

HERITAGE IMPACT ASSESSMENT

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

PROPOSED GROOTHOEK REGIONAL WATER SCHEME: LEBOWAKGOMO BULK WATER SUPPLY LEPELLE NKUMPI MUNICIPALITY AREA, CAPRICORN DISTRICT MUNICIPALITY

Type of development:

Water Supply Line

Client:

Tekplan Environmental

Client info:

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APPROVAL PAGE

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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 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 the Groothoek Regional Water Scheme: Lebowakgomo Bulk Water Supply. 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 7 heritage features were recorded. These consist of four cemeteries a Late Iron Age stone walled site, one ruin and a long linear stone wall. 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 (Millstead 2017) concluded that there is no palaeontological reason to prejudice the construction of the water supply pipeline project subject to the recommendation that all excavations conducted into the Clarens Formation land surface within Mmaphelo Township should be inspected by a qualified palaeontologist before the pipes are laid and the trenches infilled with soil.


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 10 for the detailed mitigation measures.

Table 2. Recorded sites

LABEL	LONGITUDE	LATITUDE	Description	Significance	Location	Mitigation
LEB 1	29° 37' 32.0627" E	24° 17' 38.2091" S	Cemetery	High Social Significance	Direct Impact (3 M from the line)	Realign, preservation of site in situ.
LEB 2	29° 37' 27.8579" E	24° 17' 24.7559" S	Ruin	Low to Medium Significance,	Indirect impact (12 m north from the line).	Demarcate and preserve (possibility of graves)
LEB 3	29° 35' 38.6412" E	24° 17' 25.3787" S	Stone Wall	Stone wall is probably more recent but is of unknown purpose – Low Significance	Direct impact	Chance find procedure
LEB 4	29° 35' 25.7315" E	24° 17' 31.2109" S	Iron Age Site	Medium significance	Possible indirect impact. (10 m from the line).	Demarcate and preserve chance find procedure (possibility of graves)
LEB 5	29° 34' 51.5280" E	24° 17' 40.0703" S	Cemetery	High Social Significance	Direct impact (3 m from line)	Realign, preservation of site in situ.
LEB 6	29° 32' 39.6853" E	24° 16' 08.7419" S	Cemetery	High Social Significance	Possible indirect impact (15 m from the line)	Demarcate and avoid
LEB 7	29° 32' 11.6843" E	24° 17' 34.6813" S	Cemetery	High Social Significance	Direct impact	Realign, preservation of site in situ.

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	16/07/2017

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 the Groothoek Regional Water Scheme. The report forms part of the Basic Assessment Report (BAR) and Environmental Management Programme Report (EMPR) for the Lebowakgomo 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 7 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 3: Project Description

Site Location	The project is located in the Lepelle Nkumpi Local Municipality area, Capricorn District, Limpopo Province.
Size of farm and portions	The following properties are located within the study area: Remainder of farm Locatie van M'phatlele 457 KS, Remainder of farm Naauwpoort 441 KS, Remainder of farm Schildpadnek 444 KS, Remainder of farm Boomplaats 446 KS, Remainder of farm Middelkop 445 KS, Remainder of farm Voorspoed 458 KS, Erf 9 of Lebowakgomo – GA, and Erf 3120 and Remainder of Erf 3646 Lebowakgomo – B.
Magisterial District	Lepelle Nkumpi Municipality Area, Capricorn District Municipality
1: 50 000 map sheet number	2429 AD & 2429 BC
Central co-ordinate of the development	Eastern Point 24° 18' 35.3916" S, 29° 28' 30.6274" E Western Point 24° 17' 50.1649" S, 29° 38' 15.3447" E

Table 4: Infrastructure and project activities

Type of development	Water Pipeline
Project size	28 km
Project Components	<p>The project will consist of the following main components:</p> <ul style="list-style-type: none"> • Two borehole wellfields, A & B, located approximately 10km east of Lebowakgomo. • PVC and steel pipes connecting the wellfields with three 4.5 MI reservoirs and one 9 MI reservoir, a high lift pump station and a water purification plant located in the Lebowakgomo area. • The Water purification plant will be covering an area of approx. 2 hectares. • The project will assist to supply water for the following areas: Mphahlele Regional Water Scheme, Groothoek Regional Water Scheme and urban areas of Lebowakgomo.

