

Phase 1 Heritage Impact Assessment Report

**HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED
INSTALLATION OF A WATER PIPELINE FROM MAGALIES
WATER TO THE MAROELAESFONTEIN ANDALUSITE MINE
ON PORTIONS OF THE FARMS MODDERGAT 389 KQ,
KAALVLAKTE 416 KQ AND VLAKPOORT 388 KQ, SOUTH
OF THABAZIMBI, IN THE WATERBERG DISTRICT OF THE
LIMPOPO PROVINCE.**

PREPARED BY:



PREPARED FOR:



CREDIT SHEET

Project Director

STEPHAN GAIGHER (BA Hons, Archaeology, UP)

Principal Investigator for G&A Heritage

Member of ASAPA (Site Director Status)

Tel: (015) 516 1561

Cell: 073 752 6583

E-mail: stephan@gaheritage.co.za

Website: www.gaheritage.co.za

Report Author

STEPHAN GAIGHER

***Disclaimer;** Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. G&A Heritage and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

Statement of Independence

As the duly appointed representative of G&A Heritage, I Stephan Gaigher, hereby confirm my independence as a specialist and declare that neither I nor G&A Heritage have any interests, be it business or otherwise, in any proposed activity, application or appeal in respect of which the Environmental Consultant was appointed as Environmental Assessment Practitioner, other than fair remuneration for work performed on this project.

SIGNED OFF BY: STEPHAN GAIGHER



MANAGEMENT SUMMARY

Site name and location: Proposed Installation of a Water Pipeline from Magalies Water to the Maroeloesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi.

Municipal Area: Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.

Developer: Andalusite Resources (Pty) Ltd

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa.
38A Vorster St, Louis Trichardt, 0920

Date of Report: 3 November 2017

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the Proposed Installation of a Water Pipeline from Magalies Water to the Maroeloesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi in the Waterberg District of the Limpopo Province.

This study encompasses the heritage impact investigation. A preliminary layout has been supplied to lead this phase of this study.

Scope of Work

A Heritage Impact Assessment (including Archaeological, Cultural heritage, Built Heritage and Paleontological Assessment) to determine the impacts on heritage resources within the study area.

The following are the required to perform the assessment:

- A desk-top investigation of the area;
- A site visit to the proposed development site;
- Identify possible archaeological, cultural, historic, built and paleontological sites within the proposed development area;
- Evaluate the potential impacts of construction and operation of the proposed development on archaeological, cultural, historical resources; built and paleontological resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural, historical, built and paleontological importance.

The purpose of this study is to determine the possible occurrence of sites with cultural heritage significance within the study area. The study is based on archival and document combined with fieldwork investigations.

Findings & Recommendations

The area was investigated during a field visit and through archival studies. The site was found to be devoid of any heritage sites with significance. It is recommended that obscured, subterranean sites be managed, if they are encountered.

Fatal Flaws

No fatal flaws were identified.

TABLE OF CONTENTS

1.	Introduction.....	9
2.	Background Information.....	12
2.1	Project Background.....	12
2.2	Project Description.....	12
2.3	Project Location.....	12
2.4	GPS Track Paths.....	13
3.	Regional Cultural Context.....	14
3.1	Paleontology.....	14
3.2	Stone Age.....	14
3.3	Iron Age.....	15
3.4	The Historic Era.....	17
3.5	Cultural Landscape.....	18
3.6	Previous Studies.....	23
3.7	Analysis of Previous Studies.....	24
3.8	Historical Maps.....	25
4.	Findings.....	29
5.	Methodology.....	30
5.1	Inventory.....	30
5.2	Evaluating Heritage Impacts.....	30
5.3	Fieldwork.....	31
6.	Measuring Impacts.....	31
6.1	Type of Resource.....	31
6.2	Type of Significance.....	32
6.2.1	Historic Value.....	32
6.2.2	Aesthetic Value.....	32

6.2.3 Scientific Value.....	32
6.2.4 Social Value / Public Significance	33
6.2.5 Ethnic Significance.....	34
6.2.6 Economic Significance	34
6.2.7 Scientific Significance	34
6.2.8 Historic Significance.....	34
6.2.9 Public Significance	34
6.2.10 Other.....	35
6.3 Degrees of Significance	35
6.3.1 Significance Criteria	35
6.3.2 Rarity	36
6.3.3 Representivity.....	36
7 Assessment of Heritage Potential	36
7.1 Assessment Matrix: Determining Archaeological Significance.....	36
7.2 Assessing site value by attribute	37
7.3 Impact Statement.....	37
7.3.1 Assessment of Impacts	38
7.3.2 Indicators of Impact Severity	38
7.3.4 Post-Contact Sites	39
7.3.5 Built Environment.....	39
7.3.6 Historic Significance.....	39
7.3.7 Architectural Significance	39
7.3.8 Spatial Significance.....	40
8 Impact Evaluation.....	40
8.1 Determination of Significance of Impacts	40
8.2 Impact Rating System.....	41
8.3 Rating System Used to Classify Impacts.....	41
9 Anticipated Impact of the Development	44

Water Pipeline from Magalies Water to the Maroeloesfontein Andalusite Mine44

2017/11/03

9.4 Assessing Visual Impact.....	45
9.5 Assumptions and Restrictions.....	45
10 Assessment of Impacts (Impact Statements).....	45
10.2 Built Environment.....	45
10.3 Cultural Landscape.....	45
11 Resource Management Recommendations.....	47
12 Conclusion.....	48
13 References Cited.....	48

LIST OF FIGURES

Figure 1. Project Location	12
Figure 2. Google Earth Image of the Study Area	13
Figure 3. (1) handaxe on flake; (2) thick discoidal core; (3) polyhedral core (Pollarolo, Kuman, Bruxelles, 2010)	14
Figure 4. (1,2) Handaxes with large side removal; (3-6) handaxes (Pollarolo, Susino, Kuman, Bruxelles, 2010)	15
Figure 5. Marothodi	16
Figure 6. Kaditshwene	17
Figure 7. Alongside the R510	18
Figure 8. Ploughed field through which the pipeline crosses	19
Figure 9. Pipeline alignment	19
Figure 10. Pipeline alignment	20
Figure 11. Pipeline at the Bierspruit Crossing.....	20
Figure 12. Bierspruit Riverbank	21
Figure 13. Groundworks at Bierspruit	21
Figure 14. Pipeline	22
Figure 15. Pipeline at the Crossing Point.....	22
Figure 16. Topographical Map 2427 CD 1980	25
Figure 17. Topographical Map 2427 CD 2005	26
Figure 18. Topographical Map 2427 CC 1967	27
Figure 19. Topographical Map 2427 CC 1984	28
Figure 20. Topographical Map 2427 CC 2005	29

LIST OF ABBREVIATIONS

Bp.....	Before Present
EIA	Early Iron Age
ESA.....	Early Stone Age
Fm	Femtometre (10^{-15} m)
GPS.....	Geographic Positioning System
HIA	Heritage Impact Assessment
LIA.....	Late Iron Age
LSA	Late Stone Age
MYA	Million Years Ago
MSA	Middle Stone Age
NHRA.....	National Heritage Resources Act no 22 of 1999
SAHRA.....	South African Heritage Resource Agency
S&EIR	Scoping & Environmental Impact Reporting
Um.....	Micrometre (10^{-6} m)
WGS 84	World Geodetic System for 1984

HERITAGE IMPACT REPORT

HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED INSTALLATION OF A WATER PIPELINE FROM MAGALIES WATER TO THE MAROELLESFONTEIN ANDALUSITE MINE ON PORTIONS OF THE FARMS MODDERGAT 389 KQ, KAALVLAKTE 416 KQ AND VLAKPOORT 388 KQ SOUTH OF THABAZIMBI IN THE WATERBERG DISTRICT OF THE LIMPOPO PROVINCE.

1. INTRODUCTION

Legislation and methodology

G&A Heritage was appointed by **Galago Environmental** to undertake a heritage impact assessment for the Proposed Installation of a Water Pipeline from Magalies Water to the Maroelesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi, in the Waterberg District of the Limpopo Province.

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken for:

- (a) Construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) Construction of a bridge or similar structure exceeding 50 m in length; and
- (c) Any development, or other activity which will change the character of an area of land, or water –
 - (1) Exceeding 10 000 m² in extent;
 - (2) Involving three or more existing erven or subdivisions thereof; or
 - (3) Involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or
 - (d) The costs of which will exceed a sum set in terms of regulations; or
 - (e) Any other category of development provided for in regulations.

While the above describes the parameters of developments that fall under this Act., Section 38 (8) of the NHRA is applicable to this development. This section states that;

- (8) *The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.*

In regards to a development such as this that falls under Section 38 (8) of the NHRA, the requirements of Section 38 (3) applies to the subsequent reporting, stating that;

- (3) *The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2) (a): Provided that the following must be included:*
- (a) *The identification and mapping of all heritage resources in the area affected;*
 - (b) *An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7;*
 - (c) *An assessment of the impact of the development on such heritage resources;*
 - (d) *An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
 - (e) *The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
 - (f) *If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
 - (g) *Plans for mitigation of any adverse effects during and after the completion of the proposed development.*
 - (1) Ancestral graves,
 - (2) Royal graves and graves of traditional leaders,
 - (3) Graves of victims of conflict (iv) graves of important individuals,
 - (4) Historical graves and cemeteries older than 60 years, and
 - (5) Other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
 - (h) *Movable objects, including ;*
 - (1) *Objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;*
 - (2) *Ethnographic art and objects;*
 - (3) *Military objects;*
 - (4) *Objects of decorative art;*
 - (5) *Objects of fine art;*
 - (6) *Objects of scientific or technological interest;*
 - (7) *Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and*
 - (8) *Any other prescribed categories, but excluding any object made by a living person;*
 - (i) *Battlefields;*
 - (j) *Traditional building techniques.*

A **'place'** is defined as:

- (a) A site, area or region;
- (b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
- (c) A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'Structures' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'Archaeological' means:

- (a) Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- (b) Rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation; and
- (c) Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated

therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;

(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Paleontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;

- Field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- It was assumed that the site layout as provided by **Galago Environmental** is accurate.
- We assumed that the public participation process performed as part of the S&EIR process was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

Table 1. Impacts on the NHRA Sections

Act	Section	Description	Possible Impact	Action
National Heritage Resources Act (NHRA)	34	Preservation of buildings older than 60 years	No impact	None
	35	Archaeological, paleontological and meteor sites	No impact	None
	36	Graves and burial sites	Possible Impact	Management Guidelines
	37	Protection of public monuments	No impact	None
	38	Does activity trigger a HIA?	Yes	HIA

Table 2. NHRA Triggers

Action Trigger	Yes/No	Description
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes	Proposed Installation of a Water Pipeline from Magalies Water to the Maroelesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi, in the Waterberg District of the Limpopo Province.

