G&A Heritage

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Heritage Impact Assessment Scoping Report

Report on the Scoping Phase of the Heritage Impact Assessment for the Proposed Camden – Mbewu (Theta) 765 kV Power Line.

Prepared By:

G&A Heritage

Prepared For:

Zitholele Environmental Consulting

CREDIT SHEET

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

SIGNED OFF BY: STEPHAN GAIGHER

MANAGEMENT SUMMARY

Site name and location: New 765 kV Distribution Power Line from Camden – Mbewu (Theta).

Municipal Area: Various between Ermelo and Empangeni

Developer: Eskom Holdings Ltd.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa

Date development was mooted: June 2010

Date of Report: 14 February 2011

Proposed date of commencement of development: September 2011

Eskom"s Transmission network supplying electricity to the Kwa-Zulu Natal Province requires strengthening to meet the growing demand and to improve service quality and reliability. To address this situation and to meet the projected future electricity demand, Eskom undertook to strengthen its transmission network by constructing a number of new transmission lines, linking its main generating facilities in the Mpumalanga Province with demand centres in the Kwa-Zulu Natal Province. Strengthening of the network entails the phased construction of 765kV transmission lines into the Empangeni and Pinetown Customer Load Centres. The proposed power line will be constructed between Ermelo, Mpumalanga and Empangeni in Kwa-Zulu Natal.

The purpose of this scoping report is to facilitate the decision between the several alternative alignments of the proposed power line to ensure that the option with the least impact on heritage resources is selected.

Findings;

Several sites of heritage value were identified along the various alignment options as well as some significantly important cultural landscape types. Some alternatives have less impact on the cultural heritage sensitivity of the area than other.

Recommendations;

It is recommended that alignment alternative three (3) is used.

Fatal Flaws;

The section option designated LH was found to be fatally flawed. This option would cause significant visual damage to the very sensitive eMakhosini Cultural Landscape.

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Scoping Heritage Impact Report for the Proposed 765 kV Distribution Power Line Between Camden and Mbewu (Thetha).

Introduction

Legislation and methodology

G&A Heritage was appointed by Zitholele Consulting Pty (Ltd) to undertake a heritage impact assessment of the proposed 765kV power line between Camden and Mbweu substations, in terms of the KwaZulu-Natal Heritage Act No 10 of 1997 and the South African Heritage Resources Act (25 of 1999). Section 27(1) of the Provincial Act requires such an assessment in case of:

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

A heritage impact assessment is not limited to archaeological artefacts, historical buildings and graves. It is far more encompassing and includes intangible and invisible resources such as places, oral traditions and rituals. In the KwaZulu-Natal Heritage Act 1997 a heritage resource is defined any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes the following wide range of places and objects:

(a) places, buildings, structures and equipment;
(b) places to which oral traditions are attached or which are associated with living heritage;
(c) historical settlements and townscapes;
(d) landscapes and natural features;
(e) geological sites of scientific or cultural importance;
(f) archaeological and palaeontological sites;
(g) graves and burial grounds, including –
    (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 palaeontological 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.

'Palaeontological' 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. Amafa aKwaZulu-Natali 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.

Removal of graves are subject to the following procedures as outlined by the South African Heritage Resources Agency:

- Notification of the impending removals (using English, Afrikaans and Zulu 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 Amafa aKwaZulu-Natali;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;
- Limited field investigations were performed on foot and by vehicle where access was readily

available. The comprehensive survey coverage of all the 2km corridors was deemed unnecessary as well as impractical for this phase of the project. Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- Certain areas of the route were found to be inaccessible.
- It was assumed that the alignment of the routes as provided by Zitholele Environmental Consulting was accurate.
- We assumed that the public participation process performed as part of the environmental management plan was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

Background Information

As aforementioned this EIA is being undertaken on the proposed 1 x 765kV power line between Camden Power Station (Ermelo, Mpumalanga) and Mbewu (Theta) Substation (Empangeni, KwaZulu Natal). Additionally, where required it is proposed to construct and maintain access roads adjacent to the proposed power line.

In order to link the proposed new 765kV power line into the grid other electrical infrastructure is required at the take off (Camden Power Station) and end points (Mbewu [Theta] Substation). These infrastructure requirements will take place within the footprint of the Camden Power Station and Mbewu (Theta) Substation and are outlined in Section 3.3 below. The main objective of the proposed project is to receive a decision on the Environmental Authorisation for the proposed project, whilst maintaining the integrity of the surrounding environment and preserving a workable relationship with the local authorities and communities.

In addition, all legal processes have to be adhered to so as to obtain the required Environmental Authorisation.

Project Infrastructure / Components

Infrastructure requirements in terms of the proposed project are as follows:

Camden Power Station:

- Establish 1x400kV feeder bay;
- Establish 1x765kV feeder bay;
- Add a 400/765kV transformer.

Mbewu (Theta) Substation

- Establish 1x400kV feeder bay;
- Establish 1x765kV feeder bay;
- Add a second 400/765kV transformer.

Transmission Line

Approximately 360km 765kV power line between Camden and Mbewu (Theta) substations.

How Power Grids Work

In order to facilitate a better understanding of the proposed project and the electrical infrastructure requirements mentioned above a brief description on how the power grid works has been included

Electricity always commences at the point where power is generated. The majority of electricity in South Africa originates at coal fired power stations. Coal fired power stations generate what is known as three-phase AC current. The three-phase AC current leaves the generator and enters a transmission substation near the power station.

This substation uses large transformers to convert the generator's voltage (which is at the level of

thousands of volts) up to extremely high voltages for long-distance transmission on the transmission grid. Typical voltages for long distance transmission are in the range of 155kV to 765kV in order to reduce line losses and are usually made of huge steel pylons / towers as illustrated in Figure 3-3 below. All pylons like this have three wires for the three phases. Many pylons, like the ones shown below, have extra wires running along the top of the pylons. These are ground wires and are there primarily in an attempt to attract lightning.

For power to be useful in a home or business, it comes off the transmission grid and is stepped-down to the distribution grid. This may happen in several phases. The place where the conversion from "transmission" to "distribution" occurs is a substation. A substation typically does two or three things:

- It has transformers that step transmission voltages (in the tens or hundreds of thousands of volts range) down to distribution voltages (typically 33 kV).
- It has a "bus" that can split the distribution power off in multiple directions.
- It often has circuit breakers and switches so that the substation can be disconnected from the transmission grid or separate distribution lines can be disconnected from the substation when necessary.

Project Phases

Construction Phase

The construction phase for the proposed project will take several months to complete and will entail the following process post authorisation:

***Corridor walk-down**:* To ensure that all site specific sensitivities are avoided.

During this process the exact co-ordinates of the proposed pylons will be established.

***Construction Camps**:* frequency, housing, size

***Vegetation clearance**:* An 80 metre (40 metres on either side of the power line) servitude is required for the proposed 765kV power line, vegetation will be cleared along the entire length of the servitude (this vegetation will also be maintained by Eskom in the operational phase of the project).

***Pylon footings**:* Foundations will be laid for the footings of the pylons.

***Steelwork structures**:* The pylons will be erected piece-meal; that is in segments.

***Stringing**:* Once the pylons have been erected, cables will be strung between the pylons.

***Feeder bays and Transformers**:* Feeder bays and transformers will be erected in the existing footprint of the Camden Power Station and

Mbewu (Theta) Substation.

Since the proposed power line will be over 300 km in length, the aforementioned tasks may occur simultaneous along the power line corridor.

Operational and Maintenance Phase

During operations, Eskom requires access to the servitude for maintenance activities. Maintenance activities are specialised and are, therefore, carried out by Eskom employees.

During the operational life of the power line, there will be no people housed along the servitude.

Decommissioning Phase

The following are assumed:

- The physical removal of the power line infrastructure would entail the reversal of the construction process.
    - A rehabilitation programme would need to be agreed upon with the landowners (if applicable) before being implemented.

- The disposal of materials from the decommissioned power lines would be at an approved waste disposal facility, preferably sent to a recovery centre or reused. Alternatively, recycling opportunities could be investigated and implemented.

All of the aforementioned would be subject to a separate EIA and environmental authorisation at the appropriate time.

Study Scope

Alternative Assessment

The "do nothing" alternative

Under these circumstances there would obviously be no changes to the environment along the proposed route. However, the reliability of electricity supplies to the KwaZulu Natal Province would remain a significant concern unless other sources of power generation and transmission are provided. With increasing economic activity and demand for electricity in the KwaZulu Natal Province, the regional impact of electricity failures would be significant and increasingly severe.

