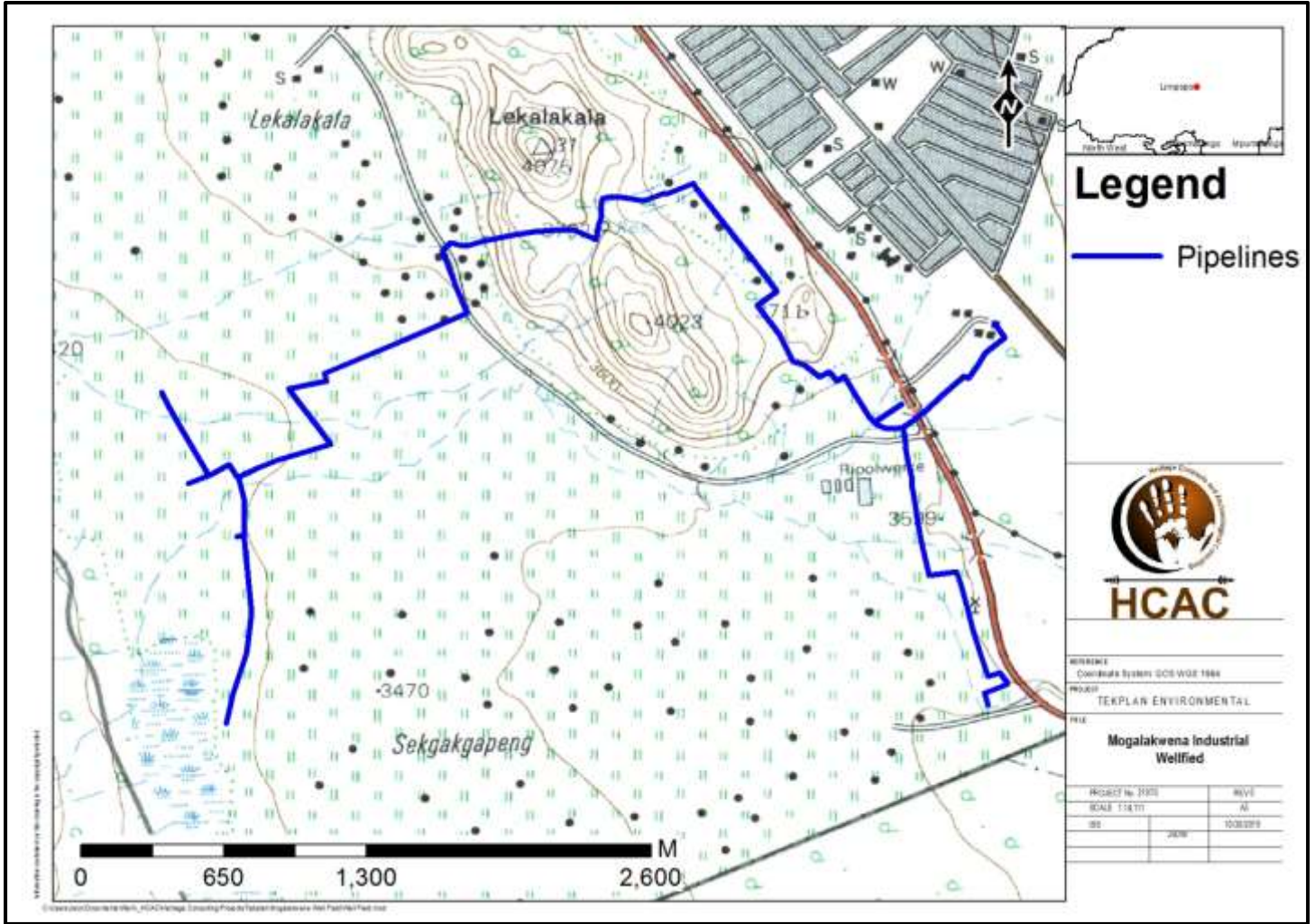


Figure 12. 1969 Topographical map of the Sefakaola Line. The line traverses' areas with numerous residential structures, a sewerage works and cultivation activities. 2428

