

# HERITAGE Pre-SCOPING REPORT

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HERITAGE PRE-SCOPING REPORT FOR THE FIRST  
PHASE OF INVESTIGATION INTO THE HERITAGE  
SENSITIVITY OF THE PROPOSED BOSA POWER LINE  
ALIGNMENT

PREPARED BY:



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# CREDIT SHEET

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***Disclaimer;** This report is a first phase heritage investigation into the heritage sensitivity of the area demarcated for the Botswana South Africa (BOSA) Power Line. The report is meant to be a guide for further fieldwork and is not meant to be totally encompassing. Information is derived solely from published works.*

### 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



# EXECUTIVE SUMMARY

**Site name and location:** Botswana South Africa Power Line (BOSA)

**Developer:** ESKOM South Africa, Botswana Power Corporation of Botswana

**Consultant:** G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa.  
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**Date of Report:** 06 November 2016

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 encompasses the heritage pre-scoping investigation. A preliminary alignment has been supplied to lead this phase of this study.

This study focuses on the proposed development of the BOSA Power Line running through both Botswana and South Africa.

## Scope of Work

A Heritage Scoping Assessment to determine the possible occurrence of heritage resources within the study areas through;

- A desk-top investigation of the area;
- Review of the available archaeological and historical literature covering the area, as well as previous cultural resource management studies in the area.

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

## Findings & Recommendations

There is sufficient evidence of the location of heritage sites within the proposed corridor to justify ground-truthing through the implementation of a full HIA.

## Fatal Flaws

No fatal flaws were identified.

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## LIST OF ACRONYMS

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

## HERITAGE IMPACT ASSESSMENT

### HERITAGE PRE-SCOPING REPORT FOR THE PROPOSED BOSA POWER LINE

#### INTRODUCTION

##### LEGISLATION AND HISTORY OF ARCHAEOLOGICAL RESEARCH

**The cultural heritage and inheritance of Botswana is protected through the implementation of the *Monuments and Relics Act no 12 of 2001*.**

According to the M&R Act, Paragraph 19, any new development should;

#### 19. Pre-development impact assessment

(1) For the purposes of this section:

"pre-development archaeological impact assessment" means

(a) the study, by an archaeologist, of an area in which development or any ground disturbing activity is to be carried out, to determine the likelihood of the development or activity impacting negatively on any cultural material or evidence that may be present in the area to be disturbed; and

(b) any recommendation made by the archaeologist on how to prevent or mitigate any negative impact to the cultural material or evidence referred to under paragraph (a); and

"environmental impact assessment study" means the study of an area in which development or any ground disturbing activity is to be carried out, to

(a) determine the possible extent of damage to the natural environment;

(b) determine means to

(i) preserve as far as is possible, the natural environment;

(ii) minimize and control waste or undue loss of or damage to natural and biological resources;

(iii) prevent, and where inevitable, promptly treat pollution or contamination of the environment.

(2) Both an archaeological pre-development impact assessment study and an environmental impact assessment study, shall be caused to be done by any person wishing to undertake major development, such as construction or excavation, for the purposes of mineral exploration and prospecting, mining, laying of pipelines, construction of roads or dams, or erection of any other structure, which will physically disturb the earth's surface.

(3) A report from the studies conducted in terms of subsection (2), shall be furnished to the Commissioner within 60 days of completion of both studies, together with a written application for the development of the area in which the studies have been conducted.

(4) No person shall, without the written permission of the Commissioner, which permission may

be given only after the Commissioner has considered the report, and which permission shall include such conditions, if any, as the Commissioner deems necessary, commence such development, or undertake such development contrary to any such condition as may be imposed.

(5) A person who contravenes subsection (4) commits an offence and is liable upon conviction to a fine not exceeding P10 000 or to imprisonment for a term not exceeding 1 year, or to both.

(6) Any permission, given in terms of this section, may at any time be withdrawn if any person has, in an application to the Commissioner for his permission, knowingly made any statement which is false in any material particular or supplied therewith any report, drawing or photograph which is false in any material particular.

(7) Where a development has been undertaken without the written permission of the Commissioner, or where such permission has been withdrawn, and the excavation or construction is suspended in terms of section 12(2)

(a) no damages, including consequential damages, of any kind, shall be payable by the State in respect of the suspension; and

(b) any extra archaeological salvage costs, being costs that would not have been necessary had the salvage work been done before the development had commenced, shall be borne by the person who has undertaken such development.

### **Town and Country Planning Act 2013**

This is a principal Act relating to planning and control of developments and land use in the country. It aims at providing orderly and progressive development of land and to establish control over the use of land through planning permission. It is applicable to all Planning Areas in the country. Section 6, provides any place declared a planning area shall within two years prepare a development plan designating the various land uses as may be appropriate. Such uses may include uses like residential, commercial, agricultural, recreational etc.

The Town and Country Planning Act (Cap 32:09), section 27(1) empowers the Minister to make provisions for the preservation of any buildings of special architectural or special architectural or historic interest. It also has recommendations for the preservation of buildings of historical or national heritage.

### **The National Conservation Strategy of 1990**

This is a plan that advocates for the protection of national cultural and heritage in Botswana. Several heritage sites are protected through this strategy.

### **100 Monuments Project**

This project is an initiative of His Excellency the President of Republic of Botswana Seretse Khama aimed at poverty alleviation by developing 100 monuments. The project develops heritage sites for tourism through development of access roads, site trails, design, installation of signage at heritage sites and employment of local guides to manage the sites. Some of sites discussed in this report are covered by this project.

### **National Policy on Culture of 2001**

The Botswana Government recognizes the need to preserve the national cultural and historical heritage as evidenced by the establishment of museums, archives libraries and educational institutions. The Policy promotes pride and nationhood using various forms of languages, performing and visual arts as well as other forms of cultural expression.

### **Vision 2036**

The national development vision, Vision 2036 was established in 2016 following nationwide consultations led by a Presidential Task Group. The need for the creation of a national vision was precipitated by the need for Botswana to intentionally define and manage its path to 'Prosperity for All', as well as how it adjusts to the rapidly changing global economy and social order. The policy advocates for a proud and united nation with diverse cultures that are upheld, tolerated and celebrated to unite the nation.

### **EA Act No 10, of 2011**

The mandate of the EA Act of 2011 is to foster national development planning principles and emphasis on the role of natural resources. It is in this regard that all developmental interventions are required by the Act to carry out an EIA to assess the potential effects of "planned developmental activities; to determine and to provide mitigation measures for impacts of such activities as may have a significant adverse impact on the environment; to put in place a monitoring process and evaluation of the environmental impacts of implemented activities; and to provide for matters incidental to the foregoing" (EA Act, 2011). Archaeological sites are protected as part of the environment under this Act.

### **Public Health Act (Cap. 63:01) of 1981**

In addition to the above, another relevant piece of legislation at the phase of salvage exhumation is the Public Health Act. The Act makes provision for public health concerns including areas such as housing, trading places, sanitation, and protection of foodstuffs, water supplies and the regulation of the use of cemeteries. The main functions under the Act are the promotion of personal health and environmental health in Botswana. This involves advising and assisting local authorities in regard to matters affecting public health. The Public Health Act defines the procedure for obtaining the exhumation permission. The Act states at Section 73: It shall be lawful for the Minister whenever he deems it expedient for the execution of any public work or any public, mining or industrial purpose, to remove any body or the remains of any body from any grave whether in an authorized cemetery or elsewhere, and by order under his hand to direct such removal to be made in such manner as he shall direct.

### **Conveyance of Dead Bodies Act (1933)**

The Conveyance of Dead Bodies Act establishes the procedure for conveyance of dead bodies from one district to the other. The Act provides that authority must be sought from the District Administration Officer who shall satisfy himself or herself that such conveyance of dead bodies does not present a health risk to the community or places through which it traverses to its internment site. Further, the Act provides that re-internment must be done within 24 hours of the arrival of remains at the reburial site. This act is normally triggered when sites have been identified with human burial remains, which sites may have to be salvaged.

### **Town and Country Planning Act (2013)**

The Act provides for the orderly and progressive development of land in both urban and rural areas in order to preserve and improve the amenities thereof. The Act requires that development plans for all areas declared as planning areas be approved (Section 11). The Act also protects old buildings and monuments that may be threatened by development

### **In South Africa cultural heritage is protected under the *National Heritage Resources Act (NHRA) no 25 of 1999.***

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 m<sup>2</sup> 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.

## BACKGROUND INFORMATION

### PROPOSED BOSA PROJECT

#### PROJECT DESCRIPTION

The Southern African Power Pool Coordination Centre ("SAPP CC") has initiated the Botswana - South Africa (BOSA) Transmission Interconnection Project on behalf of two sponsors; Eskom of South Africa



and Botswana Power Corporation of Botswana.

The objective of the project includes aspects such as:

- ✓ Alleviate congestion on the Matimba-Phokoje-Insukamini line,
- ✓ Complement other regional supply initiatives by increasing the power transfers within the SAPP network,
- ✓ Increase stability in the power pool through additional interconnection between the strong versus weak networks, which has been a source of SAPP grid instability,
- ✓ Improve system control, adequacy and reliability, and
- ✓ Deepen regional integration that will facilitate improved electricity trading.

The Project is sponsored by Eskom of South Africa, and Botswana Power Corporation and is coordinated by the Southern African Power Pool Coordination Centre (“SAPP CC”). The support funds, administered by the Development Bank of Southern Africa (DBSA), have been sourced from the Infrastructure Investment Programme for South Africa and Project Preparation and Development Fund.

The interconnector infrastructure components consist of approximately 560km, 400kV transmission line connecting the Isang 400kV substation to a proposed new Watershed B 400/132kV substation, and further connecting the proposed Watershed B substation to the Mokoodi and Pluto 400kV substations. Note that the Watershed B substation is proposed to be positioned approximately 40km’s north west of the current Watershed substation.

The figure below provides a high-level geo-spatial presentation of the planned BOSA transmission interconnection.

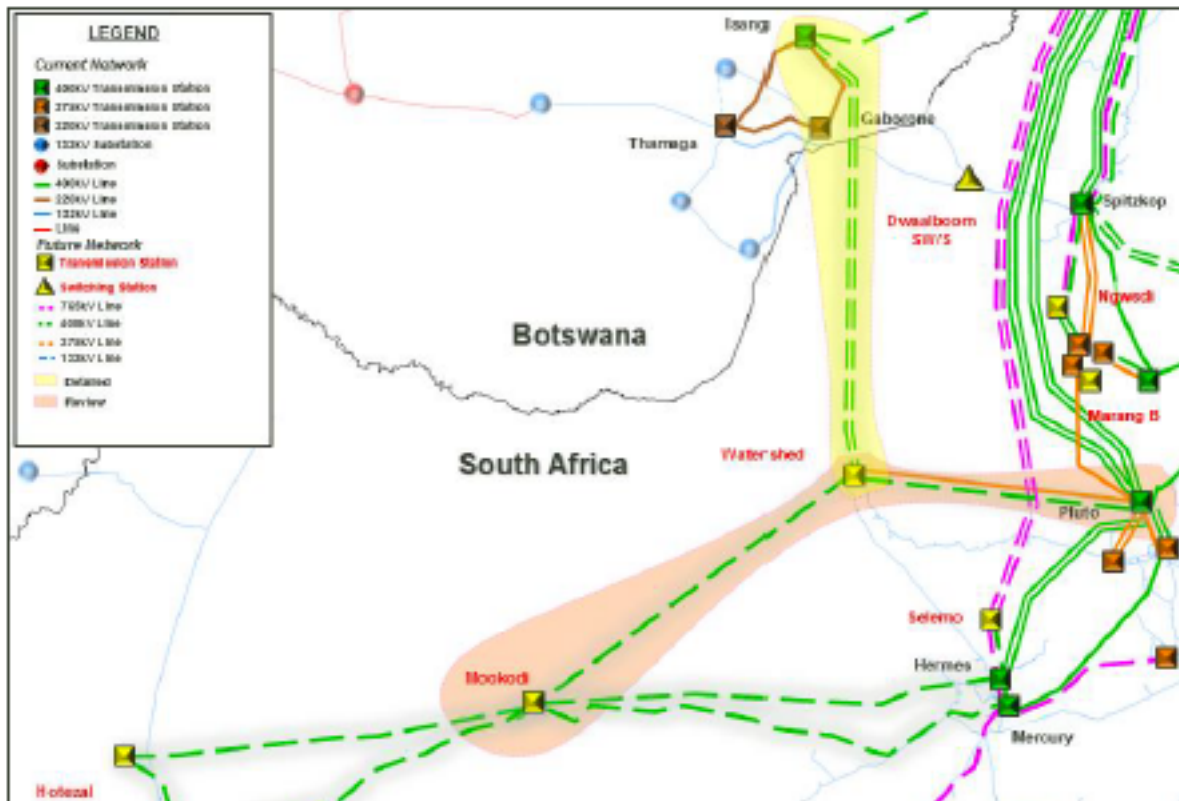


Figure 1. Original BOSA Study Area

The transaction advisor will be responsible for the preliminary design and the Environmental and Social Impacts Assessment (ESIA) for the Isang to Watershed 400kV transmission lines as well as the review of the preliminary design and ESIA done by Eskom for the portions between Watershed B and Pluto as well as Watershed B and Mokoodi substations.

