Phase 1 Heritage Impact Assessment Report

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED ANTI-EROSION MEASURES AT THE BALENI SALT WORKS PROVINCIAL HERITAGE SITE, LIMPOPO PROVINCE.

PREPARED BY:

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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 Anti-Erosion Measures at the Baleni Salt Works.

Municipal Area: Giyani District Municipality.

Applicant: Working for Wetlands Program of the Department of Environmental Affairs.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa
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Date of Report: 04 December 2018

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 anti-erosion measures recommended by the planning team for the Working for Wetlands Program to limit the negative impact of concentrated water flow at the wetlands around Baleni, 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 Basic Paleontological Assessment) to determine the impacts on heritage resources within the study area.

The following are required to perform the assessment as per SAHRA minimum standards:

- A desk-top investigation of the area;
- A site visit to the proposed mitigations;
- Identify possible archaeological, cultural, historic, built and paleontological sites within the study area;
- Evaluate the potential impacts of construction and operation of the project 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.
- Public Participation

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.

Alternatives Considered
Due to the Working for Wetlands Programme not being a development proposal (but rather a rehabilitation programme), the use of alternatives as normally applied in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) is not appropriate. A comprehensive phased approached is undertaken each year to identify wetlands with a high rehabilitation priority (Phase 1), rehabilitation objectives for each wetland unit and the most appropriate interventions to achieve these objectives (Phase 2). During Phase 3, the interventions are again scrutinised during setting-out to to consider changes that have occurred within the landscape since the original planning took place. Should any significant changes be required to the intervention, the Project Team will be informed by the engineer to ensure that the proposed design changes would not compromise the rehabilitation objectives identified for the specific wetland. For this reason, the mitigative measures identified in this report does not have any alternatives.

Findings & Recommendations
The area was investigated during a field visit and through archival studies.
The status of the site as a National Heritage Site in 1999 (Terblanche 1994a) already implied the heritage significance of the site. It was therefore not surprising that several areas with archaeological deposits were noted during the survey. Some of these sites are subject to degradation due to erosion activities. These sites will be discussed in this study and relevant recommendations for their preservation or mitigation given.

Fatal Flaws
No fatal flaws were identified.

TABLE OF CONTENTS

List of Figures

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

SANRAL .....South African National Roads Agency SOC Ltd

S&EIR ..... Scoping & Environmental Impact Reporting

Um .....Micrometre (10^{-6} m)

WGS 84 ..... World Geodetic System for 1984

Chapter 1

PROJECT RESOURCES

HERITAGE IMPACT REPORT

HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED ANTI-EROSION MEASURES AT BALENI SALT WORKS, LIMPOPO PROVINCE

1. INTRODUCTION

Legislation and methodology

G&A Heritage was appointed by Aurecon South Africa (Pty) Ltd (Aurecon) to undertake a heritage impact assessment for the proposed Anti-Erosion Measures at the Baleni Salt Works in the Limpopo Province.

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken if any activity triggers an HIA as per Table 2.

(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 m^2 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 regard 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 Aurecon is accurate.
- We assumed that the public participation process performed as part of the Basic Assessment 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	Yes	Avoidance
	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	Cattle fence line. Total length 535m
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 Description

The Working for Wetlands Programme will be commencing with planning to undertake wetland rehabilitation activities at Soutini-Baleni in Limpopo. This will involve a series of Hard Interventions such as;

- Earth berms or gabion systems to block artificial channels that drain water from or divert water to the wetland;
- Concrete and gabion weirs to trap sediment and reduce the erosion potential of concentrated flow;
- Earth or gabion structure plugs to raise channel floors and reduce water velocity;
- Concrete or gabion structures to stabilise head-cut or other erosion and prevent gullies;
- Concrete and/or reno mattress strips as road crossings to address channels and erosion in wetlands from vehicles; and

A "soft intervention" is also proposed to manage grazers within the wetland and involves the use of a low fence to exclude grazers from the eye (i.e. protection measure against overgrazing and trampling).

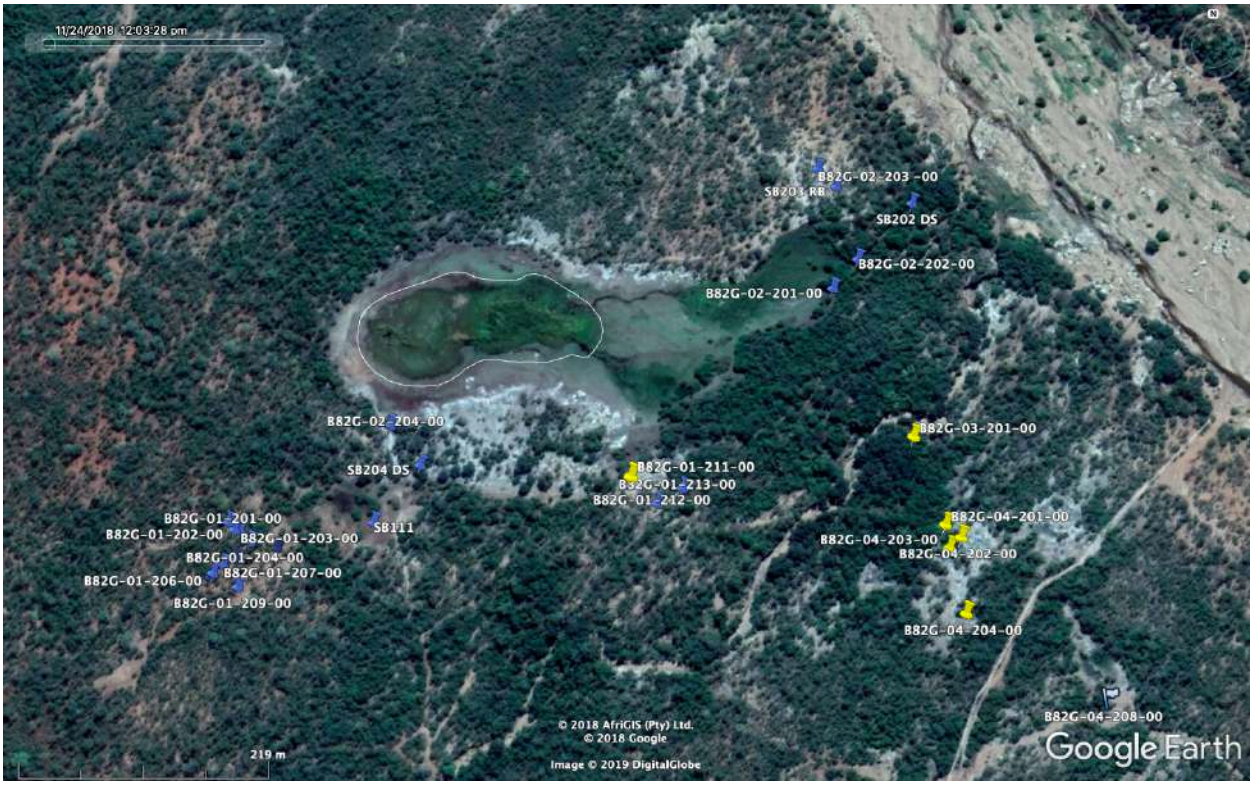


Figure 1. The Wetland and Proposed Actions (please see list below for descriptions)

Intervention no	Origin	Type
B82G-01-201-00	New	Rock/ Gravel Pack
B82G-01-202-00	New	Rock/ Gravel Pack
B82G-01-203-00	New	Rock/ Gravel Pack
B82G-01-204-00	New	Rock/ Gravel Pack
B82G-01-205-00	New	Rock/ Gravel Pack
B82G-01-206-00	New	Rock/ Gravel Pack Brush Pack
B82G-01-207-00	New	Rock/ Gravel Pack

B82G-01-208-00	New	Rock/ Gravel Pack
		Brush Pack
B82G-01-209-00	New	Brush Pack
B82G-01-210-00	New	Brush Pack
	POI	
B82G-01-211-00	New	Rock/ Gravel Pack
B82G-01-212-00	New	Rock/ Gravel Pack
	New	Earth Works
B82G-01-213-00	New	Stone Masonry/ Masonry
		Gabions
		Concrete (Low strength)
B82G-02-201-00	New	Rock/ Gravel Pack
	POI	
B82G-02-202-00	New	Silt fences
B82G-02-203-00	New	Rock/ Gravel Pack
	POI	
B82G-02-204-00	New	Earth Works
B82G-02-205-00	New	Cattle fence with walkway
B82G-03-201-00	New	Eco Logs
B82G-04-201-00	New	Brush Pack
B82G-04-202-00	New	Brush Pack
B82G-04-203-00	New	Brush Pack
B82G-04-204-00	New	Brush Pack
B82G-04-205-00	New	Brush Pack
B82G-04-206-00	New	Brush Pack
B82G-04-207-00	New	Brush Pack
B82G-04-208-00	New	Brush Pack
B82G-04-209-00	New	Brush Pack
B82G-03-202-00	New	Eco Logs

2.2 Project Location

The name Baleni, refers to a mineral hot spring located at S23.41875°, E30.91510°, and 380m above sea level. It is located approximately 20km southeast from the town of Giyani, and also falls within the borders of the Giyani Municipal District. Situated in the Limpopo Province, the district is bordered in the east by the Kruger National Park, in the south by the Groot Letaba River and in the north by the Shingwedzi River. The study area falls within the South African Lowveld - the area geographically defined as the low-lying areas east of the South African escarpment and west of the Lebombo Mountains on the Mozambique border (Onderstal 1984). For the purposes of this study, the northern Lowveld is defined as the area north of the Olifants River and south of the Limpopo river basin region. The Baleni research area covers the entire area within 1,5km around the salt pan. This encompasses the main salt working area around the spring, as well as the area peripheral to this, up to a distance of 1,5km measured from the spring's center.