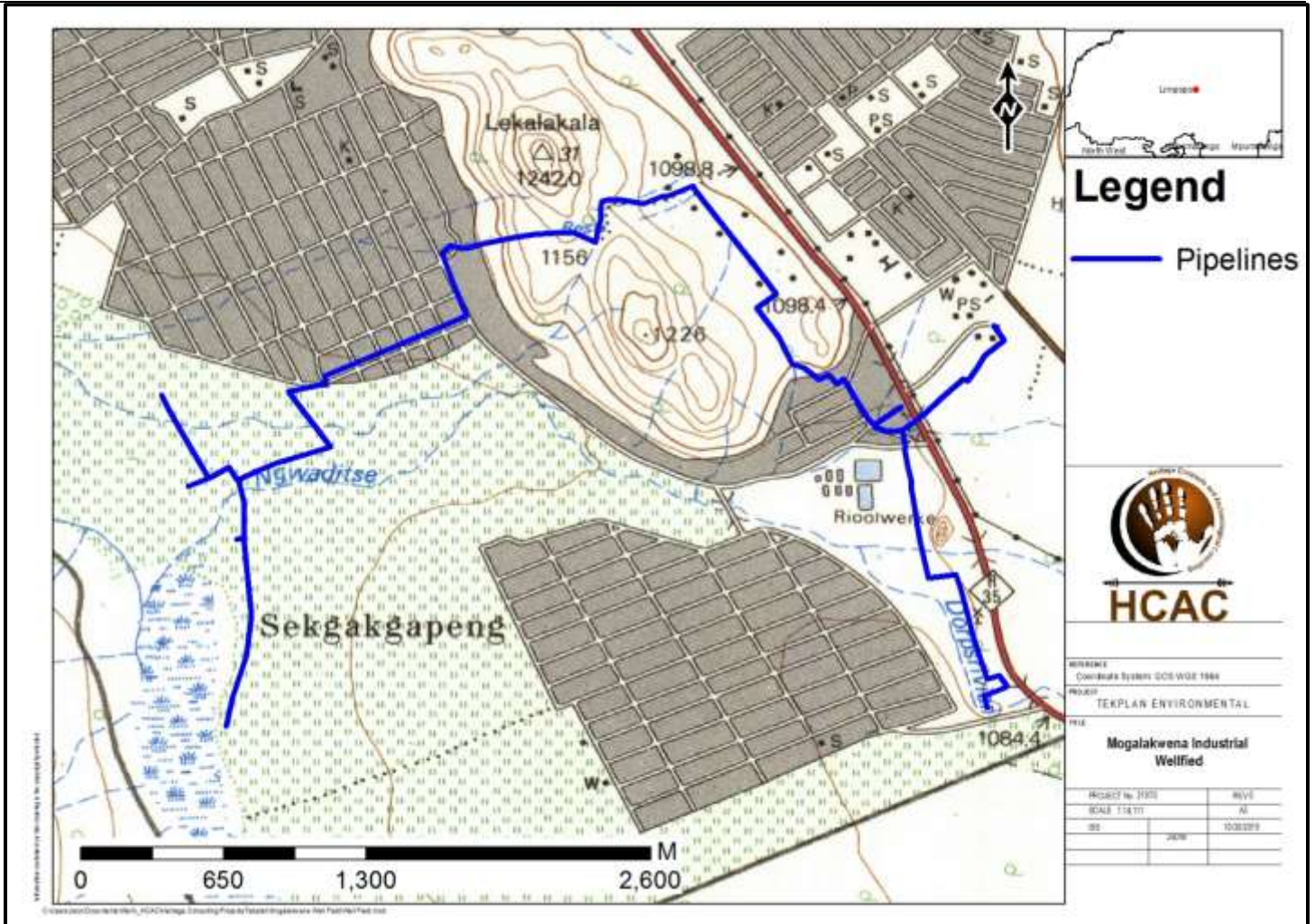


Figure 13. 1981 Topographical map of the Sefakaola Line. 1969 Topographical map of the site under investigation. The line traverses' areas with numerous residential structures, a sewerage works and cultivation activities

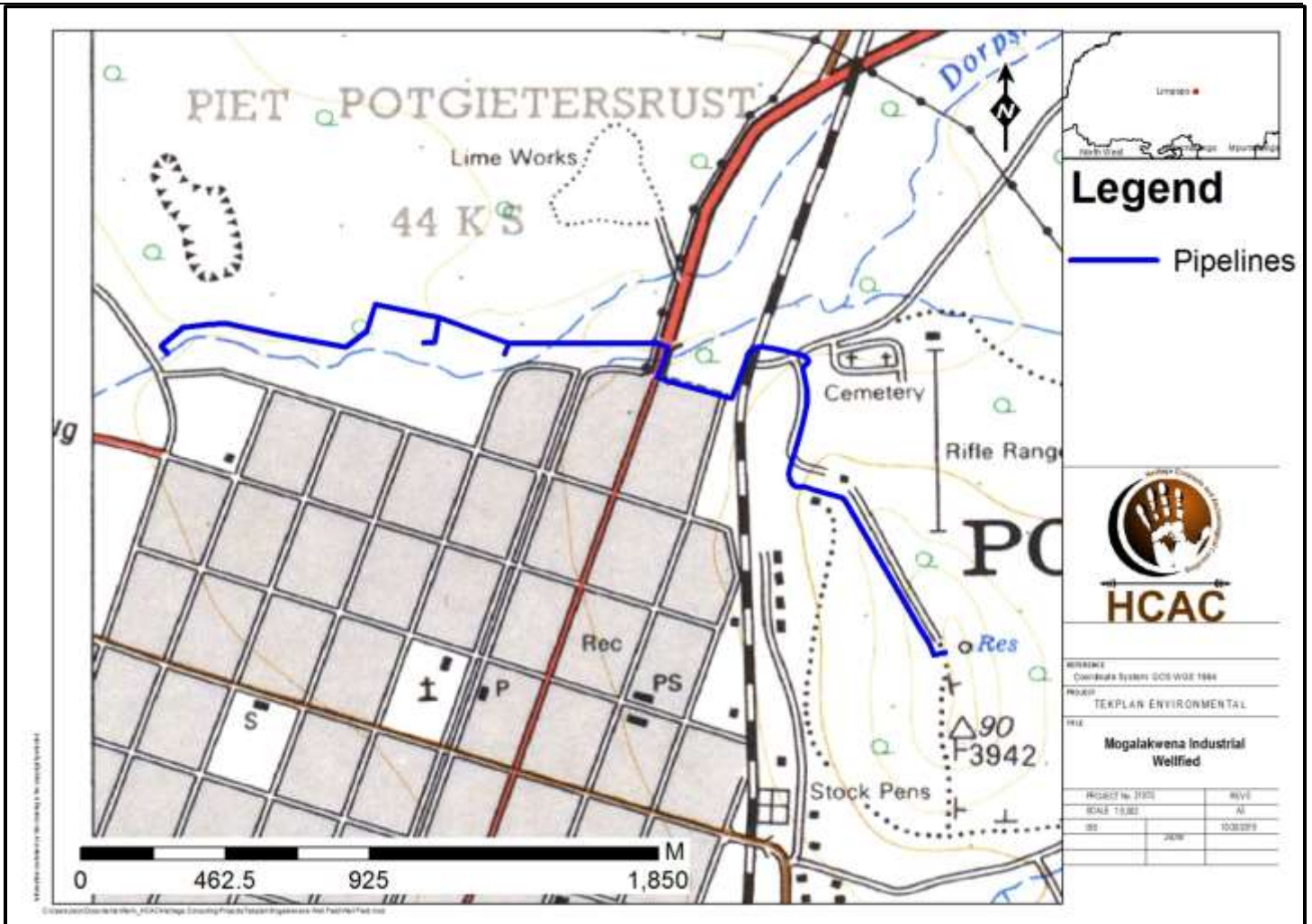


Figure 14. 1969 Topographical map (2429) of the Mokopane High Line. The study area surrounding the line includes a railway crossing, a cemetery located close to the line as well as a rifle range and small stream.