Construction of a bridge or similar structure exceeding 50m in length.	No	N/A
Development exceeding 5000 m ²	No	N/A
Development involving more than 3 erven or sub divisions	No	N/A
Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years	No	N/A
Re-zoning of site exceeding 10 000 m ²	No	N/A
Any other development category, public open space, squares, parks or recreational grounds	No	N/A

2. BACKGROUND INFORMATION

2.1 PROJECT BACKGROUND

This study focuses on the Proposed Installation of a Water Pipeline from Magalies Water to the Maroelesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi, in the Waterberg District of the Limpopo Province.

2.2 PROJECT DESCRIPTION

Andalusite Resources (Pty) Ltd plans to install a water pipeline from Magalies Water to the mine and will cross the Bierspruit on portions of the farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ. The pipeline will be approximately 14.46 km in length with a diameter of 200mm. The project entails a pipeline crossing the Bierspruit on the the farm Moddergat 389 KQ.

2.3 PROJECT LOCATION

The Maroelesfontein Andalusite mine is located south of Thabazimbi and 30km north of Northam in the Limpopo Province near the Madeleine Robinson Nature Reserve. The Pipeline starts on the Farm Vlakpoort 388 KQ, continues over Bierspruit on Portion 1 & the remainder of the farm Moddergat 389 KQ and continues on Farm Kaalvlakte 416 KQ.

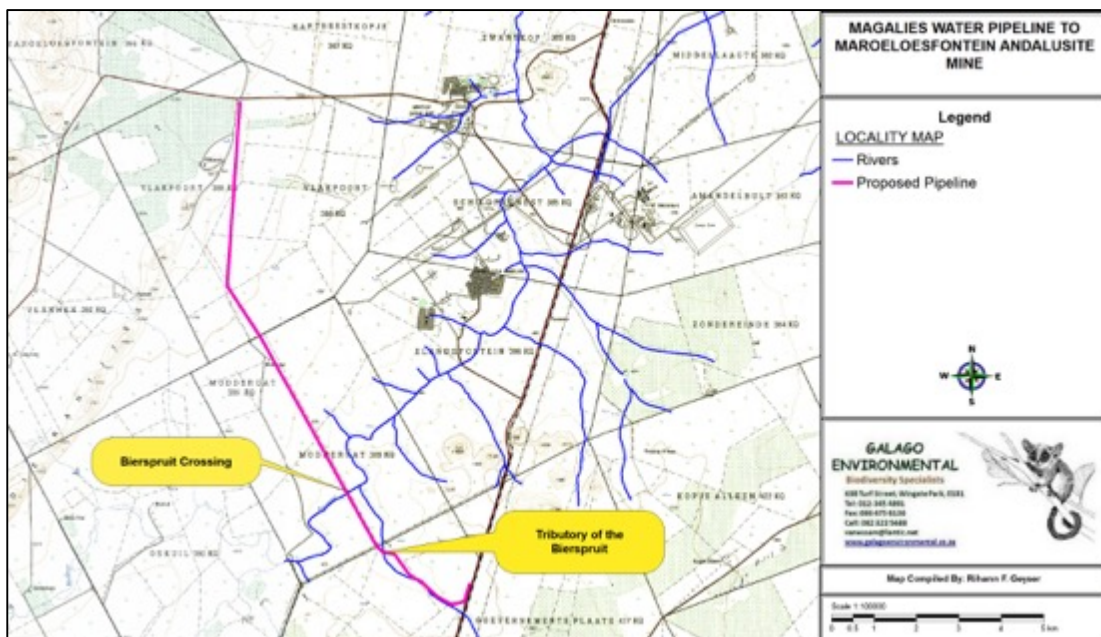


Figure 1. Project Location



Figure 2. Google Earth Image of the Study Area

2.4 GPS TRACK PATHS

Due to the linear nature of the development, the investigations followed the water pipeline alignments as provided by the client. These are reflected in the GPS track paths. GPX files supporting this statement is available on request from G&A Heritage.

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT**3. REGIONAL CULTURAL CONTEXT****3.1 PALEONTOLOGY**

The rocks of the Bushveld Igneous Complex are non-fossiliferous and are of no palaeontological concern. No fossils have been reported from the study area and the probability of fossils occurring in the Tertiary to Quaternary aeolian sand and soils in the study area is very low. These sediments are correlated with the Kalahari Group sediments. The fossils reported from Kalahari Group sediments are very sparse, occur sporadically and are low in diversity. Although no fossils have been reported for the study area, fossils such as root casts, burrows, termitaria, ostrich egg shells, mollusc shells and isolated bones have been discovered in the Kalahari Group elsewhere (Almond & Pether 2008).

3.2 STONE AGE

During the Middle Stone Age, 200 000 years ago, modern man or Homo sapiens emerged, manufacturing a wider range of tools, with technologies more advanced than those from earlier periods. This enabled skilled hunter-gatherer bands to adapt to different environments. From this time onwards, rock shelters and caves were used for occupation and reoccupation over very long periods of time (Mitchell 2002). Two Middle Stone Age sites at the Withoek Spruit (Brakpan) were researched 17 years ago, but no information on this discovery has been published.

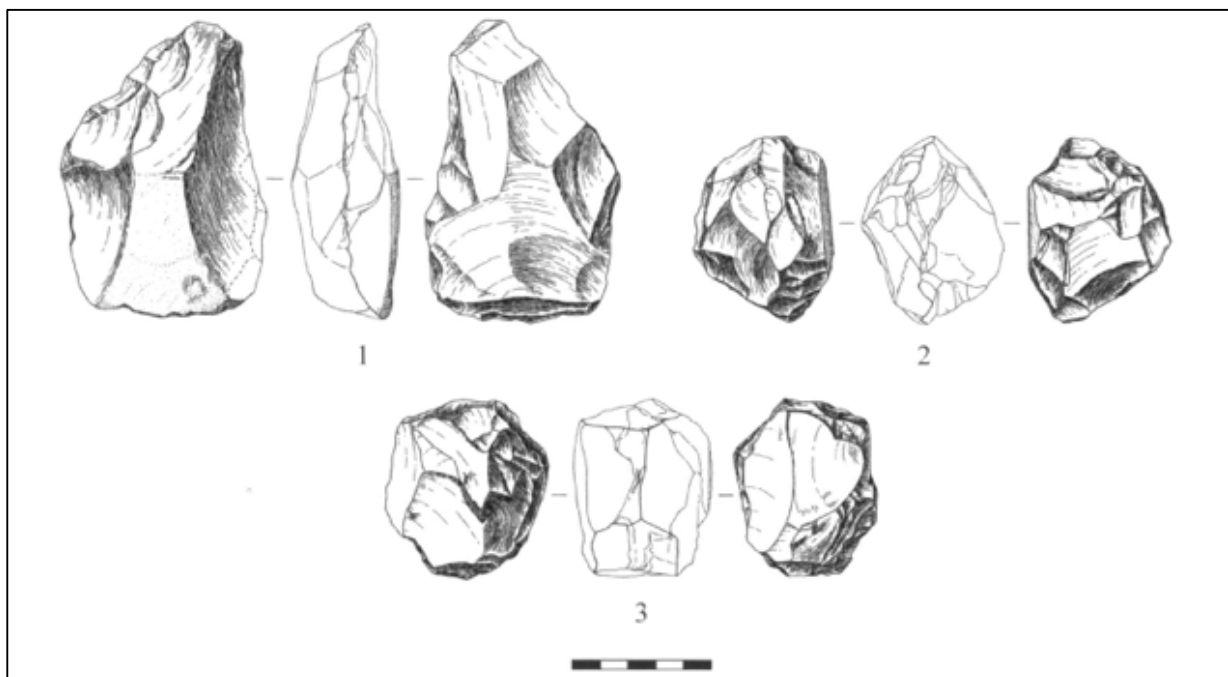


Figure 3. (1) handaxe on flake; (2) thick discoidal core; (3) polyhedral core (Pollarolo, Kuman, Bruxelles, 2010)