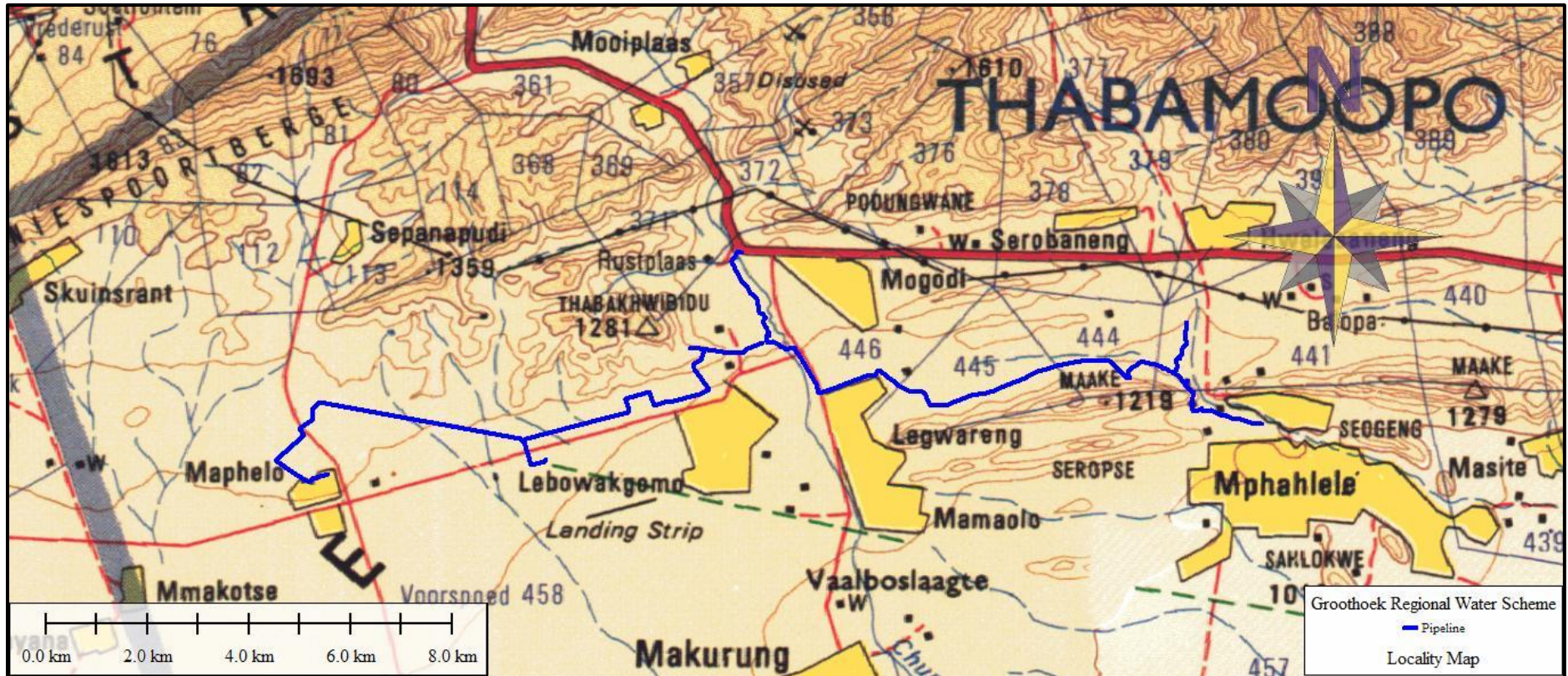


Figure 1. Provincial map (1: 250 000 topographical map)

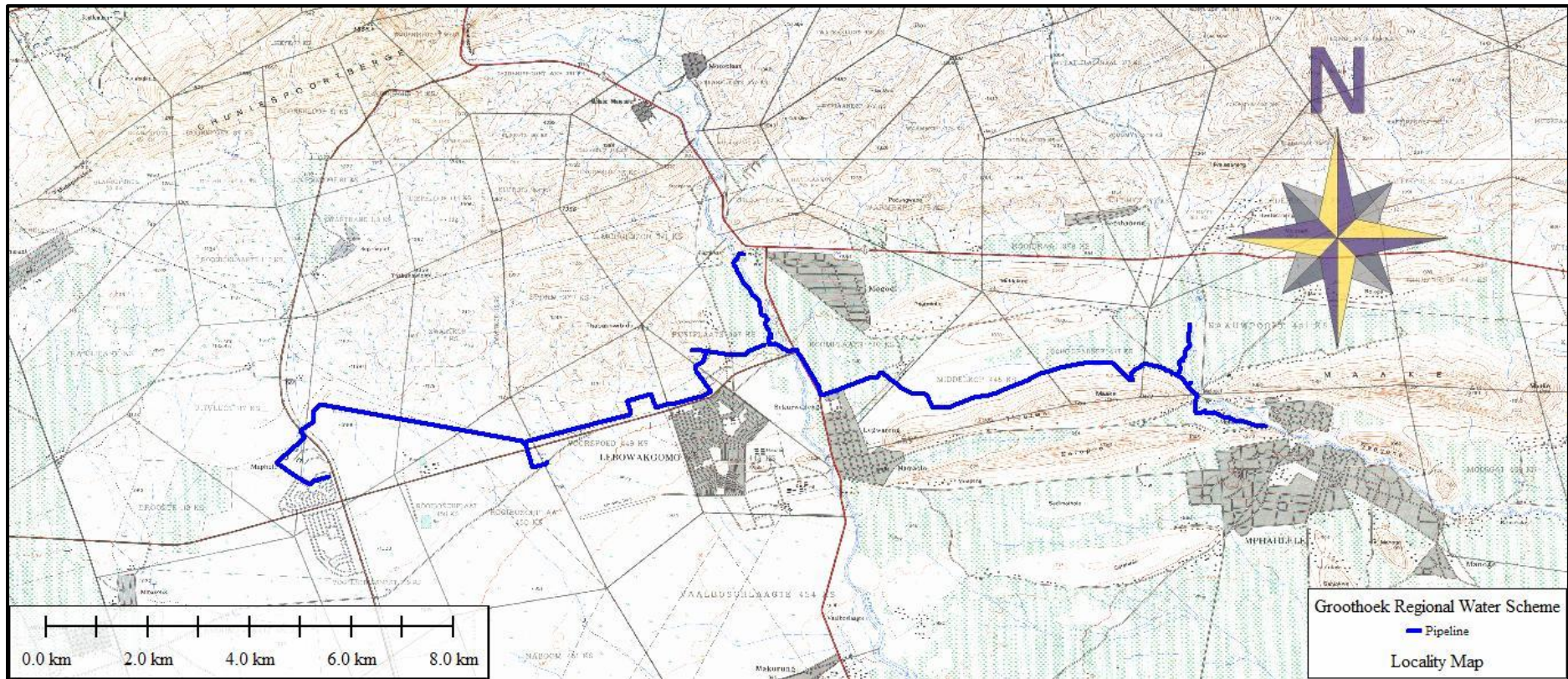


Figure 2. Regional map (1:50 000 topographical map).