2.3 GPS Track Paths

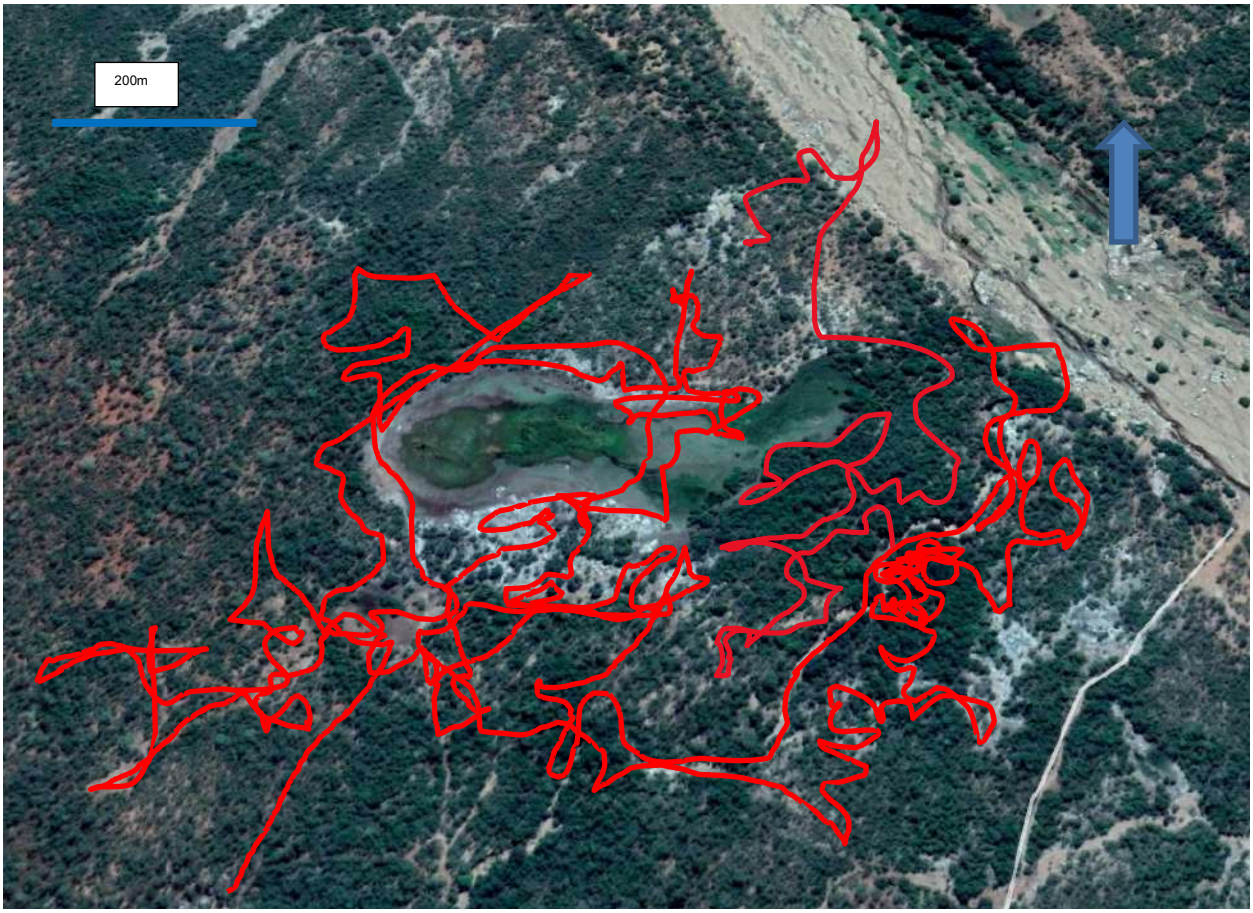


Figure 2. GPS Track Paths

Chapter 2

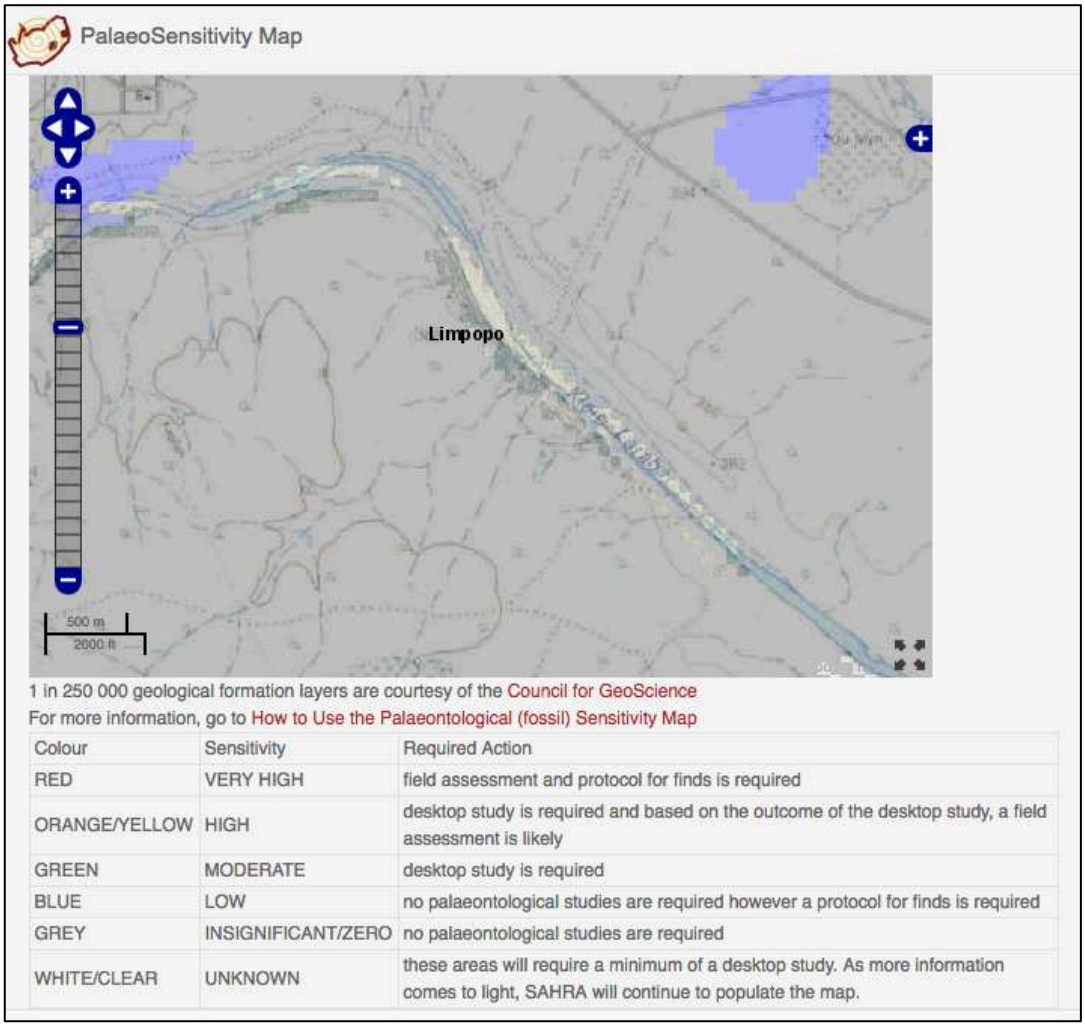
FINDINGS & CONTEXT

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

3. REGIONAL CULTURAL CONTEXT

3.1 PALEONTOLOGY

The areas fall within the "Grey" demarcation on the *PalaeoSensitivity* Map. SAHRA states that in this case a no further work in terms of Palaeontology is needed.



1 in 250 000 geological formation layers are courtesy of the Council for GeoScience
For more information, go to How to Use the Palaeontological (fossil) Sensitivity Map

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

Figure 3. *PalaeoSensitivity* Map

3.2 Stone Age

Stone implements belonging to the Early, Middle and Late Stone Age have been found in the area. These, with the rock paintings and a few engravings are evidence of the presence of hunter-gatherer communities in the past. The Sarwa, who were known to be hunters and gatherers, were still living alongside farming communities such as the Ngona in the area during historical times after 1800 (Eastwood & Fish, 1995).

The antiquity of the Late Stone Age (LSA) south of the Limpopo was realized only recently. Until about 40 years ago it was assumed that Middle Stone Age (MSA) industries gave way to LSA ones at the beginning of the Holocene or at the end of the Pleistocene. As recently as 1974, for example, Sampson's synthesis of the southern African Stone Age placed the earliest LSA at 12,000 years before present (B.P.). Radiocarbon dating after the early 1970s dramatically altered previous ideas and showed that the LSA has its origin in the late Pleistocene, which is defined here as dating between ca. 40,000 and ca. 10,000 B.P.
When Goodwin (1926) introduced the term Later Stone Age (LSA), and when the term was further developed by Goodwin and Van Riet Lowe (1929) in the late 1920s, their definition was unambiguous. The LSA was defined as several stone industries and/or cultures that included non-lithic items, such as ostrich eggshell beads and worked bone implements, and excluded Middle Stone Age (MSA) stone tools, except as recycled manuports. LSA people were explicitly linked with the biologically and behaviourally modern population of hunter gatherers, some being directly identified as Bushmen (Goodwin, 1926, p. 20; Goodwin and Van Riet Lowe, 1929, p. 171).

Today Goodwin and Van Riet Lowe's LSA definition is no longer entirely appropriate. First, ostrich eggshell beads and even a bone point have been found in MSA deposits that predate the LSA by tens of thousands of years. If the associations are reliable then these artifacts can no longer be seen as exclusively LSA. Second, fossils of anatomically modem humans, now thought to predate 100,000 B.P., have been found in MSA deposits at both Klasies River Mouth and at Border Cave (Beaumont et al, 1978; Singer and Wymer, 1982; Rightmire and Deacon, 1991). There is thus no correlation between the appearance of modern people and LSA technological evolution.
The only part of the 1920s definition that remains intact is the qualifier that LSA assemblages should lack MSA artifacts. Although LSA industries and their MSA predecessors share flaking traditions such as the bipolar technique and have some tool types in common, such as some generalized scraper types, they each have other flaking techniques and artifacts that are considered mutually exclusive.