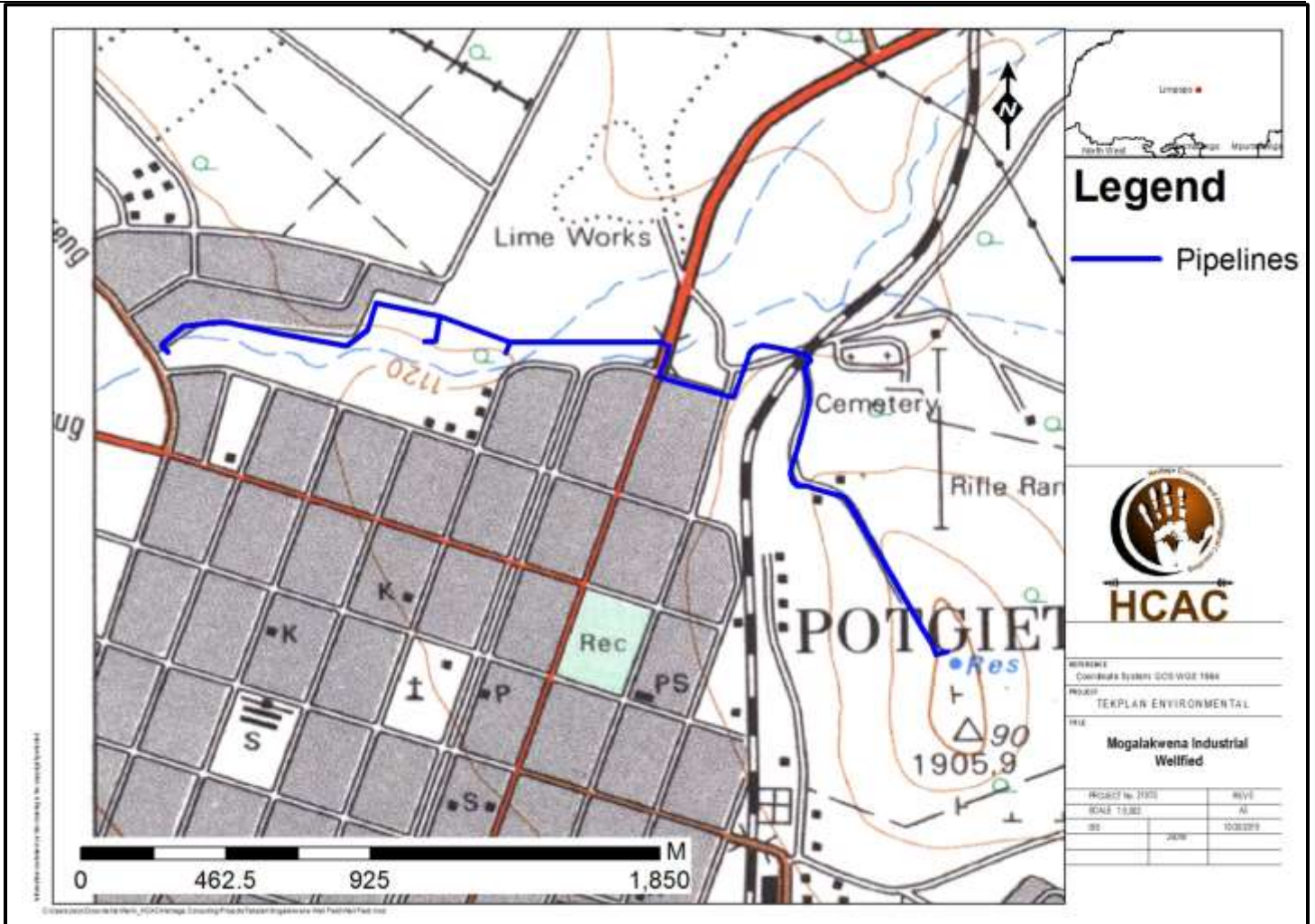


Figure 15. 1981 Topographical map (2429) of the Mokopane High Line. The study area surrounding the line includes a railway crossing, a cemetery located close to the line as well as a rifle range and small stream.

8. Findings of the Survey

The proposed pipeline mainly falls within the urban roads (Figure 17) of the town making access easy with good visibility. Some areas however had restricted access due to the built-up nature of the area as well as illegal dumping of trash and building rubble on the roads.

The proposed pipelines connect to existing boreholes (Figure 18). The boreholes were all visited with the exception of, H03-5148 which had restricted access due to an eroded stream (Figure 19), H03- 4826 that is fenced off and H03-5151 which is located in a wetland area.

During the survey 2 find spots consisting of ceramic scatters were recorded, as well as 5 sites consisting of 3 burial sites and 2 Iron Age sites were recorded (Table 5 & Figure 16). Sites were recorded with the Prefix MIW and numbered. Find spots were also numbered with the Prefix FS. Various graves were also noted within residential stands (for instance at 28° 57' 49.2769" E; 24° 09' 14.6125" S) but these graves will not be impacted on by the proposed development. The Mokopane High Line will have the lowest impact on heritage resources although a section of this line runs close to an existing municipal cemetery (MIW3) but contained no further archaeological material.

The Sefakaola Line traversers in close proximity to several find spots and grave sites. Site MIW1 is located within the road reserve, and consist of a single grave (Figure 20) with headstone and will have to be avoided. A large cemetery with more than 100 graves located at MIW 2 (Figure 21) just outside of the impact area. A scatter of undiagnostic potsherds (FS1) was also located in the road close at the base of a small hill and might be indicative of Iron Age activity in the area. Just north of this location another scatter of undecorated ceramics was recorded as FS2 with a circular stone enclosure at MIW 4 (Figure 22). The enclosure does not seem to be archaeological as it is an isolated feature and not forming part of a larger Iron Age stone walled settlement. The construction method also does not conform with the double wall and rubble filling associated with Iron Age communities (Walton 1958). The enclosure measures approximately 3 meters in diameter and the walls are less than 30 cm high.