The route identification between the Isang substation and the proposed Watershed B substations forms part of the project scope for the Transaction Advisor. Once a preferred route has been selected, this will be taken into Part 2 (Feasibility to PIM) of the project (which includes an ESIA) and preliminary design.

The project team has followed a structured, systematic and comprehensive transmission line corridor best practice selection process through which a number of corridors have been identified. From these base corridors a number of variations were identified resulting in 19 transmission corridors. After further analysis of these, 5 corridors were selected as the most viable potential corridors to be further evaluated during a Multi Criteria Decision Making (MCDM) workshop.

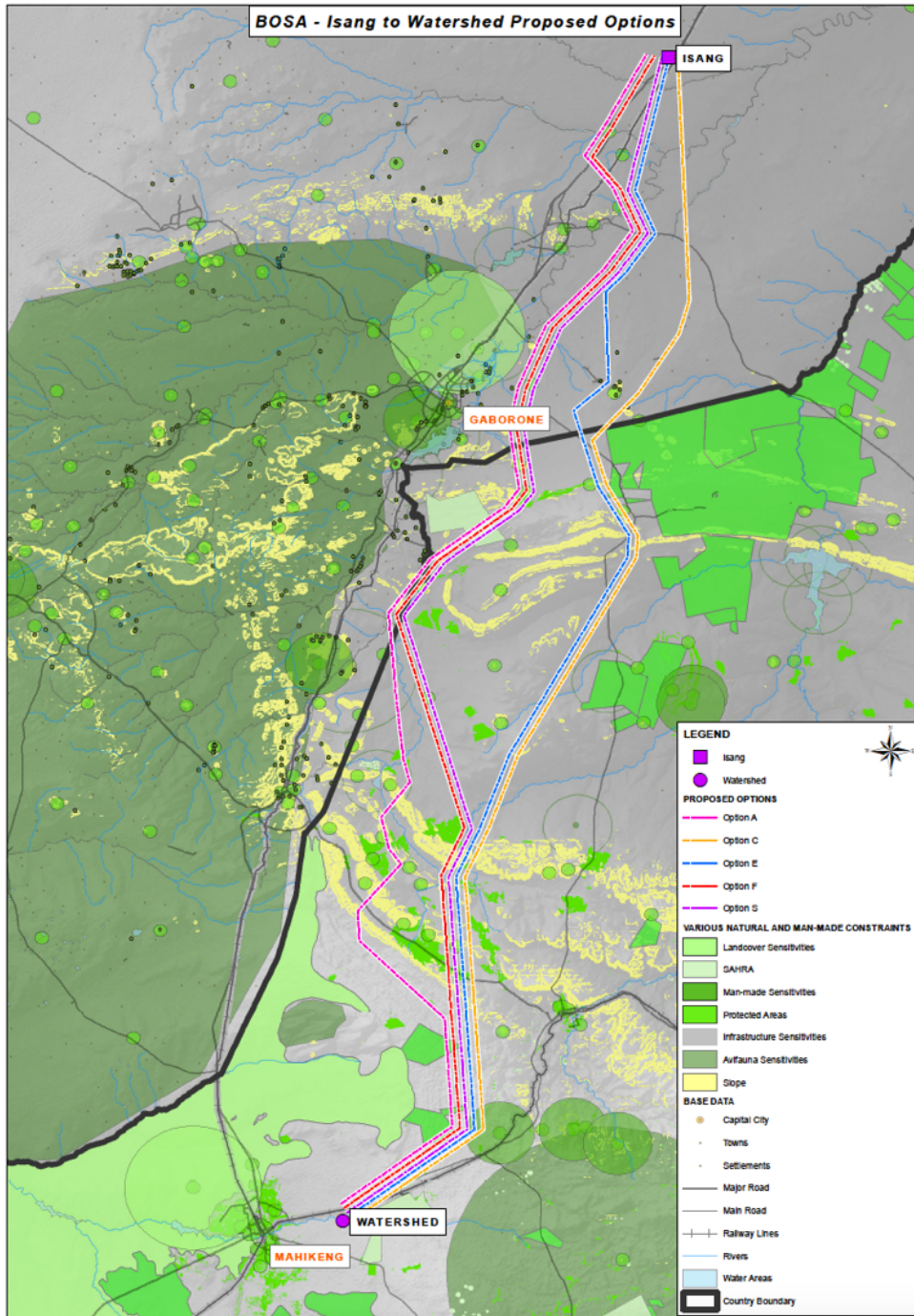


Figure 2. Proposed Alignment Options

## MCDM WORKSHOP

The MCDM approach allows for technical, financial, strategic, environmental and social constraints to inform decision making at the earliest possible stages of the Project. This enhances the sustainability of the Project for its lifecycle and assists in ensuring a smoother transition through the project phases by identifying constraints early and planning for these in the design phase.

This briefing document outlines the process to be undertaken to identify preferred route alignments for more detailed study. The MCDM workshop is to be held on the 25 May 2016 to interrogate the potential route alignments identified to provide assistance to the project team; with the selection of the best three route alignment corridors to be taken forward to more detailed study.

This process provides the feasibility study with a documented approach to the options selection process that can later serve as motivation for the selected options (i.e. during an ESIA). The environmental assessment process requires the assessment of one preferred route alignment to be compared against two alternatives and as well as no-go option. The outcomes of the MCDM will allow for these to be identified.

Within the MCDM workshop, participants representing particular fields of expertise or interests are asked to discuss and assess the suite of options against one another, on a one to one basis, and reach consensus on which option is preferred and by what margin. This process is repeated until all options and scenarios have been compared with all other options and scenarios using each of the preselected criteria. The MCDM Model then arithmetically collates preference scores and provides an overall ranking of the options (the model itself will be explained during the workshop and no further explanation will be provided here). The MCDM model works on the premise that an experienced professional can readily determine which options are preferred when considered against certain criteria, e.g. environmental, without the need for detailed assessment.

This MCDM process will include not only the relevant specialist team, but also Aurecon technical team and representatives of Eskom and the Botswana Power Corporation, in order to ensure that all relevant information, local knowledge and transmission expertise is duly taken into consideration in the final decision and that all interested parties agree on the way forward.

### Corridor Selection Methodology

Prior to the MCDM workshop a rigorous process was followed to identify a range of potential route alignment corridors. The base information used to inform these potential route alignments included:

- ✚ Roads / Towns / Settlements / Airports,
- ✚ Rivers / Water Areas / Vegetation,
- ✚ Land cover / Places of Interest,
- ✚ Protected Areas,
- ✚ Contours, a Digital Elevation Model, and Slope, as well as
- ✚ Constraints identified by ecological, heritage and avifaunal specialists.

Based on the above, 19 potential linkages between the existing Isang substation in Botswana and the proposed Watershed B substation in South Africa were identified. Of these 19 routes, 12 were considered fatally flawed based on one or more of the following considerations:

- ✚ Alignment through formally protected areas, and
- ✚ The need to cross the existing 220kV transmission lines west of Isang substation.

Additional routes were considered compromised and thus excluded from the potential routes if they covered large areas with one or more of the following:

- ✚ Densely populated areas (high levels of resettlement),
- ✚ Intensively farmed areas – either subsistence or formal farming (high levels of compensation),
- ✚ Long line length (high costs for line construction),

- ✦ Areas identified as sensitive for vultures, and
- ✦ Routes in close proximity to Gaborone.

A total of 5 corridors were identified as potential routes for more detailed assessment. These were assessed during the MCDM workshop and are indicated on the above map. It should be noted that these route alignment corridors include buffer areas to allow for the exact siting to be informed by detailed assessment of the study route.

### MCDM CRITERIA

The potential routes were assessed on the criteria identified below. The preferred route and two alternatives were assessed in detail in the ESIA.

The criteria that were used in the MCDM were as follows:

Category	Criteria	Description
Technical (Inc. Financial)	Te1. Slope	Avoid steep slopes more than 1:10
	Te2. Access	Constructability and maintainability in terms of construction and access to site
	Te3. Length	Line length and associated cost
	Te4. Width	Ability to construct 2 single circuit transmission lines spaced between 7 to 10 km apart
Environmental	En1. Biodiversity	Aquatic and terrestrial ecology; Ecological services
	En3. Avifauna	Flight paths; Nesting areas, Focal points
Social	So1. Heritage	Archaeological and cultural heritage resources
	So2. Compensation	Homes or other assets that will require resettlement or other compensation
	So3. Social	Proximity to existing large villages or towns that will remain; Distance to communities
	So4. Visual	Visibility on ridges
Strategic	St1. Proximity	Proximity to potential new Generation and Large Power Users

### RESULTS OF THE MCDM

The MCDM workshop resulted in Option C being chosen as the least sensitive and most practical alignment for the proposed BOSA line.





Figure 3. Route alignment corridor

## WATERSHED B TO ISANG SUBSTATION CONNECTION

Three possible routes were proposed.

### Route 1

This route cuts through some parts of the elevated mountainous “Swartruggens” hills. These are known to contain occupational sites of both the Iron Age and the Stone Age. It then runs through some developed areas (which has the lowest sensitivity) and finally through some greenfield areas, which might also be of heritage significance.

### Route 2

Route 2 has the same alignment through the hilly areas to the northeast as Route 1, however when it reaches the flats in the south it follows an alignment that almost exclusively runs through developed agricultural fields. These have a very low heritage significance since most sites have been demolished.

### Route 3

This runs through large sections of the Swartruggens Mountains, which are of high potential for harbouring heritage sites. It also runs through a large section of greenfield on the lowlands. It therefore has a higher potential than the other two options for impacting on potential heritage sites.

Route Selection (from preferred to least preferred)

Option 2

Option 1

Option 3

## WATERSHED B SUBSTATION VARIATIONS

The following recommendations are given in regards the potential variation to the location of the Watershed B Substation and the associated connecting lines to the proposed BOSA line.

### A) New Substation Locations

The proposed new locations for the Watershed B Substation are all located within agriculturally altered environments. As such the anticipated heritage impact is expected to be limited. Of the three sites, Option C overlays an occupational structure and would therefore have a larger potential for causing negative heritage impacts.





Figure 4. Occupational structure at Option C

**B) Connecting Power Lines**

The areas between the end of the proposed BOSA line and the new locations for the proposed Watershed B substation seems to be significantly altered by human occupation or a combination of human occupation and agricultural activities. These impacts might however only be superficial with important deposits still laying intact underneath. The main concern (from the archival study) lies with the historic battle sites associated with the Siege of Mafikeng during the Anglo Boer War.

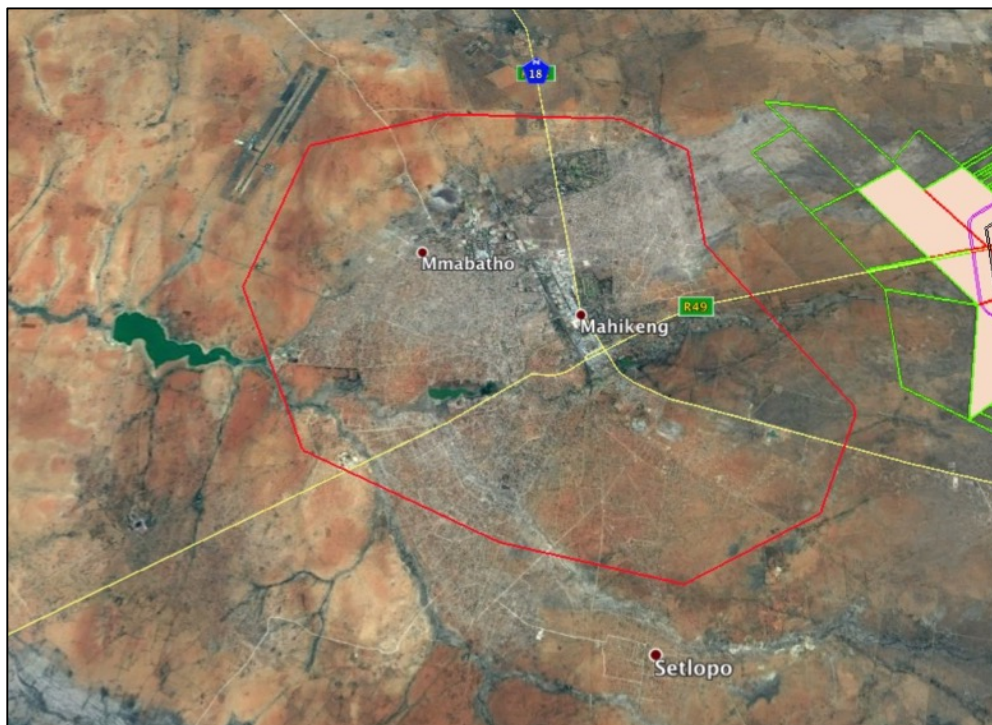


Figure 5. Area implicated in the Siege of Mafikeng

Although much of the Siege was focussed on the southern and south-western parts of the town, sites associated with this can be found all around the current town area. The most relevant and well-known sites fall within the red line in the figure above.