From the 1950s onwards, archaeologists excavating MSA sites in the interior of South Africa recognised a lithic industry containing long blades, truncated blades with retouched edges, and long unifacial points. They named it after the town of Pietersburg (now Polokwane). Pietersburg Industries are located principally in the north of South Africa, but they have not yet been documented north of the Limpopo River. Most Pietersburg sites in Limpopo Province are caves or rockshelters, the best known being Cave of Hearths (Mason 1962, 1988; Sampson 1974; Sinclair 2009), Olieboomspoort (Mason 1962; Van der Ryst 2006), Bushman Rock Shelter (Plug 1981; Porraz et al. 2015) and Mwulu's Cave (Tobias 1949; Sampson 1974). The open site Blaaubank, a gravel donga near Rooiberg, has many felsite and quartzite Pietersburg tools overlying Earlier Stone Age ones (Mason 1962). Another open site, Kalkbank, also reported to have a Pietersburg industry, yielded only a few dozen lithics (Mason 1962) amongst the large faunal collection that is now known to have been accumulated predominantly by non-human agents (Hutson & Cain 2008).

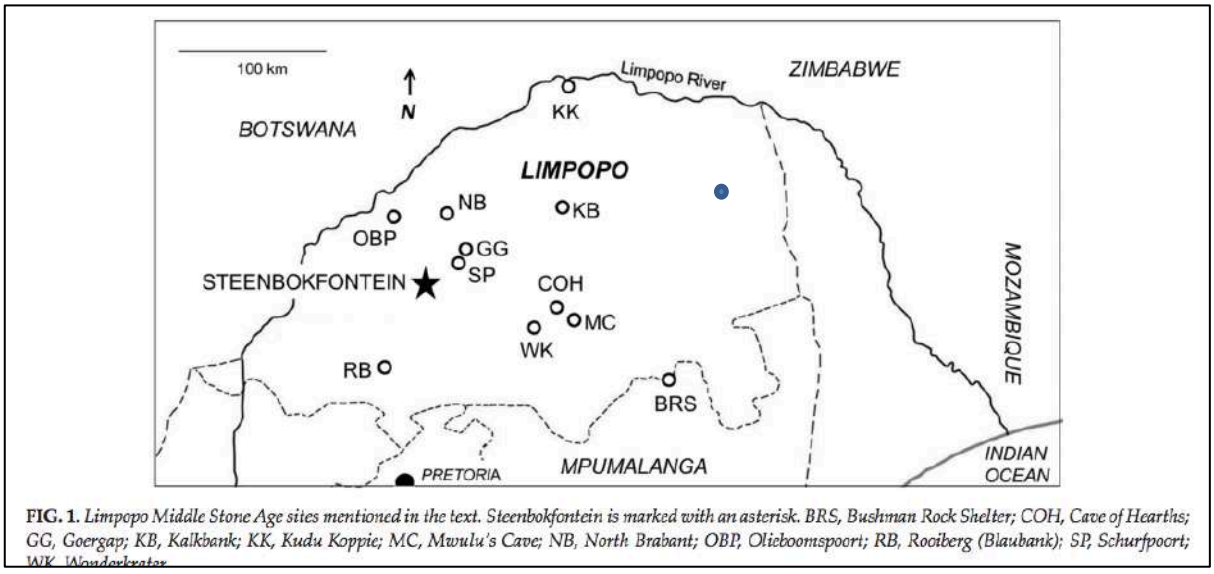


FIG. 1. *Limpopo Middle Stone Age sites mentioned in the text. Steenbokfontein is marked with an asterisk. BRS, Bushman Rock Shelter; COH, Cave of Hearths; GG, Goergap; KB, Kalkbank; KK, Kudu Koppie; MC, Mwulu's Cave; NB, North Brabant; OBP, Olieboomspoort; RB, Rooiberg (Blaubank); SP, Schurfpoort; WK, Wonderkrater*

Figure 4. Limpopo Middle Stone Age sites mentioned in the text (Hutrson & Cain, 2008) (Baleni in blue)

Most excavated MSA sites in Limpopo are below the escarpment, but amongst the known ones on the Waterberg plateau, is a small rock shelter, North Brabant (New Belgium 608 LR), which was excavated by Schoonraad and Beaumont (1968).

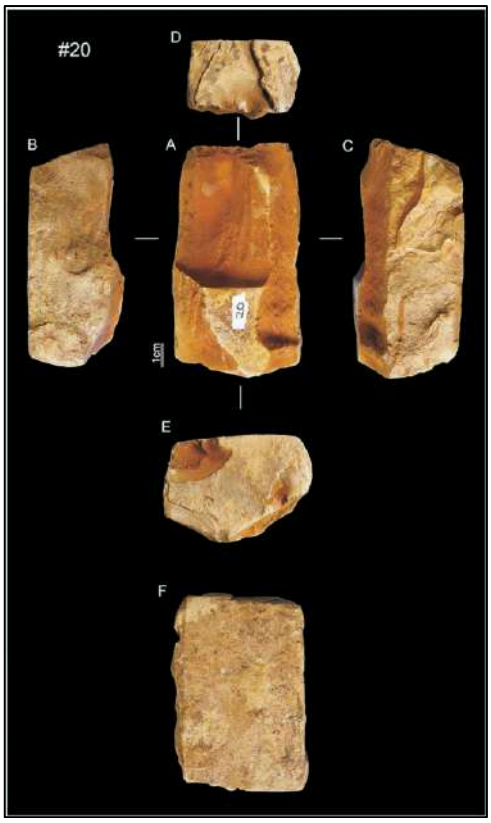


Figure 5. Middle Stone Age Tools

Figure 6. Middle Stone Age Tools

The Limpopo Province of South Africa has a rich archaeological heritage, not least of which is the sub-continent's first town, Mapungubwe, built a thousand years ago (Huffman 2000, 2007). The iron-using farmers who arrived here during the first millennium AD encountered indigenous, stone tool- using, 'Later Stone Age' (LSA) hunter-gatherers. The nature of this contact between two radically different ways of life, and the question of whether the hunter-gatherers survived it, has been much debated (e.g. Mazel 1989; Wilmsen 1989; Solway & Lee 1990; Wilmsen & Denbow 1990; Wadley 1996; Sadr 1997, 2002; Hall & Smith 2000; Schoeman 2006; Mitchell 2009). Where the Limpopo and Shashe Rivers meet, it seemed that the LSA hunting and gathering way of life ended with the rise of the first farmer towns (Sadr 2005; Van Doornum 2007). Recent excavations in rock shelters on the Makgabeng plateau, a hundred or so kilometres south of the Limpopo River, indicate that some hunter-gatherers found refuge there until the 19th century. [BRADFIELD, J., HOLT, S., & SADR, K. (2009).

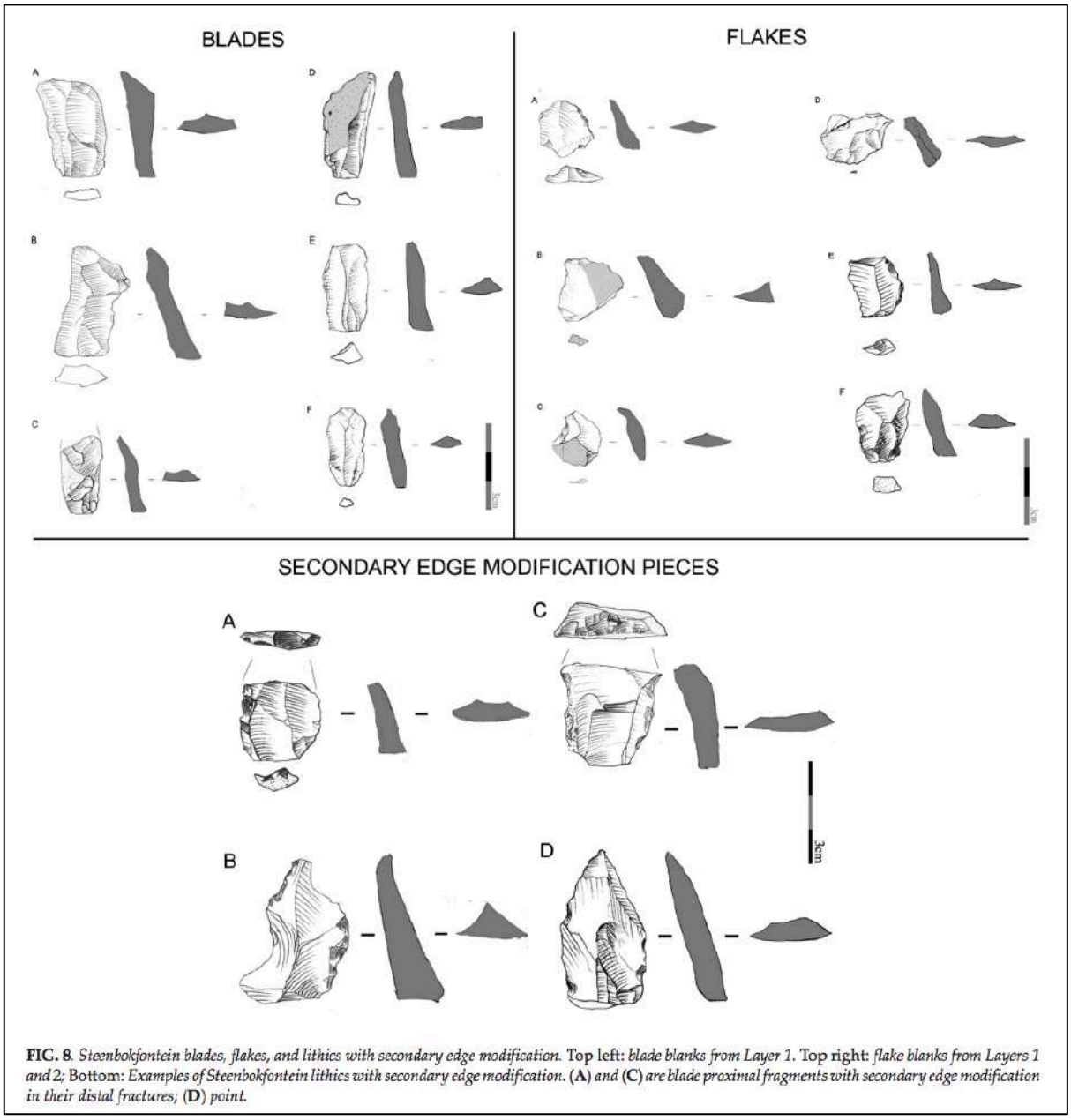


FIG. 8. *Steenbokfontein blades, flakes, and lithics with secondary edge modification.* Top left: *blade blanks from Layer 1.* Top right: *flake blanks from Layers 1 and 2;* Bottom: *Examples of Steenbokfontein lithics with secondary edge modification.* (**A**) *and* (**C**) *are blade proximal fragments with secondary edge modification in their distal fractures;* (**D**) *point.*

Figure 7. Steenbokfontein blades, flakes and lithics with secondary edge modification.

