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MOOKODI INTEGRATION PROJECT

HERITAGE REPORT – ENVIRONMENTAL IMPACT
ASSESSMENT PHASE

**HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED VRYBURG-MOOKODI
132KV POWER LINE DEVELOPMENT, NORTH WEST PROVINCE**

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Declaration:

I, J.A. van Schalkwyk, declare that I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services.



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September 2010

EXECUTIVE SUMMARY

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED VRYBURG-MOOKODI 132KV POWER LINE DEVELOPMENT, NORTH WEST PROVINCE

Due to rapid urban expansion and population growth, additional electricity supplies are urgently needed in the larger Vryburg region. In order to satisfy this demand, Eskom propose the construction of a 132kV power line, as well as two substations in the vicinity of Vryburg. For this purpose Eskom has identified a corridor with some alternatives to be evaluated as to its suitability for use in the construction of the power line, as well as the construction of additional substations.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by **SIVEST Environmental Division** to conduct a Heritage Impact Assessment to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the corridors that would disqualify any such corridor from being used for the construction of the power line as well as the substations, or would require the implementation of mitigation measures.

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the areas which is proposed to serve as corridor for the development of a power line.

The following categories of heritage sites were identified as occurring in the study area:

- Farming and farming related activities, such as farmsteads, stock pens, windmills, etc.
- Local and private cemeteries.
- Roadside memorials.

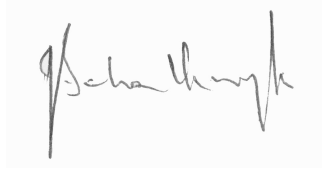
In terms of Section 7 of the NHRA, all the sites currently known to occur in the study area are evaluated to have Grade III significance with

- Farming and farming related activities, such as farmsteads, stock pens, windmills, etc. would have a high significance on a local level.
- Local and private cemeteries would have a high significance on a local level.
- Roadside memorials would have a high significance on a local level

Thus far, only one site, a small informal cemetery located on the farm Help Makaan 248, is located in what is perceived to be the corridor.

- As it is unlikely that the power line would have any other than a visual impact on the site, it is recommended that the site is retained in its current location.
- The site should be avoided at all times. During construction it should be clearly demarcated, e.g. by using danger tape.
- If retained, no permits are necessary

Based on the above, it is our opinion that from a cultural heritage point of view, there are no sites, features or objects known to exist in the corridor or its alternatives that would prevent the proposed development from taking place.

A handwritten signature in black ink on a light grey background. The signature is written in a cursive style and reads "J A van Schalkwyk".

J A van Schalkwyk
Heritage Consultant
September 2010

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GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Study area: Refers to the entire study area as indicated by the client in the accompanying Fig. 2.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 000 000 - 150 000 Before Present
Middle Stone Age	150 000 - 30 000 BP
Late Stone Age	30 000 - until c. AD 200

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. These people, according to archaeological evidence, spoke early variations of the Bantu Language. Because they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Late Iron Age	AD 1300 - AD 1830

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country

ABBREVIATIONS

ADRC	Archaeological Data Recording Centre
ASAPA	Association of Southern African Professional Archaeologists
BP	Before Present
CS-G	Chief Surveyor-General
EIA	Early Iron Age
ESA	Early Stone Age
LIA	Late Iron Age
LSA	Later Stone Age
HIA	Heritage Impact Assessment
MSA	Middle Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED VRYBURG-MOOKODI 132KV POWER LINE DEVELOPMENT, NORTH WEST PROVINCE

1. INTRODUCTION

Due to rapid urban expansion and population growth, additional electricity supplies are urgently needed in the larger Vryburg region. In order to satisfy this demand, Eskom propose the construction of a 132kV power line, as well as two substations in the vicinity of Vryburg. For this purpose Eskom has identified a corridor with some alternatives to be evaluated as to its suitability for use in the construction of the power line.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. However, according to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by **SiVest Environmental Division** to conduct a Heritage Impact Assessment to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the corridors that would disqualify any such corridor from being used for the construction of the power line as well as the substations, or would require the implementation of mitigation measures.

2. TERMS OF REFERENCE

2.1 Scope of work

The aim of this HIA, broadly speaking, is to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where it is planned to develop the transmission line.

The scope of work for this study consisted of:

- Conducting of a desk-top investigation of the area, in which all available literature, reports, databases and maps were studied;
- A visit to the proposed development area.

The objectives were to

- Identify possible archaeological, cultural and historic sites within the proposed development area;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

2.2 Limitations

- As the coordinates for the exact location of the routes were not available, as well as the fact that access to the various properties were not available, the routes were investigated only in a broad overview approach.

- In some areas the vegetation, natural as well as agricultural, was very high and dense, seriously limiting archaeological visibility.

3. HERITAGE RESOURCES

3.1 The National Estate

The NHRA (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
 - ancestral graves;
 - royal graves and graves of traditional leaders;
 - graves of victims of conflict;
 - graves of individuals designated by the Minister by notice in the Gazette;
 - historical graves and cemeteries; and
 - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
 - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - objects to which oral traditions are attached or which are associated with living heritage;
 - ethnographic art and objects;
 - military objects;
 - objects of decorative or fine art;
 - objects of scientific or technological interest; and
 - books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 Cultural significance

In the NHRA, Section 2 (vi), it is stated that “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;

- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- sites of significance relating to the history of slavery in South Africa.