Located in a saddle of the Lekalakala Mountain is the existing Sefakaola Reservoirs (Figure 23) and also the proposed location of the new water treatment facility. This area is cleared of vegetation and open (Figure 24) marked by clearing activities relating to the construction activities of the reservoirs and the various existing pipelines (Figure 25) linking into the reservoirs. These activities would have destroyed surface indicators of heritage resources however widely scattered undiagnostic potsherds and isolated lithics were recorded in the clearing around the water reservoirs and marked as FS 2. This find spot is of low significance as the artefacts are out of contexts and no surface features can be associated with the finds. Soil cover is also shallow in this area and no anthropogenic deposit noted. A semi-circular stone enclosure (Figure 25) were recorded here as MIW 5 and seems to be of recent origin, possibly a result of the construction activities relating to the reservoirs and older pipelines. This assumption is corroborated through the multiple cement slabs\foundations found in association with the feature as well as scarring on the rocks as a result of mechanical excavation.

Table 5. Recorded Heritage sites

Label	Longitude	Latitude	Description	Significance	Field Rating	Impact	Recommendation
MIW1	28° 59' 03.0876" E	24° 10' 11.9101" S	Grave located on planned pipeline next to road. The grave has a visible gravestone and cover made from tiles and reads 'Marema Fati Salome 1939-1940'	High Social Significance	GP A	Sefakaola line 4 m to the west of the recorded grave.	Retain <i>in-situ</i> . Indicate on development plans and demarcate the grave. Monitor during construction.
MIW2	28° 58' 33.9671" E	24° 09' 21.8376" S	Large cemetery located next to the road that has been included in the proposed pipeline.	High Social Significance	GP A	Sefakaola line No direct impact. Cemetery is fenced.	Indicate on development plans. Monitor during construction.
MIW3	29° 01' 13.3521" E	24° 10' 27.6273" S	Large Cemetery in Mokopane	High Social Significance	GP A	Mokopane High Line. No direct impact. Cemetery is fenced.	Indicate on development plans. Monitor during construction.
MIW4	28° 58' 40.7244" E	24° 09' 33.5123" S	Semi-circular stone enclosure at the base of the small hill.	Low significance	GP C	Sefakaola line 7 m north of the line. No direct impact.	Indicate on development plans. Retain <i>in-situ</i> .
MIW5	28° 58' 04.5191" E	24° 09' 13.8853" S	Semi-circular stone enclosure at the top of the large hill.	Low Significance	GP C	Sefakaola line 36 m to the south of the line. No direct impact.	Indicate on development plans. Retain <i>in-situ</i> .
FS 1	28° 58' 42.1427" E	24° 09' 34.0056" S	Undecorated potsherds at the base of a small hill.	Low Significance	GP C	Sefakaola line Direct impact.	Monitoring of the site during construction.
FS 2	28° 58' 07.2515" E	24° 09' 12.5244" S	Undiagnostic potsherds located in the cleared areas around the existing water reservoirs.	Low Significance	GP C	Sefakaola line Direct impact.	Monitoring of the site during construction.

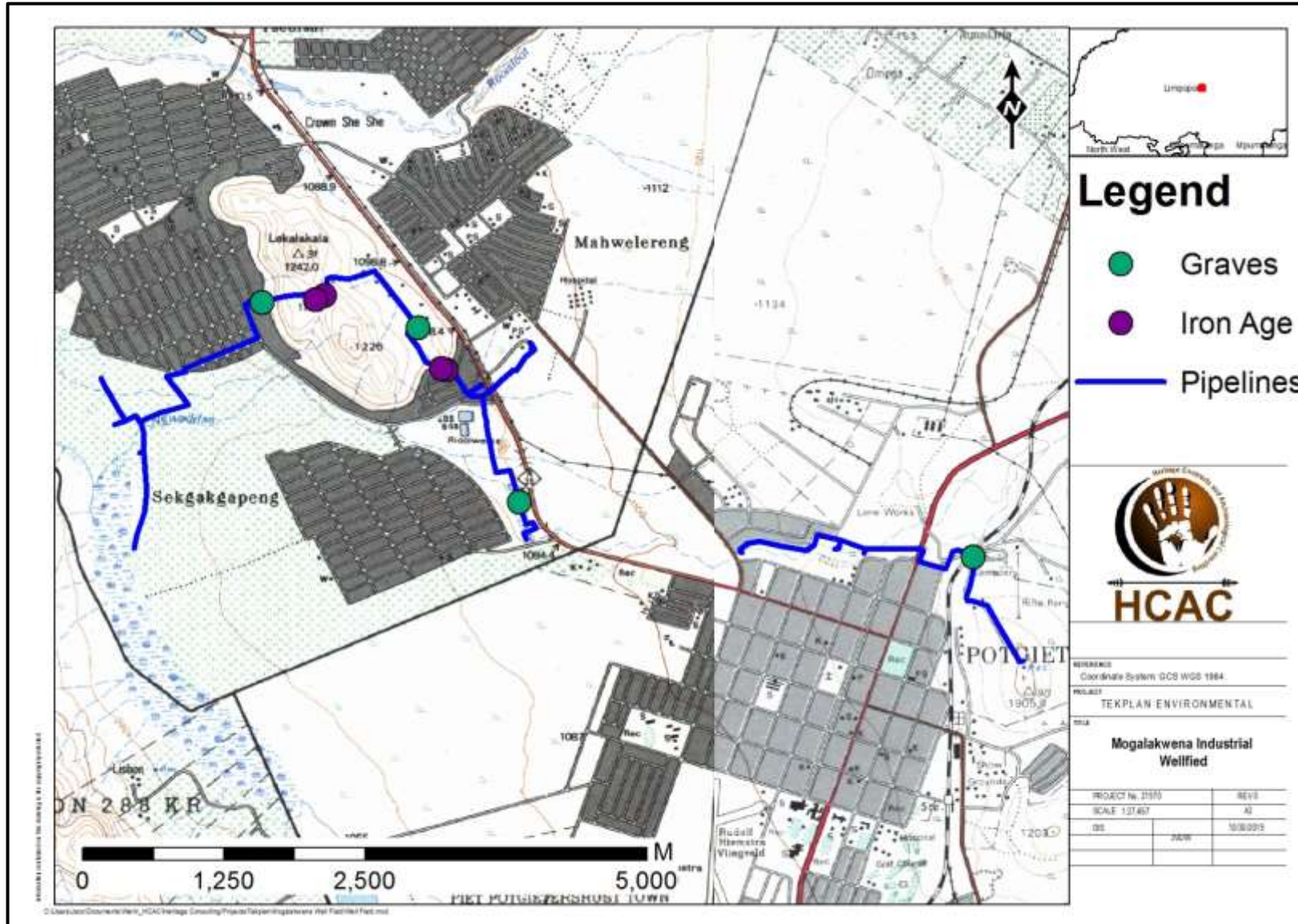


Figure 16. Site distribution map.