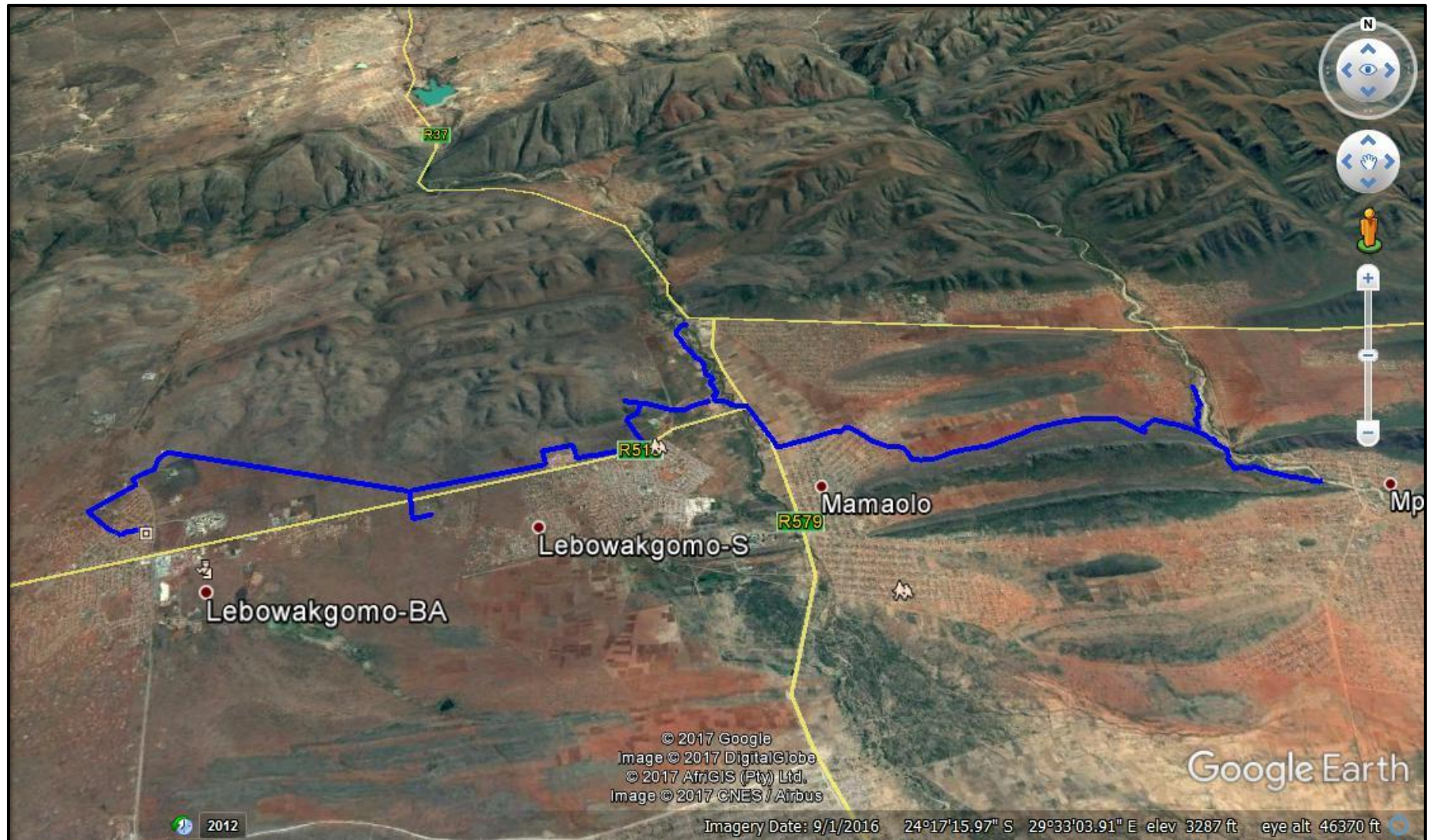


Figure 3. Satellite image (Google Earth).

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. Stone Age Scatters with densities less than 2 artefacts per m² were not recorded as they occur throughout the study area. GPS readings of heritage sites were taken at the closest point to the proposed pipeline. Sites/heritage features were located during the physical walkthrough for the project that occurred over a period of 2 days. 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 5: Site Investigation Details

	Site Investigation
Date	26 – 27 June 2017
Season	Winter –Archaeological visibility was high. The impact area was sufficiently covered (Figure 4) to adequately record the presence of heritage resources.



Figure 4: Track logs of the survey in blue.

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. 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 Lepelle Nkumpi IDP 2016 – 2021 was used to inform this section: Lepelle-Nkumpi is one of the five local municipalities within the Capricorn District Municipality in Limpopo Province and is located in the southern part of the Capricorn District. The municipality is pre-dominantly rural with a population of approximately 230 350 people. It covers 3,454.78 km², which represents 16% of the District's total land area and is divided into 30 wards which comprise a total of 94 settlements. About 95% of its land falls under the jurisdiction of Traditional Authorities. The dependency ratio, which covers people aged below 15 and above 64, is very high at 44% of total population. The population of Lepelle-Nkumpi is dominated by young people of below 35 years old who constitute 69% of total population.

According to Census 2011, there is only 33% with matric and above qualifications, among people 20 years and older. Otherwise 67% has no matric- having left school at primary or secondary levels. There is an alarmingly high percentage of females without schooling or with minimal education qualifications in the municipality and the District alike, even though there are still more women with matric and post matric qualifications.

5 Description of the Physical Environment:

The project is located in the Lepelle Nkumpi Local Municipality area, Capricorn District, Limpopo Province. (Figure 1 & 2). The proposed route traverses approximately 28 km that were surveyed on foot and by vehicle (Figure 4).

The proposed pipeline will start at Ga-Mphahlele village approximately 10km to the east of Lebowakgomo. It will be situated on the southern side of the Hlakaro intermittent stream and will run to the west for about 2km along this stream. It then turns to the north to pass through a gap within a chain of mountains. It will then turn to the west again after it traverses through the mountains and will follow this mountain range or ridge further to the west. The pipeline will be situated right at the foot of this chain of mountains which are very rocky with rocks scattered all over the slopes. The plains and flats to the north of these mountains are relatively flat and characterised by red sandy soils. These areas were previously cultivated and large parts are also used for settlements or townships.

At Mamaolo village the pipeline will turn to the north again and will pass through the village along the western banks of another intermittent stream. It will turn to the west again along a storm water drainage channel on the northern fringes of Mamaolo village up to the R518 tar road. It will follow the R518 tar road northwards for approximately 1km from where it will turn west again and will cross this road. It will also cross the Tudumo River and will meet up with the proposed Water Treatment Works PS1 to the east of Lebowakgomo. Another pipeline will also join up at the Water Treatment Works from the north. This pipeline will follow the western bank of the Tudumo River for approximately 2km up to the Water Treatment Works.