4. STUDY APPROACH AND METHODOLOGY

4.1 Extent of the Study

This survey and impact assessment covers the area as presented in Section 5 and as illustrated in Figures 2, 3 and 4.

4.2 Methodology

4.2.1 Preliminary investigation

4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted – see list of references below.

- Information of a very general nature were obtained from these sources

4.2.1.2 Data bases

The *Heritage Atlas Database*, the *Environmental Potential Atlas*, the *SAHRA Database*, the *Chief Surveyor General (CS-G)* and the *National Archives of South Africa (NASA)* were consulted.

- Database surveys produced a number of sites located in the larger region of the proposed development.
- The original Title Deeds of some of the farms were located at the C S-G office and indicated a few features in the larger region that is of cultural historical interest. Some references were found in NASA, all dealing with aspects of the management of people, infrastructure and commerce in the region.

4.2.1.3 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Information of a very general nature were obtained from these sources

4.2.2 Field survey

The area that had to be investigated was identified by **SiVest Environmental Division** by means of maps. As the development is linear in nature, it was surveyed by travelling the extent of the various corridors. Fortunately, the corridor largely follows existing roads.

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1 Site description

The geology of the study area is made up of andesite in the south, changing to sand in the north. The vegetation changes from Kalahari Plateau Bushveld in the south to Kalahari Plains Thorn Bushveld (Figure 1) in the northern section. In some sections this has been changed due to agricultural activities. The topography of the region is described as plains, with a few pans dotted sporadically in the central part of the study region. No rivers or hills that usually drew people to settle in its vicinity occur in the region.



Fig 1. Natural thorn veld and agricultural fields.

5.2 Route description

This project includes the construction of two (2) substations and five (5) separate 132 KV power lines, with a total length of approximately 130km (Figure 2). The primary power line runs from the proposed Bophirima Substation to Kalplats Substation in the North West Province and is approximately 89 km. The Kalplats-Edwards Dam Ring Extension will consist of an additional ± 35 km 132kV power line, to be stepped down to 88kV at Edwards Dam existing Distribution Substation. A detailed project and route description is provided in the sections below.

1.1.1 Project Components

The proposed project consists of a number of components which are listed below:

Substations:

- the proposed Bophirima 132/88kV Distribution Substation; and
- the proposed Kalplats 132kV Distribution Substation.

132kV power lines:

- the proposed Bophirima Substation to Kalplats Substation 132kV servitude power line (~89km);
- the proposed Kalplats Substation to the existing Edwards Dam Substation 132kV servitude power line to be stepped down to 88kV at the Edwards Dam substation (~35km);
- the proposed Bophirima Substation to existing Vryburg Municipal Substation 132kV servitude power line (~7km);
- the proposed Bophirima Substation to existing Woodhouse 132kV servitude power line (~0.1km – temporary line until the decommissioning of Woodhouse Substation); and
- the proposed Bophirima Substation to Mookodi Transmission Substation 132kV servitude power line (~14km)⁺.

⁺ It should be noted that the Mookodi Transmission Substation does not form part of the scope of this project, as environmental authorisation for the substation has been obtained as part of a separate EIA process. However, a single alignment for the Mookodi Transmission Substation site to the proposed Bophirima Substation Alternatives is included as part of the component of this proposed project.

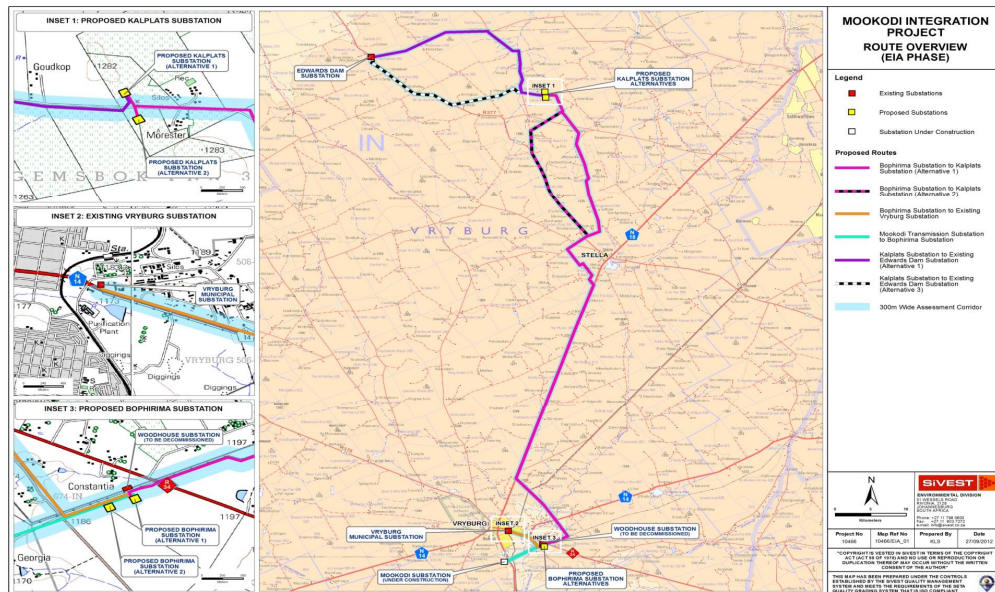


Fig 2. The study area, showing the various routes.