Figure 17. Road in the study area



Figure 18. Existing boreholes



Figure 19. Eroded stream



Figure 20. Visible graves on the sides of roads or within yards (MIW1)



Figure 21. Large cemetery (MIW2).



Figure 22. Semi-circular stone enclosure on the side of the small hill (MIW 4)



Figure 23. Existing water reservoirs



Figure 24. Cleared area around water reservoir

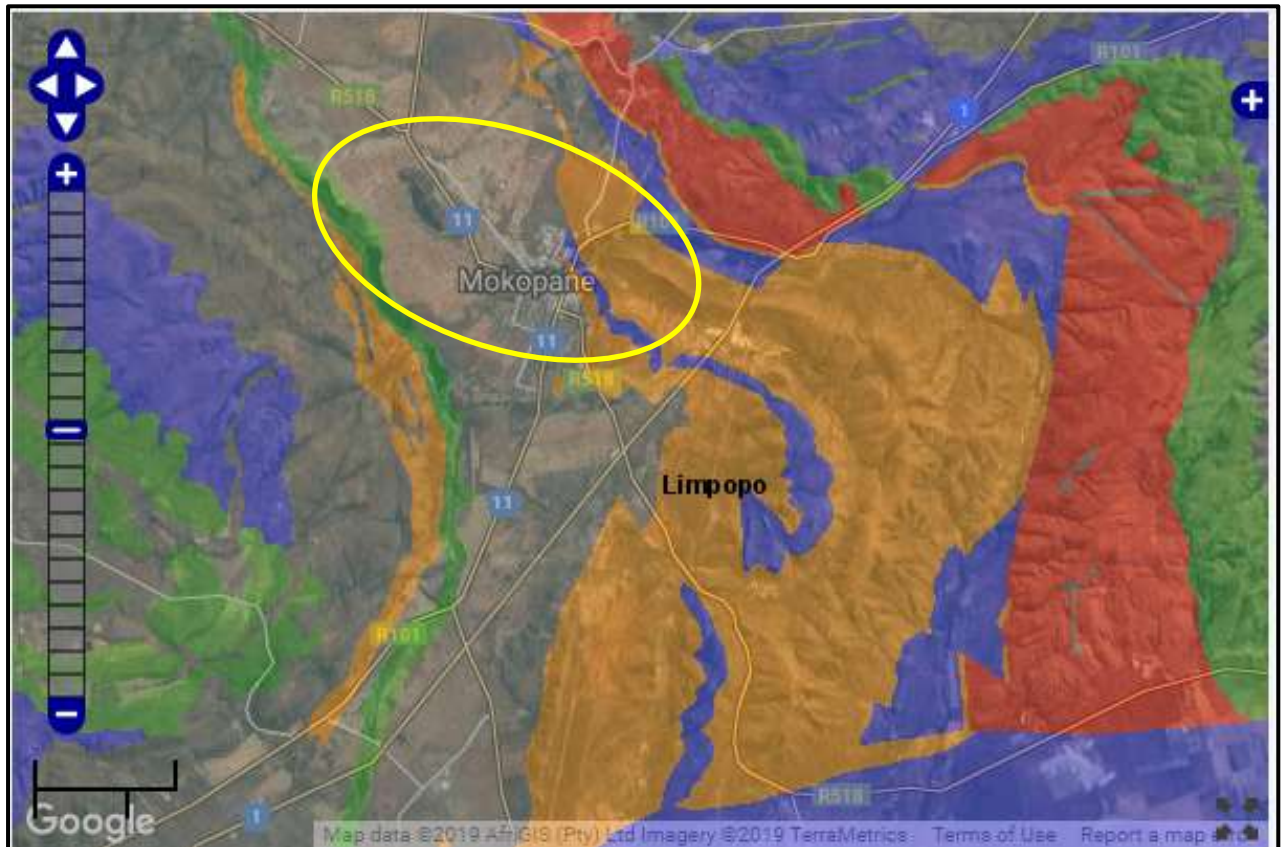


Figure 25. Old existing pipeline



Figure 26. Semi-circular stone enclosure on top of the large hill (MIW5).

Based on the SAHRA Paleontological sensitivity map the area is of insignificant to high paleontological sensitivity (Figure 27) and an independent paleontological assessment was conducted. Bamford (2019) concluded that the proposed site lies predominantly on ancient volcanic rocks of the Rustenburg Layered Suite, Bushveld complex and these do not preserve fossils. Only the western-most sector of the project lies on Kalahari Group alluvium that has an extremely small chance of preserving transported fossils such as bone fragments or wood fragments. Nonetheless, a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no palaeontological site visit is required and the project may proceed.



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

Figure 27. Approximate study area (yellow polygon) indicated as of insignificant to high paleontological sensitivity on the SAHRIS Paleontological map.

Long term impact on the cultural landscape is considered to be negligible as the surrounding area consists of a densely-developed zone. Visual impacts to scenic routes and sense of place are also considered to be low due to the extensive developments in the area.

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9. Potential Impact

Based on the current lay out three grave sites (MIW1, MIW2 and MIW3) is located approximately 4 meters from the proposed pipeline and a stone walled enclosure MIW5 35 meters (Figure 28, 30 and 31). At these locations the proposed pipeline is located within the road reserve and boxed in between the road, residential stands (MIW1) and a railway line (MIW3), and can therefore not be moved and an alternative alignment here is not possible. The impact area of the pipeline with a diameter less than 160mm is small and the impact to the grave sites can be nullified if these sites are demarcated and retained *in-situ* and monitored during construction.