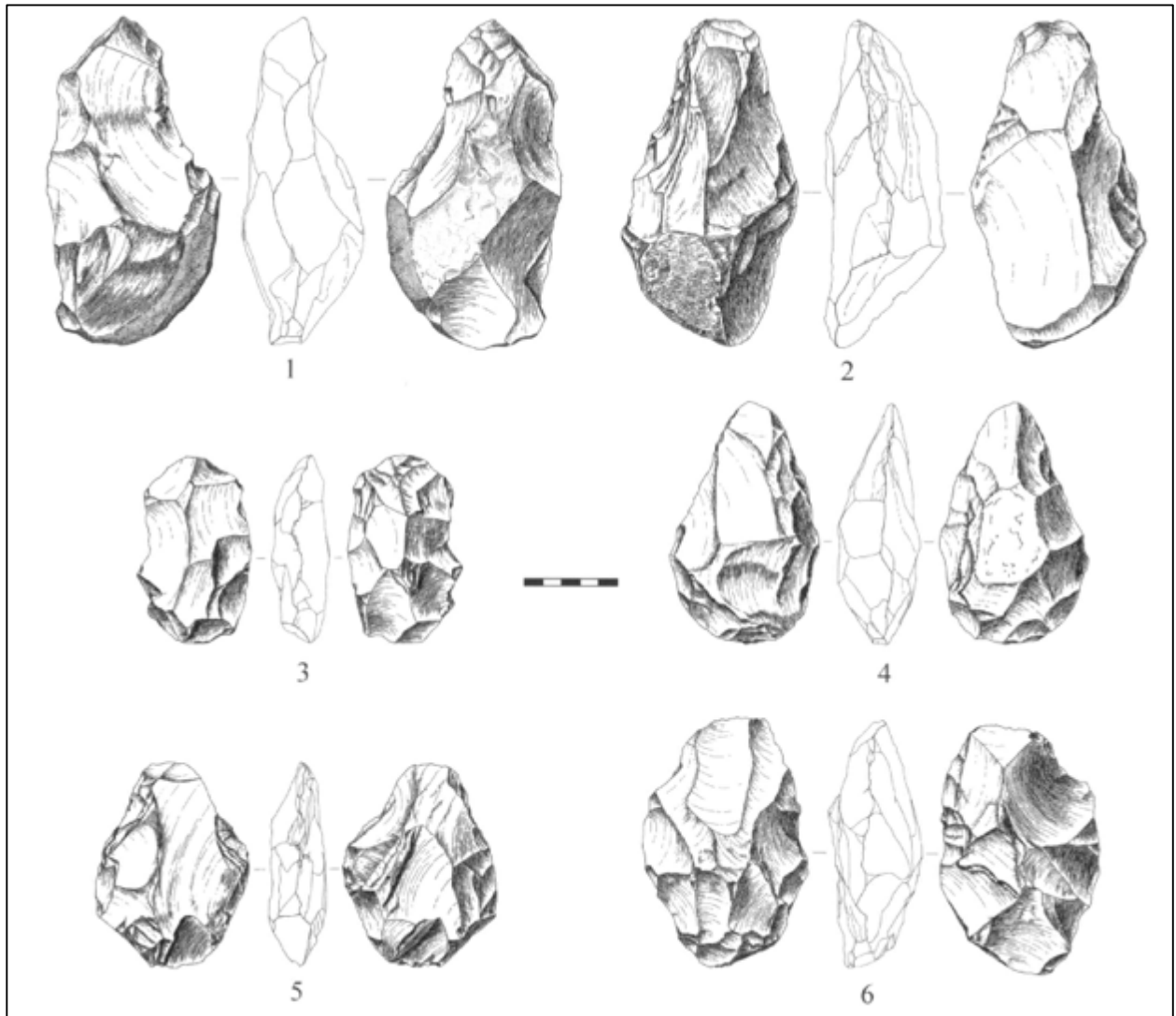


Figure 4. (1,2) Handaxes with large side removal; (3-6) handaxes (Pollarolo, Susino, Kuman, Bruxelles, 2010)

The Late Stone Age, considered to have started some 20 000 years ago, is associated with the predecessors of the San and Khoi Khoi. San hunter-gatherer bands with their small (microlithic) stone tools may have lived in Eastern Gauteng, as a magnificent engraving site near Duncanville attests to their presence in Vereeniging, south of, but close to Ekurhuleni. Stone Age hunter-gatherers lived well into the 19th century in some places in SA, but may not have been present when the first European colonists crossed the Vaal River during the early part of the 19th century. Stone Age sites may occur all over the area where an unknown number may have been obliterated by mining activities, urbanization, industrialization, agriculture and other development activities during the past decades (Morris 2004).

3.3 IRON AGE

This area is located in a region where both components of the Iron Age (both Early and Late) is found although the Late Iron Age (LIA) is far more common. During the later stages of the 18th and 19th century the Bakwena were living in megalithic sites such as Boitsimogale and Kaditshwene in the Bankeveld. The eighteenth and nineteenth centuries constituted an era of momentous change in the South African interior. The era was characterised, among other things, by the emergence and decline of large African polities, colonial expansion, the forging of new identities and the disappearance of others, as well as significant population movements, such as

witnessed during the difaqane and the Great Trek. This period also saw the introduction of new cultigens, materials and technologies, including the gradual adoption of writing as a primary archive. It was during this formative period that the area beyond the Orange and Vaal Rivers became inextricably woven into the fabric of a broader South African society as the thrust of colonial advance reached deep into the interior. The whole region south of the Limpopo River became part of an embryonic but irreversibly globalised world that had started to emerge a few centuries earlier in the wake of European colonisation and expansion (Boeyens, 2011).

Tlokwa oral traditions recalls that a chiefly branch of this Tswana cluster had shifted their capital to a large plain close to the Pilwe Hills towards the end of the eighteenth century. Oral records associated the capital site, known as Marothodi, with the historical farm Bultfontein 204 JP, onto which a small section of the stone walling extends (Ellenberger 1939:172-173, 1940:223; Schapera 1938:xii, 308).



Figure 5. Marothodi

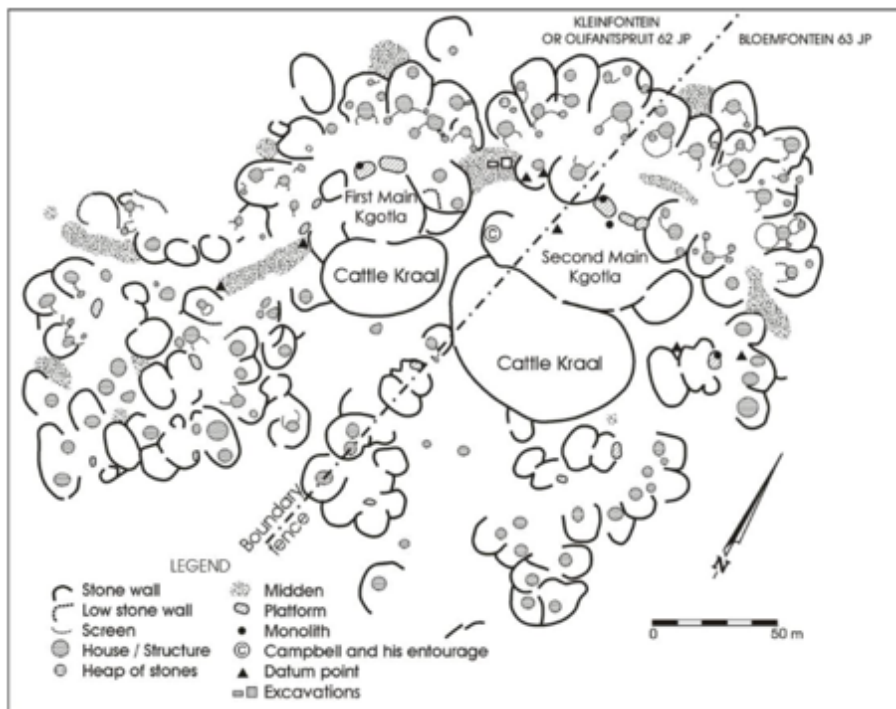


Figure 6. Kaditshwene

3.4 THE HISTORIC ERA

The historic era is dominated by the conflict between Mzilikazi and the tribes living in the area. Mzilikazi established temporary settlements near present-day Rustenburg, then launched into action against the baKwena. After falling on the Kwena at Silkaatsnek the Matabele turned on the Po who were easily overwhelmed. Kgatla Chief Pilane fled to the hills that now bear his name. Mzilikazi ruthlessly massacred the remaining Tswana groups in the area. Using the Magaliesberg as his centre, Mzilikazi expanded his kingdom, which by then stretched from the Vaal River in the south to the confluence of the Crocodile and Limpopo Rivers.

The first white farmers settled in this part of the country after 1841. The district of Waterberg was established in 1866. This indicates that there must have been enough people to make the establishment of a district a viable option.

Thabazimbi (*"Mountain of Iron"*) was named for the exceptionally lucrative iron ore that is found in the vicinity. The iron ore was discovered in 1919 by J.H. Williams. The railway from Rustenburg reached the area in the 1930's and full scale iron and steel production began. Thabazimbi was proclaimed in 1953.

In the last decade, Thabazimbi was developed into an Eco Tourism hub with its large variety of wildlife, birds and hiking trails. The Marakele National Park is situated 15km north of the town.

The Thabazimbi mine has been in operation since 1931. The mine uses conventional opencast methods.

In a 2004 article in the Mining Weekly it was stated that Amandelbult is Anglo Platinum's largest contributor and the second largest platinum mine in the world. A series of shafts has been sunk at the mine since 1973. The mine was temporarily closed from 1973 to 1976, but since has continued to increase production and in October 2002 produced 2 tons of platinum in a month.

The Amandelbult East Upper UG2 Project conventionally mines the UG2 reef, using existing mining infrastructure previously employed to extract the Merensky reef, at the vertical number 2 shaft and at three decline shafts at 44 East, 50 East and 62 East. The recently completed 75 000 tons per month UG2 concentrator was expanded to 210

000 tons per month and by 2012 the Project contributed an additional 100 000 ounces of refined platinum per annum to Amandelbult's production.