1.1.2 Substations

The proposed substations will occupy an approximate area of 100m X 100m (~10,000m² or 1ha). The substations will consist of a number of different components, including feeder bays, transformers, a central control room, lightning conductor mast (14m-high) and a bunded oil drainage area (into which transformer oil / liquids would drain in the event of a spillage). The substation would be enclosed by two levels of fencing to secure the area. The substations will also be lit at night (by a number of 400 Watt floodlights) for security and emergency operational maintenance reasons. A number of power lines will typically enter / leave the substation.

1.1.3 Tower Types and Servitudes

It is proposed that both monopole structures (Figure 3) and lattice structures (Figure 4) will be used where appropriate. Single-tern conductor power lines are proposed. Monopole and lattice tower types that are bird-friendly will be used for the proposed power lines. The monopole tower type is approximately 25m in height. The footprint will be unique for each tower based on the ground conditions such as slope etc. A diagram of the proposed tower types are indicated below. Strain towers will also be used (A strain tower is a larger tower utilised in bends and where reinforcement is required with regards to tower stability).

In most cases the land beneath the overhead lines can be used, as normal, by the landowners. Eskom, however, require that no dwellings or vegetation/crops higher than 4m be established within the servitude.

The minimum servitude width for each line will be 31m.

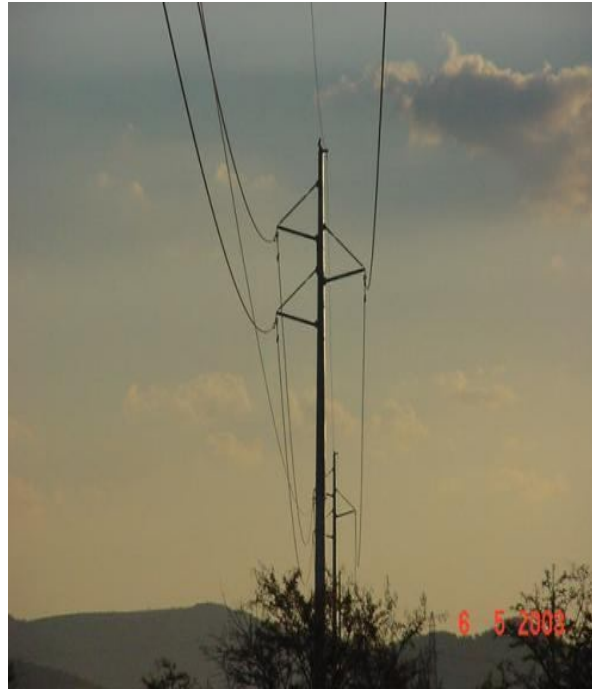
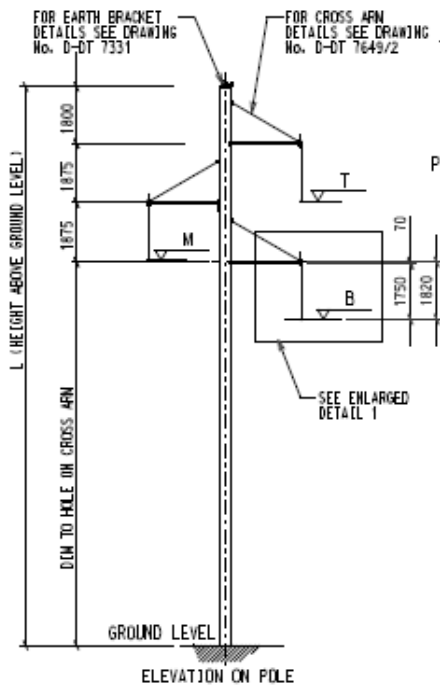


Fig 3. Proposed Monopole Structures

PLS DL '91 12100 0007141 ENG 30

TURNER DATA **247**

DATE: 02/01/03

SUPPLIER	PANEL DES.	YEAR	1996		
DESIGN REFERENCE NO.	130731	CONFIGURATION			
PHASE CONDUCTOR	140A DEAR				
EARTH CONDUCTORS	30/27.5mm ALGZ				
CONDUCTOR ATTACHMENT HEIGHT	7.5, 10m, 10.00m	A, B & C			
CONDUCTOR CLEARANCE HEIGHT	17.3m				
NOMINAL DESIGN WIND	30m				
WIND PRESSURE ON CONDUCTORS	1.5 & 200Pa				
WIND PRESSURE ON TOWER	1.5 & 200Pa				
NOTES: Additional clearance provided for 11m line					
HEIGHT UNDER WIND 5.5m min vertical phase spacing.					
TOWER		TYPE	WIND	WEIGHT	WINDLIFT
SELF-SUPPORTING STRUCTURE		2436	500	700	-
3°-45° Angle struts		2436	500	1200	200
45°-90° Angle struts		2436	500	1200	200
3°-45° Terminal			375	500	200

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Fig 4. Proposed Lattice Structures

1.1.4 Assessment Corridor

A 300m-wide corridor is currently being investigated to allow some flexibility during construction, and to take any site-specific environmental sensitivities into account. The corridor will allow for numerous route alternatives within its width to potentially be selected, and thus forms part of the location alternative assessment. The 31m servitude will be placed within this corridor, unless the EIA studies identify the need to re-route the proposed alignment to avoid sensitive environmental or no-go areas.