Impacts will be during the construction phase only and would be of medium to high significance, but can be mitigated to an acceptable level as outlined in Section 10 of this report. 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 development, impacts can be mitigated to an acceptable level. However, this and other projects in the area had a negative impact on Iron Age sites in the area, but the impact can be mitigated to an acceptable level as the sites will then be documented and recorded.

i. 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.

ii. 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.

iii. Operation Phase:

No impact is envisaged to heritage resources during this phase.

iv. Impact Assessment

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	Local (3)	Local (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)
Probability	Very Probable (4)	Not probable (2)
Significance	56 (Medium)	24 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, a chance find procedure should be implemented.	Yes
Mitigation: <ul style="list-style-type: none"> • Sites MIW 1 will have to be demarcated and indicated on development plans. • Site MIW 2,3,4 and 5 will have to be indicated on development plans. • Site MIW 1,2,3,4, FS 1 and 2 will have to be monitored during construction. • Implementation of a chance find procedure for the project. 		
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 Mogalakwena Industrial Wellfield project 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: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on but this cannot be quantified.		



Figure 28. MIW 1 in relation to the proposed pipeline.

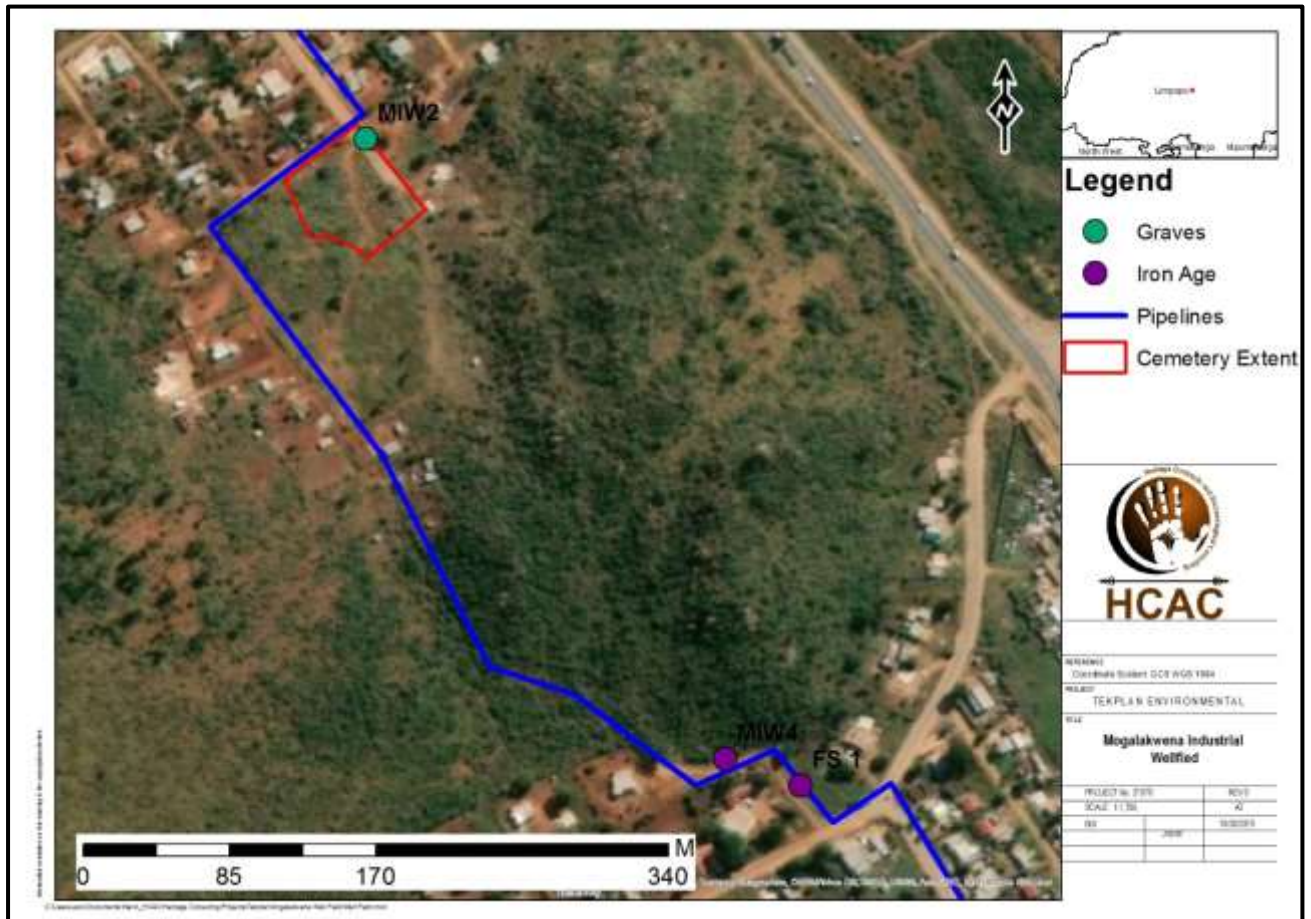


Figure 29. MIW 2, 4 and FS 1 in relation to the proposed project.