Design Alternatives

Below the ground alternative

The 765kV line is the largest in terms of capacity. The servitude width is 80m as opposed to the 55m for the 400kV line, and the height difference is of the order of 10m. As with 400kV Transmission lines, there is always a visual impact, some areas being more sensitive than others. The option of taking the transmission lines underground will address this impact, but there are other issues that need to be considered:

- The cost of underground lines is approximately 20 times more expensive than the equivalent overhead lines.
- Servitude requirements are far more onerous.
- The servitude would effectively be sterilised for many land uses, including most agricultural applications.

Structural alternatives

Two design alternatives have been proposed for this project, the Cross-Rope suspension type and the Guyed Suspension type. These are illustrated in Figure 4-1and Figure 4-2. It is important to note that the topography will largely dictate the type of tower that will be used. From this perspective, it should be noted that through more difficult terrain and when the route changes direction at a 30 degree angle, there will be need to use self-supporting towers.

Pre-EIA Technical Screening

Prior to the commencement of the EIA the Eskom technical team assessed the study area between Ermelo and Empangeni for various technically feasible alternatives for the proposed 765kV power line. These alternatives were found to be technically sound and financially preferred based on the following criteria:

- *Topography:* The terrain of the study area cannot be too steep (angle must be less xx degrees). Additionally a 765kV power line can span a maximum distance of xx metres between two pylons. Therefore large valleys and channels are considered fatally flawed areas.
- Obstructions / deviations: The power line is required to travel in a straight path as far as possible. Should the power line route be required to change direction at an angle of more than a set amount of degrees a self-supporting pylon is required which is extremely costly.
- Length of route: The shorter the route the more cost effective.

Pre EIA Environmental Screening

A pre-EIA screening assessment was undertaken on the technically feasible alternatives provided by Eskom. Members of Zitholele Consulting accompanied the Eskom technical team on a two day fly over of the study area. Prior to the fly over a desktop screening exercise was undertaken using Acrview GIS

software to identify any biophysical sensitivities. During this investigation the following aspects were utilised in visually assessing the potential environmental issues that should be avoided for each alternative:

- Water bodies / Wetlands;
- Historical building and graveyards;
- Protected areas / nature reserves;
- Build-up areas;
- Topography; and
- Sensitive fauna and flora.

After the fly over some alternatives were deemed none feasible from an environmental perspective and have not been taken into this EIA. A workshop was held at Eskom to discuss the environmental concerns and to realign certain alternatives. These newly aligned alternatives are being assessed in this EIA process.

Orientation of the Alternatives

The alternatives for the proposed EIA comprise of several loop-in and loop-out corridors in an interconnected grid. The reason for these loop in and loop out alternatives is to avoid sensitivities and technical constraints that were identified in the high-level assessment mentioned above. The alternatives are discussed by means of alphabetic representation for each alternative intersection.

Alternative 1 (AB, BC, CD, DE, EF2, FG, GH, HI, IJ)

Alternative 1 commences at the Camden Power Station (**Point A**) located approximately 15 km south east of Ermelo, Mpumalanga. The alternative heads in a south south westerly (SSW) direction along alignment **AB,** spans the *Vaal River* approximately 10 km from the Camden Power Station, spans the *Klein-Vaal River* a further 10 km and the continues for a further 10 km (**Point B**). Thereafter the alternative continues in a SSW direction along alignment **BC** for approximately 50km, spanning over the *Wielspruit* and a *tributary of the Sandspruit*, before crossing over the provincial border into Kwa-Zulu Natal.

On entering the Kwa-Zulu Natal province the alternative changes direction and curves in a south easterly direction for approximately 50km to **Point C** (approximately 30km south of Wakkerstroom). This portion of alignment BC spans over the *Slang River* and a tributary of the *Buffelspruit*.

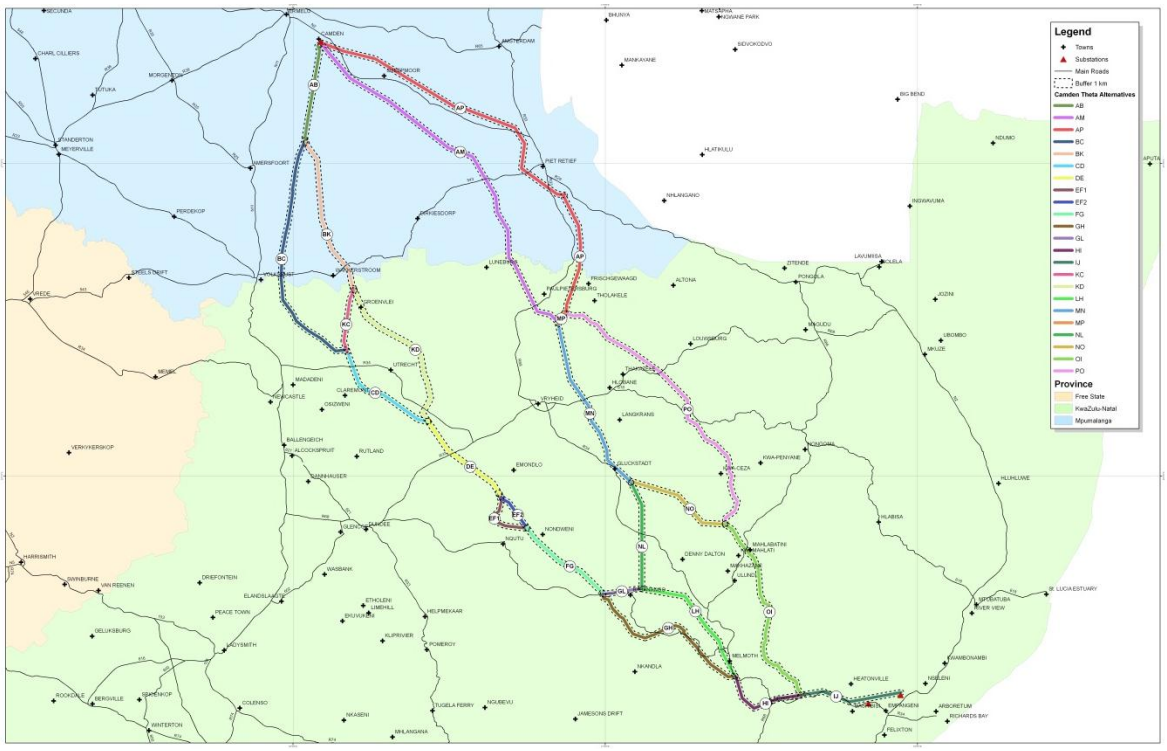
The alternative then continues in a southerly direction along alignment **CD** towards Claremont for approximately 15 km (crosses over the R34) and then turns in a south easterly direction (the turn occurs as the alignment spans the *Dorspruit*) for approximately 30km to **Point D**. The alternative then follows alignment **DE** crossing over the R33 and *Bloed River* and after approximately 40km reaches **Point E**, located approximately 10km south west of Ermondlo.

For alternative 1, the alternative follows alignment **EF2**. **EF2** is approximately 15km in length and meets **Point F** after spanning the *Jojosi River*. The alignment continues in a south easterly direction along alignment **FG** spanning over the *Nondweni* and *Ntinini Rivers.* Alignment **GH** diverts the alternative in southerly direction in order to avoid the protect nature conservation area located to the south east of Babanango. Alignment **GH** is approximately 60km in length and spans both the *Mhlatuze* and *Mefule Rivers*. **GH** runs parallel to the existing R68 road.

The alternative then turns southwards along alignment **HI** for approximately 15 km before turning in an easterly direction, crossing the R68 again and the R38 to **Point I**. The last portion of the alternative is IJ. IJ is approximately 35 km in length depending on the approved location of the Mbewu (Theta) substation (environmental authorisation is still pending for the substation). Alignment **IJ** spans over the confluence of the *Mefule* and *Mhlatuze Rivers*.

Variation Link BK

Variation link BK is provided as an alternative link to **BC**. This alignment is one of the least favourable alignments as it crosses over many sensitive areas such as: the Baltrasna proposed conservancy, irreplaceable flora, the Langfontein, Kombewaria, Outhoutdraai Ossewaaikop protected areas, Outhoutdraai, Wakkerstroom town and the Wakkerstroom Nature Reserve. The alignment is 55km in length of which 20km is located in sensitive areas.



Variation Link KC

Variation link **KC** is dependent on BK being the preferred alternative. Should BK not be the preferred alternative **KC** is not feasible as there is no route from KC north to the Camden Power Station other than link **BC**.

KC is 20 km in length and heads in a south south westerly (SSW) direction close to Groenvlei. This variation link traverses many wetland and sensitive water bodies.

Variation Link KD

Variation link **KD** spans the Slang and Dorpsruit Rivers and several water bodies. The link is approximately 60 km in length and heads in a predominantly south east direction. The link crosses the R34 before meeting up with **Point D.**

Variation Link EF1

The purpose of link **EF1** is to avoid the steep topography at **EF2**. **EF1** is approximately 20 km (5km longer than **EF1** and loops to the west of **EF2**).