Sources:

<http://www.sahistory.org.za/people/king-mzilikazi>

<http://www.limpopohappenings.co.za/thabazimbihomepage.htm>

Mining Weekly, 21 May 2004, Andrew Lanham

<http://www.angloamericanplatinum.com/media/press-releases/archive/2006/12-12-2006.aspx>

3.5 CULTURAL LANDSCAPE

The study area is located on a Game Farm and the surrounding areas associated with agricultural and mining activities.



Figure 7. Alongside the R510



Figure 8. Ploughed field through which the pipeline crosses



Figure 9. Pipeline alignment



Figure 10. Pipeline alignment



Figure 11. Pipeline at the Bierspruit Crossing



Figure 12. Bierspruit Riverbank



Figure 13. Groundworks at Bierspruit



Figure 14. Pipeline



Figure 15. Pipeline at the Crossing Point

3.6 PREVIOUS STUDIES

An extensive research into the SAHRIS database resulted in the identification of the following heritage related studies that have been performed over the last decade in the study area. Only studies within a radius of 50km from the study area were considered.

- Van Schalkwyk, J. 2010. Survey of Heritage Resources in the Location of the Proposed Merensky Mining Project, Amandelbult Section, Rustenburg Platinum Mine, Limpopo Province.
- Van der Walt, J. 2014. Archaeological Impact Assessment for the Proposed Zwartkop Industrial Development, Amandelbult, Limpopo Province.
- Van der Walt, J. 2009. Archaeological Impact Assessment Chronimet Underground Mine and Process Plant, Amandelbult, Limpopo Province.
- Van Schalkwyk, J., Teichert, F., Pelsler, A. 2003. A Survey of Archaeological Sites for the Amandelbult Platinum Mine Seismic Exploration Program.
- Van Schalkwyk, J. 1994. A Survey of Archaeological and Cultural Historical Resources in the Amandelbult Mining Lease Area.
- Cairncross, B. 2011. The Thabazimbi Mine Cave, Limpopo Province, South Africa: Assessment of the Cave and its Speleothems.
- Bamford, M. 2012. Palaeontological Impact Assessment of the Cave Mosterr Adit, Thabazimbi Mountain.
- Miller, S. 2011. First Phase Cultural Essay for the farms Donkerpoort 448KQ, Randstephne 445KQ and Waterval 443 KQ, Thabazimbi, Limpopo Province.
- Almond, J.E. 2012. Palaeontological Impact Assessment: Gatkop Cave on Farm Randstephane 415 KQ near Thabazimbi, Limpopo Province.
- Kruger, N. 2014. Archaeological Impact Assessment (AIA) of a Demarcated Surface Portion on the Farm Grootkuil 409KQ for the Proposed Platinum Photovoltaic Power Plant Development, Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.
- Fourie, W. 2012. Mostert Tunnel Level Cave (MTC) – Wachteenbietjiesdraai 350 KQ and Kwaggashoek 345 KQ – Heritage Impact Report on proposed mining activities of project Phoenix.
- Almond, J.E. 2014. Palaeontological Assessment: Combined Desktop and Site Visit Report Proposed Meletse Iron Ore Project on Remaining Extent of the farms Donkerpoort 448KQ and Randstephane 445KQ near Thabazimbi, Waterberg District, Limpopo Province.
- Pistorius, J.C.C. 2010. A Base Line Heritage Assessment Report for the Eskom's Thabatsipi Substation and 132Kv Power Line project near Amadelbult an Thabazimbi in the Limpopo Province of South Africa.
- Van Vollenhoven. A. 2013. A Report on a Cultural Heritage Impact Assessment for the Continental Limestone Mine, close to Thabazimbi, Limpopo Province.
- Miller, S. 2014. 1st Phase Cultural Heritage Impact Assessment for the Farm Donkerpoort 448 KQ Remaining Extent, Randstephne 445 KQ Remaining Extent and Waterval 443 KQ, Thabazimbi, Limpopo Province.
- Van Schalkwyk, J. 2012. Heritage Impact Assessment for the Proposed new development at the SAPS Verdrag Training Centre, Thabazimbi Region, Limpopo Province.
- Hutten, M. 2012. Heritage Impact Assessment for the Proposed Development of a Residential Eco Estate on the farm Groothoek 278 KA approximately 15km north-east of Thabazimbi, Limpopo Province.
- Mapira, N., Van Wyk Rowe, C. 2009. Phase 1 Archaeological Impact Assessment (AIA) for portion 81 of the farm Doornhoek 318 KQ Thabazimbi, Limpopo Province.
- Huffman, T. 2009. Archaeological Assessment for the Rhino Andalusite Mine, Thabazimbi. A Phase 1 report with Appendix prepared for Rhino Minerals.
- Pistorius, J.C.C. 2012. A Baseline Heritage Impact Assessment Study for Eskom's proposed new 132Kv Power Line and Substation for the Proposed Simthabi project near Thabazimbi and Rooiberg in the Limpopo Province, South Africa.
- Van Essen, R. 2008. Heritage Scoping Report (Basic Assessment): Proposed Development on Erf 1802, Northan Extension 6, Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province.
- Van Schalkwyk, J. 2008. Heritage Impact Survey Report for the Proposed Green House Lodge, Madikwe Game Reserve, Thabazimbi Magisterial District, Limpopo Province.
- Roodt, F. 2006. Heritage Resources Scoping Report: Nooitgedacht Open Cape Archaeological Survey CCt Mine on the Farm Nooitgedacht 22 JQ, Northam: Thabazimbi Municipality.

- Kusel, U. 2007. Cultural Heritage Resources Impact Assessment of Hanover 341 KQ in the Thabazimbi Area Limpopo Province.
- Hutten, M. 2012. Heritage Impact Assessment for the Proposed Development of the Kambaku Private School on the Farm Vlakplaats 137 KQ, approximately 15km north of Thabazimbi, Limpopo Province.
- Kusel, U. 2005. Cultural Heritage Resources Impact Assessment on the Farm Koedoesfontein 324 KQ Thabazimbi.
- Kusel, U. 2007. Cultural Heritage Resources Impact Assessment on the Farm Hardekoolbult 548 KQ in the Thabazimbi Municipal Area, Limpopo Province.
- Fourie, W., van der Walt, J. 2007. Sunbird Heritage Impact Assessment Proposed Estate Development on Portions of the Darm Doornhoek 318 KQ, Thabazimbi, Limpopo Province.
- Gaigher, S. 2007. Heritage Impact Assessment for the Proposed Thabazimbi Extension 38 Housing Project on the Farm Doornhoek 318 KQ, Limpopo Province.
- Van der Walt, J. 2006. Portions of the Farm Grootkuil 376 KQ, Thabazimbi, Limpopo Province.
- Miller, S. 2015. Assessment and comments on the illegal destruction of site 4L on the Waterval 443 KQ, Thabazimbi, Limpopo Province.
- Fourie, W. 2007. Request for Heritage Assessment: Portion 1, 4, 5, 6, 7 and 19 of the Farm Maroelasfontein 366 KQ, Thabazimbi, Limpopo Province.

3.7 ANALYSIS OF PREVIOUS STUDIES

The only study of any real relevance to this study was the 2006 report by Van Schalkwyk regarding the proposed UG2 Mining Development.

Van Schalkwyk's study finds the following: "... *Archaeologically speaking, the surveyed area is not an area of high significance, as environmental constraints (such as lack of open water, suitable soil for settling on and lack of stone for building material) forced people, especially during pre-colonial times, to select other areas to live in. Previous mining development, as well as prior agricultural activities had an impact on the area and would have had a negative effect on any heritage resources that might have occurred here in the past...*"

This corroborates the findings of the current study.

3.8 HISTORICAL MAPS

Topographical Map 2427 CD: Only two versions of the Surveyor General's 1:50 000 topographic map sets could be found during the archival study. These are the 1980 and 2005 sets.