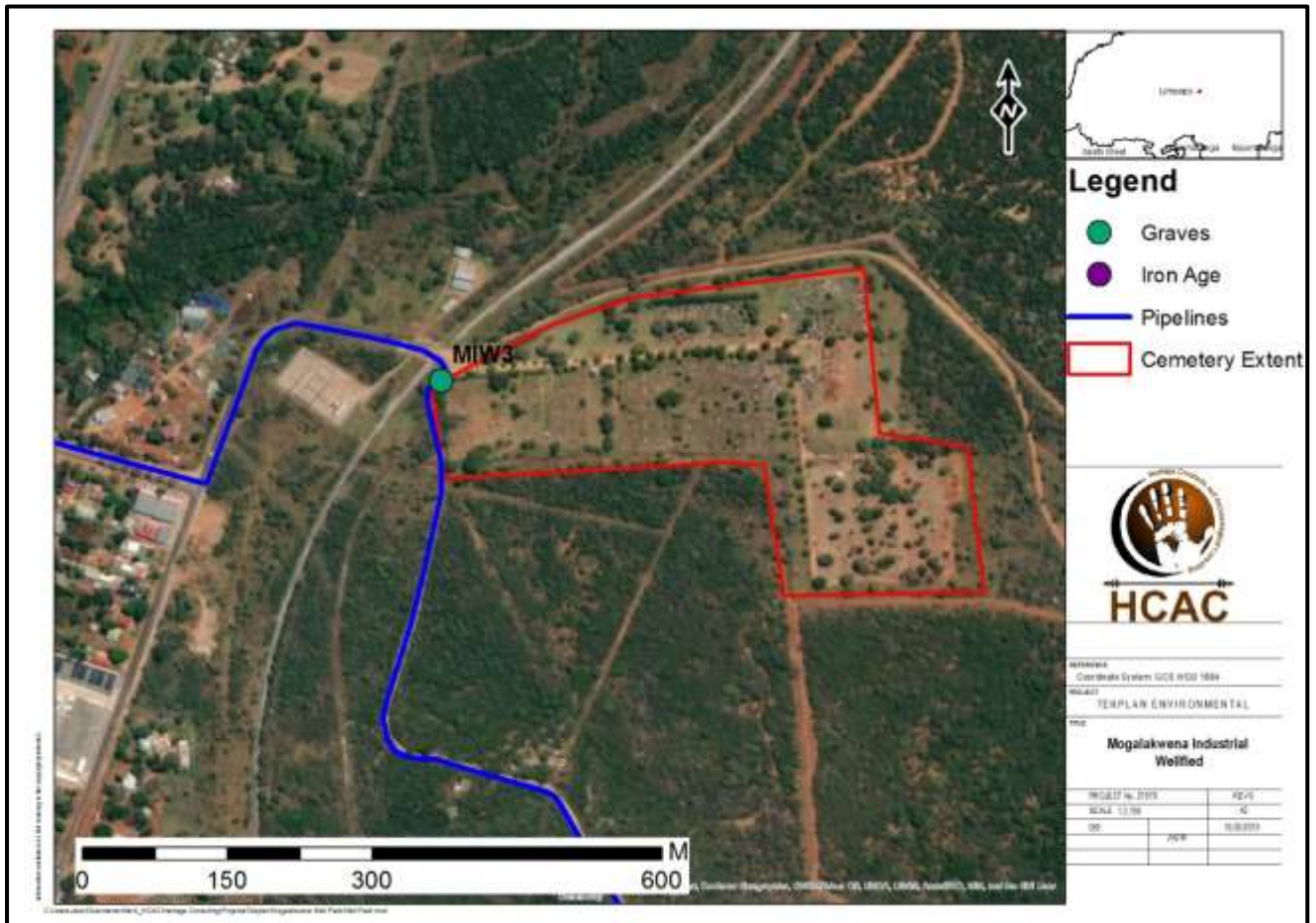


Figure 30. MIW 3 in relation to the proposed project

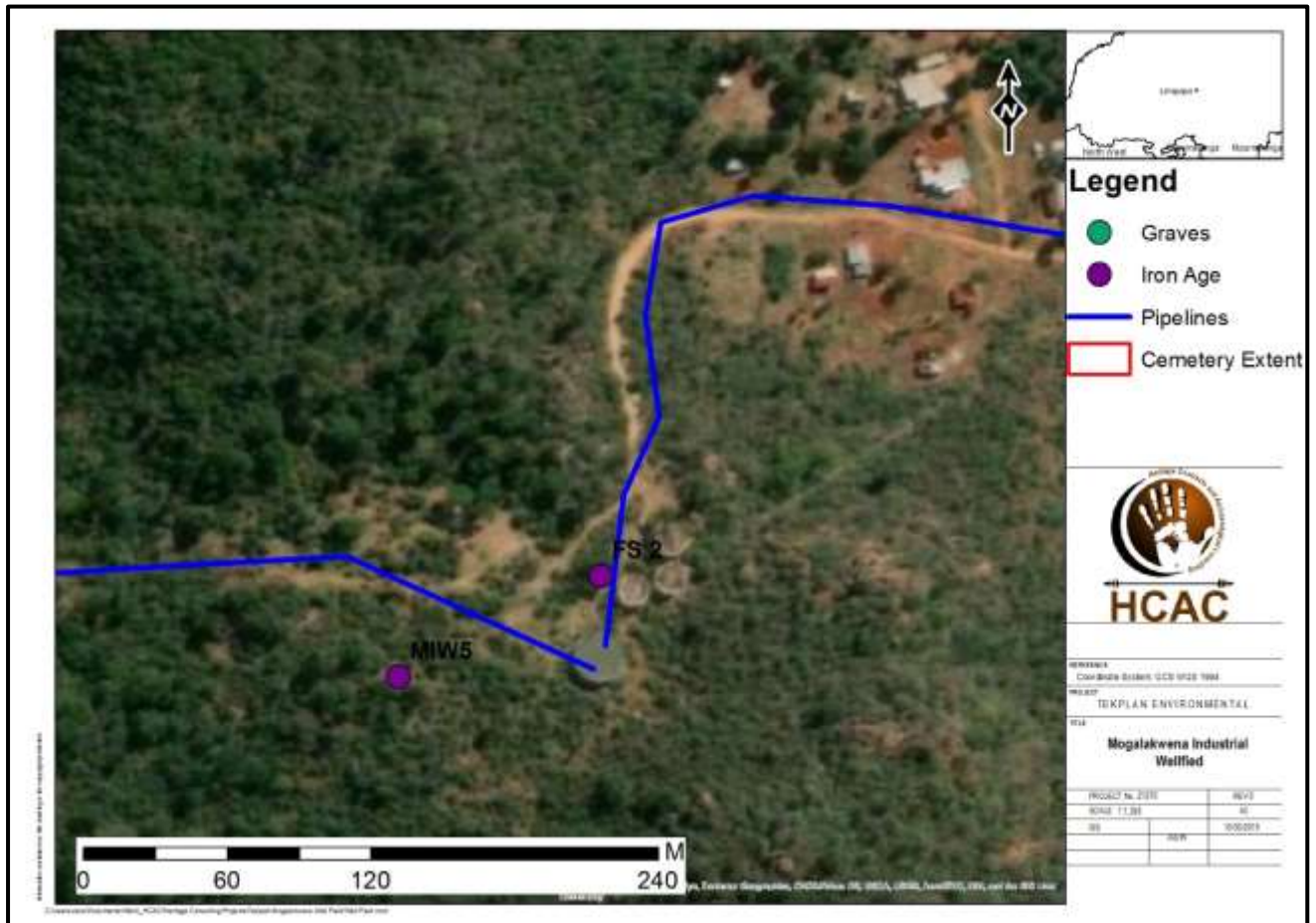


Figure 31. MIW 5 and FS 2 in relation to the proposed project.