Variation Link GLH

Variation link **GLH** is designed to divert to the north of Babanango and then turn in a south easterly direction towards **Point H**. **GLH** is 55km in length and crosses through a protected area for approximately 15km. The link also spans over the Mpembeni and Mfule Rivers as well as over an arterial road, the R68 and R34 and through Melmoth.

Alternative 2 (AM, MN, NL, LH, HI, IJ)

Alternative 2 commences at the Camden Power Station (**Point A**) located approximately 15 km south east of Ermelo, Mpumalanga. The alternative heads in a south easterly direction along alignment **AM** for approximately 135km spanning the *Vaal River, Sandspruit, Ngwempisi River, Hlelo River, Assegaai River, Boesmanspruit, Ntombe, and Pongolo Rivers*. Segment **AM** additionally traverses through the Ngwempisi protected area however it diverts to the east of the Mhlangmpisi and Rooikraal protected areas avoiding these sensitive areas.

Thereafter the alternative crosses the Mpumalanga-KwaZulu Natal provincial boundary and the *Pongola River*, before meeting **Point P** located approximately 10 km south east of Paulpietersburg. The alternative then follows alignment **MN** in a south easterly direction for approximately 60km, spanning over the *Bivana, Manzana, Ishoba Rivers* and several wetlandareas. Alignment **MN** is located approximately 10 km to the east of Vryheid, and slightly to theeast of Gluckstadt.

From **Point N**, alternative 2 heads in a southerly direction for approximately 40km towards Babanango along alignment **NL**. Alignment **NL** spans the *Wit Mfolozi River* towards **Point L**.

Thereafter the alternative follows alignment **LH**. **LH** spans through various environmentally sensitive areas such as: a protected area, the *Mpembeni River* the *Mefule River*, the R68 and R34. The alternative then follows **HIJ** as outlined for alternative 1 above.

Variation Link MP

Variation link MP is located 10 km to the south east of Paulpietersburg. The purpose of variation link MP is to provide the option of joining AM to PO or AP to MN should certain segments be more environmental feasible. MP is less than 5km in length.

Variation Link NO

Variation link NO is approximately 35 km in length and traverses in a predominantly south easterly direction. The variation link crosses an unnamed tributary of the Swart Mfolozi rivers.

Alternative 3 (AP, PO, OI, IJ)

Alternative 3 commences at the Camden Power Station (**Point A**) located approximately 15 km south east of Ermelo, Mpumalanga. The alternative heads in a south easterly direction along alignment **AP,** spans the *Vaal River* approximately 10 km from the Camden Power Station, spans the *Sandspruit* and *Hlelo River* and the continues traversing the Assegaai River to the west of Piet Retief and crosses the 543 road. After passing Piet Retief the alternative turns in a southerly direction spanning over the *Swart River, Wit River* and an *unnamed river*. The total length of alignment AP is 145km.

From **Point P**, the alternative heads along alignment **PO** in a south easterly direction. The alignment spans over the *Bivana, Manzana, Ithalu, Sikwebezi* and *Swart Mfolozi Rivers*.

Approximately 30 km north of **Point O** the alignment traverses to the west of the Ngome protected area.

The last portion of alternative 3 before the alternative joins with alternative 1 and 2 is alignment **OI**. Alignment **OI** is approximately 70 km in length and travels in a southerly direction.

Alignment **OI** is located between the Ophathe Nature Reserve and the Hluhluwe – Umfolozi Park. The alignment spans the R66, the *Wit Mfolozi* and *Mefule Rivers*. The alternative then follows **HIJ** as outlined for alternative 1 above.

Stakeholder Identified Alternatives

During the public review of the Draft Scoping Report several additional alternatives were identified by stakeholders. All technically feasible stakeholder alternatives have been added to the assessment.

These new alternatives have been labelled as follows e.g. S(ab), S(bc), S(cd). The “S” denotes “stakeholder” and the “(ab)” for example denotes which alternative it relates to, is close to, or can potentially replace. The alternatives that have been identified are listed below

- S(bc) – Along existing 765kV power line – not technically feasible;
- S(de) – Along existing 765kV power line – not technically feasible;
- S(ij) – Along existing 400kV power line;
- S(no2) – Along existing 400kV power line;
- S(am) – Along existing 400kV power line;
- S(gh);
- S(oi);
- S(no1);

Alternative S(bc) and S(de) are not technically feasible for the following reason. Eskom power line designs make provision for different reliability levels that should be conformed to. As such, all 400kV lines are built according to reliability level 2 which means a maximum wind return period of 120 years. For 765kV lines the reliability level is 3 which is a maximum wind return period of 420 years. What this means is that it can be expected that once in 120 years a wind of such magnitude will destroy a 400 kV power line. However that same wind should not destroy the 765kV power line due to the stronger design. Although Eskom is hesitant to construct the 765kV power line parallel to existing lines it is not impossible. Eskom can allow for a 765kV to be constructed parallel to a 400kV line because the 400kV and 765kV grids are separate (although superimposed on one another). In case of disaster Eskom will only lose one line of each voltage. But with two 765kV lines in parallel Eskom will lose the bulk of a very important main supply and as a result they would like to prevent (if

possible) constructing 765kV power lines in parallel. If this is unavoidable it should be done for very short sections only.

Stakeholder Identified Alternatives

Since the 400kV network is the backbone of the Eskom electricity grid, the situation with parallel lines are slightly different for the 400kV network since a fair amount of redundancy exists, unfortunately this scenario does not exist (as yet) for the 765kV network. As a result the alternatives proposed where power lines will be running parallel to existing 400 kV lines are possible, but routes S(bc) and S(de) will be problematic.

Length of the various alternative segments

ALTERNATIVE SEGMENT	LENGTH (KM)
AB	35
AM	135
S (am)	36
AP	145
BC	85
S (bc) – not feasible	44
BK	55
CD	40
DE	35
S (de) – not feasible	82
EF1	15
EF2	20
FG	35
GH	60
S (gh)	45
HI	30
IJ	35
S (ij)	60
KC	20
KD	60

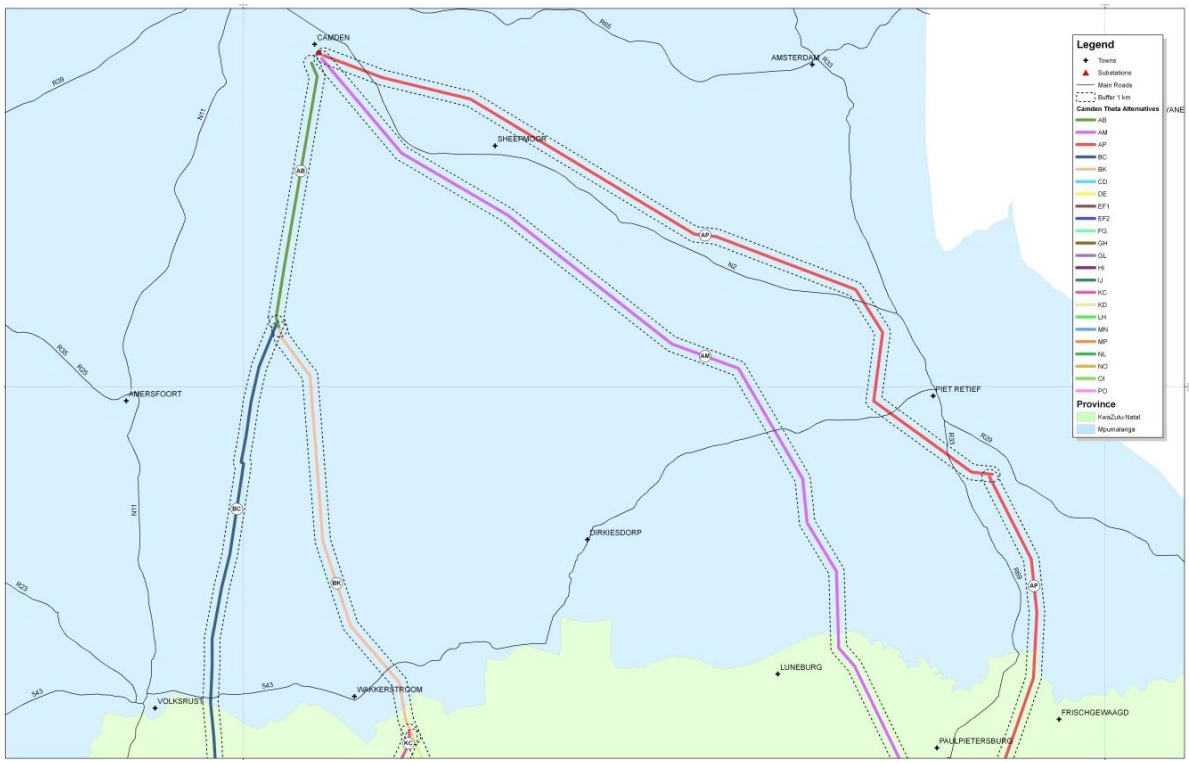
LH	45
MN	65
MP	65
NL	40
NO	35
S (no1)	20
S (no2)	38
PO	105
OI	70
S (oi)	37

Study Area Delineation

The following section is provided in order to better facilitate describing the study area. The study area has been divided into three sections. The sections are explained below.