A number of proposed components have been included as part of the Mookodi Integration Project. These components are illustrated in the figures in Section 1.1 above and are described in detail below.

1.1.5 Proposed Bophirima Distribution Substation - Alternatives 1 and 2:

The proposed Bophirima Distribution Substation is located beyond the south-eastern outskirts of Vryburg close to the Bernauw smallholdings. The two substation alternative sites are located to the south of the R34 road, relatively close to the farmstead Constantia and the existing Woodhouse Substation. Alternative 1 and 2 are located in relatively close proximity to one another, with Alternative 1 being located immediately adjacent to the Woodhouse Substation and Alternative 2 being situated further to the south west from Alternative 1.

1.1.6 Proposed Kalplats Distribution Substation - Alternatives 1 and 2:

The proposed Kalplats Distribution Substation is located approximately 28.5km to the north of the town of Stella. The nearest settlement is the hamlet of Papiessvlakte located 8km to the south-east of the Alternatives locations. The two substation alternative sites are situated in agricultural land on the farm Gemsbokpan, to the west of the Mōrester farmstead. Alternative 1 is located to the north of a district road, and Alternative 2 is located 500m to the south, on the southern side of the road.

1.1.7 Mookodi Transmission Substation to Bophirima Substation 132kV Power Line Route

The Mookodi Transmission Substation site is located approximately 6km to the south of the town of Vryburg, to the west of the N18 road on the farm Rosendal 673-IN. A single alignment for the 132kV lines that will link the Mookodi Transmission Substation and the proposed Bophirima Distribution Substation have been provided for assessment. The alignment runs from the Mookodi Transmission Substation site in a north easterly direction. It crosses the N18 road and a railway line, running in a north-easterly direction across open natural veld, passing north of the Georgia farmstead. The alignment then follows parallel to two existing distribution power lines in this area, as well as parallel to the initial section of the proposed Bophirima Substation to Vryburg Municipal Substation 132kV route alignment.

1.1.8 Bophirima Distribution Substation to Vryburg Municipal Substation 132kV power line route

From the proposed Bophirima Substation alternative sites the route of the proposed alignment runs to the south-west across open vacant land, running parallel to two existing distribution

power lines and parallel to the alignment for the proposed Mookodi to Bophirima 132kV power line route. The route turns north west before an unsurfaced district road. The route runs parallel with the unsurfaced district road until it meets with the N14. The route then crosses the N14 and runs in a north westerly direction for approximately 400m before turning north east for a short distance of approximately 100m, and then turns to the north-west behind a BP filling station / truck stop-over complex. The alignment heads back towards the N14 and crosses the Leeuspruit wetland. The alignment then runs towards the Vryburg town centre running through a light industrial area. The proposed power line will then run parallel to the N14 in the road reserve to where the existing Vryburg Municipal Substation is located.

1.1.9 Bophirima Distribution Substation to Kalplats Distribution Substation 132kV Power Line Route

Alternative alignments have been provided for comparative assessment along a part of the alignment to the north of the town of Stella. Both alternatives follow the same alignment between Vryburg (Bophirima) and Stella.

The route is proposed to exit the proposed Bophirima Substation, running north-east from the substation site and crossing the R34 road into the Bernauw smallholdings. The alignment crosses mostly open vacant grazing land in this area and is proposed to run parallel to a set of existing distribution power lines. To the south of the farmstead Helena, the alignment turns and runs in a north-westerly direction along a cadastral boundary between the farms Bernauw and Welgelegen. The alignment runs across open natural veld used for livestock grazing to where it crosses the N14 road near the farmstead Oppie Koppie. The route continues in a north-westerly alignment, crossing a railway, across open grazing land. The route intersects the Paradise unsurfaced local access road, running parallel to it before intersecting the N18 road.

To the north of this point the alignment turns to run parallel to the N18 in a north-easterly direction towards Stella. The alignment passes the Boereplaas Resort and the turn-off to Devondale, traversing the farms Elma, Thabanchu, Mabula, Weltevreden, Pan Plaats and Spitz Kop. The route traverses open veld and pastures which are used mainly for grazing through this area. Approximately 3km to the south of Stella the route turns away to the north-west from the N18, following a farm access road to the Chwaing farmstead. The alignment then moves away from the farm access road to follow a cadastral boundary, thus running to the east of the Chwaing farmstead. The route continues to run across open grazing pastures along the cadastral boundary of Zoutpansfontein to where it intersects with a local district road. The route turns to the north-east to run parallel to the road, then running across more pastures to the south of the Stroebelsrus farmstead. The route traverses the R377 (unsurfaced) road to the point where Alternative 1 and 2 split.