The pipeline will then leave the Water Treatment Works and will go up to a new reservoir on the hill behind the Rusplaas Christian Model School. The pipeline will then join the R518 tar road again and will follow it for approximately 3.5km within the servitude situated on the northern side of the road up to the Olifantspoort Water Scheme Reservoirs. From there it will follow an existing pipeline and will end up within the western suburbs of Lebowakgomo.

The vegetation of the general area and the proposed route is typical of the mainly semi-arid plains and open valleys between the chains of hills and small mountains running parallel to the eastern escarpment. The vegetation consists predominantly of short, open to closed thornveld with an abundance of Aloes and other succulents. The region is heavily degraded in places and overexploited by man for cultivation, mining and urbanisation. Both man-made and natural erosion dongas occur in areas containing clays rich in heavy metals. Encroachment by indigenous microphyllous trees and invasion by alien species is common throughout the area. It forms part of the Sekhukhune Plains Bushveld within the Savanna Biome (Mucina & Rutherford 2006).

The proposed pipeline will replace or be next to existing pipelines for a large part of the project. The existing infrastructure is still visible. The proposed area to be affected was already disturbed in places by the development of the previous pipelines as well as by the developments of the various villages and infrastructure in and around Lebowakgomo.



Figure 5. Existing infrastructure



Figure 6. Existing pipeline route.



Figure 7. Hlakaro Stream



Figure 8. Location of new reservoir.



Figure 9. Pipeline route through Mamaolo Village



Figure 10. Pipeline route through western suburbs.



Figure 11. Olifantspoort Reservoir



Figure 12. 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. No heritage issues or concerns were raised during this process.

7 Literature / Background Study:

SAHRA has some projects on record in the general vicinity of the study area, including the Marulaneng extension electrification project and the Ga Maja Moshate electrification project. These projects were exempted from further studies, due to the powerlines following existing infrastructure and low levels of impact on heritage resources. Other projects in the greater study area include:

The following CRM reports were consulted for this report:

Author	Year	Project	Findings
Van der Walt, J.	2016	Archaeological Impact Assessment for The LNW Hanging Pipe and Pipe Replacement, Limpopo Province	MSA Scatters, a ruin and graves were recorded.
Van der Walt, J.	2016	Archaeological Impact Assessment for The Proposed Son of Africa Fuel Filling Station, Chuniespoort, Limpopo Province	A stone cairn of unknown purpose.
Pistorius, J.C.C	2012	A Phase I Heritage Impact Assessment Study for Eskom's Proposed New 132kv Power Line Between the Lebowa Substation and The Proposed New Dwaalkop Substation In Lebowakgomo And Chuniespoort In The Limpopo Province	Numerous graves and graveyards
Wahl, E & Van Schalkwyk, L	2006	Heritage Impact Assessment of Chuniespoort Dam, Polokwane, Limpopo Province, South Africa	No heritage resources were found
Pistorius, J. C. C	2009	A Phase I Heritage Impact Assessment Study for Lonmin's Proposed New Dwaalkop Mining Operation Near Lebowakgomo In Chuniespoort In the Limpopo Province of South Africa	Stone Age Sites, Grave sites and historical mining infrastructure.

7.1 General History of the area

The Lebowa area has been occupied by a mostly Northern Sotho population for centuries. This group is a part of a larger Northern Sotho-speaking community occupying a large area between the Limpopo River in the north, the Drakensberg in the east and the Sekhukhune Mountains in the west (Pistorius 2012).

Another important group in this region was the Bokone. Groups of the Bokone occupied the lowveld between Phalaborwa and Bokgaga (near Leydsdorp) and the Bokone in time became scattered over a wide area of Limpopo and Mpumalanga. The main body of the Bokone seems to have fallen under the leadership of the Matlala ruling lineage when this group splintered into a multiplicity of groups during the 15th century and the 16th century (Pistorius 2012). Some groups remained in the Lowveld and some ventured south and westwards so that Koni groups settled in the later Ohrigstad, Lydenburg and Middelburg areas. The largest and most dominant group, however, settled in hillsides between Polokwane and Mokopane (Pistorius 2012).

This region is also known as Matlala-a-Thaba (Matlala of the Mountain). The Matlala royal house has experienced leadership conflicts during the 17th century. Splinter groups hereafter settled in Blouberg and Makgabeng whilst others occupied a number of mountains and river valleys such as Chuenespoort (Ga-Chuene) and ThabaTshweu (Witkoppen).

It is assumed that during the period from AD1700 to AD1826 the Pedi took political control over the territory previously known as Lebowa, but to the south of the Strydpoort Mountains. The Pedi chiefdom peaked during the reign of Thulare, who died in 1824.

A number of Sotho tribes, all of Kgaga origin, live to the north and to the south of the Strydpoort Mountains, between the Pedi to the east and the Tlokwa territory in Sekgosese to the west. The origin of the Kgaga people was Bokgaga, to the west of Ofcolaco. Their totem was the *phuti* (or 'duiker') (Pistorius 2012). The Kgaga of Mphahlele broke away (around 1750) from Maake and travelled to the south and to the west across the Steelpoort River. They settled to the west of the Olifants River and to the south of the Strydpoort Mountains in the present Mphahlele village at Chuniespoort. The Kekana of Moletlane had already settled to the south-west of the area chosen by the Kgaga of Mphahlele. The Kgaga of Mphahlele remained in the area which is today known as the Lepelle-Nkumpi municipal area (Pistorius 2012).

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 (McNabb & Binyon, 2004; Phillipson, 2005). Makapans Valley was declared a World Heritage Site in 2005.

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.

According to Bergh (1999) no Stone Age sites or occurrences are known in the direct area, although some MSA sites, including rock paintings, are known in the larger geographical area around Polokwane (Bergh 1999:4-5). This includes a site called Grace Dieu and another called Mwulu's Cave. Sites in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters.