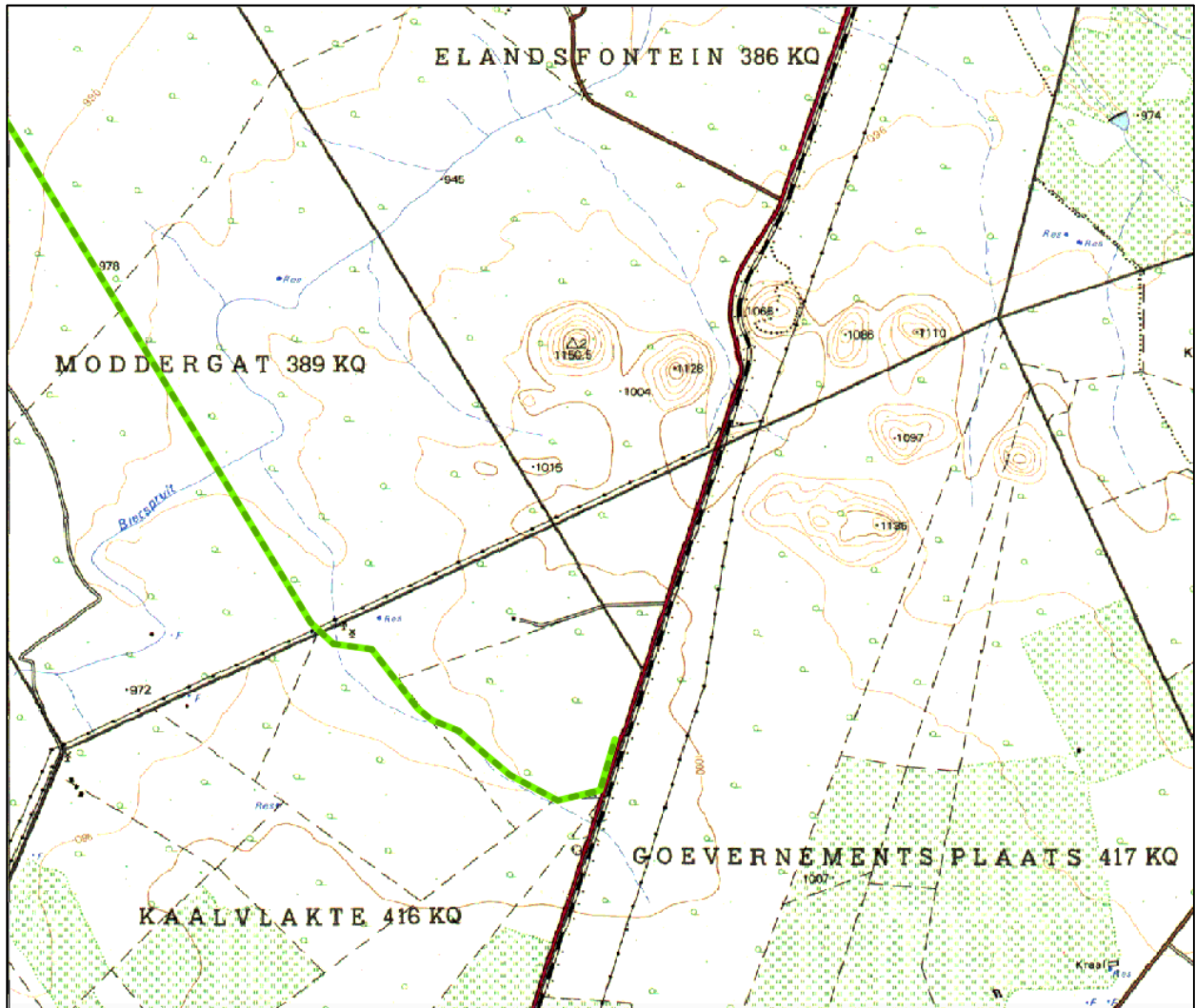


Figure 16. Topographical Map 2427 CD 1980

No sites were identified on the historical map 2427 CD 1980.

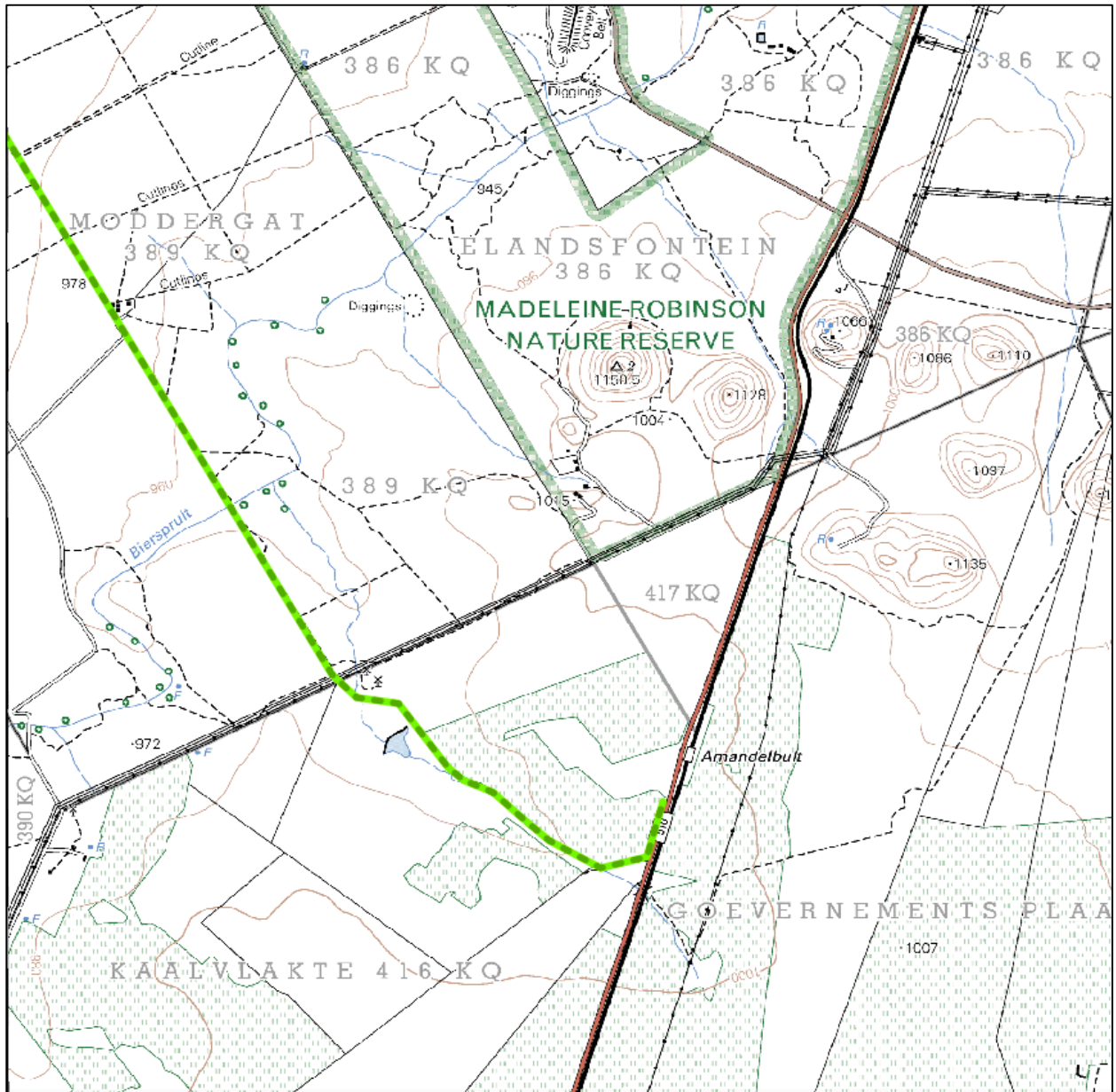


Figure 17. Topographical Map 2427 CD 2005

No sites were identified on the historical map 2427 CD 2005.

Topographical Map 2427 CC: Three versions of the Surveyor General's 1:50 000 topographic map sets could be found during the archival study. These are the 1967, 1984 and 2005 sets.

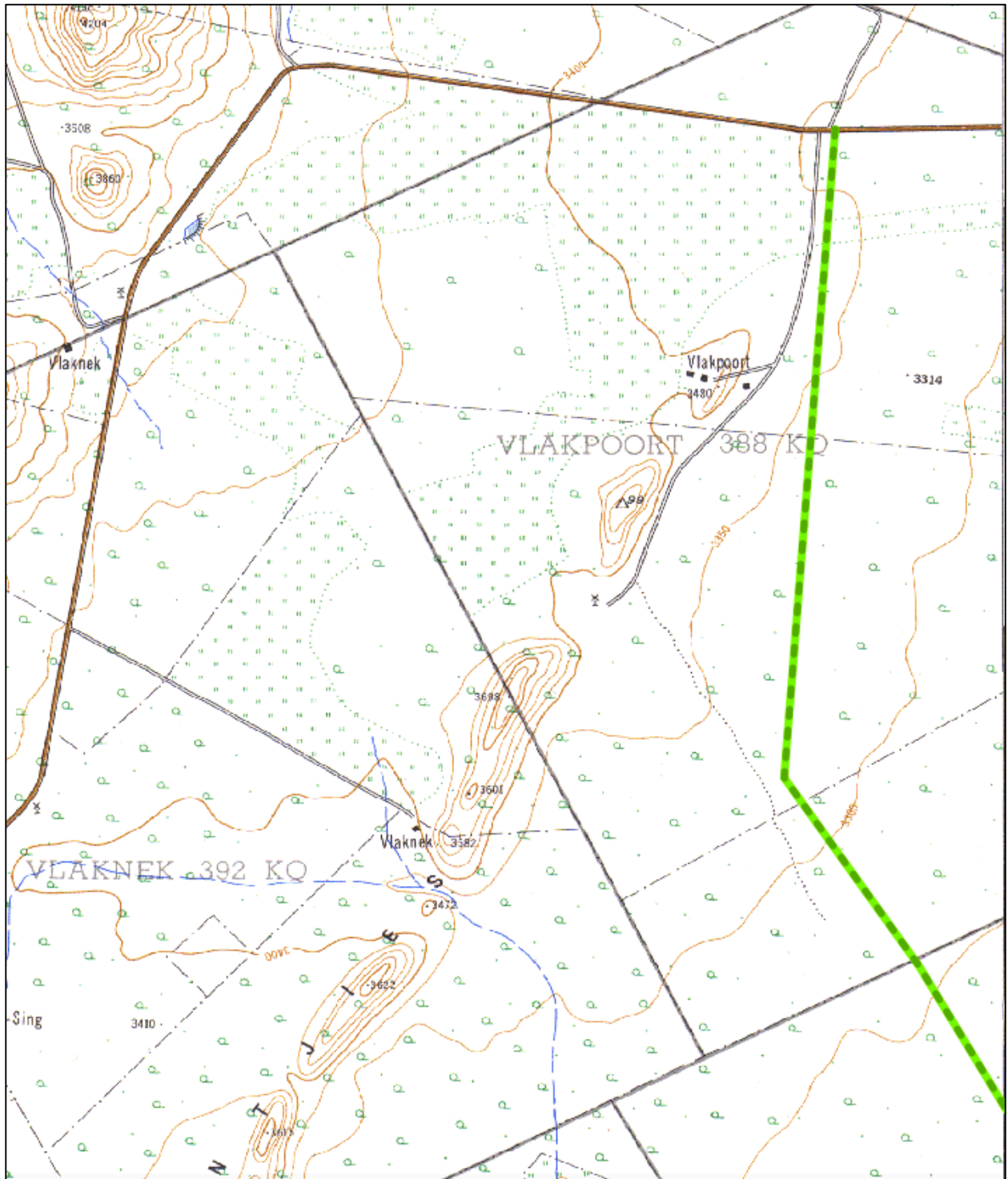


Figure 18. Topographical Map 2427 CC 1967

No sites were identified on the historical map 2427 CC 1967.