The proposed Bophirima Substation to Kalplats Substation Alternative 1 runs to the north east for a short distance along the boundary of the Farm Wilgemoed 344 consisting mainly of dry land maize cultivation before turning predominantly northwards. The proposed power line route runs through the farms Wilgemoed 344 (close to the Gelboer farmstead), Wonderklip 339 (close to the Waterval farmstead), and Koodos Rand near the Paardepan farmstead. The alignment traverses a mix of natural bushveld vegetation and cleared pastures and cultivated fields as it passes the farms Wonderklip and Koodoos Rand. From this point, the proposed route turns to the northwest, traversing a district road and the farm boundary of the Koodoos Rand and Gemsbok Pan for a relatively short distance. The proposed route then turns to the west where it eventually meets with the two proposed Kalplats Substation Sites.

Bophirima Substation to Kalplats Substation Alternative 2 leaves Alternative 1 to the north of Stella, running across maize fields before intersecting, and then running parallel to the R377 in a north-westerly direction. It crosses a mix of farming land (maize fields) and natural thornveld, traversing the farms Welgemoed, Koodoos Dam, Blink Klip and Koodoos Rand. At the intersection of the R377 and a district road, the route turns away from the R377 in a

northerly direction for a short distance before following the cadastral boundary of the farm Koodoos Rand to the north east. The route intersects the district road still running in a north easterly direction until meeting up with the Bophirima Substation to Kalplats Substation Alternative 1 where the proposed alignment follows the same route to the Kalplats Substation Sites.

1.1.10 Proposed Kalplats Substation Alternatives 1 and 2 to existing Edwards Dam Substation 132kV power line route

Alternative 1 exits the proposed Kalplats substation and heads west over agricultural/ cultivated land for approximately 3.7kms until it meets with a district road. The route then turns north, following the district road alignment across the farm Groot Gewaagd to Klip Pan, and then heads north-west towards Heeferslust. Just south of Heeferslust, the route turns west and then south-west following an existing power line servitude all the way to Edwards Dam situated adjacent to the Provincial Road R377. This last sector of the route travels across cultivated lands comprising the farms Heefers Lust, Kinderdam, Houmoed and Helpmekaar.

Alternative 2 exits the proposed Kalplats substation and heads west across the District Road following the alignment of a local road for approximately 2kms through agricultural land. The route then runs along the northern boundary of the farm Gemsbok Pan heading in a westerly direction where it then follows the Groot Verdriet 310 farm boundary until it meets up with the R377. The proposed route then follows the alignment of the Provincial Road R377 to Edwards Dam crossing the farms Bont Bok 259 and Helpmekaar.

5.2 Overview of the region

The cultural landscape qualities of the region essentially consist of a two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one consisting of a number of smaller towns, most of which developed during the last 150 years or less.

Figure 5 presents an overview of the location of known sites of heritage significance. Due to the scale of presentation, some sites overlap, with the result that there seems to be fewer sites than is the case. In similar vein, it might seem that sites occur in the various corridors, but are actually some distance from the exact route.