10. Recommendations and conclusion

The project will consist of the Mokopane High Line and the Sefakaola line. The Mokopane High Line of approximately 3,5km supply pipelines will have a limited impact as the size of the pipelines has a diameter between 110mm and 160mm. This line will be linking 4 boreholes located adjacent to the Dorps River adjacent to the industrial area to the existing Mokopane High Reservoirs located on the hill to the east of Mokopane town. This line will have the lowest impact on heritage resources although a section of this line runs close to an existing municipal cemetery (MIW3) that will require some mitigation as outlined in Table 6 but contained no further archaeological material.

The Sefakaola Line of approximately 9km water will also have a limited impact as the pipeline has a diameter between 90mm and 160mm. This line will be linking 3 boreholes in the Sekgakgapeng and Phola Park areas to the existing Sefakaola Reservoirs as well as linking 4 boreholes located adjacent to the Mogalakwena River. A water treatment facility covering an area of approximately 1 600m² will be constructed adjacent to the existing Sefakaola Reservoirs. The Sefakaola Line traverses in close proximity to several find spots and grave sites and will require some mitigation as outlined in Table 6.

The proposed water treatment facility is located in a saddle of the Lekalakala Mountain. These kinds of locations are known to contain Iron Age sites. This area is however impacted on by construction activities relating to the existing reservoirs and water pipes that would have destroyed surface indicators of heritage resources. A wide scatter of undiagnostic potsherds and isolated lithics were recorded in the cleared area and marked as FS 2. This find spot is of low significance as the artefacts are out of context and no surface features can be associated with the finds. Soil cover is also shallow in this area and no anthropogenic deposit noted. This area will however have to be monitored during construction to mitigate against chance finds. A semi-circular stone enclosure was recorded here as MIW 5 and seems to be of recent origin, possibly a result of the construction activities relating to the reservoirs and older pipelines but will not be impacted on by the new developments and no further action is necessary.

According to the SAHRIS paleontological sensitivity map, the area is of insignificant to high paleontological sensitivity, and an independent palaeontological study was undertaken by Bamford (2019). The study concluded that a Fossil Chance Find Protocol should be added to the EMP, that no palaeontological site visit is required and that the project may proceed.

The proposed project could impact directly on heritage resources most notably two grave sites (MIW1 & MIW3) that is located approximately 4 meters from the proposed pipeline. At these locations the proposed pipeline is located within the road reserve and boxed in between the road, residential stands (at MIW1) and a railway line (at MIW3), and can therefore not be moved and an alternative alignment here is not possible. The impact area of the pipeline with a diameter less than 160mm is small and the impact to the grave sites can be nullified if these sites are demarcated and retained *in-situ* and monitored during construction. The impact to heritage resources by the proposed pipeline can be mitigated to an acceptable level as outlined in Table 6 as a condition of authorisation and the EMP, based on approval from SAHRA.

Table 6. Site specific recommendations

Label	Description	Recommendation
MIW1	Grave located 4 meter from the pipeline in the road. The grave has a visible gravestone and cover made from tiles and reads 'Marema Fati Salome 1939-1940'	Retain <i>in-situ</i> . Indicate on development plans and demarcate the grave. Monitor during construction.
MIW2	Large cemetery located next to the road opposite the proposed pipeline approximately 4 meters.	Indicate on development plans. Monitor during construction.
MIW3	Large Cemetery in Mokopane, closest grave is located 4 meters from the pipeline.	Indicate on development plans. Monitor during construction.
MIW4	Semi-circular stone enclosure at the base of the small hill 7 meters from the pipeline.	Indicate on development plans. Retain <i>in-situ</i> .
MIW5	Semi-circular stone enclosure at the top of the large hill 35 meters from the pipeline.	Indicate on development plans. Retain <i>in-situ</i> .
FS 1	Undecorated potsherds at the base of a small hill.	Monitoring of the find spot during construction.
FS 2	Undiagnostic potsherds located in the cleared areas around the existing water reservoirs.	Monitoring of the area during construction.

General Recommendations:

- Located in a saddle of the Lekalakala Mountain is the existing Sefakaola Reservoirs and also the proposed location of the water treatment facility. Scatters of ceramics are noted here possibly relating to an Iron Age Site that was destroyed by the existing reservoirs. Soil cover is shallow in this area and no anthropogenic deposit noted; therefore, it is not feasible to conduct mitigation. However, construction activities relating to the proposed water treatment works will have to be monitored by an archaeologist;
- Implementation of a chance find procedure for the project as outlined in Section 9.1 as well as a Fossil chance find procedure

a. Chance Find Procedures

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

- If during the construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or rock engraving, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.

The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

b. Reasoned Opinion

The impact of the proposed project on heritage resources can be mitigated to an acceptable level with the correct mitigation measures in place. Furthermore, the socio-economic benefits of improved water supply and employment opportunities also outweigh the possible impacts to heritage resources.

c. Potential Risk

Potential risks to the proposed project are the occurrence of graves not recorded here and that subsurface cultural material/artefacts or skeletal material could be uncovered during earth works that could have cost implications and time delays. These risks can be mitigated to an acceptable level with monitoring and the implementation of a chance find procedure as outlined in Section 10a.

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12. Appendices:

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 Karochoek Solar Project

Grave Relocation Projects

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

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

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

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

Phase 2 Mitigation Projects

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

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

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

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

Heritage management projects

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

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

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

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
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- 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*)
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- 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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