Rock Art

The Central Limpopo Basin (CLB) is situated nearly equidistant between the rock art concentrations of the Maloti/Drakensberg Mountains of Lesotho/South Africa and the Matopo Hills of Zimbabwe and comprises four separate and distinct rock art areas: the Limpopo-Shashe Confluence Area (LSCA), Northern Venda, the Soutpansberg and the Makgabeng Plateau (Fig. 1). The region is relatively well researched (e.g. Schoonraad 1960; Willcox 1963; Pager 1975, 1977, Eastwood 1999, 2003, 2005; Eastwood & Blundell 1999; Eastwood & Cnoops 1999; Eastwood et al. 1999; Hall & Smith 2000; Blundell & Eastwood 2001; Smith & Ouzman 2004), and since 1992 roughly 60% of the total land area has been surveyed and a total of 953 rock art sites have been located and recorded. Whilst the survey work continues, and much recording work remains to be done, the CLB data set is already amongst the most detailed in southern Africa. [Eastwood, E., & Smith, B. (2005).

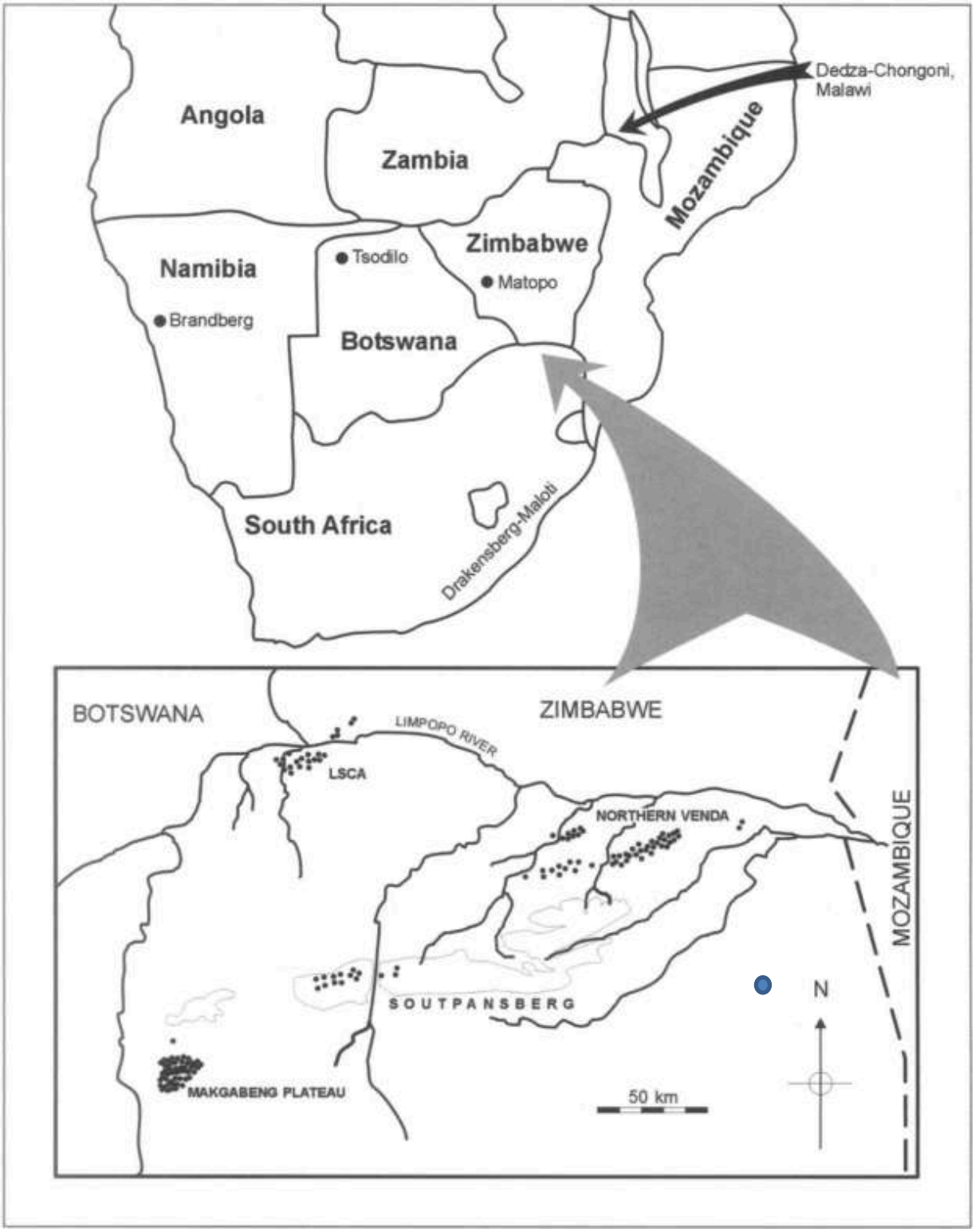


Figure 8. Rock Art Locations (Blue dot indicates Baleni)

Figure 9. Khoekhoen Geometric Patterns and Finger Dot Painting (Makgabeng Plateau)

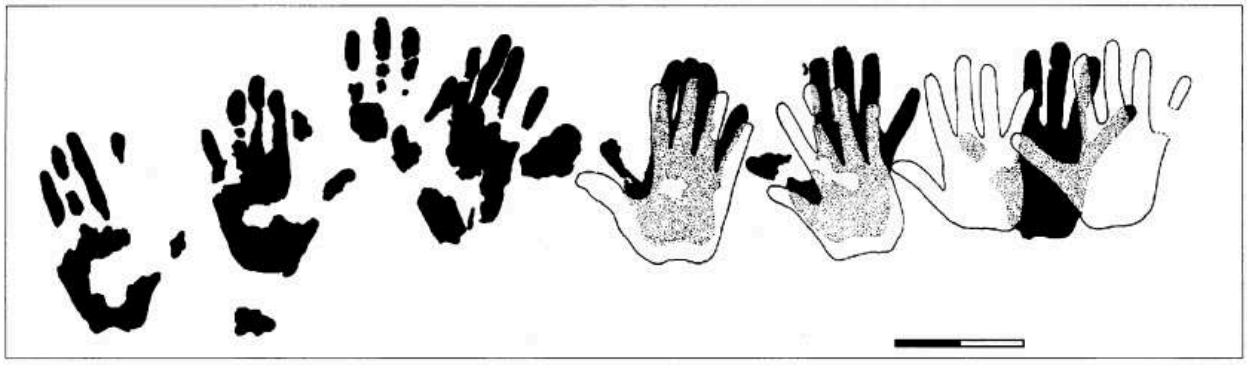


Figure 10. Red handprints overlain by white handprints, Soutpansberg, Central Limpopo Basin. Scale 200mm

3.3 Iron Age

The Limpopo Province and especially the Shashe/Limpopo Confluence area (SLCA) and the Limpopo Basin area contains many Iron Age sites. Although Early Iron age sites are limited (when a distinction is made between Early and Middle Iron Age) there are some important sites on the Soutpansberg such as Happy Rest.

The most significant Iron Age industry in Limpopo must be the Leopards Kopje of Mapungubwe/K2 Industry. These sites are found scattered across the province, although the majority of paramount sites seems to be concentrated on the Limpopo and Levhuvhu Rivers.

Sites that are culturally related to K2 and Mapungubwe have been observed on Hamilton 41 MS, Samaria 28 MS and Den Staat 27 MS (Fig. 1). Another site related to Mapungubwe was excavated by Van Wyk (1987) on Skutwater to the east of Greefswald. Small Iron Age sites postdating Mapungubwe and K2 have been recorded on Greefswald, including some stone-walled sites on hilltops. Some of these sites have been identified by T.N. Huffman as Khami type ruins. (Huffman 2009). According to oral

tradition, communities belonging to the Lea and Twa mamba tribes, related to the Venda and the Shona-speaking people, settled in the Greefswald region in historical times. They were followed, after c. AD 1700, by Sotho-speaking people.

A few physical features distinguish Khami muzinda (plural = mizinda , the Shona word for a chief's place) from Zimbabwe centres. For example, Khami palaces often bear check patterns, and the pottery usually incorporates black and red motifs on globular vessels and tall-necked jars. The distribution of Khami markers and the linguistic history of the Zimbabwe culture area show that the Khami phase marks the distribution of Kalanga-speaking polities.
Radiocarbon dates from Khami itself (Huffman 2007: 258-259), the name site (Robinson 1959) for the phase and the largest capital (second only to Great Zimbabwe), suggest an early 1 5th century beginning. At about the same time, Kalanga groups began to move southwards. The Letsibogo district of Botswana (Campbell et al 1996; Huffman & Kinahan 2002/2003) provides one example. Khami settlements first appear in the Mapungubwe landscape at this same time (Fig. 2). So far, there are some 255 commoner homesteads (Level 1 – Family Head) on record. These homesteads probably housed some 50 people at any one time, 20-30 being children (following Huffman 1986). There are 10 other hilltop sites with stonewalled palaces. These royal centres are all the same size (Level 3 - Petty Chief), supporting about 350 people each. [Huffman, T., & Du Piesanie, J. (2011).