Northern Section

The northern section of the study area refers to the Mpumalanga portion of the study area

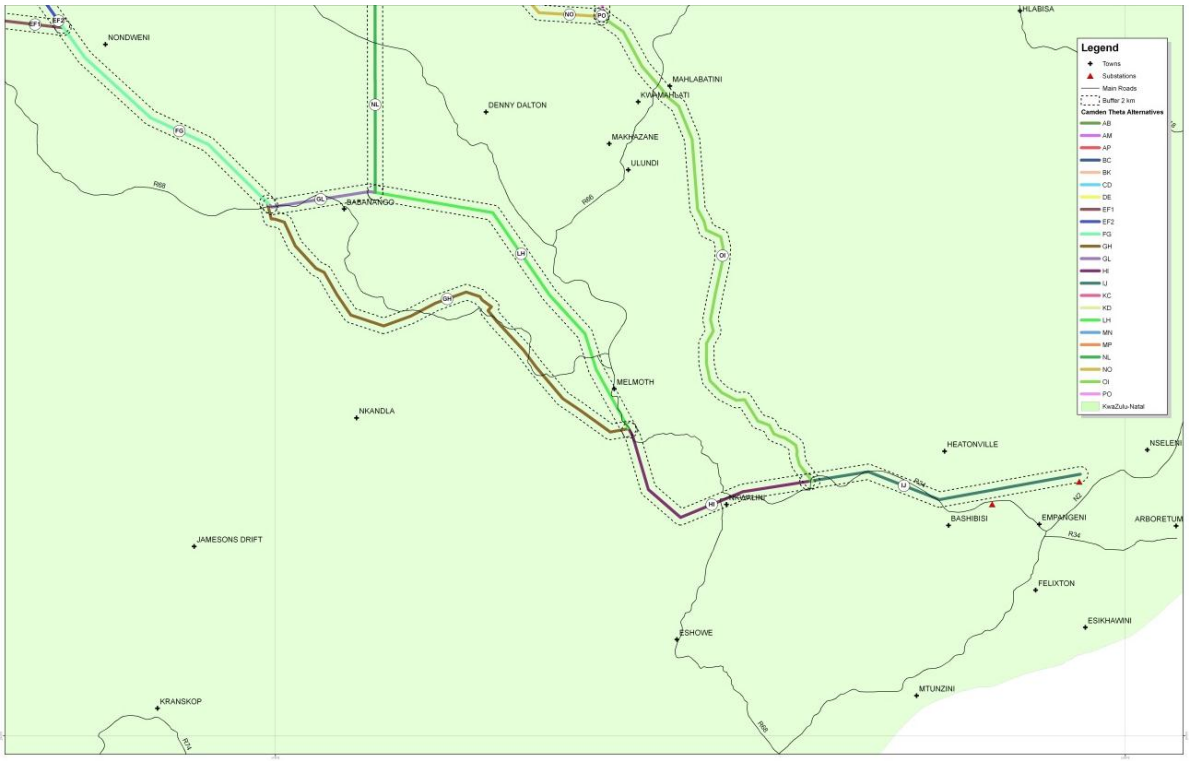


Central Section

The central section of the study area refers to the northern KwaZulu Natal portion of the study area, that is, everything south of the Mpumalanga provincial border and north of points E, N and O (Figure 4-7).

Southern Section

The southern section of the study area refers to the southern KwaZulu Natal portion of the study area, that is, everything south of points E, N and O and north of the proposed substation (Figure 4-8).



DESCRIPTION OF THE RECEIVING ENVIRONMENT

Regional Context

The study area is located within the Mpumalanga and KwaZulu Natal provinces. A number of District Municipalities (DMs) and Local Municipalities (LMs) form part of the study area. These municipalities are as follows;

Affected Municipalities

DISTRICT MUNICIPALITY & LOCAL MUNICIPALITY

· Umzinyathi District Municipality: · Nqutu Local Municipality

· Amajuba District Municipality: · Utrecht Local Municipality

· Zululand District Municipality:

· eDumbe Local Municipality

· uPhongolo Local Municipality

· Abaqulusi Local Municipality

· Ulundi Local Municipality

· Uthungulu District Municipality:

· Nkandla Local Municipality

· Mthonyaneni Local Municipality

· uMhlathuza Local Municipality

· Umlalazi Local Municipality

· Gert Sibande District Municipality:

· Msukaligwa Local Municipality

· Seme Local Municipality

· Mkondo Local Municipality

Methodology

This study defines the heritage component of the Environmental Impact Assessment process. It is described as a first phase Heritage Impact Assessment (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations. The alternative corridors as identified earlier in this report will be evaluated to determine their cultural heritage significance. Based on this information an alternative will be selected that will result in the least negative impact on the area"s cultural inheritance. The final step in this process will be a physical walk-down of the selected alternative to ensure that no unidentified sites are damaged.

Evaluating Heritage Impacts for Power Lines

The evaluation of the heritage sensitivity of power lines is significantly different to the process as found in other activity evaluations. Power lines have a linear character leading to impacts over large areas. The physical character of a power line creates an inescapable sense of thoroughfare. This characteristic has a significant impact on the visual qualities of the landscape and especially the cultural landscape. For this reason it is important that emphasis be placed on the visual impact of such a development on the cultural identity of the study area.

The direct physical impact of a power line on the surface of the study area is often less dramatic than many other activities. New construction approaches and pylon designs also results in less physical impacts. It is therefore often possible to mitigate surface interference through the application of a walk-down phase. This study will therefore focus mainly on aspects that will influence the visual character of the cultural landscape while documenting surface sites and leaving the mitigation of smaller less significant sites to the walk-down phase.

Due to the large study area it is impossible to study all the surface areas in detail as the corridors are 2km in width and over 300km in length. A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

After plotting of the different routes on GPS the areas were accessed using suitable combinations of vehicle access, access by foot as well as four-wheeler motorbike.

Sites were documented by digital photography and geo-located with GPS readings using the WGS 84 datum. Basic site evaluation forms were completed for identified sites.

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

Geological maps guided investigations into the paleontological riches of the area.

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 and DEAP (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 formalized. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimize the visual impact.

Similar studies have determined that power lines 400kV and above are visible but not intrusive in daylight from 5km away. Power lines are however not seen as intrusive until they are 450m or closer to the observer. This aspect will vary especially in cases of cultural landscapes rather than cultural sites. In the case of cultural landscapes the sense of thoroughfare created by the power lines can be seen as detrimental to the landscape character and can significantly influence the “sense of place”.

Many of the alternatives identified follow the route of existing power lines. These options are more desirable than the undeveloped areas as the visual impact already exists and it does not imply a compounding effect.

Assessing archaeological and Paleontological Sites

The direct effect of the development on archaeological and paleontological sites cannot be determined until such time as the power line servitude is placed within the 2km corridor of the. Direct impacts can only be evaluated in the line-design phase of the project and mitigated during the walk-down phase. Mitigation can usually be achieved by fine-tuning of pylon placements and exclusion of sensitive areas.

Assumptions and Restrictions

- It is assumed that the SAHRA database locations are correct
- Comprehensive surface surveying of the 2km corridors is unfeasible due to the large amount of surface area involved.
- A final walk-down will ensure that surface sites within the selected corridor are protected through the micro-adjustment of pylon placements as well as other activity manipulation
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the inclusive Visual Impact Assessment for the EIA is sufficiently thorough.
- It is assumed that the social impact assessment and public participation process of the EIA will result in the identification of any intangible sites of heritage potential.

Chapter 2

PROJECT RESOURCES

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENTS

REGIONAL CULTURAL CONTEXT

Since the study area is very large, the heritage resource inventory will be based on the three sections as outlined in the previous chapter.