### **Watershed B Heritage Sensitivities**

*Several areas of possible heritage significance were identified through aerial analysis of the proposed routes. Known information about the characteristics of settlement patterns in these areas as well as geographic suitability analysis was used to determine possible sites of heritage significance. The following categories were identified;*

#### **Baberspan Archaeological Sites**

The Baberspan area is a well-known repository for archaeological deposits both from the Stone Age and the Iron Age. Several sites have been identified here throughout the years and it also serves as an excellent example of the pan fringe settlement pattern that has become distinct in this area.

#### **Cemeteries**

These are official municipal cemeteries that could be identified close to the proposed corridors. It is important to take into consideration that developments should adhere to a 100m buffer around these burial grounds.

#### **Possible Stone Age Sites**

It has been determined that the frequently occurring pans in this area is a popular settlement area for especially Stone Age (more commonly Middle- to Late Stone Age) communities. The abundance of agate (extremely good base material for the manufacturing of stone tools) might have led to these sites. Animals also frequent these pans, making them excellent hunting areas.

#### **Possible Iron Age Sites**

Several areas indicated geographically suitable areas for Iron Age site settlements. Such areas are specifically at the confluence of water courses and around permanent springs (or "oogs"). Several such sites were found. The area is not known for monumental stone walled sites and none could be observed through the aerial analysis.

#### **Possible Rock Art Sites**

The area under investigation is known to have sustained several groups of San hunter-gatherer groups in the past. These communities might have been living in this area for as long as 20 000 years ago. Although the large majority of this area is low lying without prominent elevated areas, there is a few ridges running for short distances mostly formed through sandstone. Some of these (especially the elevated areas around pans) have produced both rock painting and rock engravings.

#### **Paleoanthropological Sites**

The southern part of the study area is also quite well known for its paleoanthropological history with prominent finds such as the Taung Child Skull (now thought to be an adult *Australopithecine*) was made less than 60km south of Vryburg. It is therefore prudent to keep the possibility of such finds in mind during the study. Such sites will however only be identifiable during the fieldwork phase of the project.

### **Recommendations**

If Option A is chosen for the development of the Watershed B Substation, the occupants of the rural house here should be included in the list of IAP's. The possibility of family graves should be followed up with them.

It is further recommended that the final alignment of the Watershed B to BOSA connecting lines be subjected to a Heritage Walk-down to ensure that it will not impact on historic battle sites associated with the Siege of Mafikeng.



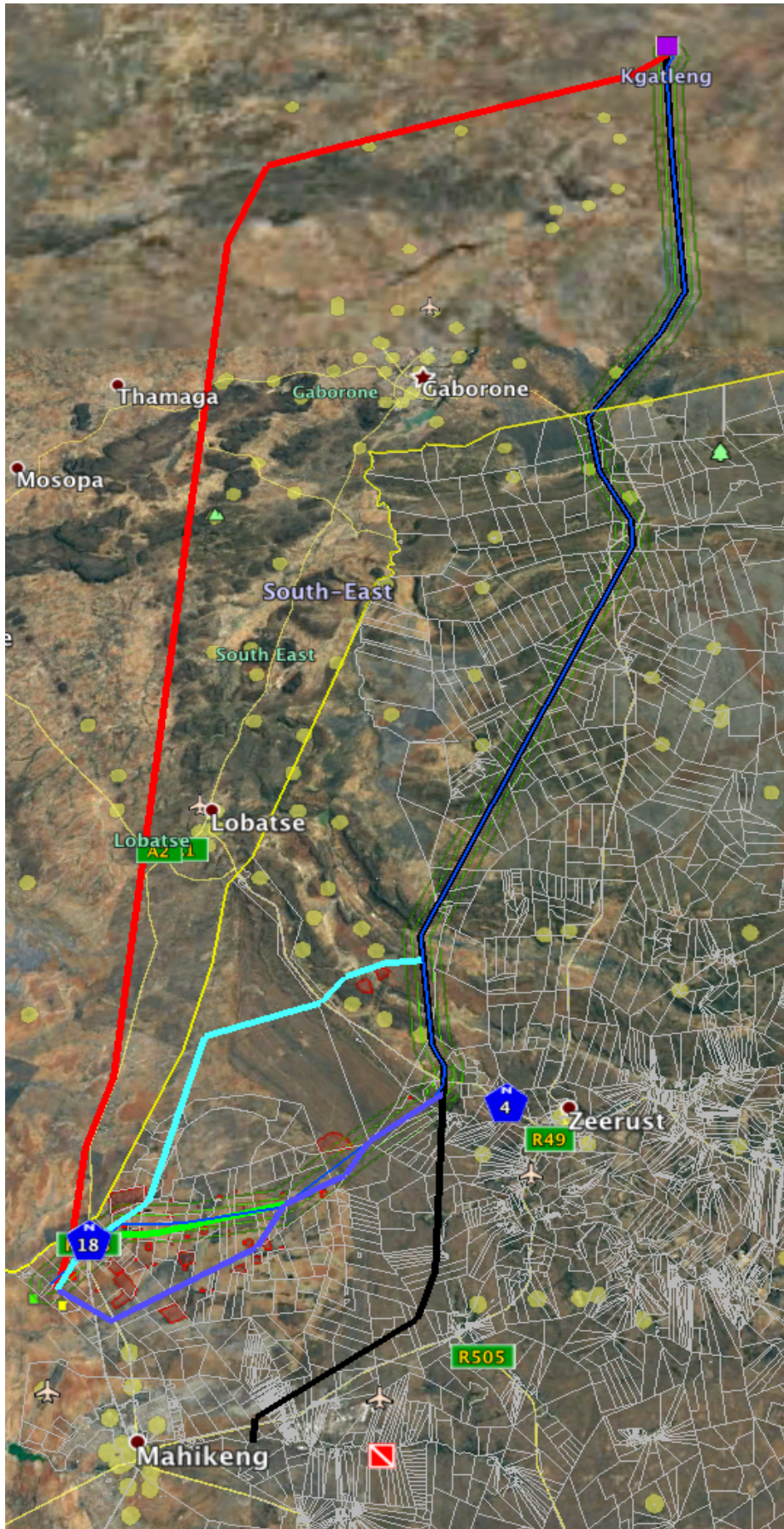


Figure 6. Options with heritage Sites in Yellow

2016/11/05

After a MCDM Workshop on the possible routes the least impact route was selected.

The final alignment looks as follow;

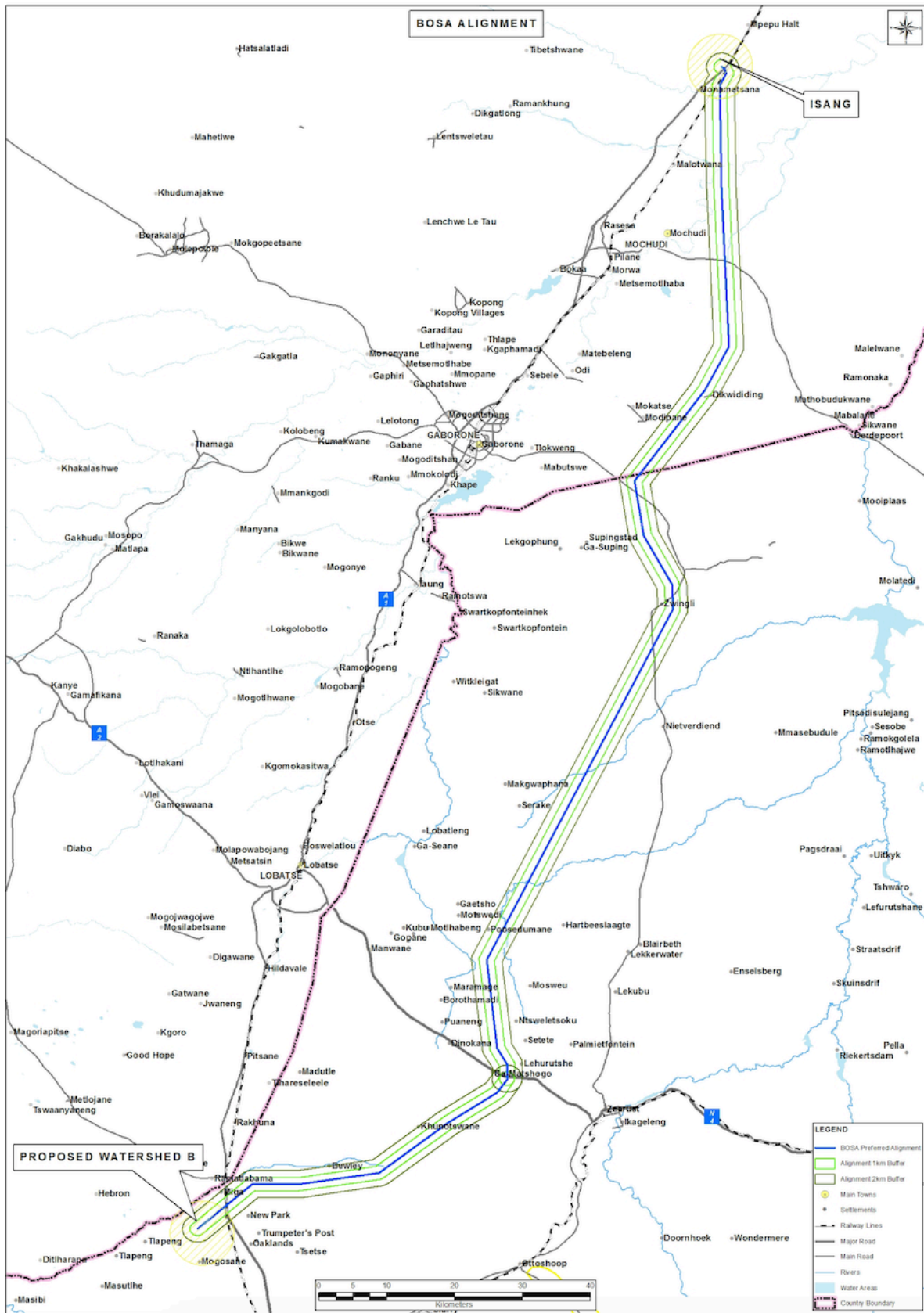


Figure 7. Final Alignment.



## **HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT**

### **REGIONAL CULTURAL CONTEXT**

#### **PALEONTOLOGY**

It is not anticipated that any of the proposed activities will affect bedrock and therefore it will also not affect the paleontological layer.

#### **STONE AGE**

##### **SOUTH AFRICAN COMPONENT**

The Southern African Stone Age sequence is well established on the basis of the terrace stratigraphy of the Vaal River Valley. Just as in North and East Africa, this begins in the basal Pleistocene with the occurrence of simple pebble tools of Kafuan type. These develop into what is called the pre-Stellenbosch, which is found in the oldest gravels of the Vaal and which includes artifacts made from pebbles that recall both the Kafuan and the Oldowan. The true Stellenbosch complex occurs in the next-younger series of deposits; it is simply a Southern African version of the Abbevillian and Acheulean of other parts of Africa and Europe. Typical are hand axes, cleavers, flakes struck from Victoria West cores, and (in its later phases) various sorts of flakes produced by the prepared striking-platform–tortoise-core technique. The Stellenbosch was followed by the Fauresmith, which is characterized by evolved hand axes and Levallois-type flakes. The Stellenbosch and Fauresmith together constitute what is called the South African Older Stone Age, a period roughly corresponding to the Lower and Middle Paleolithic stages of Europe. On the other hand, the South African Middle Stone Age belongs to the later part of the Upper Pleistocene. It is characterized by a series of more or less contemporary flake-tool assemblages, each of which displays local features. These are known as Mossel Bay, Pietersburg, Howieson's Poort, Bambata Cave, Stillbay, etc.; Stillbay, which occurs in Kenya and Uganda, is the only one of these found outside Southern Africa. The characteristic tools are made on flakes produced by a developed Levalloisian technique, including slender unifacial and bifacial lances or spear points for stabbing or throwing. In the final stages of the Middle Stone Age, known as the South African Magosian, microlithic elements appear, just as in the case of East Africa.