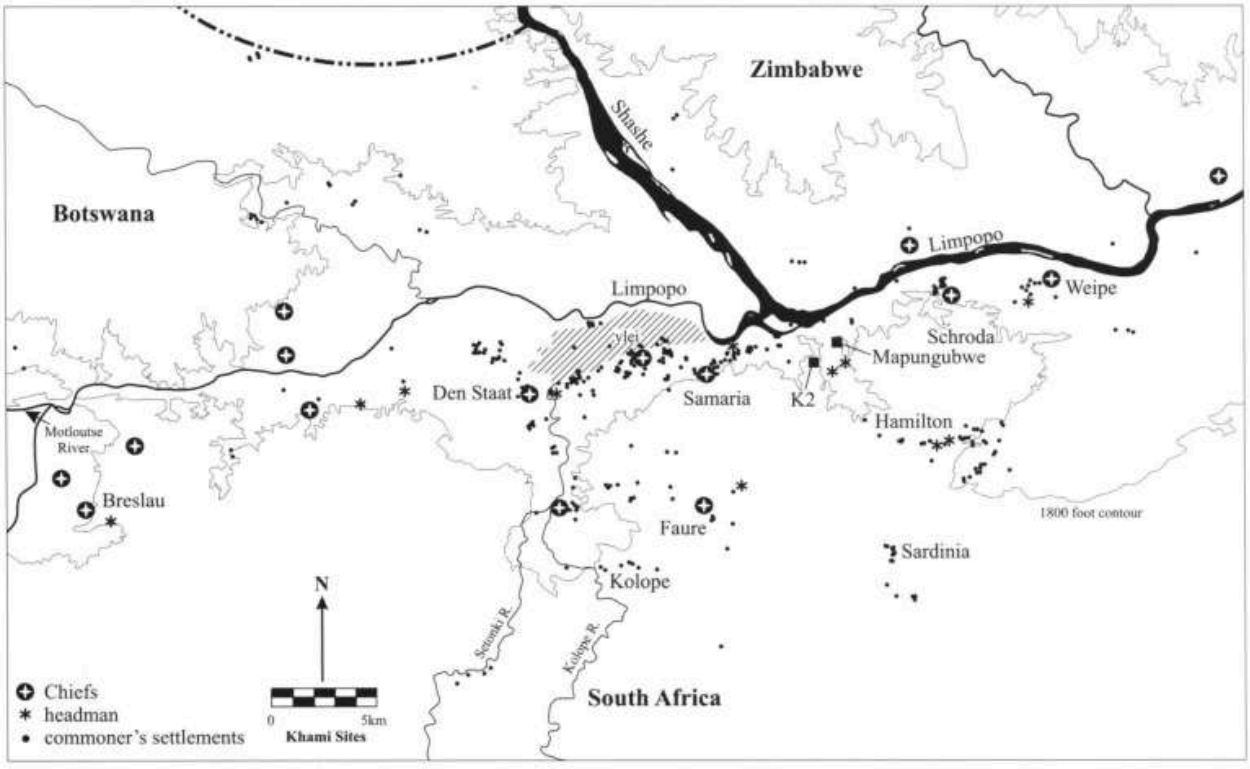


Figure 11. Khami-period sites in the Mapungubwe landscape

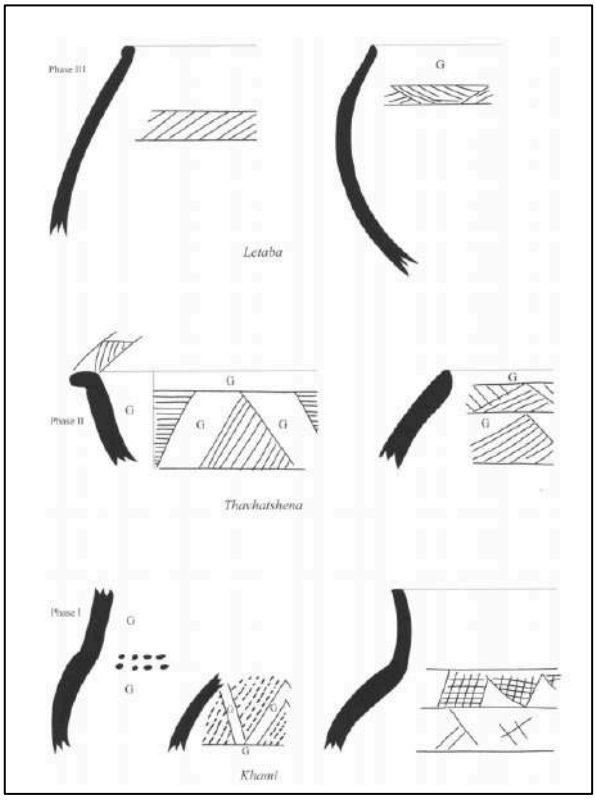


Figure 12. Ceramic facies associated with the three phases of occupation at Machemma

3.4 The Historic Era

Louis Johannes Tregard was born on the 10th of August 1783 in Oudtshoorn in the Karoo. Very little is known of his upbringing, but the diaries he kept of these endeavours, show him to be a reasonably well-educated man. Tregard later wrote his name as Tregardt, but it must be noted that there are a number of variants of the name, i.e. Trigardt, Triegardt and the most common, Trichardt. The latter form has been used for towns named in his honour.

Tregardt started farming in Boschberg and later at Somerset East. He moved across the Fish River in 1834 and rented land new the Kei River from the Xhosa chief, Hintsa. Here, in Xhosa country, he was acknowledged as a leader among the exiled Boer community of approximately 30 families. There exists evidence to suggest that Tregardt had shown overt hostility towards the British regime and he was even accused of inciting the Xhosa to begin the frontier war of 1834-5. When he learned that the authorities had issued a warrant for his arrest, Tregardt slipped away from this farm in Hintsa's country and crossed the Orange River. There he received support and assistance from Hendrik Potgieter and Johannes van Rensburg.

Tregardt and his family, as well as Hans van Rensburg's group, started the trek into the far north and arrived at the foot of the Soutpansberg Mountain range in 1836 in two separate parties, as they had parted ways en route due to a disagreement. Van Rensburg's party continued east towards Inhambane, but his entire group was exterminated en route. Tregardt's group was joined by the first group to arrive in the area under the leadership of Coenraad De Buys (the progenitor of the De Buys / Buys people who still live in Buysdorp – a settlement west of Louis Trichardt), who came to the area in 1821. They formed an alliance and aided the Ramabulana to replace the western Venda Chief, Ramavhoya assuming control of the salt plan north of the Soutpansberg Mountain. Tregardt remained in the area for about one year, before leading reconnaissance missions into current day Zimbabwe and towards Mozambique in search of the van Rensburg clan, the made their way to Delagoa Bay 7 months after setting off in September 1837. The trek claimed the lives of many in the party, including Tregardt, who succumbed from malaria in October of 1938.

After his death other Voortrekkers settled in the area as ivory hunters but left after Chief Makhado and his vhaVenda people defeated them in 1867. Only in 1898 did the *Zuid-Afrikaansche*

Republiek take control of the region and established the town Louis Trichardt the following year in February 1899.

Along with other towns in Limpopo Province, Louis Trichardt was renamed Makhado in 2003, after the Venda King Makhado who ruled in the region from the mid-1800s until his death in 1887. However, there was local rejection to the new name, and it was claimed less than 1% of the town's population had been consulted on the change. It was not only the Afrikaans people who were opposed to the name change, many Shangaan people regarded Chief Makhado as an oppressor. A residents' association applied to Pretoria's High Court in 2005 to have the name overturned. They were rejected but rather astonishingly appealed in South Africa's Supreme Court and won, and the name was changed back to Louis Trichardt in 2007.

3.5 Salt Extraction at Baleni

Archaeologists have visited the saltworks in the past, drawing on the modern salt extraction activities for comparative data applicable to their own studies (e.g. Evers 1974).
Evers (1974; 1981) after visiting the site remarks on the similarities of the Baleni deposits with that of Eiland and Harmony. The continued extraction and the methods employed at the site have also been recorded by other observers (e.g. De Witt 1966; (Terblanche 1994)). Observations at Baleni have also been used to reconstruct traditional salt making methods at the Tsonga Kraal Open Air Museum (Terreblanche 1994).

As elsewhere in Africa, present-day salt extraction at Baleni is an exclusively dry season activity. The salt-season usually starts in May, the precise day of commencement being decided on beforehand by consulting the ancestral spirits (Terblanche 1994).

The first step in the extraction process is to construct the filters through which the salt is leached. The filters are mostly made from the branches and bark of the mopane tree (*Colophospermun mopane*). These filters vary in size, but must be high enough to place a container underneath. Four forked poles are planted into the ground approximately 40cm – 60cm from each other to form a square. Four other poles are placed in the forks of the planted poles and tied together using bark from a mopane tree. A hanging sieve from bark and thin branches is woven onto this structure. This sieve is held into position by supple mopane rods and lined with dry grass. Using clay from an anthill, the inside is built up into a cone shape leaving only a small hole in the bottom through which water can drip. This hole is usually covered with dry grass or leaves (Terblanche 1994).