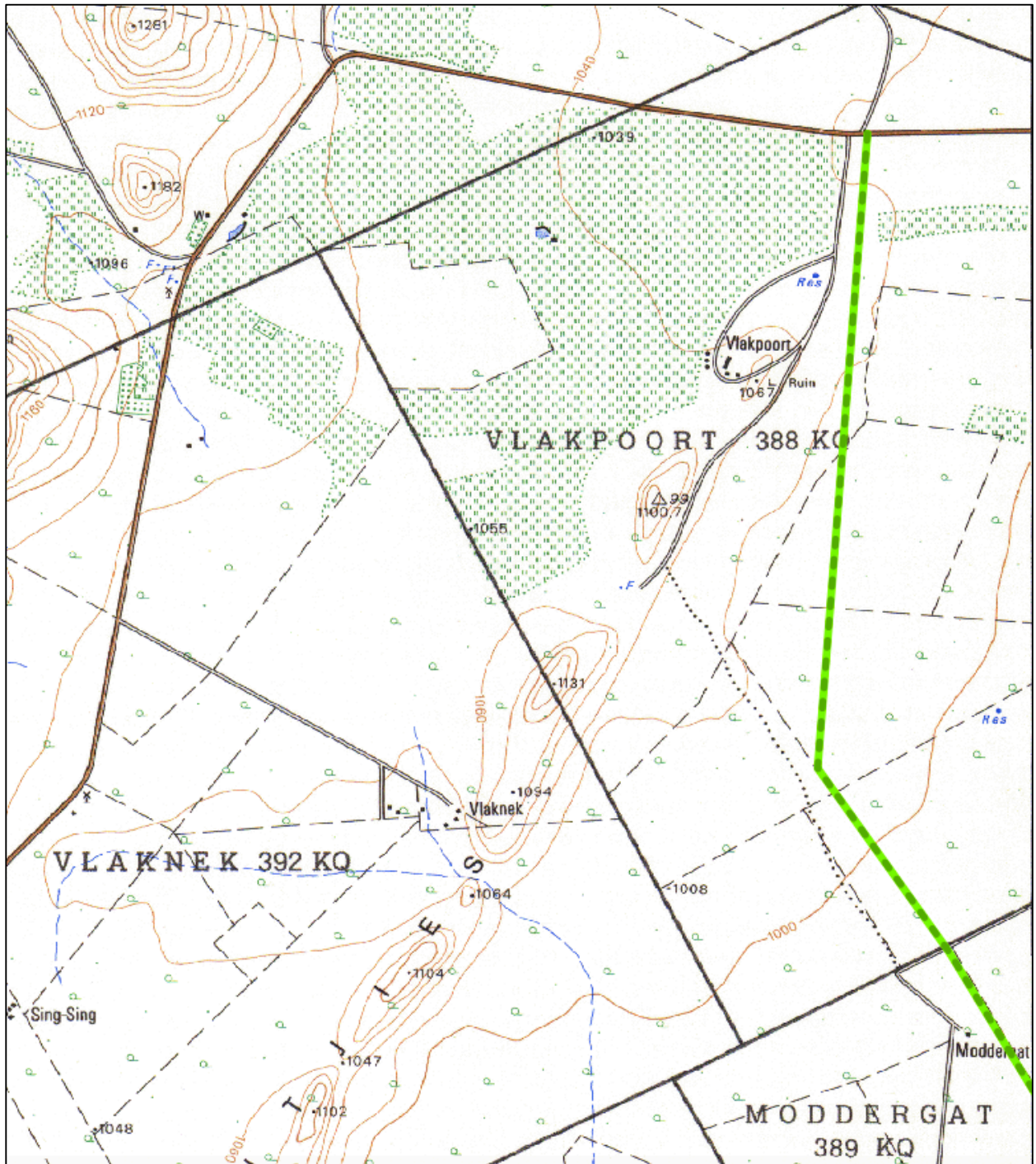


Figure 19. Topographical Map 2427 CC 1984

Ruins indicated on the Topographical Map 2427 CC 1984. These fall outside of the study area.

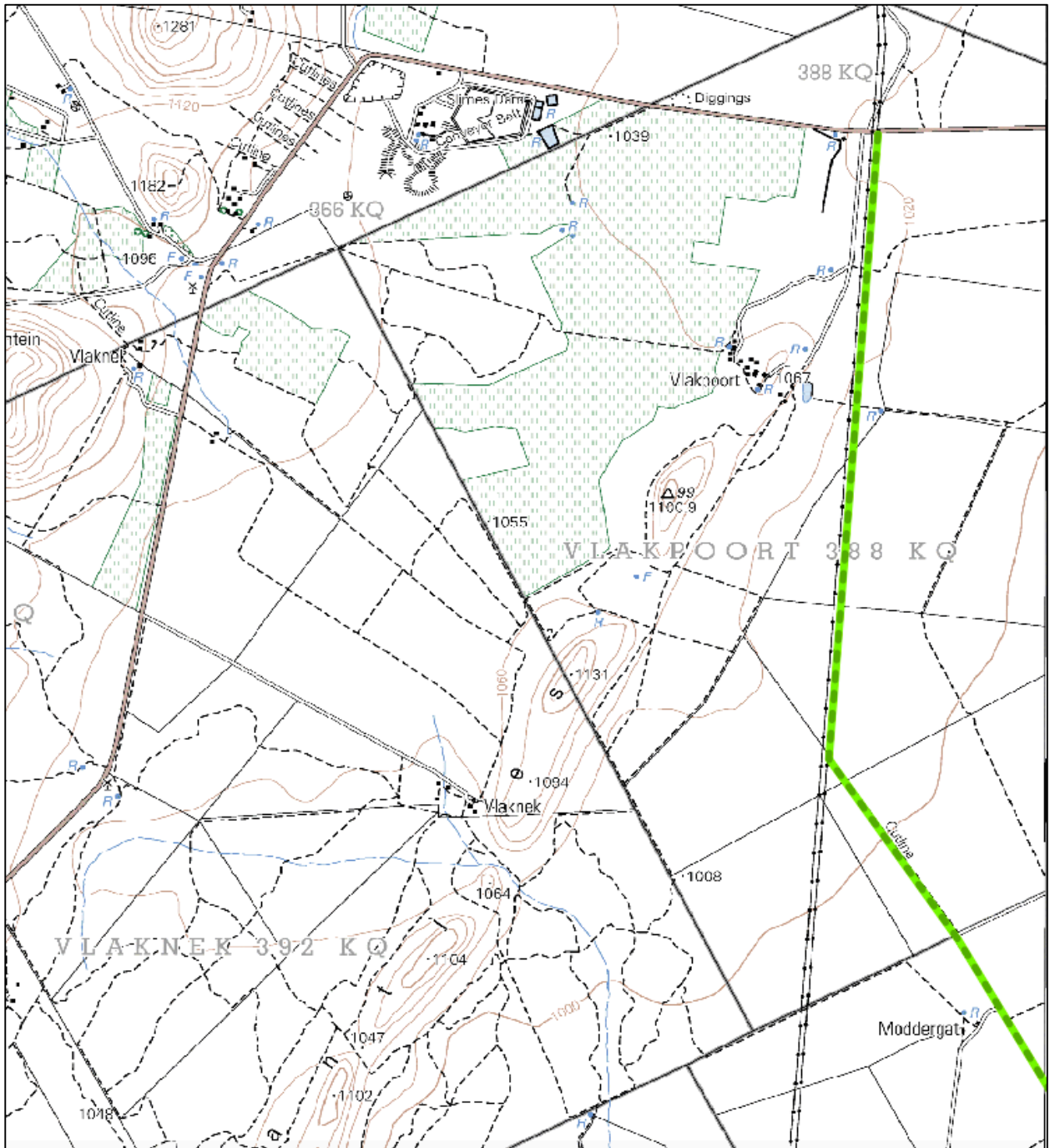


Figure 20. Topographical Map 2427 CC 2005

No sites were identified on the historical map 2427 CC 2005.

4. FINDINGS

The site was found to be devoid of any heritage sites with significance. It is recommended that obscured, subterranean sites be managed, if they are encountered.

5. METHODOLOGY

This study defines the heritage component of the EIA process being undertaken for the Proposed Installation of a Water Pipeline from Magalies Water to the Maroelesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi, in the Waterberg District of the Limpopo Province. It is described as a first phase (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

5.1 INVENTORY

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are several different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984*).

5.2 EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

After plotting of the site on a GPS the areas were accessed using suitable combinations of vehicle access and access by foot.

Sites were documented by digital photography and geo-located with GPS readings using the WGS 84 datum.

Further techniques (where possible) included interviews with local inhabitants, visiting local museums and information centers and discussions with local experts. All this information was combined with information from an extensive literature study as well as the result of archival studies based on the SAHRA (South African Heritage Resource Agency) provincial databases.

This Heritage Impact Assessment relies on the analysis of written documents, maps, aerial photographs and other archival sources combined with the results of site investigations and interviews with effected people. Site investigations are not exhaustive and often focus on areas such as river confluence areas, elevated sites or occupational ruins.