The Later Stone Age cultures of this region—the Smithfield and the Wilton—developed during post-Pleistocene times. These are closely related and, in their later stages, reveal varying degrees of influence as the result of contact with the culture introduced by the Bantu-speaking peoples. Both were extant at the time the first Europeans arrived in Southern Africa, and there is little doubt that the Wilton, which is a typical microlithic assemblage, is to be associated with the modern San (Bushman). There are many paintings in the rock shelters and engravings on stones in the open-air sites of Southern Africa, the oldest of which belong to the Later Stone Age. The naturalistic style of art revealed at these sites persisted until well into historic times (*Encyclopedia Britannica*).

#### **Sensitive Areas**

The following areas within the study corridor is identified as possible high potential areas for the location of Stone Age sites. This selection is based on the following;

- Geographic suitability
- The presence of other known Stone Age sites
- Geological appropriateness



Figure 8. Possible high risk areas for Stone Age Sites (South African Component)

### BOTSWANA COMPONENT

For the purposes of this study with classify baseline archaeological information into four parts of south-eastern Botswana: Gaborone, Kgatleng and Southern Regions. South-eastern Botswana is one of the richest regions in country in terms of archaeological, historical and heritage resources (both tangible and intangible). There are over 200 archaeological sites recorded in the area. Most of the sites were identified during Archaeological Impact Assessment for dams and associated developments.

The archaeological diversity of area includes the Early Stone Age (ESA), Middle Stone Age (MSA), Early Iron Age (EIA), Middle Iron Age (MIA), and Late Iron Age (LIA). ESA tools have been found in various parts of the south eastern Botswana, which date between 1 million to 150 000 years ago. Most of the tools are crude, big and are mainly cores. Unfortunately, most of the EAS sites in Botswana are found with materials that are not datable. Several Stone Age sites have been identified in the south eastern Botswana.

### IRON AGE

#### SOUTH AFRICAN COMPONENT

The Iron Age is well represented in this area with the majority of sites being composed of the Late Iron Age sequence. These sites are found in a variety of geographic locations; however, their prominent stone walling makes them easily identifiable on the ground. Early Iron Age sites have been identified and is mostly associated with the San in these areas. Several rock art sites also attest to their presence within the study area.

The later Iron Age sites such as Kaditshwene (close to Mafikeng) is recognized by the typical Sotho-Tswana scalloped stone walling. Some of these sites gained mega status and could have contained as much as 30 000 people.



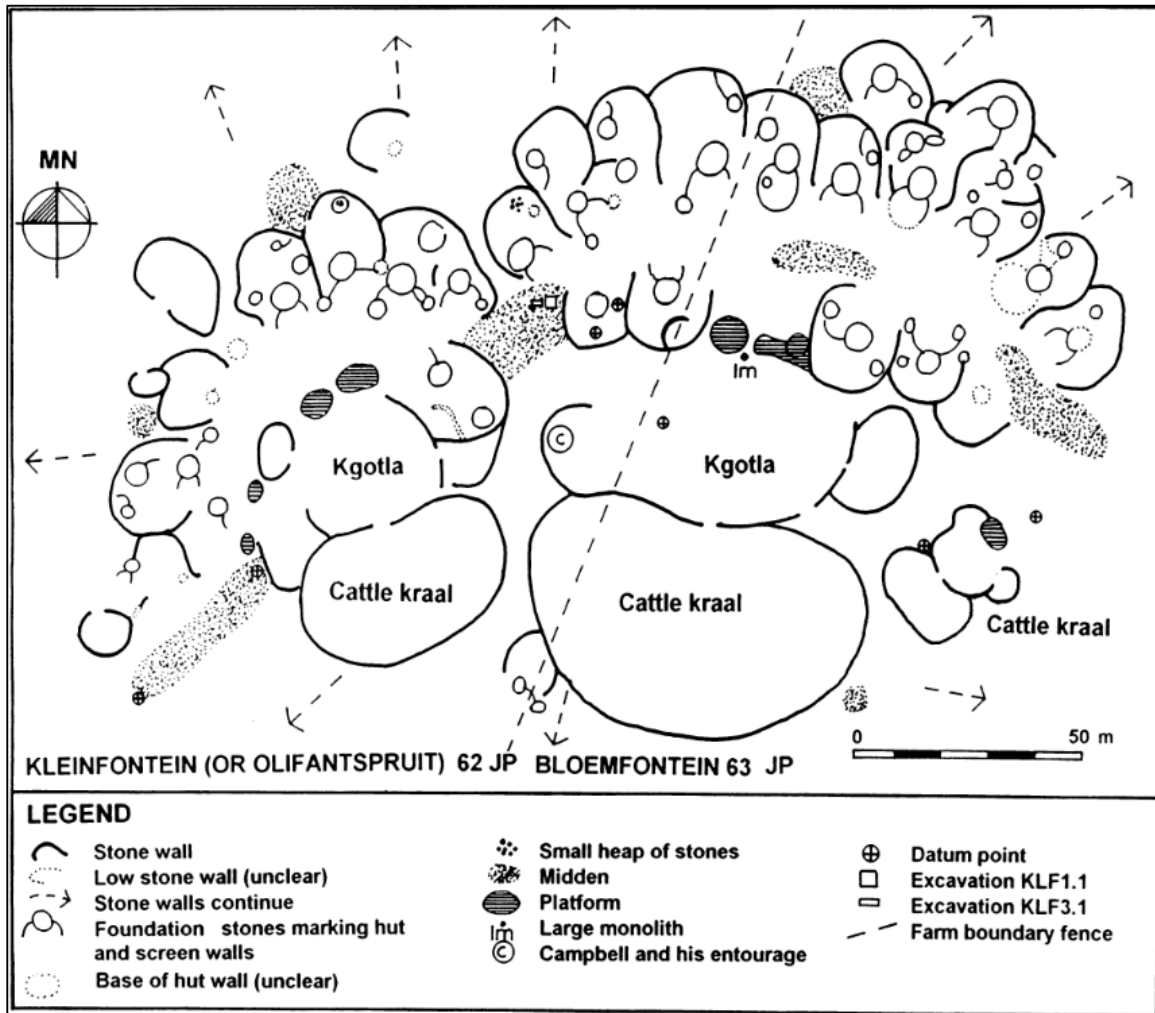


Figure 9. Scalloped stone walling at Kleinfontein

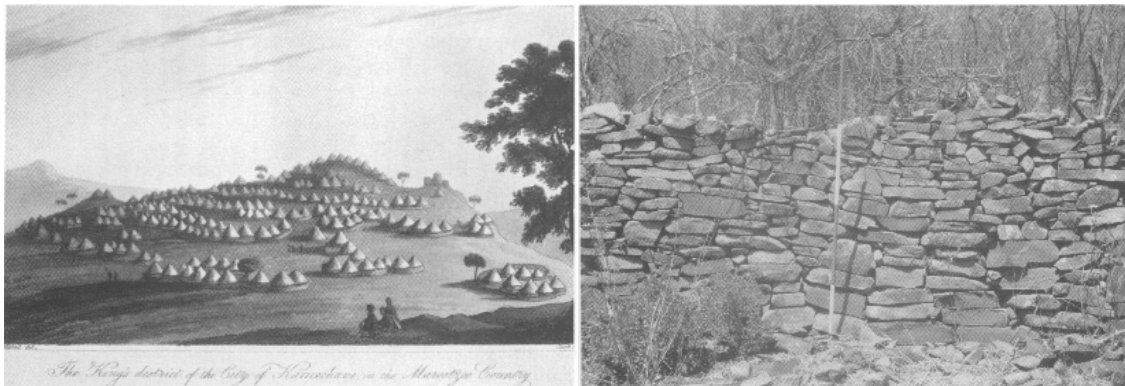


Figure 10. Campbell's 1822 sketch of Kaditswhene and stone walling

## Sensitive Areas

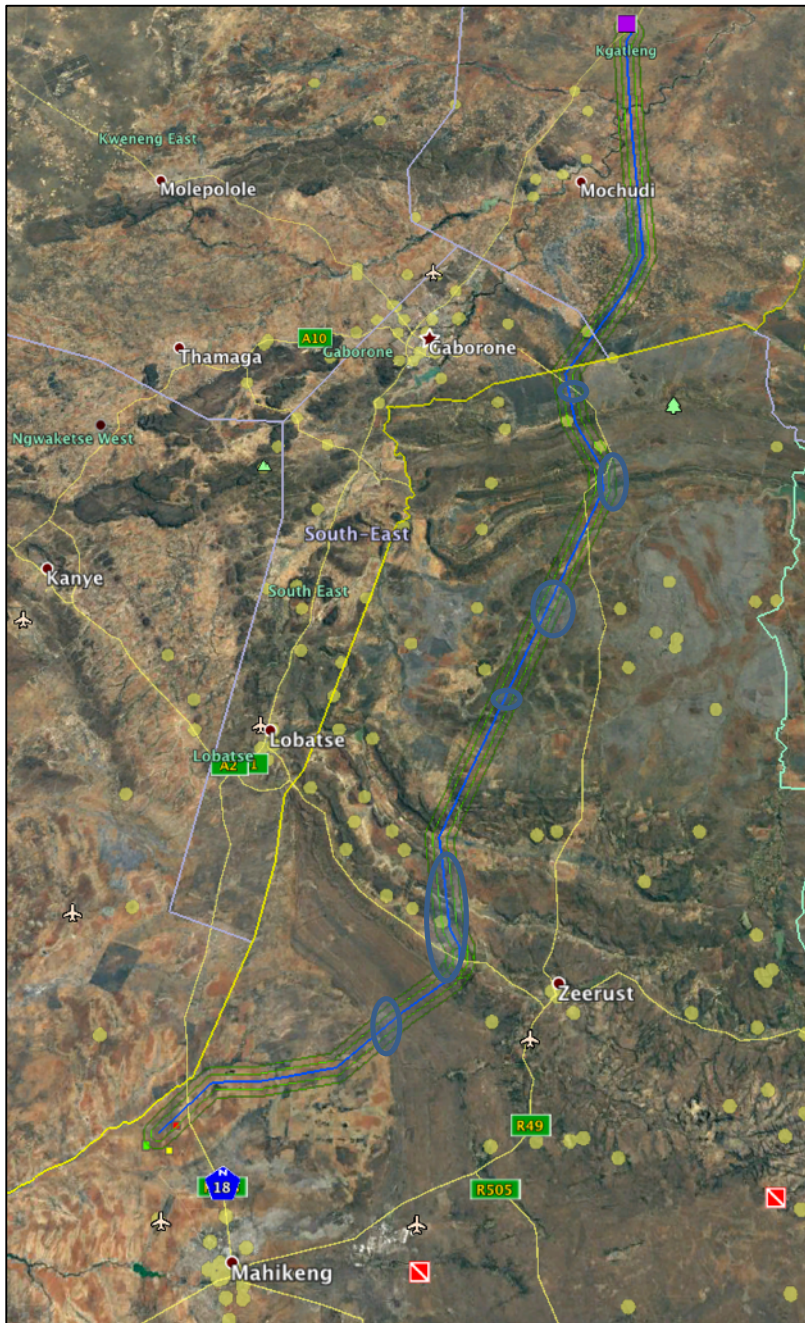


Figure 11. Possible Sensitive Areas along alignment

**BOTSWANA COMPONENT**

Iron Age sites noted in around south eastern Botswana include EIA (Zhizo Tradition), MIA (Toutswe Tradition, Great Zimbabwe Tradition) and LIA (Khami Tradition) sites. Spiritual and ritual sites have been recorded in especially in caves and hilltops.

Gaborone is located in south-eastern Botswana. Several archaeological sites are found this area. It is also nearer to Kweneng and Kgatleng Districts where archaeological remains of national value have been identified. These include the Matsieng footprints in Rasesa, Kolobeng and Ntsweng sites in Molepolole. There are also archaeological remains and sites that are found in Gaborone and its environs.

One important site in Gaborone is one at Broadhurst where an Iron Age settlement which dates back to 14th century AD was found. A small midden was uncovered during earth-moving operations which



contained well preserved faunal remains, charcoal and pottery (Denbow and Campbell, 1980). The Broadhurst pottery is characterized by very fine herringbone and cross-hatching motifs bordered by stepladder arches on slightly necked jars with thickened rims. Red ochre was used as infilling for panels and to burnish the inside of bowls. This pottery style was first identified at Broadhurst where it was dated to A.D. 1360 (Van de Ryst, 2006). Similar materials have also been identified at the top of the Taukome, Toutswe, Thatswane, Bosutswe, and Shoshong. Related materials occur at Mapungubwe but the date for Broadhurst is later than these sites. The discovery of these materials at Broadhurst provides useful information on the occupation times of south eastern Botswana in relation to eastern Botswana.