The next step is to scrape off the salt crust on the edge of the swamp. Terblanche (1994) mentions that the shell of a freshwater mussel is used for his practice. This mixture of soil and salt is then taken to the filter where it is mixed with an equal amount of river sand. The river sand loosens the texture of the gathered crust, which would otherwise be too clayey. A suitable quantity of this mixture is then placed in the filter. Once in the filter, water obtained from the river is poured over the mixture. This process is repeated until the receptacle underneath the filter is filled with the saltwater extraction. After water has been poured over the salt-soil mixture two or three times, the content of the filter is scraped out and discarded next to the filter (Evers 1981; Terblanche 1994). The bulk of the archaeological deposit found at Baleni are mounds formed by the scraped-out filter content.

The saltwater mixture is then placed in a container over a fire and boiled slowly so that the water evaporates, leaving only moist salt behind. The crystallized salt is then scraped into a pot, a large potsherd or calabash, again using a freshwater mussel shell. On questioning the meaning of the shell's use, Terblanche (1994) was informed that it used because it was always the practice, since iron objects will rust on contact with the salt. When there is enough, the damp salt is formed into a cone shape. This is done by pouring the content onto a flat surface and forming the cone by ladling it with the hands. Terblanche indicates that at times coals are placed on the cone to form a hard crust on the surface. Sometimes the cone is also paced on dry grass, which is then burnt in order to produce the same effect. Witt (1966) mentions a process where the cone is placed in the sun in order for it to dry, and then baked in a clay pot placed on a fire. Measurements of the cones found that the cones weighed between 1 and 2 kg (Terblanche 1994).

Figure 13. Mopane and Sand Filters

Figure 14. Salt Water Being Filtered

Figure 15. End Product

Figure 16. Salt Makers with Members of the Study Team

3.7 Historical Maps

The following historic map-sets were consulted during the study;

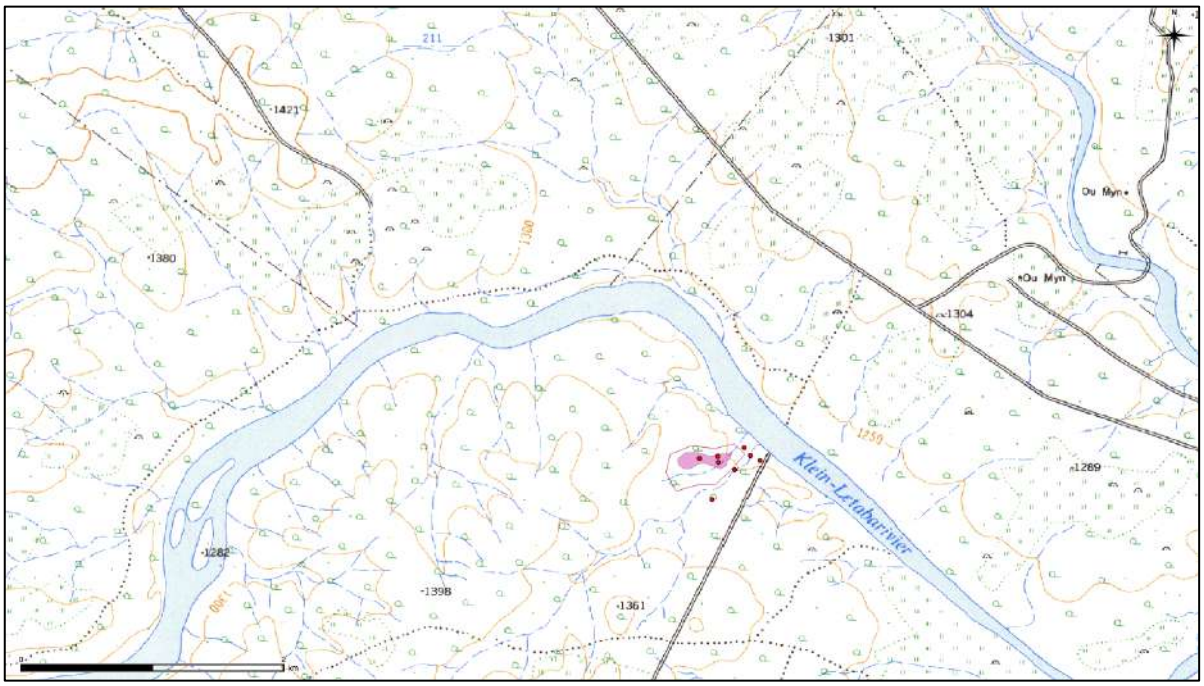


Figure 17. 1967 Map (Site location in pink as well as in all subsequent maps)

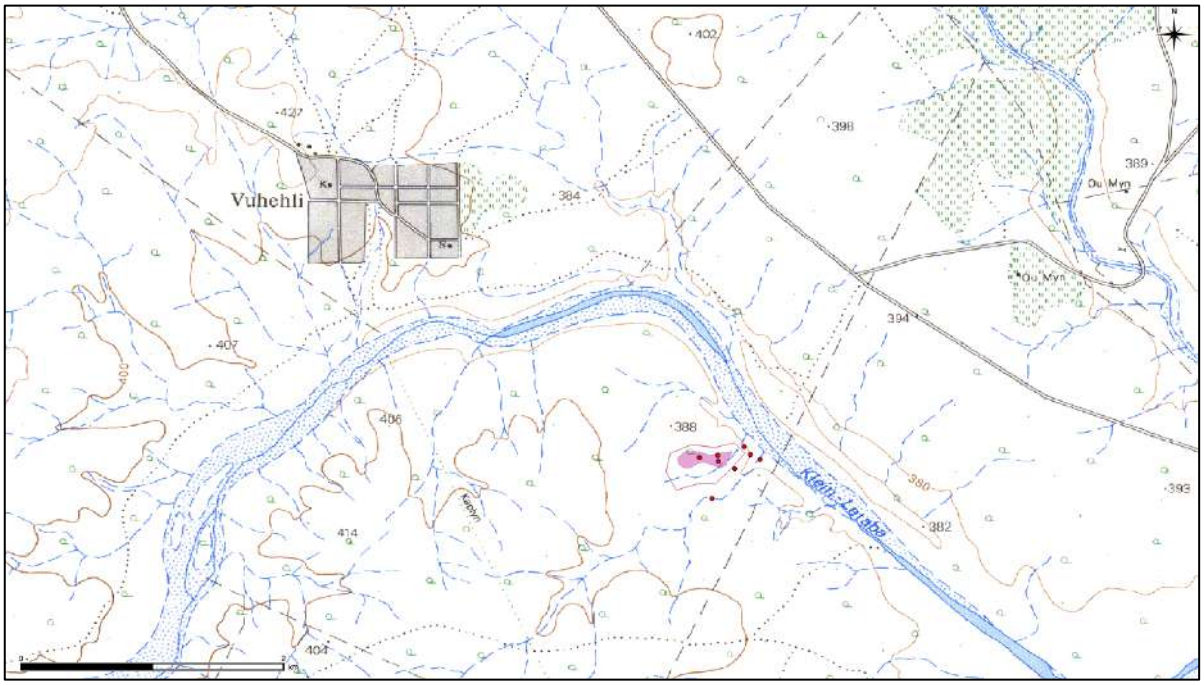


Figure 18. 1980 Map

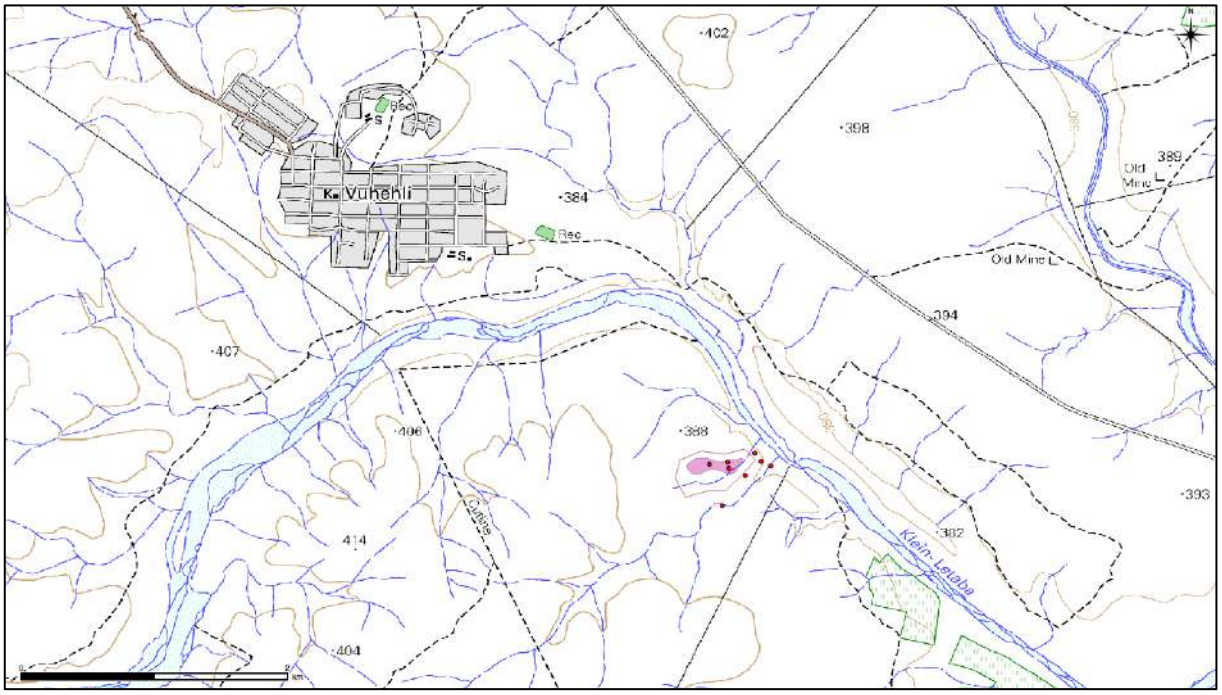


Figure 19. 1997 Map

No structures of heritage significance could be identified on the historical maps of the area.