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 Olieboompoort Cave (Mason, 1962) and other sites in the Waterberg to the West (Van der Ryst, 1998).

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). This could include the Mzonjani facies of the Urewe Tradition, dating to between AD450 and AD750 (Huffman 2007); the Doornkop facies of the Kalundu Tradition (AD750 to AD1000); the Eiland facies of the same tradition dating between AD1000 and AD1300; the Icon facies of the Urewe Tradition (AD1300-1500), as well as the Letaba facies of Kalundu, dating to between AD1600 – AD1840. To the north west of the study area is several LIA Ndebele stone walled sites (Loubser 1991). Surveys in the larger area indicated the presence of mostly Doornkop and Eiland sites Roodt (2002, 2003, 2006 and 2008).

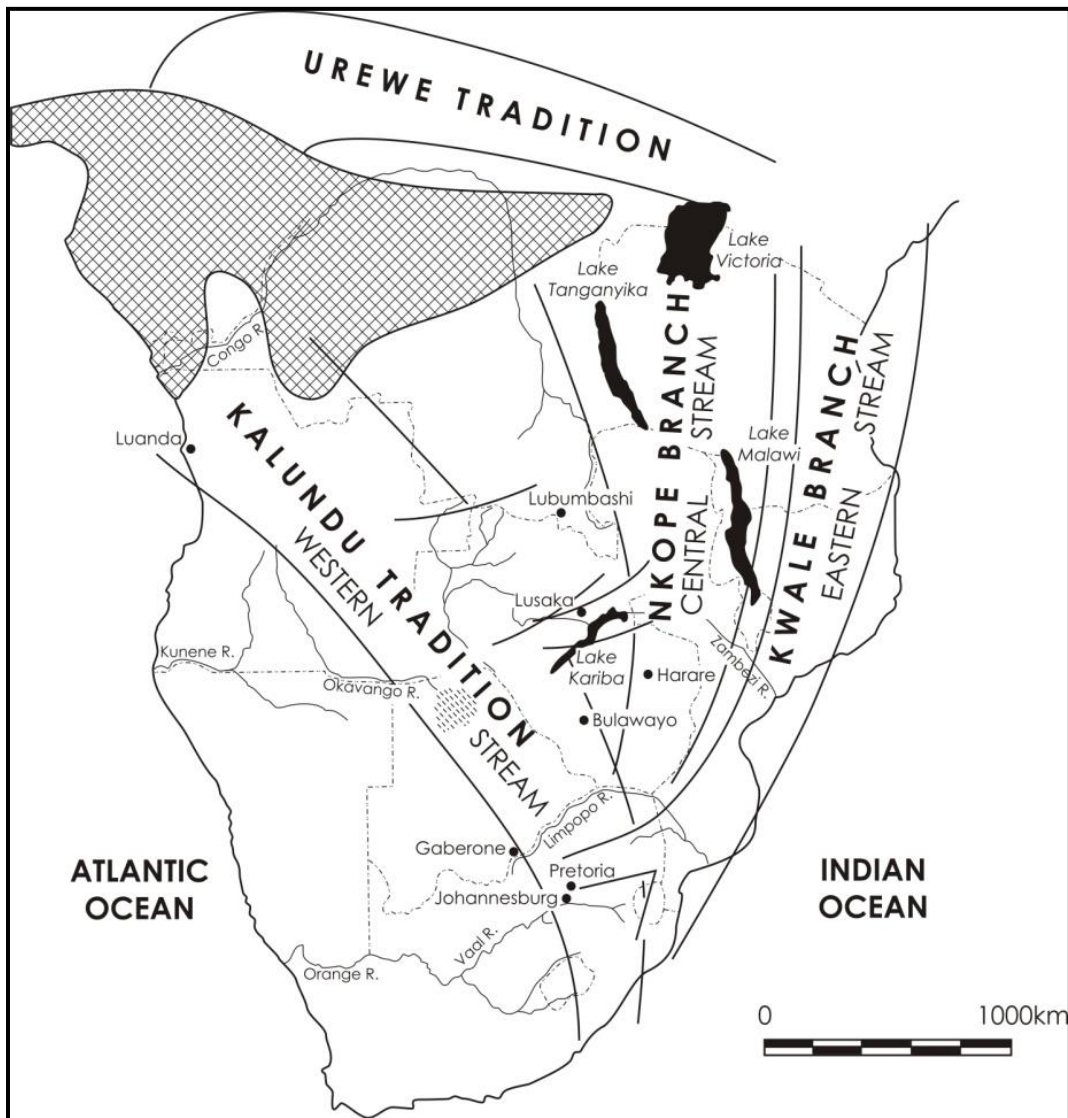


Figure 13. Movement of Bantu speaking farmers (Huffman 2007)

8 Findings of the Survey

This report focuses on the proposed infrastructure for the proposed water supply pipelines for the Groothoek Water Scheme Lebowakgomo. The proposed pipeline will replace or be next to existing pipelines for a large part of the project. The existing infrastructure is still visible. The proposed area to be affected was already disturbed in places by the development of the previous pipelines as well as by the developments of the various villages and infrastructure in and around Lebowakgomo.

During the survey 7 sites were recorded in total (Table 2). These consist of four cemeteries a Late Iron Age stone walled site, one ruin and a long linear stone wall. 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.

A short feature description follows in Section 9 of this report with recommendations included in Section 10.