Excavations have been undertaken at the site of Moritsane approximately 20 km west of Gaborone. This site was organized around a central kraal. An infant burial with several hundred very small blue-green and yellow cane glass beads was recovered. Ceramics from this site contain much more of an emphasis on incised techniques, though the motifs and placement of decoration are virtually identical to Broadhurst (Denbow and Campbell, 1980). It is suggested that occupants of these sites were people who possessed large herds of domestic animals. Wealth, social status and influence were instrumental in the longer maintenance of cultural traditions (Cohen, 2010).

In his study at Ranaka, Lane, (1992) states that pottery from excavations presented similar range of decorative motifs and techniques of decoration like that of the 14th century EIA site at Broadhurst. These include a higher percentage of thickened rims in the Broadhurst assemblage, and a corresponding greater proportion of necked jars relative to open bowls but with a difference in assemblage and the pottery from sites around Ranaka (Lane, 1992). According to Denbow (1986) Moritsane and Broadhurst ceramics indicate continuity of settlement through at least the fourteenth century (Denbow, 1986).

There is the Bonnington Farm remains at Block 5 located adjacent to Gaborone-Molepolole road. Here grain silos and a housing structure are still standing intact. According to Dewah (2014), Bonnington Farm was originally owned by British farmers from the Cape. It is a remnant of what used to be Broadhurst Farms that were situated in the area in 1800s. Kgosi Sechele I gave this farm to the British farmers with a strategy of creating a buffer against encroaching Boers from the south. In this farm, livestock was reared and crops including maize, sorghum, groundnuts, beans and cotton were produced and sold in South Africa. The silos were built in 1952 to store animal feeds (Dewah 2014).

According to the Department of National Monument and Museum (DNMM) Site Register, there are several sites that have been found within Gaborone and the immediate surroundings but no further studies have been undertaken there. Most of these sites belong to Stone Age and Iron Age. A list of these sites is provided in the appendices section.

It is also essential to contextualize the study area within the broader archaeological data of Kgatleng District. Kgatleng District has undergone extensive archaeological research (see Walker 1996, Pearsons 1995, Marshals 1995, and Motlotle 1995). The National Museum databases record shows that there is some form of Archaeology within the broader project area. The most prominent being Modipe National Monument, Seoke and Matsieng.

Modipe Hill which is an Iron age settlement comprises of a granite outcrop measuring 3 kilometres in length and a kilometre in width (Mabuse & Tlhako 2009). According to recent research conducted in the area, the site was occupied by the Bakgalagadi people around the 15th century with the Tswana groups occupying it at a later period. The extent of the settlement is more prominent and elaborate on the eastern side of the hill with an area measuring 300 metres characterised by pot sherds and hut remains.

Between 1992 and 1995 archaeological excavations and survey work was conducted at Modipe Hill, Kgatleng District. The is a known Iron Age site comprising of a wide range of materials including hut settlement and associated scatter at the base of the hill and a complex of stone enclosures on the slopes (Pearson 1995).

In addition, Seoke, just like Modipe hill, consists of rich intensive stone walling. The deserted ruins are visible on hills and are on defensive spots. These areas were probably ideal in the late 18th century due to Difaqane invasions. There are also a number of Anglo-Boer places such as Basuto Kop situated in the area. In addition, there are various defensive positions and stonewalls that were built between October

1899 and February 1900.

Matsieng is a petroglyph site characterised by pecked human and animal's tracks located near a 3-metre-deep natural crevice on a granite rock. The human foot prints found in Matsieng are more like outlines while feline pugs are pecked in full (Walker 1998). Matsieng footprints can be found in many parts of Botswana and are associated with a legendary ancestor of Tswana people. Many believe that he(Matsieng) emerged from a hole in the ground with his cattle when the sand was apparently wet, the tracks subsequently dried when the earth hardened.

This assertion has however been quashed by Tlou and Campbell(1984) who explain that these traditions are merely used to justify occupation of these lands. This being the case because the Tswana people are failing to account for similar footprints in other parts of Southern Africa for example in Angola, South-east Zimbabwe, Victoria falls, Southern Namibia and Orange River as they fall outside the Tswana historic range (Walker 1998:213).

It is worth noting that the petroglyphs like the one in Matsieng and the rest of Southern Africa are attributed to the San people. These were "title deeds" to waterholes, directions to water holes or teaching youngsters how to identify and recognise antelope species from their tracks (Wilman 1933).

## THE HISTORIC ERA

### THE SOUTH AFRICAN COMPONENT

An analysis of the alignment of the powerline indicates that it does not traverse any built-up areas. No published records could be found of any heritage sites. The following components can however still be encountered during the EIA phase of the study;

Historic Landscape Type	Description	Occurrence possible?
1 Paleontological	Mostly fossil remains. Remains include microbial fossils such as found in Barberton Greenstones	Yes
3 Historic Built Environment	<ul style="list-style-type: none"> <li>- Historical townscapes/streetscapes</li> <li>- Historical structures; i.e. older than 60 years</li> <li>- Formal public spaces</li> <li>- Formally declared urban conservation areas</li> <li>- Places associated with social identity/displacement</li> </ul>	Yes
4 Historic Farmland	<p>These possess distinctive patterns of settlement and historical features such as:</p> <ul style="list-style-type: none"> <li>- Historical farm yards</li> <li>- Historical farm workers villages/settlements</li> <li>- Irrigation furrows</li> <li>- Tree alignments and groupings</li> <li>- Historical routes and pathways</li> <li>- Distinctive types of planting</li> <li>- Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting.</li> </ul>	Yes
5 Historic rural town	<ul style="list-style-type: none"> <li>- Historic mission settlements</li> <li>- Historic townscapes</li> </ul>	Yes
6 Pristine natural landscape	<ul style="list-style-type: none"> <li>- Historical patterns of access to a natural amenity</li> <li>- Formally proclaimed nature reserves</li> <li>- Evidence of pre-colonial occupation</li> <li>- Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages</li> <li>- Historical structures/settlements older than 60 years</li> <li>- Pre-colonial or historical burial sites</li> <li>- Geological sites of cultural significance.</li> </ul>	Yes
7 Relic Landscape	<ul style="list-style-type: none"> <li>- Past farming settlements</li> <li>- Past industrial sites</li> </ul>	Yes

	<ul style="list-style-type: none"> <li>- Places of isolation related to attitudes to medical treatment</li> <li>- Battle sites</li> <li>- Sites of displacement,</li> </ul>	
8 Burial grounds and grave sites	<ul style="list-style-type: none"> <li>- Pre-colonial burials (marked or unmarked, known or unknown)</li> <li>- Historical graves (marked or unmarked, known or unknown)</li> <li>- Graves of victims of conflict</li> <li>- Human remains (older than 100 years)</li> <li>- Associated burial goods (older than 100 years)</li> <li>- Burial architecture (older than 60 years)</li> </ul>	Yes
9 Associated Landscapes	<ul style="list-style-type: none"> <li>- Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes</li> <li>- Sites associated with displacement &amp; contestation</li> <li>- Sites of political conflict/struggle</li> <li>- Sites associated with an historic event/person</li> <li>- Sites associated with public memory</li> </ul>	Yes
10 Historical Farmyard	<ul style="list-style-type: none"> <li>- Setting of the yard and its context</li> <li>- Composition of structures</li> <li>- Historical/architectural value of individual structures</li> <li>- Tree alignments</li> <li>- Views to and from</li> <li>- Axial relationships</li> <li>- System of enclosure, e.g. defining walls</li> <li>- Systems of water reticulation and irrigation, e.g. furrows</li> <li>- Sites associated with slavery and farm labour</li> <li>- Colonial period archaeology</li> </ul>	Yes
11 Historic institutions	<ul style="list-style-type: none"> <li>- Historical prisons</li> <li>- Hospital sites</li> <li>- Historical school/reformatory sites</li> <li>- Military bases</li> </ul>	Yes
12 Scenic visual	<ul style="list-style-type: none"> <li>- Scenic routes</li> </ul>	Yes
13 Amenity landscape	<ul style="list-style-type: none"> <li>- View sheds</li> <li>- View points</li> <li>- Views to and from</li> <li>- Gateway conditions</li> <li>- Distinctive representative landscape conditions</li> <li>- Scenic corridors</li> </ul>	Yes

#### BOTSWANA COMPONENT

Gaborone City is situated in south-eastern part of Botswana. The city is the capital of Botswana. Gaborone currently has a population of about 231 592 people. The city is constituted by different people from different parts of Botswana and foreigners from different parts of the world. To understand the origins of the city, a brief history is discussed as follows:

In the 1880s, Kgosi Gaborone of the Batlokwa clan left the Magaliesberg area in the South African province of North West to settle in the south-eastern Botswana and called the settlement Moshaweng. When European settlers came in the area they found Kgosi Gaborone here and called the area Gaborone's Village. It was later shortened to Gaborone. The original village of Gaborone was set up around 1887 on the banks of Notwane River. In 1891, the railway came and 4km to the west, Gaborone station was built. Cecil Rhodes, a mining magnate, built a fort for colonial administration across the river from Gaborone. The fort was where Rhodes planned the Jameson Raid during the Second Boer War. The old Gaborone became a suburb of the new Gaborone, and is known as "The Village".

During the time of Bechuanaland Protectorate, its administrative headquarters were in Mafikeng (now Mafikeng), South Africa (Jonsson, 2000). With independence coming in 1966, in 1962 it was decided that the new capital should be moved to Gaborone. Lobatse was the first choice as the nation's capital. However, Lobatse was deemed too limited, and instead, a new capital city would be created at Gaborone. Gaborone was chosen for several reasons: the site had no tribal affiliation thus availability of public land, the proximity to the Notwane River with a basin suitable for dam construction, best communications (rail and the north-south road) and some existing infrastructure to site developments (Jonsson, 2000). With the selection of Gaborone as the capital, the administration of the time accordingly set up plans for the new capital. By 1963, a master plan had been prepared by the public works department in Mafikeng. The city was planned under Garden city principles with numerous pedestrian walkways and open spaces. Building of Gaborone started in mid-1964. During the city's construction, the chairman of Gaborone Township Authority, Geoffrey Cornish, likened the layout of the city to a "brandy glass" with the government offices in the base of the glass and businesses in the "mall", a strip of land extending from the base.

Most of the city was built within three years, earlier than expected so the government offices could move in earlier. Two thousand workers helped to construct the city. Buildings in early Gaborone include assembly buildings, government offices, a power station, a hospital, schools, a radio station, a telephone exchange, police stations, a post office, more than 1,000 houses and apartments, a British high commission, a library, a brewery, a church, and numerous other structures. By 1966, the population of Gaborone was about 5,000 people.

The name of the city was changed from Gaborone to Gaborone in 1969 (Jonsson, 2000). As the city was built so quickly, there was a massive influx of labourers who had built illegal settlements on the new city's southern industrial development zone. These settlements were named Naledi. In 1971, because of the growth of illegal settlements, the Gaborone Town Council and the Ministry of Local Government and Lands surveyed an area called Bontleng, which contained low-income housing. However, Naledi still grew, and the demand for housing was greater than ever.

In 1971, it was decided to extend the original town towards the north into the Broadhurst Farm. Almost immediately, the next phase of planning for Gaborone called Broadhurst II was put into operation. A second industrial area was also planned as the original industrial extension (extension 13) had been completely settled by squatters who were by then well-established. In 1973, the Botswana Housing Corporation built a "New Naledi" across the road from the "Old Naledi". Residents from Old Naledi would be moved to New Naledi. However, the demand for housing increased yet again; moreover, the residents who relocated to New Naledi disliked the houses. The problem was solved in 1975 when Sir Seretse Khama, the president of Botswana, rezoned Naledi from an industrial zone to a low-income housing area...

By 1978 there were 42 500 inhabitants of which 10 000 were living in Old Naledi which prompted a special upgrading scheme in the 1970s. Further extensions were done to Broadhurst. These extensions took the planned development up to the limit of state –owned land. The Gaborone west plan was also made based on continuous growth in accordance with market demands.

It worth noting that in 1982 the Southern African Development Community (SADC) also established its headquarters in Gaborone. Gaborone gained the title of city in 1986 after being classified as a town. Gaborone today is one of the fastest growing capital cities in Africa and perhaps in the third world. In spite of rapid growth, through careful planning and management, development of the city has been sustainable in all respects.

In addition to a wide range of archaeological research, extensive historical research has been conducted in the Kgatleng District (e.g. Schapera 1972, Campbell and Main 2003). It is essential to provide a brief history of Mochudi because of Mochudi's historical connection with Morwa. Campbell and Main (2003) state that Mochudi is named after the Kwena Kgosi, Motshodi. The Bakwena believe that their earliest home was somewhere just north of Mochudi but they trace their recent history from near Pretoria, South Africa, commencing in the 15th century.