4. Findings

4.1 Fieldwork Results

Several concentrations of potsherds and ash was noticed in the areas around the Baleni Wetland. None of these sites were however to be affected by the proposed erosion mitigation measures. The only site that would potentially be affected was located on the edge of a natural drainage ditch which was earmarked for stabilization. This will be designated as Site 1 as per Fig 25.

4.1.1 Site 1

GPS 23°25'14,6" S
30°54'46,6" E

This site contained a large concentration of potsherds (some of which was diagnostic) with ash deposits and the remains of hut rubble. It is situated on the eastern side of an erosion donga flowing north-south and draining into the Middle Letaba River. Some deposits were also noted on the western side of the donga suggesting that the site has been split by the erosion.

Figure 20. Potsherd on site

Figure 21. Potsherd on site

Figure 22. Deposits within vertical erosion wall

Figure 23. Gravel remains of a hut

Figure 24. Possible extent of Site 1 deposits.

Discussion

During 2004/2005, Alexander Antonites performed a survey and excavation at the Baleni Salt works describing sites and settlement distribution within this area. Antonites identifies a possible site (designated BS02) close to the location of Site 1. Although several different locations are both given in the text and maps for the site, the GPS coordinates indicate that it might be the same site as Site 1. The document was found to be flawed when it came to site locations, however the archaeological information was still valid and of value for this study.

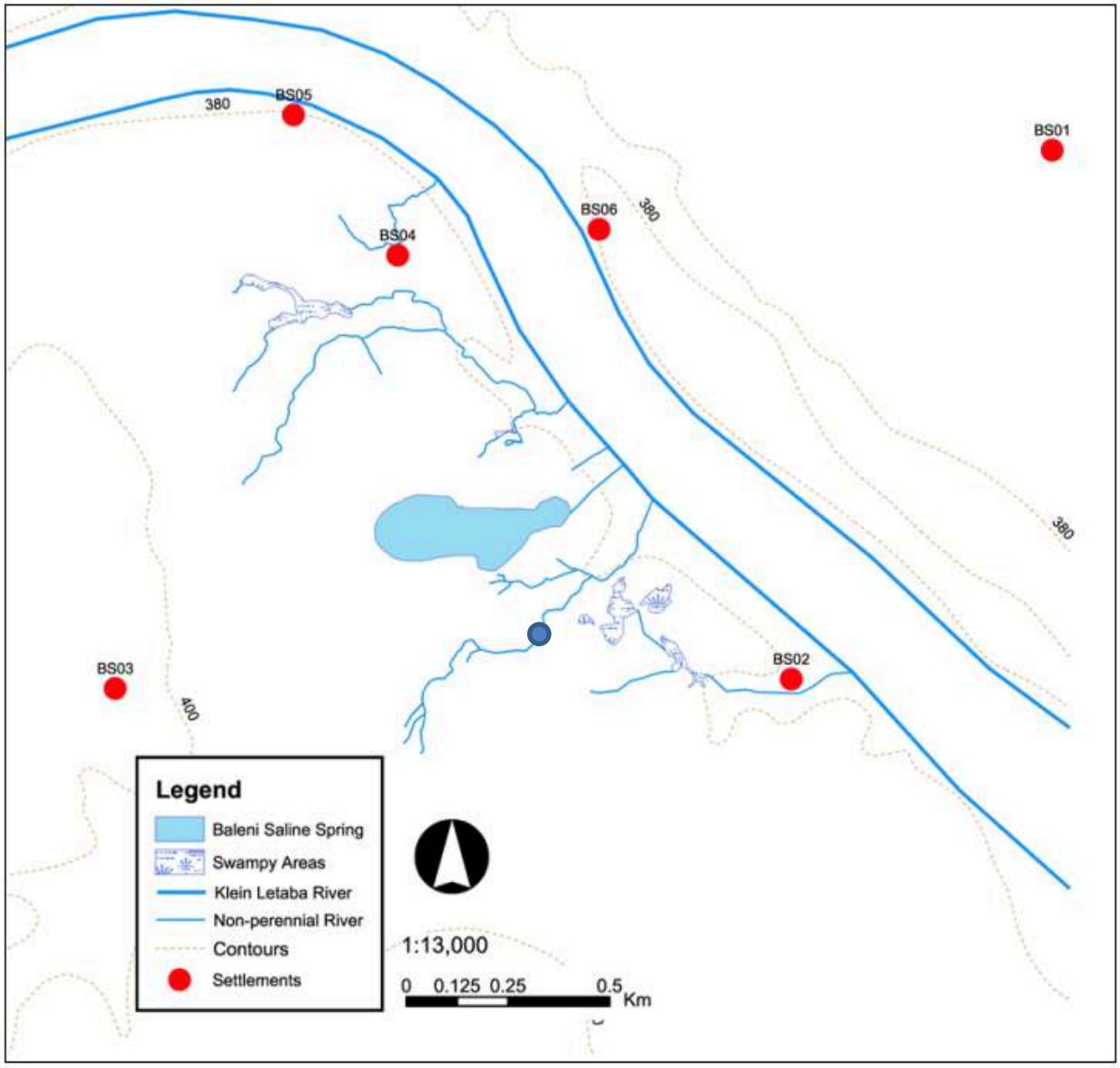


Figure 25. Sites identified by Antonites - BS02 location is incorrect (A Antonites, 2005) – Site 1 in Blue

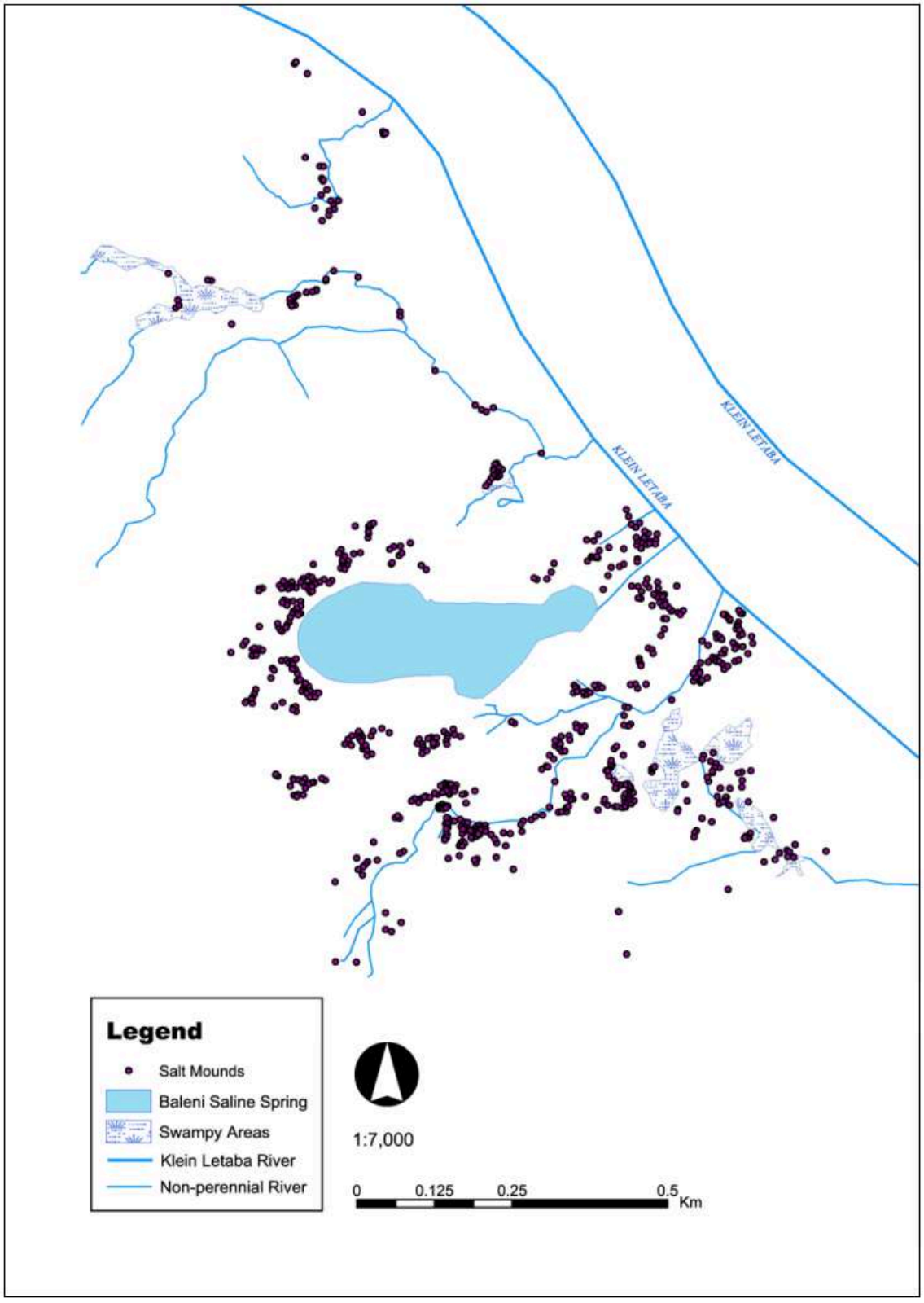


Figure 26. Locations of what is referred to as "Salt Mounds"- some of which was found to be hut remains (A Antonites 2005)

The following is an abstract from the Antonites report. It refers to BS04, however (taking the glaring similarities between the two sites) it was meant to describe site BS02 or Site 1 as per this report;

BS04

This site was identified by the presence of ceramic scatters and daga. A deep donga seems to have cut through the biggest part of the site, since material was found on both edges of it, and not extending very far back. The extensive erosion made it difficult to determine the approximate size of the settlement.

Estimates indicate that it did not exceed 2000m2. Preliminary analysis of the surface ceramics indicated that the site was occupied during the early first millennium. Leached out mounds of earth, possibly from a later date, were also identified on the edge of the donga. This led to the decision to excavate test pits in order to obtain ceramics which could be used for a more detailed temporal context for the settlement. (Antonites, 2005).