9 Description of Identified Heritage Resources:

Table 6: Recorded features and coordinates

LABEL	LONGITUDE	LATITUDE	Description	Significance	Location
LEB 1	29° 37' 32.0627" E	24° 17' 38.2091" S	Cemetery	High Social Significance	Direct Impact (3 M from the line)
LEB 2	29° 37' 27.8579" E	24° 17' 24.7559" S	Ruin	Low to Medium Significance,	Indirect impact (12 m north from the line).
LEB 3	29° 35' 38.6412" E	24° 17' 25.3787" S	Stone Wall	Stone wall is probably more recent but is of unknown purpose – Low Significance	Direct impact
LEB 4	29° 35' 25.7315" E	24° 17' 31.2109" S	Iron Age Site	Medium significance	Possible indirect impact. (10 m from the line).
LEB 5	29° 34' 51.5280" E	24° 17' 40.0703" S	Cemetery	High Social Significance	Direct impact (3 m from line)
LEB 6	29° 32' 39.6853" E	24° 16' 08.7419" S	Cemetery	High Social Significance	Possible indirect impact (15 m from the line)
LEB 7	29° 32' 11.6843" E	24° 17' 34.6813" S	Cemetery	High Social Significance	Direct impact

9.1 Site Distribution Map

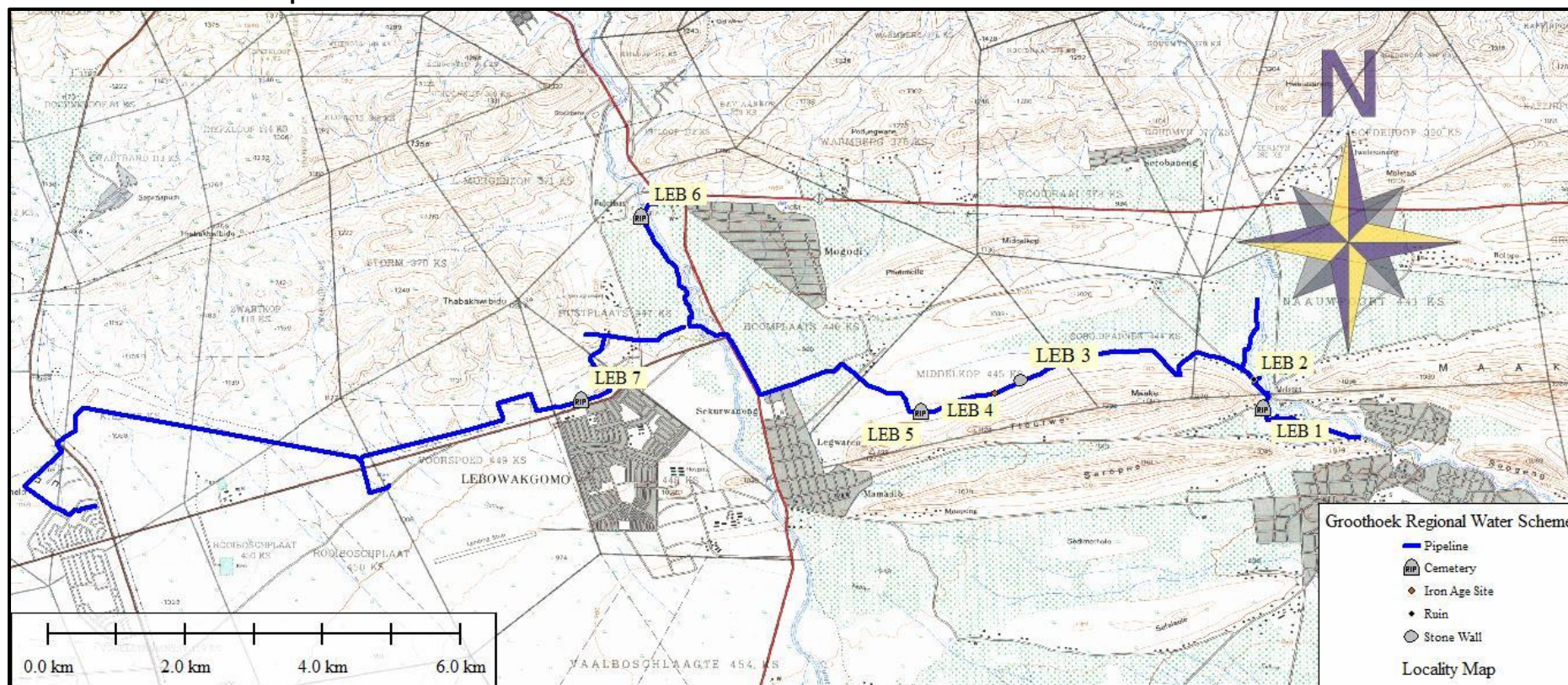


Figure 14. Recorded sites in relation to the proposed pipeline.

9.2 Late Iron Age. (LEB 4).

Site Number	Leb 4
Type of Site	Archaeological
Geographical Setting	This complex is situated on the northern side and right at the foot of Maake Mountain. The mountain has rocky slopes and the wall is situated right at the edge of these rocky slopes before they transfer into the sandy plains to the north of the mountain. The identified is situated directly next to and on the southern side of the propose pipeline alignment.
Current Condition of site	The site has been damaged and the walls are collapsed in some places.
Description and type of artefacts, approximate age and significant features of the site.	The low stone walls were packed to form enclosures and other sections of wall. The enclosures were packed in different sizes and shapes, but together they formed a distinct pattern as part of a settlement. The packed walls covered an area of approximately 80m x 30m in size along the foot of the mountain. The walls consist of low lines of packed rocks, but some of these walls were damaged or were collapsed in some places. The walls measure approximately 0,5m high and 0,5m wide in some places. The stone walls are also overgrown with grass, trees and other vegetation and this makes the identification of the size, shape and purpose of the stone walls difficult. No other features, structures or artefacts were found or identified with the identified stone walled complex.
Depth and stratification of the site	Unknown



Figure 15. General site conditions



Figure 16. Stone packed features at Site LEB 4



Figure 17. Site LEB 4 – Stone walling



Figure 18: Site conditions Site LEB 4



Figure 19. General site conditions Site LEB 4



Figure 20. Stone Packed features.





Statement of Significance

The site is of medium significance.

Field Rating (Recommended grading or field significance) of the site:	Generally Protected B
Recommendations	The site will not be directly impacted on and it is recommended that the site should be Demarcated and preserved. A chance find procedure should also be implemented due the possibility of unmarked graves.