Campbell and Main (2003) further noted that sometimes in the late 16th or early 17th century, Kgabo's

son, Motshodi, moved the Bakwena from Sokwane, on the edge of the Kalahari, eastward to Mochudi. He later moved to Modipe. The remains of stonewalls can still be found on the hills, west of Mochudi and may be the remains of his early settlement. As outlined in the subsequent paragraphs, Mochudi area was recognized as Kwena land until it was occupied by Bakgatla-ba-ga-Kgafela in 1871 under the leadership of Kgama (Mosothswane). Prior to the 1860s, Kgosi Kgamanyane and his Bakgatla lived in the Rustenburg area of South Africa. However, the Boer farmers had occupied their land. Paul Kruger the leader of the Boers expected Kgamanyane to provide a supply of labour as payment for the right to remain on his land.

In 1869, Kgamanyane refused to supply further labour and was tied to a wagon wheel and lashed. He and a large group of his people remembered a promise by Sechele to provide land for them if driven out by the Boers. They moved west to seek shelter with the Bakwena.

In November 1870, the Bakgatla began to establish themselves in the fields and valleys below Phuthadikobo Hill in what is now the centre of Mochudi. Sechele accepted their presence on his land, but demanded tribute that the Bakgatla refused to pay. In 1875, the Bakwena attacked the Bakgatla at Mochudi, but were severely defeated. Thus, the village of Mochudi was re-established, now by the Bakgatla who also laid claim to the surrounding area. Intermittent fighting continued until 1881, and the Bakgatla did not actually gain title to the land until 1899 when the Protectorate Administration legally defined Kgatla boundaries.

Soon after Kgamanyane had established Mochudi, many Bakgatla began to move westward from South Africa to live at Mochudi, substantially increasing the size of the village. In 1892, when Kgosi Lentswe became a Christian, he forbid any missionaries/churches apart from the Dutch Reformed Church to work in Kgatleng. To this day the DRC remains the major church in Mochudi. Most of the people currently residing at Rasesa are related to those in Mochudi. Due to village expansion, Mochudi and Rasesa are now connected.

The Kgotla is one of the most important places of cultural and political significance near the study area. The kgotla is the very heart of traditional tribal administration. It is where the Chief (Kgosi), members of the community and tribal officials meet to address issues affecting the community. The Kgotla includes modern buildings and open-sided traditional buildings where there are chairs, benches and a place for the Kgosi to sit. It is the location of the customary court. The main activities in the Kgotla today are tribal meetings, resolution of ward problems and hearing of minor criminal and civil cases. None of these important cultural institutions will be affected by the proposed Project.

### GRAVE AND BURIAL SITES

The proposed alignment area contains several small village sites. Due to the rural and primitive nature of these occupational units, burials are often performed close to the houses or huts. Although the documentation of grave sites will be part of the social impact assessment their relocation will form a second phase of the heritage management project.

### KNOWN SITES (BOTSWANA)

SITE_NAME	TYPE	X	Y
MABUTSANE N	UN	23.34194	24.2697
KHAKHEA PAN N	MSA/EIA/LIA	23.55139	24.6244
SEKOMA PAN 1	MSA/EIA/LIA	23.91667	24.5083
SEKOMA PAN 2	MSA/EIA/LIA	23.9125	24.5208
KGOME	MSA/EIA/LIA	24.66417	24.5853
JWANA	MSA/EIA/LIA	24.76667	24.5736
TIETLESI RIDGE	UN	25.24806	24.8644
LOWE	MSA/LSA/EIA	25.23861	24.8656

MOSHANENG	UN	25.27417	24.8597
MAKOLONTWANE	LIA/H	25.27444	24.86
KGWAKGWE HILL	MSA/EIA/LIA	25.31028	24.9989
KANYE AIRSTRIP	ESA/MSA/LSA/H	25.32556	24.9917
GASEGOGWANE	ESA/LIA	25.26028	24.8867
SITE 5	ESA/MSA/LSA/H	25.27444	24.8875
SITE 6	ESA/MSA/LSA/H	25.31667	24.9292
GAMMELETSI HILL S	MSA/EIA/LIA	25.37528	24.8678
HATSATLADI- MMAMOROLONG S	MSA/EIA/LIA	25.39194	24.8328
SITE 9	ESA/MSA/LSA/H	25.4125	24.8169
SITE 10	MSA/EIA/LIA	25.26194	24.8883
MOSHOPA E	MSA/LSA/EIA	25.4275	24.8083
MOSWAEDI	MSA/EIA/LIA	25.44361	24.7597
RANAKA P2	LSA/LIA/RA	25.46167	24.8978
RANOI SCH (LETLHAKANE)	LIA/H	25.30833	24.8114
MOSHOPA 1	ESA/MSA/LSA/H	25.45083	24.7558
MOSHOPA 2	LIA/H	25.45083	24.7597
MOSHOPA 3	LSA/LIA/RA	25.45611	24.7619
MOSHOPA 4	LSA/LIA/RA	25.445	24.7544
MOSHOPA 5	MSA/LSA/LIA	25.4375	24.7811
SITE 23	LIA/H	25.44611	24.9703
SITE 24	MSA/EIA/LIA	25.45722	24.9781
SITE 25	LIA/H	25.38333	24.8919
SITE 26	ESA/MSA/LSA/H	25.43444	24.9844
SITE 27	LIA/H	25.45694	24.9911
SITE 28	MSA/EIA/LIA	25.45528	24.9936
SITE 29	LIA/H	25.47778	24.9106
SITE 30	ESA/MSA/LSA/H	25.43333	24.9203
SITE 31	LIA/H	25.42	24.9183
SITE 32	LIA/H	25.41972	24.9211
KANYE MATSIENG F/PRINT	LSA/LIA/RA	25.24686	24.9519
MANYANA ROCK SHELTER	LSA/LIA/RA	25.41694	24.7628
	LIA/H	25.67	24.8022
BARATANI	MSA/EIA/LIA	25.66667	24.8322
MANYELANONG	LIA/H	25.65778	24.8369
LEHAWA HILL E	LIA/H	25.56917	24.8986



DITHAOPO HILL	ESA/MSA/LSA/H	25.62222	24.9558
NTLHANTLHE	ESA/LIA	25.62694	24.9686
MOSWELAKGOSI HILL	LIA/H	25.62333	24.7686
SEKALABA	LIA/H	25.33528	25.045
LETLHAKANE	LIA/H	25.47472	25.0989
MORANE	LSA/LIA/RA	25.41833	- 25.0603
NTSWESOLO HILL	LIA/SA	25.36833	25.2542
KGORO PAN	MSA/LSA/LIA	25.45056	25.4411
KGORO HILL	LSA/IA	25.49244	25.428
MOTSENEKATSE HILL	LIA/H	25.57083	25.1583
MOTSENEKATSE HILL 1	LIA/H	25.56944	25.1609
MOTSENAKATSE HILL 2	LIA/H	25.57064	25.1656
MOTSENAKATSE HILL 3	LIA/H	25.57147	25.1695
MOTSENAKATSE HILL 4	LIA/H	25.5685	25.1698
MOLAPOWABOJANG RIVER 4	ESA/LIA	25.55722	25.1889
MOLAPOWABOJANG 5	ESA/MSA/LSA/H	25.54806	25.1958
SOKOMEDI HILL	LIA/H	25.43028	24.4572
SOKOMEDI HILL	LIA/H	25.44139	24.4578
SOKOMEDI HILL SE	LIA/H	25.44139	24.4578
SOKOMEDI HILL S	LIA/H	25.42389	24.4644
SITE 4	LIA/H	25.43278	24.4386
SOKOMEDI HILL N 1	LIA/H	25.43278	24.4475
SOKOMEDI HILL N 2	LIA/H	25.43056	24.4475
MALAKOPI	LIA/H	25.42139	24.4475
SOKOMEDI HILL S 3	LIA/H	25.42694	24.4631
SOKOMEDI HILL S 1	LIA/H	25.43528	24.4631
SOKOMEDI HILL S 2	LIA/H	25.43028	24.4633
DITHEJWANE HILL 1	LIA/H	25.47194	24.4583
MAGAGARAPE 1	ESA/MSA/LSA/H	25.46028	24.4697
MANTSHETLA E	LSA/EIA/LIA	25.46472	24.4692
DITHEJWANE HILL 2	LIA/H	25.47917	24.4525
SOKOMEDI HILL SW	LIA/H	25.38167	24.4719
SOKOMEDI HILL S	LIA/H	25.41889	24.4631
SITE 17	LIA/H	25.37139	24.49
DITHEJWANE HILL 3	LSA/LIA/RA	25.44778	24.4469
SITE 19	MSA/LSA/LIA	25.42972	24.4194

SITE 20	LIA/H	25.43389	24.4425
MAGAGARAPE BROEDERSTROM	MSA/EIA/LIA	25.445	24.4706
MAGAGARAPE NE	LSA/EIA/LIA	25.45	24.4706
MAGAGARAPE N	MSA/EIA/LIA	25.43972	24.4714
MAGAGARAPE W	MSA/EIA/LIA	25.43917	24.4753
MOSINKI	MSA/EIA/LIA	25.48111	24.3436
MANTSHETLHA 1	MSA/EIA/LIA	25.45722	24.4714
MANTSHETLHA 2	LIA/H	25.45472	24.4728
MANTSHETLHA 3	MIA	25.44861	24.475
TSHELETSELE	MSA/EIA/LIA	25.44583	24.4769
MAGAGARAPE 2	MSA/EIA/LIA	25.44417	24.4594
LOWE KOPONG	ESA/MSA/LSA/H	25.53889	24.1989
LEGAGA LWA RRAMAHUPELA	ESA/MSA/LSA/H	25.87467	24.3494
LOWE KOPONG	ESA/MSA/LSA/H	25.53889	24.1989
LEGAGA LWA RRAMAHUPELA	ESA/MSA/LSA/H	25.87467	24.3494
BORELEDI JWA RRAMAHUPELA	ESA/MSA/LSA/H	25.88175	24.4486
DITLHAKONG	ESA/MSA/LSA/H	25.88153	24.4488
KGOBOGA THOGO/KO SITILONG	ESA/MSA/LSA/H	25.87933	24.407
LEGAGA LA NKWE	ESA/MSA/LSA/H	25.86172	24.3677
LESAKA LA BADIMO	ESA/MSA/LSA/H	25.86214	24.3663
RAMONKONYANE	ESA/MSA/LSA/H	25.82592	24.3334
SEBONO SA NAGA	ESA/MSA/LSA/H	25.88978	24.3676
MARELETSANE	ESA/MSA/LSA/H	25.88978	24.3676
MAIPHITLWANE GORGE	ESA/MSA/LSA/H	25.90011	24.3703
LEKOBOLU	ESA/MSA/LSA/H	25.89917	24.3649
LEDUNG	ESA/MSA/LSA/H	25.83503	24.2265
LEDUNYANA	ESA/MSA/LSA/H	25.83503	24.3097
KHODUMAJAKWE	LIA/H	25.50972	24.3381
LIVINGSTONE'S CAVE	ESA/MSA/LSA/H	25.53556	24.4289
PRICE MISSION LOGAGENG	ESA/MSA/LSA/H	25.52278	24.4308
IRON DITCH	ESA/MSA/LSA/H	25.53917	24.4986
MARAPALELO	ESA/MSA/LSA/H	25.56944	24.4972
MMANOKO	ESA/LIA	25.66694	24.465
MMANOKO RIVER 1	ESA/LIA	25.66611	24.4622