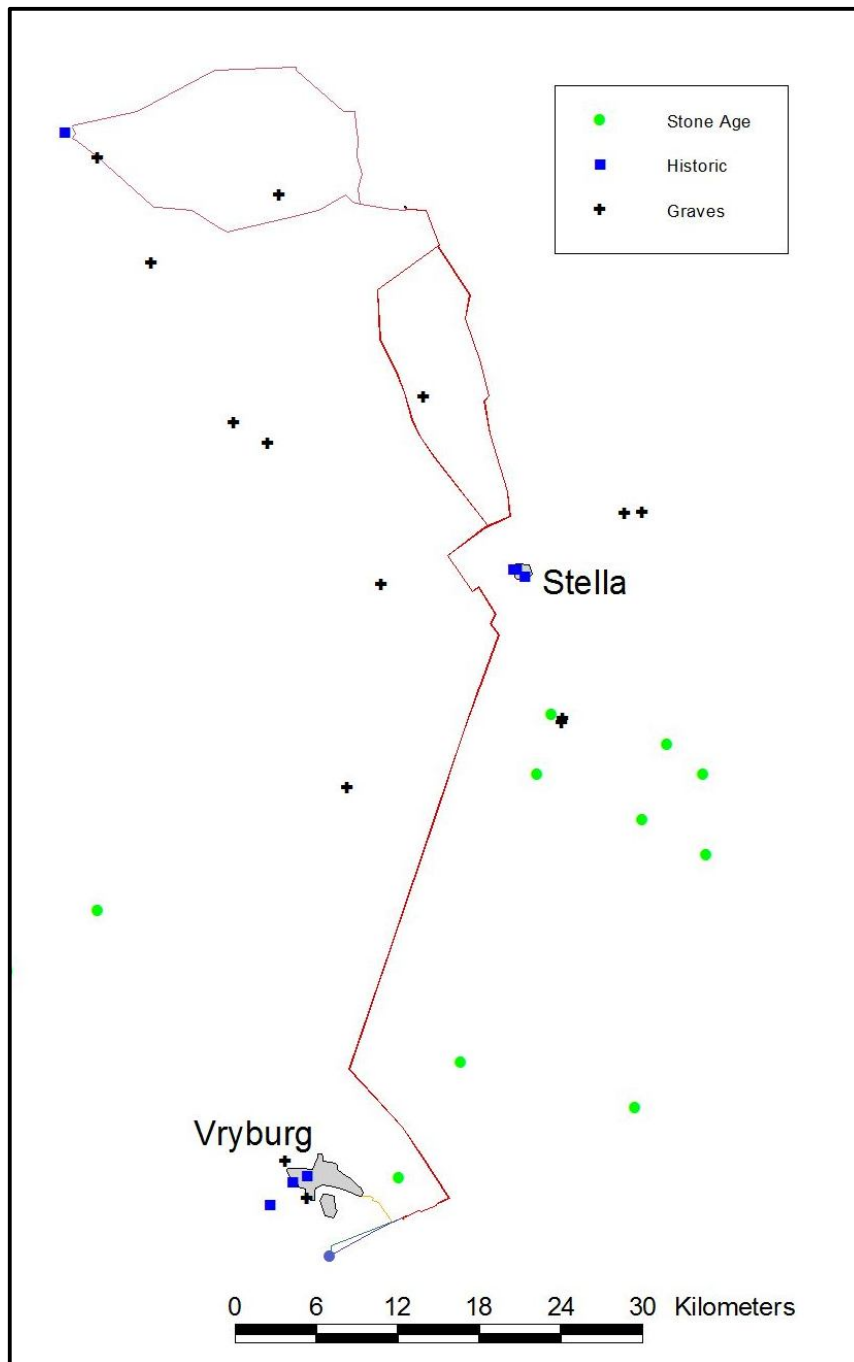


Fig 5. The study area in relation to known heritage sites.

Early history

Very little habitation of the central highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. In many cases, tools dating to this period are found on the banks of the many pans that occur all over. The MSA is a technological stage

characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the region. These are mostly open sites located near river and pans. For the first time we also get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA.

The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual beliefs. One such site is located on the farm Bernauw located to the east of the study area.

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area. Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province.

The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959).

- Archaeological sites

NHRA Category	Archaeological and palaeontological sites
Protection status	General Protection - Section 35: Archaeology, palaeontology and meteorites

Heritage sites assessment		
<i>Site type</i>	<i>Site significance</i>	<i>Site grading (Section 7 of NHRA)</i>
None	-	-

None	
------	--

Impact assessment	
Impact	-
Mitigation	-
Permits	-

Historic period

Many early travellers, hunters and missionaries (Burchell 1824, Campbell 1822, Smith 1834-1836 (Lye 1975), Moffat 1842 and Harris 1852) either passed through the area or close to it. Their writings leave us a tantalising description of what life was in these communities before large-scale interaction with white settlers took place. Some of the first whites to settle here were the missionaries Samuel Broadbent and Thomas Hodgson, who settled some distance to the east of what later became known as Wolmaransstad.

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Few towns were established and it remained an undeveloped area.

During the 1880s the white settlers exploited conflict between the different Tswana chiefdoms to obtain more land. From this developed the Republic of Stellaland, which, due to British intervention in the area due to the discovery of diamonds, was very short-lived. The town of Stella was to be the capital of the republic.

The last chapter in the history of the region was its incorporation under the policy of homeland development, into the Republic of Bophuthatswana. This was a very fragmented 'State' and it would have needed permanent support by the central government to keep it in place. Since 1994, this has fallen away and the people and the region were reincorporated into the larger Republic of South Africa

- Farmsteads

Farmsteads are complex features in the landscape, being made up of different yet interconnected elements. Typically these consist of a main house, gardens, outbuildings, sheds and barns, with some distance from that labourer housing and various cemeteries. In addition roads and tracks, stock pens and wind mills complete the setup. An impact on one element therefore impacts on the whole.

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
	General Protection - Section 34: Structures older than 60 years

Heritage sites assessment		
Site type	Site significance	Site grading (Section 7 of NHRA)
None	-	-



Fig 6. Examples of farmsteads and farming related features identified in the region.

Impact assessment	
Impact	It is highly unlikely that the power line would cross over any existing farmstead or other buildings
Mitigation	If the route change and the line is to cross such a feature, total documentation (mapping, photographing and oral documentation) would be required
Permits	If older than 60 years, a permit from SAHRA would be required

- Cemeteries

Apart from the formal cemeteries that occur in municipal areas (towns or villages), a number of these, some quite informal, i.e. without fencing, is expected to occur sporadically all over, but probably in the vicinity of the various farmsteads. Many might also have been forgotten, making it very difficult to trace the descendants in a case where the graves are to be relocated.

Most of these cemeteries, irrespective of the fact that they are for land owner or farm labourers (with a few exceptions where they were integrated), are family orientated. They are therefore serve as important 'documents' linking people directly by name to the land.