9.3 Ruins (Site LEB 2 and LEB 3).

Site Number	Site LEB 2
Type of Site	Recent/historical
Geographical Setting	It is situated to the north-west of the "poort" where the Hlakaro stream comes through the mountain. The site is situated next to and to the north-east of the proposed pipeline where it makes an extension for HO1-3463 1
Current Condition of site	Dilapidated
Description and type of artefacts, approximate age and significant features of the site.	The site consists of the foundations of a hut, set within the remains of an extended courtyard. The foundations of the hut are a circular line of packed rocks which supported mud brick walls. The hut measured approximately 4m in diameter, but only the foundations are still evident. The walls of the courtyard also have a line of packed rocks as foundation with mud brick walls on top of that. The courtyard measures approximately 15m x 15m in size and extended northwards from the location of the hut. The whole area is overgrown with grass and other vegetation. No other structures, features or artefacts were found or identified with the remains of the identified homestead.

<p>Depth and stratification of the site</p>	<p>Unknown</p>
	
<p>Figure 21. General site conditions Site LEB 2</p>	<p>Figure 22. Features at Site LEB 2</p>
	
<p>Figure 23. Stone packed features at site LEB 2</p>	<p>Figure 24. General site conditions</p>
<p>Statement of Significance</p>	<p>The site could be older than 60 years and sites like these are often associated with unmarked graves. The site is of low to medium significance. If graves are present these are of high social significance.</p>
<p>Field Rating (Recommended grading or field significance) of the site:</p>	<p>Generally Protected B (GP. B).</p>
<p>Recommendations</p>	<p>Site LEB 2 will not be directly impacted on but should be demarcated and avoided. A chance find procedure should be implemented.</p>

Stone Packed Wall (Site LEB 3)

Site Number	Site LEB 3
Type of Site	Recent
Geographical Setting	The stone wall is situated on the northern side and right at the foot of Maake Mountain. The mountain has rocky slopes and the wall is situated right at the edge of these rocky slopes before they transfer into the sandy plains to the north of the mountain. The identified wall is situated within the proposed alignment route and extends a little bit further to the south as well
Current Condition of site	Dilapidated
Description and type of artefacts, approximate age and significant features of the site.	The stone built wall extended along the foot of the mountain for approximately 50 meters and it does not seem to enclose any feature or other structures. The wall measures approximately 0.5m wide and 0.75m high in places. It is dilapidated all over its course and could possibly have other features or dimensions as well. The purpose of this extended wall is not known as yet.
Depth and stratification of the site	Unknown



Figure 25. General site conditions Site LEB 3



Figure 26. Features at Site LEB 3



Figure 27. Stone packed features at site LEB 3



Figure 28. General site conditions

Statement of Significance	The site is recent. The site is of low significance.
Field Rating (Recommended grading or field significance) of the site:	Generally Protected C (GP. C).
Recommendations	A chance find procedure should be implemented.

9.4 Cemeteries and grave sites (Site LEB 1, 5, 6, 7).

Site Number	Site LEB 1, 5, 6, 7
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 LEB 1</p> <p>Three graves were identified at this location. The graves are situated to the west of Ga-Mphahlele village and close to the "poort" where the Hlakaro stream comes through the mountain.</p> <p>Two of the graves are situated next to and on the western side of the proposed pipeline route. The two graves were placed next to each other and have formal cement and stone built dressings and headstones. The one grave is of Dinah Thipe who died in 1934 and the other grave is of Hester Mpekase who died in 1913. These graves look like they are the graves of two children. Both graves are orientated from west to east and are overgrown with grass and other vegetation.</p> <p>The third grave is situated approximately 5m to the east of the proposed pipeline. This grave also has a formal granite and cement grave dressing and is also orientated from west to east. This grave is crudely fenced off and is also overgrown with grass and other vegetation. It is the grave of Malongete Ngwato Mahlatji who died in 1920 according to the inscription on the headstone.</p> <p>Site LEB 5</p> <p>A large and newly demarcated cemetery was identified at this location. It is situated on the eastern fringes of Mamaolo village and at the foot of Maake Mountain. It is also situated next to and to the north of the proposed pipeline alignment.</p> <p>The cemetery is fenced off and locked and measures approximately 400m x 400m in size. There are approximately 100 graves within this cemetery as it was only being used recently. The cemetery and graves are overgrown with grass and other vegetation and it was not maintained recently.</p> <p>Most of the graves have formal, granite headstones and dressings and most of them are orientated from west to east. The cemetery was locked and no access was gained to document some of the graves within.</p> <p>Site LEB 6</p> <p>A small informal cemetery was identified at this location. It is situated approximately 15m to the west of the proposed pipeline alignment. It seems as if the planners for the proposed route identified the graves beforehand as the proposed line makes an unfamiliar turn at this location.</p> <p>This informal cemetery is crudely fenced off and has five graves within. The graves were placed in one line next to each other and they are orientated from west to east. There are three single graves and one double grave situated in the middle. The graves all have formal granite or cement dressings and headstones. The graves have inscribed headstones and from that it was deduced that these are graves of European descendant and they are off different families. The graves date from the 1930's up to the 1950's. The cemetery and graves are overgrown with grass and other vegetation and it was not maintained recently.</p>

Site LEB 7

Another small informal cemetery was identified at this location. This cemetery is situated within the proposed pipeline alignment on the northern fringes of Lebowakgomo town.

The cemetery is fenced off and locked and measures approximately 25m x 25m in size. There are approximately 25 graves within this cemetery and it is overgrown with grass and other vegetation and it was not maintained recently.

Most of the graves have formal, granite headstones and dressings and most of them are orientated from west to east. The cemetery was locked and no access was gained to document some of the graves within.



Figure 29. Grave at Site LEB 1



Figure 30. Graves at Site LEB 5



Figure 31. Formal Cemetery at Site LEB 6



Figure 32. General site conditions Site LEB 6



Figure 33. Graves at Site LEB 7



Figure 34. Grave at Sites LEB 7

<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 20-meter buffer and the pipeline rerouted in these areas. These rerouted areas will have to be assessed by an archaeologist.</p>

9.5 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.