MMANOKO RIVER 2	ESA/LIA	25.665	24.4597
MMANOKO RIVER 3	ESA/LIA	25.66528	24.4583
MMANOKO RIVER 4	ESA/MSA/LSA/H	25.66444	24.4564
MMANOKO RIVER 5	ESA/MSA/LSA/H	25.66361	24.4519
MMANOKO RIVER 6	ESA/MSA/LSA/H	25.66694	24.4522
MMANOKO RIVER 7	MSA/EIA/LIA	25.67083	24.4478
MMANOKO RIVER 8	ESA/MSA/LSA/H	25.67333	24.4375
GAKGALE MINE	LIA/H	25.90694	24.2947
KGOPE HILL	LIA/H	25.95444	24.2853
LENTSWELETAU	MSA/LSA/LIA	25.83944	24.2544
DITSHUKUDU SE	LIA/H	25.80028	24.3333
SEPIHATLAPHA HILL	ESA/LIA	25.49	24.7217
KOLOBENG MISSION	ESA/MSA/LSA/H	25.66611	24.6636
DIMAWE	LSA/LIA/RA	25.62306	24.75
SENAMAKULA HILL 1	ESA/MSA/LSA/H	25.74	24.6561
SESITAJWE HILL	MSA/EIA/LIA	25.78194	24.7442
THAMAGA ROCKSHELTER	MSA/LSA/LIA	25.77806	24.6961
RAMAPHATLHE	MSA/EIA/LIA	25.62889	24.6942
PITSEGAEAGELWE HILL 1	MSA/EIA/LIA	25.64222	24.6686
PITSEGAEAGELWE HILL 2	ESA/MSA/LSA/H	25.645	24.6661
PITSEGAEAGELWE HILL 3	MSA/EIA/LIA	25.65	24.6628
SENAMAKULA HILL 2	LIA/H	25.73833	24.6508
KOLWANE RIVER	ESA/MSA/LSA/H	25.50611	24.7194
THAMAGA SOUTH 1	ESA/MSA/LSA/H	25.51667	24.6964
THAMAGA SOUTH 2	ESA/MSA/LSA/H	25.51028	24.7006
THAMAGA SOUTH 3	MSA/EIA/LIA	25.51889	24.6942
THAMAGA SOUTH 4	ESA/MSA/LSA/H	25.76111	24.6942
THAMAGA SOUTH 5	ESA/LIA	25.755	24.7192
MOSUSU LANDS	MSA/EIA/LIA	25.72556	24.5869
KAMENAKWE	LSA/IA	25.67056	24.5417
THAMAGA SOUTH 6	ESA/LIA	25.77694	24.7008
THAMAGA SOUTH 7	ESA/MSA/LSA/H	25.76833	24.68
KOLOBENG	ESA/LIA	25.66472	24.5892
THAMAGA 1	ESA/MSA/LSA/H	25.79028	24.6661
THAMAGA 2	ESA/MSA/LSA/H	25.78	24.6967
RADIEPOLONG HILL	ESA/MSA/LSA/H	25.77972	24.6814
ROCKY SHELTER THAMAGA	LSA/IA	25.75806	24.6661

THAMAGA 3	ESA/MSA/LSA/H	25.78	24.6972
THAMAGA 4	ESA/MSA/LSA/H	25.78417	24.6553
THAMAGA 5	ESA/MSA/LSA/H	25.78389	24.6553
THAMAGA 6	ESA/MSA/LSA/H	25.79167	24.6661
THAMAGA 7	ESA/MSA/LSA/H	25.79111	24.6664
THAMAGA 8	ESA/MSA/LSA/H	25.79111	24.66
OSTRICH SHELTER THAMAGA	LSA/LIA/RA	25.79111	24.6664
FIKENG 1	LSA/LIA/RA	25.70361	24.7686
FIKENG 2	LIA/H	25.70444	24.7756
GABORONE DAM 1	ESA/MSA/LSA/H	25.92056	24.7042
OLD YACHT CLUB SITE	MSA/EIA/LIA	25.92639	24.7147
MARUAPULA SCHOOL	SA/LIA	25.93167	24.6458
MORITSHANE GABANE	MSA/LSA/EIA	25.775	24.6475
FORT GABORONE	ESA/MSA/LSA/H	25.93944	24.6711
KGALE HILL 1	MSA/EIA/LIA	25.865	24.7008
BYRD'S CAMP	ESA/MSA/LSA/H	25.85389	24.7339
GOLF COURSE	LIA/H	25.93833	24.6453
KGALE HILL 2	LIA/H	25.86889	24.6961
BROADHURST 2	MSA/EIA/LIA	25.89861	24.6214
BROADHURST 3	LSA/LIA/RA	25.925	24.5936
VILLAGE, GABORONE	ESA/MSA/LSA/H	25.94139	24.6683
KGALE HILL 3	LIA/H	25.87222	24.6894
GOLF CLUB	ESA/LIA	25.93194	24.65
SEWAGE PONDS 1	ESA/LIA	25.96722	24.6169
SEWAGE POND 2	ESA/LIA	25.97083	24.6186
SEWAGE PONDS 3	ESA/MSA/LSA/H	25.97083	24.6161
GABORONE DAM 2	ESA/MSA/LSA/H	25.90472	24.7222
BROADHURST PRIMARY SCHOOL	ESA/MSA/LSA/H	25.94611	24.6294
GINGER, GABORONE	ESA/MSA/LSA/H	25.94833	24.6381
SEWAGE PONDS 4	ESA/MSA/LSA/H	25.97222	24.6117
PHAKALANE ESTATE	MSA/EIA/LIA	25.96667	24.6061
SEWAGE PONDS 5	ESA/LIA	25.955	24.6478
KGALE VIEW	MSA/EIA/LIA	25.87917	24.6881
NOTWANE FARM	SA/IA	25.92694	24.7061
LEMUNYANE RUIN	LIA/H	26.004	24.6403

MOKOLODI HILL	MSA/EIA/LIA	25.83542	24.7493
TLOKWENG OLD KGOTLA	ESA/MSA/LSA/H	25.95886	24.6642
GOORA-THAERE	MSA/EIA/LIA	25.66889	24.9411
GA-MMA KGAMPU	ESA/MSA/LSA/H	25.67556	24.9353
RAMOTSWA VILLAGE	LIA/H	25.87111	24.89
BASUTO KOP	LIA/H	25.84556	24.7519
METSEMASWAANE 1	LIA/H	25.81361	24.7894
KGOPO FARM	LIA/H	25.76389	24.7889
METSEMASWAANE 2	LIA/H	25.81056	24.7928
POTSANE	LIA/H	25.77278	24.8853
MOREPO HILL	ESA/MSA/LSA/H	25.78194	24.9231
TAUNG RIVER 1	ESA/LIA	25.77889	24.9056
TAUNG RIVER 2	ESA/LIA	25.78694	24.8878
TAUNG RIVER 3	ESA/LIA	25.78111	24.9025
TAUNG RIVER 4	ESA/LIA	25.78056	24.9031
TAUNG RIVER 5	ESA/LIA	25.78472	24.8972
TAUNG RIVER 6	ESA/LIA	25.77	24.9058
TAUNG RIVER 7	ESA/LIA	25.78528	24.8947
TAUNG RIVER 8	ESA/LIA	25.78306	24.8994
TAUNG RIVER 9	ESA/MSA/LSA/H	25.83167	24.8539
TAUNG RIVER 10	ESA/LIA	25.83333	24.8572
TAUNG RIVER 11	ESA/MSA/LSA/H	25.85222	24.8603
TAUNG RIVER 12	ESA/LIA	25.83806	24.8475
TAUNG RIVER 13	ESA/MSA/LSA/H	25.85056	24.8281
MADIABATLHO	ESA/MSA/LSA/H	25.87583	24.8819
MATSIENG	ESA/LIA	25.87833	24.8797
SEPHITSWANE HILL 1	MSA/EIA/LIA	25.84917	24.8506
SEPHITSWANE HILL 2	MSA/EIA/LIA	25.86417	24.8436
MOGAGABE HILL	MSA/EIA/LIA	25.83639	24.8008
GOO-MOENG WARD	ESA/LIA	25.8775	24.8769
RAMOTSWA MATSIENG F/PRINT	ESA/MSA/LSA/H	25.72917	25.0028
RAMOTSWA MANGANESE MINE	MSA/EIA/LIA	25.87775	24.8836
PITSA	MSA/EIA/LIA	25.67722	25.1297
BARATANI HILL	MSA/EIA/LIA	25.73833	25.0006
LOBATSE ESTATE 1	MSA/EIA/LIA	25.72194	-25.21

SEOKE	MSA/EIA/LIA	25.72083	25.2053
SITE 8	MSA/EIA/LIA	25.74778	25.1881
KNOCKDUFF FARMS	MSA/EIA/LIA	25.67222	25.1542
LOBATSE ESTATE 2	LIA/H	25.68972	25.2244
BARATANI CAVE	ESA/LIA	25.74833	25.0025
RESERVE FARM W	ESA/MSA/LSA/H	25.6625	-5.2272
LOBATSE 1	ESA/LIA	25.66444	25.2369
LOBATSE 2	LIA/H	25.67111	25.2111
LOBATSE HOSPITAL SPRUIT	ESA/LIA	25.66917	25.2042
BENDERS DRIVE WEST	LIA/H	25.65944	25.1889
BOSWELATLOU	LIA/H	25.66917	25.1892
SITE 21	LIA/H	25.66917	25.1797
KNOCKDUFF	UN	25.66917	25.1628
NYWANE DAM	ESA/LIA	25.67917	25.1186
MOROEKWE 1	ESA/MSA/LSA/H	25.67694	25.0969
MOROEKWE 2	LIA/H	25.70444	25.0858
QUETH LOCK	ESA/LIA	25.69806	25.0694
OTSE HILL NW	MSA/EIA/LIA	25.72	25.0014
OTSE N VALLEY	ESA/LIA	25.72556	25.0083
CARVENS CHRISTINA'S FARM	ESA/LIA	25.73861	25.0006
LOBATSE 3	LIA/H	25.70028	25.2042
LOBATSE 4	LIA/H	25.6875	25.2172
LOBATSE 5	LIA/H	25.67167	25.2342
PELENG	LIA/H	25.68111	25.2339
LOBATSE MINERAL WORKING	LIA/H	25.74167	25.215
LOBATSE ESTATE 3	LIA/H	25.73722	25.1769
LOBATSE ESTATE 4	LIA/H	25.72694	25.1575
KAMAWE RIVER	ESA/LIA	25.5725	25.16
OTSE PEAK	MSA/EIA/LIA	25.71333	25.0069
MANYELANONG HILL	MSA/EIA/LIA	25.71528	25.0075
LOBATSE 10	LIA/H	25.69778	25.2497
PELENG	LIA/H	25.69472	25.2497
GOOD HOPE 3	LIA/H	25.69083	25.1797
SPTSKOP 2	LIA/H	25.70222	25.175
SPITSKOP 3	LIA/H	25.70556	25.1783
MANYELANONG OTSE		25.7575	25.0522
OTSE CAVE	LSA/EIA/LIA	25.75583	25.055

VULTURY AT OTSE	LIA/H	25.76611	25.0067
MANYELANONG	LIA/H	25.77528	25.05
SEGORONG GORGE	LIA/H	25.72567	25.0069
LENTSWE LA BARATANI	MSA/EIA/LIA	25.69444	24.9861
RAMOTLABAKI	MSA/EIA/LIA	26.92639	23.8739
MATSIENG	ESA/MSA/LSA/H	26.15722	24.5883
MODIPE W	LIA/H	26.155	24.6375
MODIPE SW	LIA/H	26.1525	24.6386
MODIPE HILL	LIA/H	26.17333	24.6678
OODI	MSA/LSA/LIA	26.02889	24.5636
MODIPE E	LIA/H	26.16083	24.6422
MODIPE N	LIA/H	26.16083	24.6314
MODIPE S	LIA/H	26.15528	24.6503
MATSHWANE SITE	LIA/H	26.1325	24.6297
BELABELA FARM	MSA/EIA/LIA	26.03583	24.5094