NHRA Category	Graves, cemeteries and burial grounds
Protection status	
General Protection - Section 36: Graves or burial grounds	

Heritage sites assessment		
<i>Site type</i>	<i>Site significance</i>	<i>Site grading (Section 7 of NHRA)</i>
Cemetery	High on a regional level	III

Site identification:				
<i>Description</i>	Small informal farm cemetery. Contains grave of Willem van Holk, a Dutch teacher, who was buried here in 1896			
<i>Farm</i>	Help Makaar 248	<i>Coordinates</i>	S 26.28064	24.58969



Fig 7. The cemetery with the van Holk and other graves.

Impact assessment	
Impact	As it is unlikely that the power line would have any other than a visual impact on the site, it is recommended that the site is retained in its current location.
Mitigation	The site should be avoided at all times. During construction it should be clearly demarcated, e.g. by using danger tape.
Permits	If retained, no permits are necessary

- Towns

Vryburg:

This town was founded in 1883 as the capital of the Republic of Stellaland, an independent Boer republic. The Boers that inhabited the area styled themselves as free citizens, or *vryburgers*, in Dutch, from which the name of the town was derived. The town achieved municipal status in 1896.

- According to available data bases this town has 5 buildings listed as of provincial significance. In addition some cemeteries and monuments also occur.

- As the proposed power line does not cross into town, there would be no impact on any of these sites.

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 34: Structures older than 60 years	



Fig 8. Examples of sites and features found in Vryburg.

Stella:

A small town that developed in 1882 as part of the independent Boer Republic Stellaland. This came about as the Boers supported the Koranna chief David Massouw in his fight against the Tswana chief Mankurwane of the Tlhaping. In order to compensate then Massouw gave then some farms which they turned into an independent Republic, named Stellaland. The name is derived from the Latin for star. It was coined as a comet was visible in 1882.

- No buildings or other features are listed for this town in any database. However, it does have buildings older than 60 years, small monuments and the DR Church was designed by the well-known architect Gerhard Moerdijk.
- As the proposed power line does not cross into town, there would be no impact on any of these sites.

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 34: Structures older than 60 years	



Fig 9. Examples of sites and features found in Stella.

6. SITE SIGNIFICANCE AND ASSESSMENT

6.1 Heritage assessment criteria and grading

According to the NHRA, No. 25 of 1999, Section 2(vi), the *significance* of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential.

A matrix was developed whereby the above criteria, as set out in Sections 3(3) and 7 of the NHRA, No. 25 of 1999, were applied for each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar sites.

The NHRA stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation, on a local authority level.

The occurrence of sites with Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the application of mitigation measures would allow the development activities to continue.

6.2 Statement of significance

In terms of Section 7 of the NHRA, all the sites currently known or which are expected to occur in the study area are evaluated to have Grade III significance with

- Farming and farming related activities, such as farmsteads, stock pens, windmills, etc. would have a high significance on a local level.
- Town/community cemeteries and farm cemeteries would have a high significance on a local level.
- Roadside memorials would have a high significance on a local level.

6.3 Impact assessment

Impact analysis of cultural heritage resources under threat of the proposed development, are based on the present understanding of the development.

Environmental Parameter	Stone Age
Issue/Impact/Environmental Effect/Nature	Many sites are still unknown. Their potential and significance therefore unknown. The impact will be the physical disturbance of the material and its context. Impact will be focused on a particular node, i.e. if the trench cut through a site.
<i>Extent</i>	Local
<i>Probability</i>	Possible
<i>Reversibility</i>	Partly reversible
<i>Irreplaceable loss of</i>	Marginal loss

<i>resources</i>		
<i>Duration</i>	Medium term	
<i>Cumulative effect</i>	Low cumulative effect	
<i>Intensity/magnitude</i>	Medium	
<i>Significance Rating</i>	Sites have a medium significance on a region level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	3	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	34 (Negative low impact)	6 (low negative)
Mitigation measures	All of these sites should be avoided as far as possible. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. Sites that cannot be avoided should be excavated in full by an archaeologist qualified in Stone Age archaeology.	

Environmental Parameter	Iron Age	
Issue/Impact/Environmental Effect/Nature	Many sites are still unknown. Their potential and significance therefore unknown. The impact will be the physical disturbance of the material and its context. Impact will be focused on a particular node, i.e. if the trench cut through a site.	
<i>Extent</i>	Local	
<i>Probability</i>	Possible	
<i>Reversibility</i>	Partly reversible	
<i>Irreplaceable loss of resources</i>	Marginal loss	
<i>Duration</i>	Medium term	
<i>Cumulative effect</i>	Low cumulative effect	
<i>Intensity/magnitude</i>	Medium	
<i>Significance Rating</i>	Sites have a medium significance on a region level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	3	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	2	1
Intensity/magnitude	2	1

Significance rating	34 (Negative low impact)	6 (low negative)
Mitigation measures	All of these sites should be avoided as far as possible. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. Sites that cannot be avoided should be excavated in full by an archaeologist qualified in Iron Age archaeology.	