NORTHERN SECTION

This part of the study area comprises the area within the Mpumalanga Province. The regional cultural context for this area is as follows;

PALEONTOLOGY

The Barberton Greenstone Belt (BGB) is a geological formation in Mpumalanga that has produced some of the oldest evidence of life anywhere in the World. This formation is not limited to the Barberton area and several versions of it are found close to the study area. These include the Kromberg, Onverwacht and Hoogenoeg sites. The BGB comprises 5 to 6 km of predominantly komatitic and basaltic pillow lavas and sheet flows and related intrusions that are interlayered with cherts and overlain by cherts, banded iron formations, and shales. This magmatic sequence has been interpreted to represent 3480- to 3220-million-year-old oceanic crust and island arc assemblages. These rocks have undergone metamorphism from prehnite-pumpellyite to green-schist facies. Within the originally glassy rims of many BGB pillow lavas, dense populations of mineralized tubular structures 1 to 9 ,um in width (average width, 4 Fm) and up to 200 Fm in length (average length, 50 Fm) are observed. These structures consist of fine-grained titanite and extend away from healed fractures along which seawater once flowed.

STONE AGE

This area is home to all three the known phases of the Stone Age, nl. The Early (2.5 million – 250 000 years ago), Middle (250 000 – 22 000 years ago) and Late Stone Age (22 000 – 200 years ago). The Late Stone Age in this area also contains sites with rock art from the San and Khoi San cultural groups. Early to Middle Stone Age sites are uncommon in this area, however rock-art sites and Late Stone Age sites are much better known.

IRON AGE

The Iron Age sequence is divided into the Early Iron Age (200 – 1400 BP) and the Late Iron Age (1400 – 1900 BP). Although the Early Iron Age is not known from this specific area (EIA sites are know from Lydenburg and Bambata), several Late Iron Age sites of Sotho and Swazi origin is found here

By 1400 the second migration of the Nguni with their vast cattle herds arrived in the area. The most prominent of these were the Ndebele tribe. Some Ndebele stone walled sites are also known from this area.

THE HISTORIC ERA

Historic towns within this section include Ermelo, Piet Retief, Wakkerstroom and Amersfoort. This area is well known for its rich historic character and contains sites connected with several historic military and political conflicts. Historic cemeteries (victim of conflict sites), provincial and private museums, battlefield sites and other historic sites are found here.

Around the Wakkerstroom area several historic grave sites associated with the Anglo-Boer war is located. Further historic sites are the house of writer Sir H Rider Haggard and the site of historic battle re-enactments.

Cultural Landscape

The cultural landscape for this area is richly associated with the colonial period as well as its violent past. A unique stone architectural heritage was established in the Eastern Highveld from the second half of the 19th century well into the early 20th century. During this time period stone was used to build farmsteads and dwellings, both in urban and in rural areas. Although a contemporary stone architecture also existed in the Karoo and in the Eastern Free State Province of South Africa a wider variety of stone types were used in the Eastern Highveld. These included sandstone, ferricrete (.ouklip.), dolerite (.blouklip.), granite, shale and slate.

The origins of a vernacular stone architecture in the Eastern Highveld may be ascribed to various reasons of which the ecological characteristics of the region may be the most important. Whilst this region is generally devoid of any natural trees which could be used as timber in the construction of farmsteads, outbuildings, cattle enclosures and other structures, the scarcity of fire wood also prevented the manufacture of baked clay bricks. Consequently stone served as the most important building material in the Eastern Highveld.

MARKET SQUARE ~ VOLKSRUST - This area was renamed Voortrekker Square in 1938. There is the Burger Memorial dedicated to the memory of the women and children who died in the concentration camp and it also commemorates all those who fought for the freedom of the Zuid Afrikaanse Republiek(ZAR).

CONVENTION BRIDGE - Just outside Volksrust on the Newcastle road are the remains of the Convention Bridge, which originally linked the ZAR to Natal. In 1814 the Swaziland Convention was signed in a railway coach (on the bridge) by Sir Henry Loch and the President Paul Kruger.

BRITISH MEMORIA - This memorial laid out in the form of a cross can be found on the north side of town.

HOUSE & GRAVE OF GENERAL PIET JOUBERT - Gen. Piet Joubert"s house and grave can be found approximately 25km outside Volksrust on the Vrede road.

ROODEDRAAI SCHOOL MUSEUM **-** This museum is situated on a historical farm site approximately 30 km outside of town on the Vrede road. It is full of information about Anglo-Boer War and an English Fort can also been seen.

VOLKSRUST PRISON - Volksrust prison was built after the war and its main claim to fame is that on November 5 1913 Mahatma Gandhi"s Passive Protest Movement marched through Volksrust, it was stopped and he was sentenced to a period of hard labour or a fine. He spent several months in this prison during his stay in South Africa.

MOUNT PROSPECT - General Colley"s grave is situated near Mount prospect on the Kwa Zulu Natal"s Battlefield"s Route and this graveyard can be reached using a 4 x4 vehicle.

MAJUBA BUSHMAN PAINTINGS - These can be found by travelling 2 km on foot near O„Neill"s Cottage. These San paintings have only recently been discovered in the foothills of the mountain. They are to be found under an over-hanging rock, which would have afforded shelter to the San in this area. Nearly seventy San paintings depicting leopards, snakes, the anteater and various species of buck can be seen.

THE CONCENTRATION CAMP **-** This is situated at Grens Spruit, which adjoined the old Transvaal and Natal borders. The Volksrust Concentration camp was erected in October 1900 and was regarded as being one of the biggest. A total of 1009 people died in this camp: the majority of them were children.

THE CONCENTRATION CAMP MEMORIAL **-** This Memorial can be found in Market Square and commemorates those who died in the camps. Their names were immortalized on the granite slabs and many of the bodies of those who died have been re-interred on this site.

VOLKSRUST STATION **-** This quaint sandstone station was built in 1885 and is still used. The only

existing Zuid-Afrikaanse Customs Office can also be seen at this site.

STEAM LOCOMOTIVE- For Steam train aficionados a fine example of a steam train can be found in Market Square. Stream Trains in this area were phased out in 1937 when the electrification of the Durban ~ Volksrust line was completed.

NUWE REPUBLIEK MUSEUM. This museum in Vryheid housed the council chamber and government offices of the Nuwe Republiek. Displays can also be found in the Carnegie Library and Lucas Meyer house.

FORT PROSPECT. The outpost in the Vryheid area was manned by 80 British soldiers and was attacked by 400 Boers on September 24 1900. It lasted most of the day but eventually the Boers were forced to withdraw after the Zululand Native Police reinforced the British troops.

ALLEMAN'S NECK. In the Volksrust area, this was where the British forces finally broke through into the Transvaal.

Central and Southern Section

The Central and Southern Sections is largely homogeneous in their cultural characteristics and will therefore be discussed as a single section.

Paleontological Sites

Border Cave, a large overhang in the remote Ingwavuma district, has been occupied by humans for about 190 000 years and is one of only a few archaeological sites in the world with a complete stratigraphic record. More than a million artefacts have been excavated from the site. The site is not directly in the study area; however is of such high value that it should be noted here.

Paleontological remains occur in the Cretaceous layer underlying the study area. These are of high significance but should not be impacted on as the ground intrusion is very limited.

Archaeological sites

Pre-Colonial (*Pre-Contact*) Sites

eMakhosini Cultural Landscape

The eMakhosini Cultural Landscape is probably the most sensitive area within any of the evaluated options from a visual impact approach. This is not a single site or even a group of sites but rather a combination of historic sites, landscapes and history bound by oral traditions and cultural significance defining the Zulu culture.

eMakhosini (literally "the valley of the chiefs") lies just southwest of the town of Ulundi. Much of the area is defined by the presence of several stone walled sites associated with the powerful Buthelezi and Khumalo clans. These clans among others were key players in the formation of the Zulu kingdom. The famous King Shaka Zulu was born here around 1785 and it is here that his forbearers, Nkosinkulu Zulu, Phunga, Mageba, Ndaba, Jama and Senzangakhona lie buried. The graves and royal residences of four paramount rulers of the Zulu – Shaka, Dingane, Mpande and Cetswayo- are located in and around the eMakhosini Valley. At Cetswayo"s royal residence at Ondini there is today also a site museum as well as the KwaZulu Cultural Museum.

Although the eMakhosini valley is of great importance to the Zulu it also bears evidence of the Voortrekkers. Voortrekker leader Piet Retief lays buried in the valley at kwaMatiwane – The Hill of Execution. A monument to Retief and his followers are found not far from the partially reconstructed Mgungundlovu – Dingane"s royal residence. Another famous Voortrekker child hero – Dirkie Uys"s grave has also recently been discovered in the area.

Possibly the most important cultural sites in the eMakhosini valley is Nobamba and Siklibheni. At

Siklibheni the original *nkatha ka zulu* – the sacred royal regalia consisting of a ring of special grasses and herbs covered in the skin of a python – was made. Siklibheni was the residence of *inkosi* Senzangakhona ka Jama Zulu (c. 1757 – 1816), father of Shaka, Dingane and Mpande and grandfather to Cetshwayo.

Not far from here is found the grave site of Senzangakhona"s mother – Mthaniya. Across the hills is the site of Nobamba where the homesteads of Kings Jama and Dinuzulu once stood. Dinizulu is buried under a granite slab at the foot of the nearby Ntabaye Zulu hill.