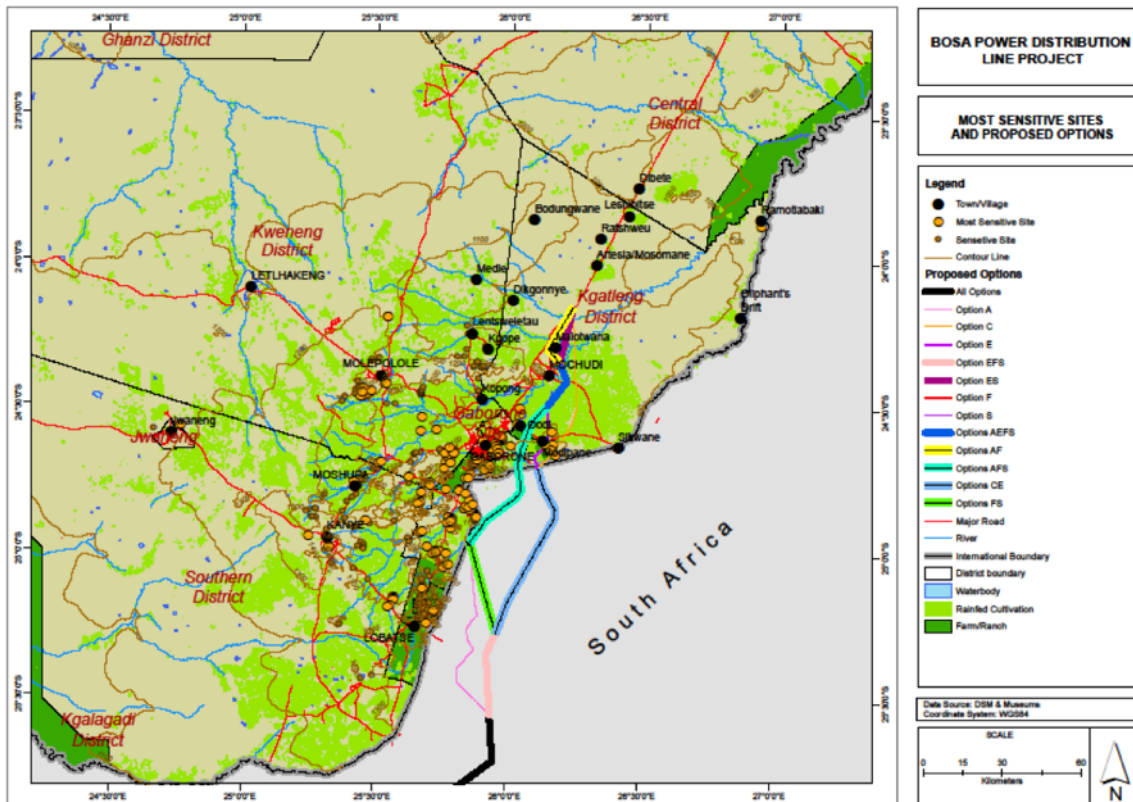


Figure 12. Site locations



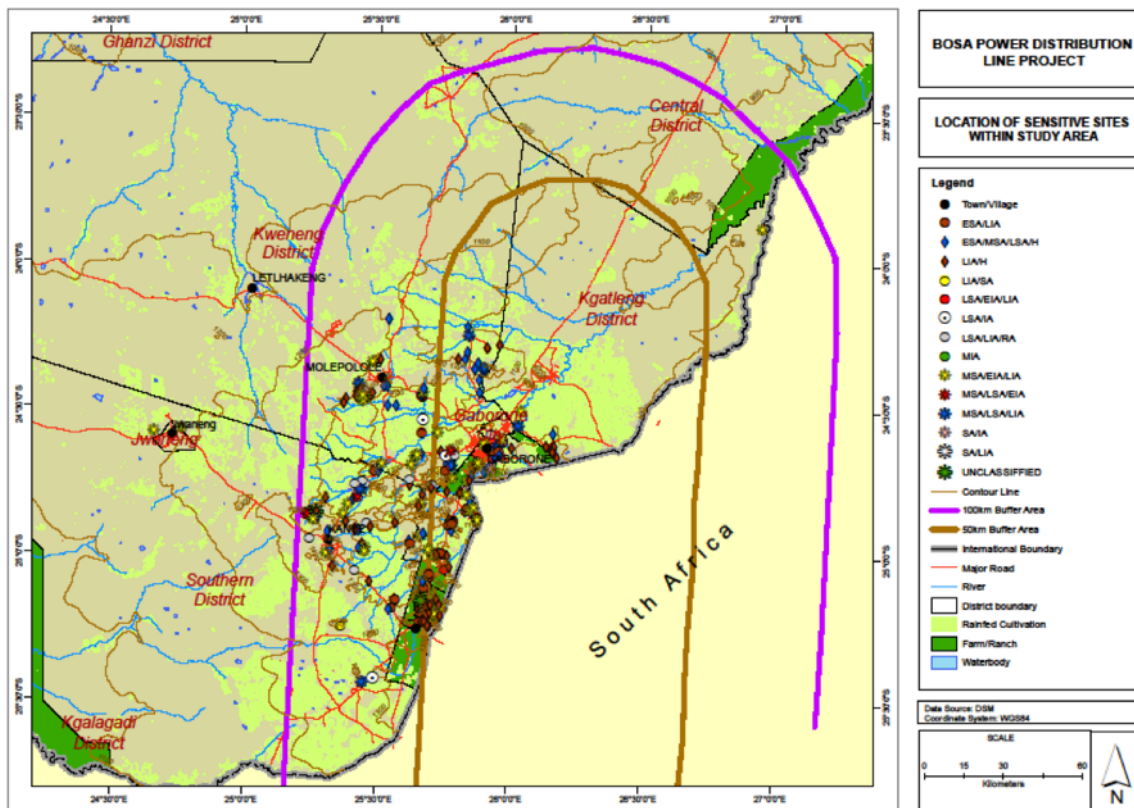


Figure 13. Sites within study area

**KNOWN SITES (SOUTH AFRICA)**

Site No.	Site Name	GPS	Description	Map Key
001	BOSA Grave 1	25°45'15.33"S 25°57'20.12"E	Grave Marker	2525DD
002	BOSA Ruins 1 & 2	25°44'24.41"S 25°57'30.52"E	Ruins	2525DB
003	BOSA Ruins 3	25°40'26.61"S 25°56'53.71"E	Ruins	2525DB
004	BOSA Ruins 4	25°38'21.07"S 25°56'6.09"E	Ruins	2525DB
005	BOSA Ruins 5	25°37'59.85"S 25°52'7.68"E	Ruins	2525 DB
006	BOSA Grave 2	25°35'5.31"S 25°47'48.81"E	Grave Marker	2525 DB
007	BOSA Ruins 6	25°33'39.76"S 25°46'15.35"E	Ruins	2525 DB
008	BOSA Cemetery 1	25°18'58.39"S 25°47'48.59"E	Cemetery	2525BD
009	BOSA Livingstone Mission	25°19'34.88"S 25°48'3.67"E	Mission Station	2525 BD
010	BOSA Mission 1	25°26'26.79"S 25°52'8.88"E	Mission Station	2525 BD
011	BOSA Ruins 7	25°19'37.09"S 25°59'40.85"E	Ruins	2525 BD
012	BOSA Cemetery 2	25°10'31.24"S 25°50'7.00"E	Cemetery	2525 BA_BB
013	BOSA Ruins 8 & 9	25° 8'45.91"S 25°59'6.48"E	Ruins	2525 BA_BB

014	BOSA Ruins 10	25° 7'41.98"S 25°59'54.01"E	Ruins	2525 BA_BB
015	BOSA Ruins 11	25°12'36.56"S 26° 6'30.96"E	Ruins	2526 AA
016	BOSA Ruins 12 & 13	25°10'26.01"S 26° 3'18.62"E	Ruins	2526 AA
017	BOSA Ruins 14	25° 8'47.40"S 26° 4'39.42"E	Ruins	2526 AA
018	BOSA Ruins 15	25° 4'36.92"S 26° 0'11.85"E	Ruins	2526 AA
019	BOSA Ruins 16	24°55'43.95"S 26° 5'24.99"E	Ruins	2426 CC
020	BOSA Chonuane (Mission?) 1846-1847	24°51'58.15"S 26° 0'8.75"E	Mission Station?	2426 CC
021	BOSA Ruins 17	24°55'30.09"S 26°13'36.57"E	Ruins	2426 CC
022	BOSA Ruins 18	24°51'47.70"S 26° 0'8.06"E	Ruins	2426 CC
023	BOSA Ruins 19	24°49'5.07"S 26°11'57.28"E	Ruins	2426 CC
024	BOSA Ruins 20	24°49'27.42"S 26° 3'19.58"E	Ruins	2426 CC

### Data Collection Methods

The assessment of cultural heritage resources will begin with a desktop study for the preliminary collection of data. This will involve an assessment of known or potential archaeological and cultural heritage resources in the proposed development area based on the Department of National Museum and Monuments (DNMM) records, as well as other forms of records will be used to reveal various types of sites in the study area. The main objective of the field surveys is to locate (heritage) archaeological sites, features and remains. Surveys will be undertaken in the whole project area with emphasizes on areas expected to have a high likelihood of heritage finds. The other objective of surveys is to collect and record cultural materials in and around the Project Area. Field surveys will provide useful information concerning the spatial distribution of heritage resources and thereafter appropriate mitigation measures will be developed.

A high resolution digital camera will be used to take pictures of interesting heritage features. A Geographic Positioning System (GPS), set at WGS 84, will be used to mark the spatial distribution of archaeological materials found during survey. A GPS is a useful mapping tool where archaeological features are identified.

The primary goal of any AIA study is to ensure that all activities required to achieve the objectives of a planned development project are undertaken in an environmentally acceptable manner. The main activities of the BOSA transmission line and associated infrastructure project include bush clearing and creation of access routes. These development activities will affect the surficial and underlying strata, impacting on soils, vegetation, streams and cultural/historic resources. Some projects have demonstrated the benefits of carrying out an AIA, whereupon the initial development option was foregone in favour of a more cost effective and environmentally sound alternative. It is imperative to identify all the impacts that may arise from all stages of the proposed development and ensure that they are comprehensively assessed.

The DNMM grading scale will be used to access sites at full survey level:

#### DNMM grading scale

Scale	Interpretation
1	Preserve at all costs
2	Preserve if possible, otherwise extensive salvage work
3	Test Excavation to Determine Work is Required

- 4 Systematic Representative Sampling Sufficient  
5 No Further Work Required

Oral interviews and public consultations will be undertaken as part of the EIA process to solicit information on the archaeology, history and sacred sites that local communities may be aware. A key component of the methodology for Rakola-Watershed Transmission Power Line is to avoid sites with archaeological, historical, religious or cultural value as well as tourist attractions and public locations with heritage significance e.g. places selling traditional medicines and shrines among others.

Some of the sensitive heritage sites are likely to be located at:

1. Elevated areas: there are several raised areas in Gaborone, Modipane and Lobatse region. Thereafter the area stays adulating. Early Iron Age areas are likely to be identified in elevated areas. There are several rivers including Metsemotlhabe and Notwane Rivers that provide water to major dams in the southern part of the country. Elevated areas also act as spiritual homes and rainmaking sites.
2. Rich mineral areas: several early mines (iron) and associated towns were identified by Campbell and other teams in several areas in south-eastern Botswana Table 1). These studies will provide a predictive model for identifying ancient mining sites in the study area.
3. Built heritage: Gaborone and Lobatse are incredibly rich in old buildings because they are some of the oldest towns in Botswana
4. Water Bodies (River environs): Are potential candidates for Late Stone Age sites. Several LSA sites have been identified around Thamaga and Manyana areas.
5. Ponds and pans are ideal for identifying Early Stone Age tools and possibly hominids sites associated with evolution of modern human beings. Pans spotted in the study area are considered to be archaeologically sensitive
6. Kraals: These are ideal sites for identifying male burials. Traditionally, males were buried in kraals and the practice still occurs to date in some parts of the country
7. Areas with buffalo grass: These are high phosphorus areas that correlate with the location of archaeological sites in south-eastern Botswana. Moritshane is one of the known EIA sites in the study area.

### **BOSA Transmission Line Corridor Workshop**

In order to ensure that all specialist dealing with the environment and heritage are at the same footing, a stakeholder workshop was held 23 May 2016 in Pretoria, South Africa. The workshop also explored various technical, financial, strategic, and environmental, heritage and social constrains in order to determine the best route 3 route alignments to be taken for more detailed study. Special attention was devoted to high likelihood area. This process is repeated until a consensus route is selected by all experts.

#### **TERMS OF REFERENCE (TOR)**

Based on heritage scoping to this stage, it noted that the following Terms of Reference (ToR) should be taken into consideration during the EIA study:

1. Social Impacts: archaeological, historical, aesthetic, religious or cultural value sites should be avoided, as well as tourist attractions and public locations
2. Zone of Heritage Influence: detailed GIS mapping should be undertaken for known heritage sites within 50km and 100km buffer zone (Appendix 3).
3. Visual Impacts: avoid natural parks and areas with a high scenic, architectural, cultural or historic value
4. Route planning software tools: Various software including routes from Google Maps to and GIS tools should be used for identifying heritage sites followed by ground truthing exercise.
5. Route survey criteria: proximity to hills, rivers, pans, relieve areas, areas with buffalo grass and ancient mines. By nature, these areas present access restrictions that are part of the project area. Some of the most sensitive areas likely to be affected by the proposed developed are around Modipane Hills, Notwane River and Gaborone Dam.
6. Public consultations: oral interviews should be undertaken to supplement surveys.
7. Archaeological Management Plan: to developed for discovered sites.
8. Grading Criteria: the DNMM assessment of ranking of sites should be followed

## MEASURING IMPACTS

In 2003 the SAHRA (South African Heritage Resources Agency) compiled the following guidelines to evaluate the cultural significance of individual heritage resources (these are applicable to Botswana as well):

### TYPE OF RESOURCE

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

### TYPE OF SIGNIFICANCE

#### 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.

#### 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.
- 

#### 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 paleo-environmental 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?

## 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?

#### 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

#### ECONOMIC SIGNIFICANCE

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

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

#### 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?

#### 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?

#### 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?

#### 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?

## DEGREES OF SIGNIFICANCE

### 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*).

### RARITY

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

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

### 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			

## ASSESSMENT OF HERITAGE POTENTIAL

### 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. 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 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 settlements, 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 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

## 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.

## **RESOURCE MANAGEMENT RECOMMENDATIONS**

There is enough information regarding the possible occurrence of Iron Age and Stone Age sites within the proposed development area to justify ground-truthing studies.

A systematic ground survey will determine the number of sites as well as their heritage significance. The heritage practitioner will liaise with the social consultant to determine the location of burial sites, ceremonial or religious sites.

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