We believe the subsequent excavations designated as BAL 01 (unfortunately no GPS coordinates or 1:50 000 references are given for these excavations) refer to Site 1. The photographs contained in the report also seem to corroborate this.

Figure 27. Exposed wall at Site 1

Figure 28. Eroded wall from Antonites Report (Antonites, 2005)

Figure 29. Archaeological Stratigraphy from Antonites Excavation (Antonites 2005)

Figure 30. Salt Mounds as described by Antonites, rather thought to be hut remains

4.1.2. Site 2

GPS 23°25'15,2" S
30°54'31,1" E

Figure 31. Grave Site

A single grave site was also identified; however, it is not expected to be impacted upon. The site should be avoided by at least 25m.

Figure 32. Location of Grave Site

4.2 Public Participation

As part of the heritage orientated public participation the following steps were taken to inform local residents of the planned development.

- Notices indicating the location of the rehabilitation interventions were placed on site (See Addendum 1).
- IAP's were invited to register through the lead consultant's public participation process, to facilitate the dissemination of information and to enable them to log any queries or complains in regards the heritage of the are and how it will be affected by the proposed rehabilitation interventions.
- This HIA will be made available for public comment as part of the broader EIA report for this project.
- If a ROD in terms of the NHRA is issued for the project, IAP's will be informed of their right to log complaints within 14 days.
- Letters informing IAP's of the BAR will be circulated by the lead consultant.
- As part of the wider EIA stakeholder engagement component, advertisements regarding the development was placed in local newspapers by the lead consultant.

Chapter 3

IMPACT ASSESSMENT

5. METHODOLOGY

This study defines the heritage component of the EIA process being undertaken for the proposed anti-erosion measures recommended by the Working for Water engineers to limit the impact of water flow off at the wetlands around Baleni, 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 altering action and buffer 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 actions, direct implementation of an inventory study may preclude the need for an overview.

There are a number of 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 sources were consulted in this study;

- South African National Archive Documents
- Government Gazette 92 of 2007
- SAHRIS (South African Heritage Resources Information System) Database of Heritage Studies
- Internet search
- Historic maps
- 1967, 1980, 1997 & 2008 Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2018 imagery
- Published articles and books
- JSTOR Article Archive

5.3 Fieldwork

Fieldwork for this study was performed on the 21th of August 2018. Most of the areas were found to be accessible by vehicle. Areas of possible significance were investigated on foot. The survey was tracked using GPS and a track file in GPX format is available on request.

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.

6. Assessment of Heritage Potential

6.1 Assessment Matrix

6.1.1 Determining the Archaeological Significance

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings but also applies to other provinces. 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 3. Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deaon, 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	On old river terrace

			hill/dune	
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 settlement, but buildings 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 4. 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

6.2 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 which is now widely used in most provinces. 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.

6.3 Impact Statement

6. 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 activities. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed activity 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

6.4 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
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.

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).*

6.5 Pre-Contact Sites
As discussed in Findings – Chapter 2

6.6 Post-Contact Sites
No sites associated with the post-contact era will be affected by the proposed actions.

6.7 Built Environment
No structures were identified on site.

7. 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.

7.1 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 if 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.

7.2 Impact Rating System

An 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.

7.2.1 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:

Table 5. Classification of Impacts

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.

8. Anticipated Impact of the Actions

8.1 Iron Age Deposit Site (Site 1)

Interventions are being proposed to minimize further erosion. Although this will stabilise the archaeological deposit it will necessitate cutting into the existing deposits. The resultant structure will however be beneficial to downstream archaeological sites.

Table 6. Mitigation of Impacts: *Site 1*

IMPACT TABLE FORMAT		
Heritage component	*Iron Age Deposit Site (Site 1)*	
Issue/Impact/Heritage Impact/Nature	*Heritage sites of significance: Iron Age*	
Extent	*Provincial (3)*	
Probability	*Likely (3)*	
Reversibility	*Irreversible (4)*	
Irreplaceable loss of resources	*Significant loss of resources (3)*	
Duration	*Medium term (2)*	
Cumulative effect	*High cumulative effect (3)*	
Intensity/magnitude	*High (3)*	
Significance Rating of Potential Impact	*54 points. The impact will have a negative impact rating.*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	3	2
Probability	3	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	54 (medium negative)	9 (low negative)
Mitigation measure	*It is suggested that the proposed cutting be subjected to a second phase of investigation and that a professional*	

	archaeological excavation be performed under a permit issued by the SAHRA.

8.2 Fence Line

Table 12. Mitigation of Impacts: *Fence Line*

IMPACT TABLE FORMAT		
Heritage component	*Unidentified sites*	
Issue/Impact/Heritage Impact/Nature	*Heritage sites of significance: Fence Line*	
Extent	*Local/district (2)*	
Probability	*Unlikely (1)*	
Reversibility	*Partly reversible (2)*	
Irreplaceable loss of resources	*No loss of resource. (1)*	
Duration	*Medium term (2)*	
Cumulative effect	*Low cumulative effect (1)*	
Intensity/magnitude	*Low (1)*	
Significance Rating of Potential Impact	*9 points. The impact will have a low negative impact rating.*	
	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	9 (low negative)	9 (low negative)
Mitigation measure	*The fence line will be a low impact activity which will be placed within the wetland area and will not impact on the heritage of the site.*	

8.3 Grave Site

Table 13. Mitigation of Impacts: *Grave Site*

IMPACT TABLE FORMAT	
Heritage component	*Iron Age Deposit Site*
Issue/Impact/Heritage Impact/Nature	*Heritage sites of significance: Iron Age*
Extent	*Local/district (2)*
Probability	*Possible (2)*
Reversibility	*Barely reversible (3)*
Irreplaceable loss of resources	*Significant loss of resources (3)*

Duration	*Medium term (2)*	
Cumulative effect	*High cumulative effect (3)*	
Intensity/magnitude	*High (3)*	
Significance Rating of Potential Impact	*45 points. The impact will have a negative impact rating.*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	3	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	45 (medium negative)	9 (low negative)
Mitigation measure	*The grave site should be avoided by at least 25m buffer zone during the construction phase.*	

10. Chance Finds Protocol

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 as per Chapter 2;
- Stone concentrations of any formal nature.

Figure 33. Photos curtesy of EON Hanisch

- The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:
- All excavators 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.
- Should human remains be uncovered it is important that the site be secured until such time as the SAPS and the heritage consultant can access the site.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

11. Conclusion

Although several sites of heritage value are located within the study area, only one site will be directly affected by the proposed anti-erosion measures, namely intervention B82G-01-213-00.

It is recommended that the proposed site be subjected to an archaeological excavation permitted by the SAHRA. Should the WFW monitoring show any new erosion or flow deviations that could impact on heritage sites, a heritage practitioner should be approached to evaluate the impact.

Due to the limited impact of the activity proposed, there are no direct heritage impacts on the local community and it is accepted that the public participation process performed by the lead consultant will be sufficient.

12. References Cited & Researched

Ahler, S.A. 1977. Functional analysis of nonobsidian chipped stone artefacts: terms, variables and quantification. In: Hayden, B. (ed.). Lithic use-wear analysis: 301-328. New York: Academic Press.

Greenfield, H. J. and van Schalkwyk, L. O. 2003. Intr a- settlement social and economic organization of Early Iron Age farming communities in southern Africa: view from Ndondondwane. Azania, 38: 121-37.

Huffman, T. N. 1993. Broederstroom and the Central Cattle Pattern. South African Journal of Science, 89: 220-26.

Huffman, T. N. 2001. The Central Cattle Pattern and interpreting the past. Southern African Humanities, 13: 19-35.

Kent, S. 1998. Invisible gender-invisible foragers: hunter-gatherer spatial patterning and the southern African archaeological record. In: Kent, S. (ed.) Gender in African prehistory: 39-67. California: Altamira Press.

Japha, D., Japha, V., Le grange, L & Todeschini, F. Mission Settlements in South Africa: A Report on their historical background and prospects for conservation. University of Cape Town.

Maggs, T. O. 1984c. The Iron Age south of the Zambezi. In Southern African Prehistory and Paleoenvironments (ed. R. Klein). Rotterdam: Balken, pp. 329-60.

Maggs, T. O. 1995. The Early Iron Age in the extreme south: some patterns and problems. Azania, 29/30: 171-8.

Bewsher, P K, & De Jong, R C, (1997), Ecotourism and cultural resource management. Document prepared for the SA Wildlife College. Pretoria: Centre for Ecotourism.

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.

Cultural Heritage 146 Ekurhuleni SoER 2003.

Entries on towns in the Standard Encyclopedia of Southern Africa, published by Nasou, 1970-1976 (11 volumes).

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.

Mason, R. (1986). Origins of Black People of Johannesburg and the Southern Western Central Transvaal AD350-1880. Occasional Paper No. 16 of the Archaeological Research Unit.

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.

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

Stark, F, (1986). Germiston: The heart of South Africa. Germiston: Felstar Publishing.

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

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

Whitelaw, G. 1997. Archaeological monuments in KwaZulu-Natal: a procedure for the identification of value. Natal Museum Journal of Humanities. 9:99-109.

Addendum 1
Measuring Impacts

Measuring Impacts

In 2003 the SAHRA compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

1 Type of Resource

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

2 Type of Significance

2.1 Historic Value

It is important in the community, or pattern of history

o Important in the evolution of cultural landscapes and settlement patterns

o Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.

o 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.

o 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

o 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

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

2.2 Aesthetic Value

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

o Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.

o Importance for its creative, design or artistic excellence, innovation or achievement.

o 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.

o 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.

2.3 Scientific Value

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

o 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.

o Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.

o 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.

o 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.

o It is important in demonstrating a high degree of creative or technical achievement at a particular period

o 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?

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?

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

2.6 Economic Significance

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

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

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?

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?

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?

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?

3 Degrees of Significance

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. 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).

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.

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.