Environmental Parameter	Colonial Period – farmsteads	
Issue/Impact/Environmental Effect/Nature	The various features are subject to damage. Easier to identify and therefore easier to avoid. Variety of interconnected elements makes up the whole. Impact on part therefore implies an impact on the whole	
<i>Extent</i>	Local	
<i>Probability</i>	Possible	
<i>Reversibility</i>	Partly reversible	
<i>Irreplaceable loss of resources</i>	Marginal loss	
<i>Duration</i>	Medium term	
<i>Cumulative effect</i>	Low cumulative effect	
<i>Intensity/magnitude</i>	Medium	
<i>Significance Rating</i>	Sites have a medium significance on a region level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	2	1
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	24 (Negative low impact)	6 (low negative)
Mitigation measures	All of these sites should be avoided as far as possible. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. In exceptional cases mitigation can be implemented after required procedures have been followed.	

Environmental Parameter	Colonial Period – cemeteries	
Issue/Impact/Environmental Effect/Nature	The various features are subject to damage. Easier to identify and therefore easier to avoid. Variety of interconnected elements makes up the whole. Impact on part therefore implies an impact on the whole	
<i>Extent</i>	Local	
<i>Probability</i>	Possible	
<i>Reversibility</i>	Partly reversible	
<i>Irreplaceable loss of resources</i>	Marginal loss	

<i>Duration</i>	Medium term	
<i>Cumulative effect</i>	Low cumulative effect	
<i>Intensity/magnitude</i>	Medium	
<i>Significance Rating</i>	Sites have a medium significance on a region level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	2	1
Reversibility	2	1
Irreplaceable loss	2	1
Duration	2	1
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	24 (Negative low impact)	6 (low negative)
Mitigation measures	All of these sites should be avoided as far as possible. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. In exceptional cases mitigation can be implemented after required procedures have been followed.	

7. ALTERNATIVES ASSESSMENT

7.1 Heritage assessment criteria and grading

According to the NHRA, No. 25

Alternative	Preferred/Not preferred/ No Preference	Specialist Concerns	Fatal Flaws (Yes/No)
Bophirima Substation to Kalplats Substation Corridor Alternative 1	No preference	None	No
Bophirima Substation to Kalplats Substation Corridor Alternative 2	No preference	None	No
Kalplats Substation to Existing Edwards Dam Substation Corridor Alternative 1	Preferred	None	No
Kalplats Substation to Existing Edwards Dam Substation Corridor Alternative 3	Not preferred	Small informal farm cemetery. Contains grave of Willem van Holk, a Dutch teacher, who was buried here in 1896	No

Alternative	Preferred/Not preferred/ No Preference	Specialist Concerns	Fatal Flaws (Yes/No)
Bophirima Substation Alternative 1	No preference	None	No
Bophirima Substation Alternative 2	No preference	None	No
Kalplats Substation Alternative 1	No preference	None	No
Kalplats Substation Alternative 2	No preference	None	No

8. CONCLUSIONS

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the areas which is proposed to serve as corridor for the development of a power line.

The following categories of heritage sites were identified as occurring in the study area:

- Farming and farming related activities, such as farmsteads, stock pens, windmills, etc.
- Local and private cemeteries.
- Roadside memorials.

In terms of Section 7 of the NHRA, all the sites currently known to occur in the study area are evaluated to have Grade III significance with

- Farming and farming related activities, such as farmsteads, stock pens, windmills, etc. would have a high significance on a local level.
- Local and private cemeteries would have a high significance on a local level.
- Roadside memorials would have a high significance on a local level

Thus far, only one site, a small informal cemetery located on the farm Help Makaan 248, is located in what is perceived to be the corridor.

- As it is unlikely that the power line would have any other than a visual impact on the site, it is recommended that the site is retained in its current location.
- The site should be avoided at all times. During construction it should be clearly demarcated, e.g. by using danger tape.
- If retained, no permits are necessary

Based on the above, it is our opinion that from a cultural heritage point of view, there are no sites, features or objects known to exist in the corridor or its alternatives that would prevent the proposed development from taking place.

9. REFERENCES

9.1 Data bases

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9.2 Literature

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9.3 Maps and aerial photographs

1: 50 000 Topocadastral maps: 2624BA, 2624BB, 2624DA, 2624DB, 2624DC, 2624DD, 2624BC, 2624BD, 2724BA, 2724BB

Google Earth

APPENDIX 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE RESOURCES

Significance

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. Historic value				
Is it important in the community, or pattern of history				
Does it have strong or special association with the life or work of a person, group or organisation of importance in history				
Does it have significance relating to the history of slavery				
2. Aesthetic value				
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group				
3. Scientific value				
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage				
Is it important in demonstrating a high degree of creative or technical achievement at a particular period				
4. Social value				
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons				
5. Rarity				
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage				
6. Representivity				
Is it 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.				
7. Sphere of Significance		High	Medium	Low
International				
National				
Provincial				
Regional				
Local				
Specific community				
8. Significance rating of feature				
1.	Low			
2.	Medium			
3.	High			

APPENDIX 2. RELEVANT LEGISLATION

All archaeological and palaeontological sites, and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

(1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority-

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.