Further south is found *kwaDukuza*, the last royal residence of Shaka Zulu. Shaka came to power in 1816 and reinforced his claim to the Zulu throne after a convincing victory at his early homestead kwaBulawayo in the eMakhosini valley. In 1828, Shaka"s half-brothers, Dingane and Mhlangana had Shaka killed with the help of his Induna, Mbopa. He was stabbed to death on 22 September 1828.

Mgungundlovu was the royal residence to Dingane during his reign of the Zulu kingdom. The city (with up to 7000 inhabitants) was abandoned and burned down after Dingane learned of an advancing Voortrekker party set on revenge for the Bloukrans and Weenen massacres. Much of the site has been excavated in recent years and a section has also been reconstructed.

Close to the entrance to Mgungundlovu is the grave of Nkosinkhulu kaMalandela (1627 – 1709) who is considered to be the founder of the Zulu royal dynasty. His royal homestead is also thought to be close by here.

Approximately five kilometres from Mgungundlovu is Mthonjaneni spring, believed to be the place where Dingane"s wives drew water for his consumption.

Nodwengu on the Mahlabatini plains was the Zulu capital during the reign of King Mpande. Mpande reigned for 32 years and this was one of the most peaceful periods in the history of the Zulu nation. Mpande died a natural death in 1872 and is buried at Nodwengu where there is also a site museum.

Ondini, the royal residence of king Cetshwayo is in fact three different locations. After seceding his father Mpande, Cetshwayo destroyed the original Ondini as per Zulu custom. He then commenced to build the second Ondini in the Mahlabatini plains modelling the design on Dingane"s Mgungundlovu. After the British destroyed this site in 1879 at the battle of Ulundi, Cetshwayo was exiled, however on his return he built the third Ondini just south of the second. The second Ondini"s remains can be found some 5km south of Ulundi.

Prince Dabulamanzi kaMpande's grave is located at Nondweni. The prince commanded the Undi corps and the uThulwana, inDluyengwe, inDlondlo and uDloko regiments that attacked Lord Frederick Chelmsford"s depot at Rorke"s Drift. Prince Dabulamanzi was killed by a boer, Paul van der Berg in 1886 after hostilities between him and the Voortrekkers surfaced. His grave is marked by a stone cairn at Nondweni.

Piet Retief's grave. In 1837 Piet Retief (by then a well-known Voortrekker leader) wrote a letter to King Dingane of the Zulu in which he stated that the Voortrekkers wanted to live in peace with the Zulus. Dingane indicated that he would concede land to the Boers if they retrieved stolen cattle from Chief Sekonyela of the Batlokwa (the idea being to gauge the military strength of the Boers). This raid by the Boers was so successful that Dingane decided to plot Retief"s death. After being invited to the royal kraal for festivities and being disarmed Retief and his men were overpowered and executed at kwaMatiwane. The bodies of Retief and his men were recovered nearly a year later and reburied at the foot of the mountain.

Colonial (*Post-Contact*) Sites

British settlers first arrived at Port Natal (Durban) in 1824 when Shaka, King of the Zulu was firmly in charge of the hinterland. Thirteen years later a party of Boer families trekked in from the Free Sate. Between 1860 and 1911 shiploads of Indians arrived to work in the coastal sugar plantations. Since then, immigrants from around the world have brought with them different cultures, enriching the character of the province in many ways.

Northern and central KwaZulu-Natal is strewn with sites of battles between the Zulu, Boer and British during the 1800"s and 1900"s. The British final conquered

the Zulu in the Anglo-Zulu War of 1879 and later the Boers in the First and Second Anglo Boer wars. These conflicts are now collectively known as the South African War. A result of these conflicts was the construction of many forts in the area. One such is Fort Nolela where the British rallied before the decisive battle for Ulundi. Several grave sites, monuments, stone cairns and statues are the legacy of this violent time in our history. These remains are found scattered throughout the study area.

Ncome / Blood River. By November 1838 Andries Pretorius was leading the Voortrekkers in outright hostilities against Dingane"s Zulus after the murders of Piet Retief and his party. Near the Ncome river scouts reporting seeing a large Zulu Impi. Pretorius formed a laager (interconnected wagon perimeters) with three canons in-between wagons. The Zulu attack had to forge the Ncome River and fire from the laager as well as mounted surge parties massacred the Zulu numbers to the effect that the water in the river turned red – resulting in the battle being known forever as Blood River. After defeating the large Zulu battalion Pretorius turned his attention the Mgungundlovu, however by the time they reach the settlement it had been torched. For many years the 16th of December was known as the Day of the Vow, however nowadays it is known as the Day of Reconciliation. A monument and site museum with full-scale bronze ox wagons is located at the battle site today.

Isandlwana. Probably one of the two most significant battles of the Anglo-Zulu War. On 22 January 1879 an Impi of around 20 000 warriors attacked the British forces camped at the mountain known as Isandlwana. The British lacked sufficient defensive structures and by the afternoon the camp had been overrun. The British lost 1 357 men as well as the battle. Isandlwana was the worst defeat ever suffered by a colonial power in Africa. The area at the foot of the mountain is scattered with graves and monuments to the men who lost their lives here. In 1883 a mission church was also built at this site under Bishop William Kenneth Macrorie.

Rorke's Drift. This site was a well-known crossing place of the Buffalo River. On the same day that the British forces were overrun at Isandlwana another Zulu war party attacked the British camp at Rorke"s drift. This time the Zulu attack was kept at bay by less than 100 soldiers. Today a small museum is found here in a thatched house that served as a hospital at the time of the battle.

Khambula. On 29 March 1879 a 20 000 strong Zulu Impi attacked the British at Khambula in the north of Zululand. The Zulu were led by Chief Mnyamana Buthelezi while the British were under the command of Colonel Sir Evelyn Wood. After losing over 2000 men the Zulus had to retreat in defeat. Today a memorial commemorates this battle site.

Grave of Piet Lafras Uys. Piet Uys was the son of the well-known Voortrekker leader of the same name and brother to the young hero, Dirkie Uys. His father and brother were both killed in 1838 at the battle of Ithaleni. Fighting under the British Colonel Redvers Buller, Uys"s small party was overrun by a Zulu impi. They managed to break through the Zulu lines and regroup with the remaining force. While Colonel Buller remained and received the Victoria Cross for valor, Uys fought his way back to the men isolated behind the lines where he was stabbed in the back by a Zulu soldier. A monument to him was erected on this site by his men in 1881.

Ulundi. A domed monument is found at the site of the final battle of the Anglo-Zulu war. Here an organized assault by the British resulted in 1500 Zulu being killed before King Cetshwayo finally surrendered.

Prince Imperial Cross. A most unlikely victim of the Anglo-Zulu War was the French Prince Imperial, Napoleon Eugene Louis Jean Joseph. While serving as an aide-de-camp to Lord Chelmsford he and a number of mounted soldiers were sent on a routine mission along the Ityotyozi River. In the afternoon they were ambushed and attacked by a Zulu regiment. The young prince had dismounted and his horse bolted, trampling him. Here he turned to face his attackers and was stabbed 17 times. After the war the Zulu warriors who led the attack spoke highly of the prince"s bravery saying that "he fought like a lion". A stone cross commemorates the site of his demise.

Laing's Nek. On 28 January 1881 a British force of 1200 men were repulsed by Commandant-General Piet Joubert at Laing"s Nek just south of Volksrust. There is a historic marker found at this site

Schuinshoogte. On 7 February 1881 the mail wagon was ambushed by the Boers. General Colley of the British army decided to escort the wagon the next day when it was again attacked by the Boers at the

Ingogo River. The British retreated after losing 139 men. A historic marker is found here.

Majuba. On 26 February 1881 General Colley of Schuinshoogte fame took the hill at Majuba with 370 men. From here they rained small arms fire on the Boer encampment. Although the British held the high ground, they were not well entrenched and Boer volunteers quickly overrun their position. Colley and 91 of his men were killed, 134 wounded and 59 taken prisoner. A memorial to this battle and several grave sites are found at the foot of Majuba hill.

O'Neil's Cottage. This small homestead is located at the foot of Majuba mountain. Some of the wounded at Majuba was cared for here and three men who subsequently died were also buried in the small cemetery. An armistice was signed at the cottage on 23 March 1881 allowing for the independence of the Zuid-Afrikaansche Republic. After the truce was signed, the documents in respect of retrocession of land to the Boers were signed at Hilldrop House, home to the writer, Sir H Rider Haggard.

Block houses. The study area was the scene for many military Block-houses used to control access to certain areas. Always within firing distance of each other these miniature forts would form a line that could easily be defended. Several remains of these structures are still found within the study area.