The following documents were consulted in this study;

- South African National Archive Documents
- SAHRIS (South African Heritage Resources Information System) Database of Heritage Studies
- Internet Search
- Historic Maps
- 1967, 1980, 1984 and 2005 Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2017 imagery
- Published articles and books
- JSTOR Article Archive

5.3 FIELDWORK

Fieldwork for this study was performed on the 2nd of November 2017. Most of the areas were found to be accessible on foot. The survey was tracked using GPS and a track file in GPX format is available on request.

The study was mainly focused on systematic field surveys of the study area.

Areas with less development impact was investigated closer to determine whether any sites of heritage value could still occur sub-surface, however no indications of such sites were evident (such as graves, shell middens, disposed pot sherd etc.).

Where sites were identified, it was documented photographically and plotted using GPS with the WGS 84 datum point as reference. GPX files are available on request from G&A Heritage.

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the surveyors to evaluate the relative importance of sites found. Furthermore, GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a **Garmin Colorado** GPS (WGS 84-datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location, which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development. It may also be referred to as archaeological testing' (DAHGI 1999a, 27).

'Test excavation should not be confused with, or referred to as, archaeological assessment which is the overall process of assessing the archaeological impact of development. Test excavation is one of the techniques in carrying out archaeological assessment which may also include, as appropriate, documentary research, field walking, examination of upstanding or visible features or structures, examination of aerial photographs, satellite or other remote sensing imagery, geophysical survey, and topographical assessment' (DAHGI 1999b, 18).

6. MEASURING IMPACTS

In 2003, the SAHRA (South African Heritage Resources Agency) compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

6.1 TYPE OF RESOURCE

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

6.2 TYPE OF SIGNIFICANCE

6.2.1 HISTORIC VALUE

It is important in the community, or pattern of history

- Important in the evolution of cultural landscapes and settlement patterns
- Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

6.2.2 AESTHETIC VALUE

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

6.2.3 SCIENTIFIC VALUE

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

(a) Does the site contain evidence, which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

- internal stratification and depth
- chronologically sensitive cultural items
- materials for absolute dating
- association with ancient landforms
- quantity and variety of tool type
- distinct intra-site activity areas
- tool types indicative of specific socio-economic or religious activity
- cultural features such as burials, dwellings, hearths, etc.
- diagnostic faunal and floral remains
- exotic cultural items and materials
- uniqueness or representativeness of the site
- integrity of the site

(b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

(c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?

- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

(d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

6.2.4 SOCIAL VALUE / PUBLIC SIGNIFICANCE

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site
- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration

- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?

6.2.5 ETHNIC SIGNIFICANCE

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

- ethnographic or ethno-historic reference
- documented local community recognition or, and concern for, the site

6.2.6 ECONOMIC SIGNIFICANCE

(a) What value of user-benefits may be placed on the site?

- visitors' willingness-to-pay
- visitors' travel costs

6.2.7 SCIENTIFIC SIGNIFICANCE

(a) Does the site contain evidence, which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?

(b) Does the site contain evidence, which can make important contributions to other scientific disciplines or industry?

6.2.8 HISTORIC SIGNIFICANCE

(a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?

(b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?

(c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?

(d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

6.2.9 PUBLIC SIGNIFICANCE

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- visibility and accessibility to the public
- ability of the site to be easily interpreted
- opportunities for protection against vandalism
- economic and engineering feasibility of reconstruction, restoration and maintenance
- representativeness and uniqueness of the site
- proximity to established recreation areas
- compatibility with surrounding zoning regulations or land use
- land ownership and administration
- local community attitude toward site preservation, development or destruction

- present use of site

(b) Does the site receive visitation or use by tourists, local residents or school groups?

6.2.10 OTHER

(a) Is the site a commonly acknowledged landmark?

(b) Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?

(c) Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?

(d) Is the site representative of a particular architectural style or pattern?

6.3 DEGREES OF SIGNIFICANCE

6.3.1 SIGNIFICANCE CRITERIA

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are provided in Appendix B and Appendix C. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information, which, if properly recovered, will enhance understanding of Southern African human history, is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population (Smith, L.D. 1977).

6.3.2 RARITY

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

6.3.3 REPRESENTIVITY

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

The table below illustrates how a site's heritage significance is determined

Spheres of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific Community			

7 ASSESSMENT OF HERITAGE POTENTIAL

7.1 ASSESSMENT MATRIX: DETERMINING ARCHAEOLOGICAL SIGNIFICANCE

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (J) and Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings (Morris 2007a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

Table 1 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon and, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, could be of exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Table 1: Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deacon, NMC as used in Morris)

Class	Landform	Type 1	Type 2	Type 3
-------	----------	--------	--------	--------

L1	Rocky Surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near features such as hill/dune	On old river terrace
L4	Sandy ground, coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin
L6	Developed urban	Heavily built-up with no known record of early settlement	Known early buildings but have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Loping floor or small area	Flat floor, high ceiling
Class	Archaeological traces	Type 1	Type 2	Type 3
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell of bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5m thick	Deposit >0.5 m thick

Table 2: Site attributes and value assessment (adopted from Whitelaw 1997 as used in Morris)

Class	Landforms	Type 1	Type 2	Type 3
1	Length of sequence /context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte / ecofacts
2	Presence of exceptional items (incl. regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

7.2 ASSESSING SITE VALUE BY ATTRIBUTE

Table 2 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu-Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

7.3 IMPACT STATEMENT

7.3.1 ASSESSMENT OF IMPACTS

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions, which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

- (a) destruction or alteration of all or part of a heritage site;
- (b) isolation of a site from its natural setting; and
- (c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined below:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

7.3.2 INDICATORS OF IMPACT SEVERITY

Magnitude

The amount of physical alteration or destruction, which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of heritage value, are of the highest severity.

Duration

The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

Diversity

The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. (*Zubrow, Ezra B.A., 1984*).

7.3.4 POST-CONTACT SITES

No sites associated with the post-contact era will be affected by the proposed development.

7.3.5 BUILT ENVIRONMENT

No buildings in the study area.

7.3.6 HISTORIC SIGNIFICANCE

Built Environment within the Study Area.

No	Criteria	Significance Rating
1	<i>Are any of the identified sites or buildings associated with a historical person or group?</i> N/A	N/A
2	<i>Are any of the buildings or identified sites associated with a historical event?</i> N/A	N/A
3	<i>Are any of the identified sites or buildings associated with a religious, economic social or political or educational activity?</i> N/A	N/A
4	<i>Are any of the identified sites or buildings of archaeological significance?</i> N/A	N/A
5	<i>Are any of the identified buildings or structures older than 60 years?</i> N/A	N/A

7.3.7 ARCHITECTURAL SIGNIFICANCE

No	Criteria	Rating
1	<i>Are any of the buildings or structures an important example of a building type?</i>	

	N/A	N/A
2	Are any of the buildings outstanding examples of a particular style or period? N/A	N/A
3	Do any of the buildings contain fine architectural details and reflect exceptional craftsmanship? N/A	N/A
4	Are any of the buildings an example of an industrial, engineering or technological development? No	N/A
5	What is the state of the architectural and structural integrity of the building? N/A	N/A
6	Is the building's current and future use in sympathy with its original use (for which the building was designed)? N/A	N/A
7	Were the alterations done in sympathy with the original design? N/A	N/A
8	Were the additions and extensions done in sympathy with the original design? N/A	N/A
9	Are any of the buildings or structures the work of a major architect, engineer or builder? No	N/A

7.3.8 SPATIAL SIGNIFICANCE

Even though each building needs to be evaluated as a single artefact the site still needs to be evaluated in terms of its significance in its geographic area, city, town, village, neighbourhood or precinct. This set of criteria determines the spatial significance.

No	Criteria	Rating
1	Can any of the identified buildings or structures be considered a landmark in the town or city? No	N/A
2	Do any of the buildings contribute to the character of the neighborhood? No	N/A
3	Do any of the buildings contribute to the character of the square or streetscape? No	N/A
4	Do any of the buildings form part of an important group of buildings? No	N/A

8 IMPACT EVALUATION

This HIA Methodology assists in evaluating the overall effect of a proposed activity on the heritage environment. The determination of the effect of a heritage impact on a heritage parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the heritage practitioner through the process of heritage impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

8.1 DETERMINATION OF SIGNIFICANCE OF IMPACTS

Significance is determined through a synthesis of impact characteristics, which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

8.2 IMPACT RATING SYSTEM

Impact assessment must take account of the nature, scale and duration of effects on the heritage environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact will be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

8.3 RATING SYSTEM USED TO CLASSIFY IMPACTS

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

NATURE		
Including a brief description of the impact of the heritage parameter being assessed in the context of the project. This criterion includes a brief written statement of the heritage aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).

3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on a heritage parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which heritage resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the heritage parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).

CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the heritage parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects.
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects.
3	Medium Cumulative impact	The impact would result in minor cumulative effects.
4	High Cumulative Impact	The impact would result in significant cumulative effects.
INTENSITY / MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the heritage parameter. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact Significance Rating	Description

6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

9 ANTICIPATED IMPACT OF THE DEVELOPMENT

WATER PIPELINE FROM MAGALIES WATER TO THE MAROELAESFONTEIN ANDALUSITE MINE

IMPACT TABLE FORMAT		
Heritage component	<i>Pipeline crossing at Bierspruit</i>	
Issue/Impact/Heritage Impact/Nature	Proposed Installation of a Water Pipeline from Magalies Water to the Maroelesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi, in the Waterberg District of the Limpopo Province.	
<i>Extent</i>	<i>Local</i>	
<i>Probability</i>	<i>Unlikely</i>	
<i>Reversibility</i>	<i>Totally Reversible</i>	
<i>Irreplaceable loss of resources</i>	<i>Insignificant loss of resources</i>	
<i>Duration</i>	<i>Medium term</i>	
<i>Cumulative effect</i>	<i>Low cumulative effect</i>	
<i>Intensity/magnitude</i>	<i>Low</i>	
<i>Significance Rating of Potential Impact</i>	<i>8 points. The impact will have a low negative impact rating.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	1	1

Reversibility	2	2
Irreplaceable loss	1	1
Duration	2	2
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	8 (low negative)	8 (low negative)
Mitigation measure	<i>Should any graves be identified during the construction phase of the project the attached recommendations should be followed in the mitigation of them.</i>	

9.4 ASSESSING VISUAL IMPACT

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CndV Architects and The Department of Environmental Affairs and Development Planning (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalised. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimise the visual impact.