9.6 Palaeontological Resources

An independent paleontological study (Millstead 2017) found that “*The majority of the project area is underlain by rocks of the late Achaean to early Proterozoic rocks of the Transvaal Supergroup. These units consist of the Chuniespoort Group (Malmani Subgroup and Duitschland Formation) and undifferentiated rocks of the Pretoria Group. Late Triassic/Early Jurassic sediments of the Clarens Formation (Karoo Supergroup) underlie the western-most extent of the project’s infrastructure. The rocks of the Clarens Formation are known to be fossiliferous and to contain highly scientifically significant fossil assemblages. The probability of the project negatively impacting upon the fossil assemblages of the Clarens formation is low. The carbonate sediments of the Malmani Subgroup are richly fossiliferous containing abundant assemblages of stromatolites and the probability of the project impacting upon these is high; however, the significance of any such impact will be low. The Duitschland Formation and the rocks of the Pretoria group are unfossiliferous; the probability and significance of the palaeontological heritage of these units being negatively impacted is nil. No damage mitigation protocols are required to preserve the palaeontological heritage of the project area in those portions of the project that are underlain by the rocks of the Malmani Subgroup, Duitschland Formation or the Pretoria Group and none are suggested herein.*

The Clarens Formation contains scientifically important fossils that may be negatively impacted upon by the project. As such, any excavations that are produced within the portion of the project area underlain by the Clarens Formation, for the emplacement of the pipelines, may well expose scientifically valuable fossils. It is recommended, therefore, that all excavations that are produce into the Clarens Formation land surface within Mmaphelo Township should be inspected by a qualified palaeontologist before the pipes are laid and the trenches infilled with soil. Should any fossil materials be identified the excavations in that area should be halted in that location and SAHRA informed of the discovery. A significant potential benefit of the examination of the excavations associated with the construction of the project is that currently unobservable fossils may be uncovered. As long as the construction process is closely monitored it is possible that potentially significant fossil material may be made available for scientific study. Should scientifically or culturally significant fossil material exist within the project area any negative impact upon it could be mitigated by its excavation (under permit from SAHRA) by a palaeontologist and the resultant material being lodged with an appropriately permitted institution. In the event that an excavation is impossible or inappropriate the fossil or fossil locality should be protected and the fossil site excluded from any further construction and the location of the pipeline moved.

He concluded that the desktop study has not identified any palaeontological reason to prejudice the construction of the water supply pipeline project subject to the proposed damage mitigation procedures being implemented. ” (Millstead 2017)

9.7 Battlefields and Concentration Camps

There are no battlefields or related concentration camp sites located in the study area. The British built a concentration camp at Pietersburg during the Boer War to house almost 4,000 Boer women and children. (<http://www.sahistory.org.za/pietersburg/colonial-history-polokwane>).

9.8 Potential Impact

9.8.1 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.

9.8.2 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.

9.8.3 Operation Phase:

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

Table 7. Impact Assessment of the project

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 (3)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (3)
Probability	Probable (4)	Not Probable (2)
Significance	48 (Medium to high)	22 (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:		
Some 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 LEB 1,3,5,7), the line will have to be rerouted in order to avoid these sites and the sites will have to be demarcated during construction.		
Cumulative impacts:		
Other authorised projects (e.g., powerline, mining, pipeline and road infrastructure projects) in the area could have a cumulative impact on the heritage landscape. The added impact the Groothoek regional scheme 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 Groothoek 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.

10 Recommendations and conclusion

During the survey 7 heritage features were recorded. These consist of four cemeteries a Late Iron Age stone walled site, one ruin and a long linear stone wall.

An independent paleontological study (Millstead 2017) concluded that there is no palaeontological reason to prejudice the construction of the water supply pipeline project subject to the recommendation that all excavations that are conducted into the Clarens Formation land surface within Mmaphelo Township should be inspected by a qualified palaeontologist before the pipes are laid and the trenches infilled with soil.

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 implementation of the correct mitigation measures and management actions as detailed in Table 2 and 8 as well as the paleontological recommendations (Millstead 2017) and the implementation of a chance find procedure for the project. Furthermore, the need for potable water is a major concern for the communities living in the area and 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 that the project is authorised from a heritage perspective on the condition that the recommendations as made in this report and the paleontological report (Millstead 2017) are implemented as part of the EMPr and based on approval from SAHRA.

Table 8. Recommended mitigation measures on sites.

LABEL	LONGITUDE	LATITUDE	Description	Significance	Mitigation
LEB 1	29° 37' 32.0627" E	24° 17' 38.2091" S	Cemetery	High Social Significance	Realign, preservation of site in situ.
LEB 2	29° 37' 27.8579" E	24° 17' 24.7559" S	Ruin	Low to Medium Significance,	Demarcate and preserve (possibility of graves)
LEB 3	29° 35' 38.6412" E	24° 17' 25.3787" S	Stone Wall	Stone wall is probably more recent but is of unknown purpose – Low Significance	Chance find procedure
LEB 4	29° 35' 25.7315" E	24° 17' 31.2109" S	Iron Age Site	Medium significance	Demarcate and preserve chance find procedure (possibility of graves)
LEB 5	29° 34' 51.5280" E	24° 17' 40.0703" S	Cemetery	High Social Significance	Realign, preservation of site in situ.
LEB 6	29° 32' 39.6853" E	24° 16' 08.7419" S	Cemetery	High Social Significance	Demarcate and avoid
LEB 7	29° 32' 11.6843" E	24° 17' 34.6813" S	Cemetery	High Social Significance	Realign, preservation of site in situ.

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.

10.1 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 pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or 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.

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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www.sahistory.co.za

12 Appendices:**Curriculum Vitae of Specialist**

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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 Chloorkop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.

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

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

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

Phase 2 Mitigation Projects

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

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

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

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

Heritage management projects

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

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

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

PUBLICATIONS AND PRESENTATIONS

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

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

REFERENCES:

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