Utrecht Museum. This museum housed in the old parsonage depicts life in Utrecht and also the history of the Dutch Reformed Church.

Fort Amiel. This was an important military base from 1867 to 1902. During the Anglo Zulu and Boer Wars it was used as a transit camp hospital and commissariat store. Today it houses a historical and military museum.

The Old Cemetery. British soldiers are buried in the old cemetery in Utrecht. One of these graves is of Steven Thorton Philimore, deputy commissioner of the British Army during the Anglo Zulu War.

Pokorowsky Memorial. A marble slate commemorating Captain Leo Pokorowsky, a Pole who was an officer in the Russian Army. He fought with the Boer forces during the Anglo Boer War and was killed in a skirmish on Christmas Day 1900 when he and his men attacked the British garrison in Utrecht.

Blood River Poort Battlefield. Fought on September 17 to prevent Louis Botha"s attempt to invade Natal, the British were outflanked and in the 10 minute action lost 16 officers, 273 men and 3 guns. On the D251. Follow the signs. After 8-km turn into Goedgeloof farm. Graves 1-km on the right side of the road.

Holkrans Battlefield. On this site in the Vryheid area 56 Burgers were killed on May 6 1902 in a surprise attack by a Zulu impi on Zuinguin Mountain. 22-km from Vryheid on the Paulpietersburg road.

Hlobane Battlefield. British forces were defeated by a Zulu impi on Hlobane Mountain in the Vryheid area on March 28 1879. 20-km from Vryheid on the Hlobane road.

Gqokli Hill: Located 10 km south of Ulundi is the site of an epic battle between the forces of King Shaka and the Ndwande people in 1818. It may be viewed from a lay-bye on the road to Ulundi.

Ondini Historical Reserve – site of the last battle of the Anglo-Zulu War. A historical reserve and monument, it includes an interpretative centre, stadium, tourist accommodation and the Kwa-Zulu Natal Cultural Museum.

Register of Cultural Sites Identified

The following sites were identified within the indicated corridors. The different sections of the proposed alignments will be discussed individually. Should a section not be listed, no heritage sites were identified therein.

AP
CTM 001
An informal cemetery with several historic graves are located here.

BC
CTM 002
Informal cemetery site.

CTM 003

A stone kraal, possibly of historic importance.

CTM 004

Stone kraal of possible historic importance.

CTM 005

A historic homestead.

CTM 006

A historic homestead.

CTM 007

A historic homestead

CTM 008

Possibly historic stone kraal.

CTM 009

Possibly historic stone kraal

CTM 010

Historic Homestead

CTM 011

Cemetery site

CTM 012

Cemetery site

CTM 013
Cemetery Site

CTM 014
Stone walled structure

CTM 015

Stone walled structure

CTM 016

Stone walled structure

CTM 017
Stone walled structure

CTM 018
Stone walled structure

CTM 019

Stone walled structure

CTM 020

Historic homestead

CTM 021
Historic homestead

CTM 022
Stone walled structure

BK
CTM 023
Stone walled structure

FG
CTM 024
Cemetery Site

CTM 025
Traditional Tribal Church

GL
CTM 026
Stone walled Iron Age Site

MN
CTM 027
Cemetery Site

PO
CTM 028
Grave site

CTM 029
Graveyard Site

CTM 030
Stone walled site

Amafa Database Sites

The following sites were identified through study of the Amafa Database of sites. These sites are located on the 1:50 000 map sheets containing the buffer zone study area and are not necessarily within the buffer zone itself. After identification of the favored alternative their exact positions will be determined within the study corridor. GPS coordinates are as found in the database.

MAP SHEET No	SITE No	DESCRIPTION	GPS COORDINATES
27 29 BD	2	LSA AND ROCK ART	27 29 30 S 29 51 30 E
27 29 BD	3	LSA AND ROCK ART	28 29 S 29 51 30 E
27 29 DB	1	MSA SURFACE SITE	27 45 S 29 52 E
27 29 DB	2	HISTORIC SITE O' NEILS COTTAGE	
27 29 DD	1	LSA AND ROCK ART	27 54 S 29 45 E
27 29 DD	2	LSA AND ROCK ART PAINTINGS	27 54 S 29 45 E
27 29 DD	3	ARIAL PHOTOGRAPH INFO POSSIBLE STONE WALL SITE	27 57 51 S 29 45 56 E
27 29 DD	4	ARIAL PHOTO INFO UNCERTAIN	27 53 42 S 29 51 32 E
27 29 DD	5	HISTORIC SITE STRUCTURE	27 48 25 S 29 58 01 E
27 29 DD	6	LIA MIDDEN SCTRUCTURE	27 46 56 S 29 46 52 E
27 29 DD	7	LIA MIDDEN SCTRUCTURE	27 46 39 S 29 46 18 E
27 29 DD	8	LIA MIDDEN SCTRUCTURE	27 46 20 S 29 46 13 E
27 30 AC	1	LSA AND ROCK ART PAINTINGS	
27 30 AC	2	SURFACE SITE	27 29 S 30 08 E
27 30 AC	3	LSA AND ROCK ART PAINTING	27 16 22 S 30 09 23 E
27 30 AC	4	LSA AND ROCK ART PAINTING	27 23 42 S 30 14 16 E
27 30 AC	5	LSA AND ROCK ART PAINTING	27 27 53 S 30 07 04 E
27 30 AD	1	HISTORIC SITE STRUCTURE	27 29 07 S 30 19 15 E
27 30 BC	1	HISTORIC SITE VADERLAND BRIDGE	27 18 15 S 30 41 10 E
27 30 BC	2	LSA SURFACE SITE	27 29 S 30 35 E
27 30 BC	3	ROCK ART AND HISTORIC SITE SHELTER	27 29 53 S 30 31 45 E
27 30 BD	1	LSA SURFACE SITE	27 25 S 30 58 E
27 30 BD	2	ESA SURFACE SITE	27 29 42 S 30 59 31 E
27 30 CB	1	LSA ROCK ART PAINTING	27 40 04 S 30 16 05 E
27 30 CB	2	LSA ROCK ART PAINTING	27 42 S 30 18 E
27 30 CB	3	INFO UNCERTAIN	
27 30 CB	4	MSA SURFACE SITE	27 40 10 S 30 19 35 E
27 30 CB	5	MSA SURFACE SITE	27 41 45 S 30 20 40 E
27 30 CD	6	MSA AND LSA ROCK ART PAINTING	27 40 S 30 15 E
27 30 CB	7	LIA SURFACE SITE	27 37 25 S 30 22 08 E
27 30 CB	8	LSA ROCK ART AND LIA PAINTING	27 42 55 S 30 23 45 E
27 30 CB	9	LIA STRUCTURE SITE	27 38 08 S 30 21 36 E
27 30 CB	10		
27 30 CB	11	LSA ROCK ART PAINTING	27 42 50 S 30 23 42 E
27 30 CB	12	LIA SURFACE SITE	27 43 20 S 30 24 07 E
27 30 CB	13	HISTORIC STRUCTURE SITE	27 39 08 S 30 20 20 E
27 30 CB	14	LIA SURFACE SITE	27 37 45 S 30 22 00 E
27 30 CB	15	MSA SURFACE SITE	27 36 S 30 16 E