Due to the fact that the project will mainly involve sub-surface infrastructure it is not anticipated that any visual impacts will be encountered. Pump stations will also be of low profile and will therefore have a minimum of impact.

9.5 ASSUMPTIONS AND RESTRICTIONS

- It is assumed that the South African Heritage Resources Information System (SAHRIS) database locations are correct
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the social impact assessment and public participation process of the Basic Assessment will result in the identification of any intangible sites of heritage potential.

10 ASSESSMENT OF IMPACTS (IMPACT STATEMENTS)

10.2 BUILT ENVIRONMENT

Some structures associated with rural living were identified;

- Brick outbuildings (modern and historic)
- Barb-wire fences (modern)
- Dirt roads (modern)
- Footpaths
- Tarred roads

Mitigation

None of the structures will be affected by the construction activities.

10.3 CULTURAL LANDSCAPE

The following landscape types were identified during the study.

Landscape Type	Description	Occurrence still possible?	Identified on site?
1 Paleontological	Mostly fossil remains. Remains include microbial fossils such as found in Barberton Greenstones	Yes, sub-surface	No

2 Archaeological	Evidence of human occupation associated with the following phases – Early-, Middle-, Late Stone Age, Early-, Late Iron Age, Pre-Contact Sites, Post-Contact Sites	Yes, sub-surface	No
3 Historic Built Environment	<ul style="list-style-type: none"> - Historical townscapes/streetscapes - Historical structures; i.e. older than 60 years - Formal public spaces - Formally declared urban conservation areas - Places associated with social identity/displacement 	No	No
4 Historic Farmland	<p>These possess distinctive patterns of settlement and historical features such as:</p> <ul style="list-style-type: none"> - Historical farm yards - Historical farm workers villages/settlements - Irrigation furrows - Tree alignments and groupings - Historical routes and pathways - Distinctive types of planting - Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting. 	No	No
5 Historic rural town	<ul style="list-style-type: none"> - Historic mission settlements - Historic townscapes 	No	No
6 Pristine natural landscape	<ul style="list-style-type: none"> - Historical patterns of access to a natural amenity - Formally proclaimed nature reserves - Evidence of pre-colonial occupation - Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages - Historical structures/settlements older than 60 years - Pre-colonial or historical burial sites - Geological sites of cultural significance. 	No	No
7 Relic Landscape	<ul style="list-style-type: none"> - Past farming settlements - Past industrial sites - Places of isolation related to attitudes to medical treatment - Battle sites - Sites of displacement, 	No	No
8 Burial grounds and grave sites	<ul style="list-style-type: none"> - Pre-colonial burials (marked or unmarked, known or unknown) - Historical graves (marked or unmarked, known or unknown) - Graves of victims of conflict - Human remains (older than 100 years) - Associated burial goods (older than 100 years) - Burial architecture (older than 60 years) 	Yes	No
9 Associated Landscapes	<ul style="list-style-type: none"> - Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes - Sites associated with displacement & contestation - Sites of political conflict/struggle - Sites associated with an historic event/person - Sites associated with public memory 	No	No
10 Historical Farmyard	<ul style="list-style-type: none"> - Setting of the yard and its context - Composition of structures 	No	No

	<ul style="list-style-type: none"> - Historical/architectural value of individual structures - Tree alignments - Views to and from - Axial relationships - System of enclosure, e.g. defining walls - Systems of water reticulation and irrigation, e.g. furrows - Sites associated with slavery and farm labour - Colonial period archaeology 		
11 Historic institutions	<ul style="list-style-type: none"> - Historical prisons - Hospital sites - Historical school/reformatory sites - Military bases 	No	No
12 Scenic visual	<ul style="list-style-type: none"> - Scenic routes 	No	No
13 Amenity landscape	<ul style="list-style-type: none"> - View sheds - View points - Views to and from - Gateway conditions - Distinctive representative landscape conditions - Scenic corridors 	No	No

Mitigation

It is recommended that the development designs consider the positive and negative characteristics of the existing cultural landscape type and that they endeavor to promote the positive aspects while at the same time mitigating the negative aspects.

11 RESOURCE MANAGEMENT RECOMMENDATIONS

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.

- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until the heritage practitioner has had sufficient time to analyze the finds.

12 CONCLUSION

The Proposed Installation of a Water Pipeline from Magalies Water to the Maroelesfontein Andalusite Mine on Portions of the Farms Moddergat 389 KQ, Kaalvlakte 416 KQ and Vlakpoort 388 KQ, south of Thabazimbi, in the Waterberg District of the Limpopo Province, was investigated and it was found to be limited in sites of heritage significance.

Provided the recommendations in this report is followed there is no reason, from a heritage point of view, why this development cannot continue.

13 REFERENCES CITED

- ALMOND, J.E. & PETHER, J. 2008. Palaeontological heritage of the Northern Cape. Interim
- Bewsher, P K, & De Jong, R C, (1997), Ecotourism and cultural resource management. Document prepared for the SA Wildlife College. Pretoria: Centre for Ecotourism.
- CNdV Architects and The Department of Environmental Affairs and Development Planning (2006)
- De Jong, R.C., (1992). Draft policy guidelines for cultural resource management in nature conservation and forestry areas in South Africa. Pretoria: National Cultural History Museum (unpublished)
- Department of Arts, Culture, Science and Technology, (1996). White Paper on Arts, Culture and Heritage. Pretoria: SA Communication Service.
- DEAT, (1996). White Paper on the Development and Promotion of Tourism in South Africa. Pretoria: The Department.
- DEAT, (1998). A national strategy for Integrated Environmental Management in South Africa. Discussion document. Pretoria: The Department.
- DEAT, (1998). White Paper on environmental management policy for South Africa. Government Gazette, Vol 395, No 18894, 15 May 1998.
- Department of Public Works, (1998), White Paper 1997. Public Works towards the 21st century. Government Gazette, Vol 391, No 18616, 14 January 1998.
- Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984, "The Reporting of Small-Scale Survey Results for Research Purposes: Suggestions for Improvement." Co-authored with David M. Lacy. *American Archaeology* 4(1):43-49.
- Ellenberger, V. 1939. History of the Batlokwa of Gaberones (Bechuanaland Protectorate). *Bantu Studies* XIII:165-198.
- Entries on towns in the *Standard Encyclopedia of Southern Africa*, published by Nasou, 1970-1976 (11 volumes).
- Files in Gauteng Office of SAHRA, Northwards, Parktown, Johannesburg
- Galla, A, (1996), Shifting the paradigm. A plan to diversify heritage practice in South Africa. Cape Town: South African Museums Association.
- Gauteng Department of Economic Affairs and Finance, (1997). Gauteng Tourism White Paper. Johannesburg: The Department.

Hall, C.M, & McArthur, S. (eds), (1996). Heritage management in Australia and New Zealand. Draft publication.

Harrison, R, (1994). Manual of heritage management. Oxford: Butterworth Heinemann.

Jote, K, (1994). International legal protection of cultural heritage. Stockholm: Juristförlaget.

Killick, D. 2004. Review Essay: "What Do We Know About African Iron Working?" *Journal of African Archaeology*. Vol 2 (1) pp. 135–152

McCarthy, T.S. 2006. The Witwatersrand Supergroup. In: Johnson MR, Anhaeusser and Thomas RJ (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria. pp 155-186.

McCarthy, T.S. and Rubidge, B.S. 2005. *The story of Earth and Life – a southern African perspective on the 4.6 billion year journey*. Struik Publishers, Cape Town. pp 333.

Morris, D. & Beaumont, P. 2004. *Archaeology in the Northern Cape: some key sites*. Kimberley: McGregor Museum.

Musa, (1994). *Museums for South Africa: Intersectoral investigation for national policy*. Pretoria: MUSA Secretariat.

National Heritage Council Act, No 11 of 1999.

National Heritage Resources Act, No 25 of 1999.

National Research Foundation, Nexus database of current and completed research projects

Pollarolo, Kuman, Bruxelles, 2010, Acheulean artefacts at Maropeng in the Cradle of Humankind World Heritage Site, Gauteng Province, South Africa 2010/6/1. *Journal, The South African Archaeological Bulletin* Pages 3-12

Republic of South Africa, (1996). Constitution of the Republic of South Africa, Act 108 of 1996. Government Gazette, Vol 378, No 17678, 18 December 1996.

Ross, M. (1996). *Planning and the heritage. Policy and procedures*. Second edition. London: E & FN Spon.
SAHRA website <http://www.sahra.org.za>

The City of Germiston: Official Guide, (1957). Germiston: Publicity Association.

UNESCO, (1983). Conventions and recommendations concerning the protection of the cultural heritage. Paris: UNESCO.

US National Parks Service, (1988). Management Policies.

National Heritage Resources Act (NHRA) no 25 of 1999.

Environment Conservation Act, 1989 (Act 73 of 1989)

Minerals Act, 1991 (Act 50 of 1991)

Cultural Institutions Act, No 119 of 1998

SAHRA technical report, 124 pp. Natura Viva cc, Cape Town.