27 30 CB	16	HISTORIC STRUCTURE SITE	27 31 29 S 30 24 49 E
27 30 CC	1	ISA SURFACE SITE	27 55 S 30 01 E
27 30 CC	2	MSA SURFACE SITE	27 56 S 30 13 E
27 30 CD	1	ESA AND MSA SURFACE SITE	27 52 30 S 30 23 00 E
27 30 CD	2	MSA SURFACE SITE	27 59 S 30 26 28 E
27 30 DA	1	LSA SURFACE SITE	27 44 04 S 30 32 28 E
27 30 DA	2	LSA SURFACE SITE	27 36 S 30 36 E
27 30 DA	3	ISA SURFACE SITE	27 44 40 S 30 32 00 E
27 30 DB	1	LSA ROCK ART PAINTING	27 31 40 S 30 51 43 E
27 30 DB	2	MSA LSA SURFACE SITE	27 31 40 S 30 51 43 E
27 30 DB	3	ISA SURFACE SITE	27 31 48 S 30 51 46 E
27 30 DB	4	MSA SURFACE SITE	27 31 46 S 30 51 54 E
27 30 DB	5	MSA SURFACE SITE	27 31 48 S 30 51 50 E
27 30 DB	6	MSA SURFACE SITE	27 31 50 S 30 51 54 E
27 30 DC	1	ESA LSA SURFACE SITE	27 56 S 30 31 15 E
27 30 DC	2	LSA ROCK ART PAINTING	27 45 10 S 30 31 54 E
27 30 DC	3	LSA ROCK ART LIA PAINTING	27 45 15 S 30 31 55 E
27 30 DC	4	LIA SURFACE SITE	27 55 S 30 38 E
27 30 DC	5	LIA SURFACE SITE	27 47 23 S 30 32 17 E
27 30 DC	6	HISTORIC STRUCTURE SITE	27 46 36 S 30 31 54 E
27 30 DC	7	LSA ROCK ART PAINTING	27 53 42 S 30 40 12 E
27 30 DC	8	LIA SURFACE SITE	27 54 14 S 30 40 41 E
27 30 DD	1	MSA EROSION SITE	27 45 45 S 30 45 30 E
27 30 DD	2	ISA EROSION SITE	27 46 S 30 59 E
27 30 DD	3	ISA EROSION SITE	27 49 S 30 49 E
27 30 DD	4	ESA EROSION SITE	27 49 S 30 52 E
27 30 DD	5	ESA MSA LSA EROSION SITES	27 49 S 30 52 E
27 30 DD	6	ESA MSA LSA EROSION SITES	27 49 S 30 52 E
27 30 DD	7	LSA SURFACE SITE	27 56 S 30 51 E
27 31 AC	1	LIA SURFACE SITE	27 29 S 31 07 E
27 31 AC	2	HISTORIC STRUCTURE SITE	27 29 55 S 31 12 15 E
27 31 AC	3	MSA AND HISTORIC STRUCTURE SITE	27 26 39 S 31 12 27 E
27 31 AC	4	LIA AND HISTORIC STRUCTURE SITE	27 27 38 S 31 12 50 E
27 31 AC	5	HISTORIC STRUCTURE SITE	27 27 48 S 31 12 52 E
27 31 AC	6	HISTORIC STRUCTURE SITE	27 29 17 S 31 12 16 E
27 31 AC	7	ROCK ART LIA AND HISTORIC ENGRAVING SITE	27 29 48 S 31 12 07 E
27 31 AC	8	ISA SURFACE SITE	27 20 02 S 31 09 47 E
27 31 AC	9	ROCK ART LIA AND HISTORIC ENGRAVING SITE	27 23 42 S 31 11 18 E
27 31 AC	10	ROCK ART LIA AND HISTORIC ENGRAVING SITE	27 24 46 S 31 12 14 E
27 31 AC	11	LIA AND HISTORIC STRUCTURE SITE	27 18 10 S 31 13 13 E
27 31 AC	12	HISTORIC STRUCTURE SITE	27 17 41 S 31 13 36 E
27 31 AC	13	HISTORIC STRUCTURE SITE	27 19 05 S 31 10 55 E
27 31 AC	14	HISTORIC STRUCTURE SITE	27 19 44 S 31 12 03 E
27 31 AC	15	HISTORIC STRUCTURE SITE	27 29 50 S 31 00 01 E
27 31 AC	16	MSA SURFACE SITE	27 26 16 S 31 12 19 E

27 31 AC	17	MSA SURFACE SITE	27 25 15 S 31 09 25 E
27 31 AC	18	MSA SURFACE SITE	27 27 41 S 31 09 53 E
27 31 AC	19	LIA STRUCTURE SITE	27 27 05 S 31 11 12 E
27 31 AC	20	HISTORIC STRUCTURE SITE	27 26 06 S 31 10 23 E
27 31 AC	21	HISTORIC STRUCTURE SITE	27 25 58 S 31 11 07 E
27 31 AC	22	HISTORIC STRUCTURE SITE	27 25 53 S 31 10 02 E
27 31 AC	23	HISTORIC SITE AND IIA STRUCTURE	27 25 51 S 31 09 56 E
27 31 AD	1	ROCK ART IIA AND HISTORIC ENGRAVING SITE	27 25 26 S 31 16 00 E
27 31 AD	2	HISTORIC STRUCTURE SITE	27 15 52 S 31 15 17 E
27 31 AD	3	LIA AND HISTORIC STRUCTURE SITE	27 17 05 S 31 20 54 E
27 31 AD	4	LIA AND HISTORIC STRUCTURE SITE	27 17 19 S 31 20 57 E
27 31 AD	5	MSA AND HISTORIC STRUCTURE SITE	27 18 00 S 31 21 37 E
27 31 AD	6	LSA AND HISTORIC SURFACE SITE	27 19 35 S 31 25 59 E
27 31 AD	7	MSA LSA AND HISTORIC SURFACE SITE	27 19 51 S 31 26 38 E
27 31 AD	8	HISTORIC SHELTER	27 19 35 S 31 19 10 E
27 31 AD	9	HISTORIC SHELTER	27 18 59 S 31 16 31 E
27 31 AD	10	LIA SURFACE SITE	27 21 50 S 31 22 22 E
27 31 AD	11	LIA SURFACE SITE	27 21 46 S 31 22 54 E
27 31 BB	1	MSA ISA SHELTER SITE	27 01 21 S 31 59 21 E
27 31 BB	2	LSA SURFACE SITE	27 08 30 S 31 58 30 E
27 31 BB	3	MSA SURFACE SITE	27 08 30 S 31 59 00 E
27 31 BB	4	LSA SURFACE SITE	27 09 19 S 31 58 42 E
27 31 BC	1	ESA SITE	27 23 00 S 31 37 19 E
27 31 BC	2	ESA SURFACE SITE	27 25 S 31 31 E
27 31 BC	3	ESA SURFACE SITE	27 25 S 31 32 E
27 31 BC	4	ESA SITE	27 25 30 S 31 36 15 E
27 31 BC	5	ESA MSA SURFACE SITE	27 26 10 S 31 32 40 E
27 31 BC	6	ESA SURFACE SITE	27 27 50 S 31 35 55 E
27 31 BC	7	MSA LSA AND HISTORIC SURFACE SITE	27 23 00 S 31 30 42 E
27 31 BC	8	LIA AND HISTORIC STRUCTURE SITE	27 25 40 S 31 35 51 E
27 31 BC	9	LIA AND HISTORIC STRUCTURE SITE	27 25 49 S 31 36 07 E
27 31 BC	10	MSA LSA IIA AND HISTORIC STRUCTURE SITE	27 25 46 S 31 36 02 E
27 31 BD	1	ESA SURFACE SITE	27 20 40 S 31 45 15 S
27 31 BD	2		
27 31 BD	3	ESA SURFACE SITE	27 28 S 31 57 E
27 31 BD	4	ISA SURFACE SITE	27 21 00 S 31 57 40 E
27 31 BD	5	MSA LSA SURFACE SITE	27 22 00 S 31 57 40 E
27 31 BD	6	ESA SURFACE SITE	27 24 45 S 31 58 30 E
27 31 BD	7	MSA SURFACE SITE	27 25 50 S 31 56 15 E
27 31 BD	8	MSA SURFACE SITE	27 26 50 S 31 59 40 E
27 31 BD	9	ISA SURFACE SITE	27 27 10 S 31 59 15 E
27 31 BD	10	LSA SURFACE SITE	27 27 15 S 31 58 30 E
27 31 BD	11	MSA AND ISA SURFACE SITE	27 27 15 S 31 59 45 E
27 31 BD	12	MSA SURFACE SITE	27 28 05 S 31 58 20 E
27 31 BD	13	ISA SURFACE SITE	27 27 50 S 31 57 15 E

27 31 BD	14	ISA SURFACE SITE	27 28 20 S 31 57 10 E
27 31 BD	15	MSA SURFACE SITE	27 28 20 S 31 59 00 E
27 31 CA	1	ISA EROSION SITE	27 39 28 S 31 06 48 E
27 31 CA	2	ESA SURFACE SITE	
27 31 CA	3	MSA SURFACE SITE	27 40 30 S 31 13 35 E
27 31 CA	4	MSA SURFACE SITE	27 38 50 S 31 12 00 E
27 31 CA	5	MSA SURFACE SITE	27 40 00 S 31 10 00 E
27 31 CA	6	ISA SURFACE SITE	27 44 S 31 05 07 E
27 31 CA	7	MSA SURFACE SITE	27 38 00 S 31 14 15 E
27 31 CA	8	ISA SURFACE SITE	27 41 30 S 31 03 30 E
27 31 CA	9	HISTORIC STRUCTURE SITE	27 31 31 S 31 14 13 E
27 31 CA	10	LIA SURFACE SITE	27 30 58 S 31 14 08 E
27 31 CA	11	HISTORIC STRUCTURE SITE	27 30 56 S 31 14 22 E
27 31 CA	12	HISTORIC STRUCTURE SITE	27 35 10 S 31 12 58 E
27 31 CA	13	HISTORIC STRUCTURE SITE	27 35 14 S 31 13 02 E
27 31 CA	14	MSA SURFACE SITE	27 35 06 S 31 12 34 E
27 31 CA	15	LIA HISTORIC SURFACE SITE	27 32 38 S 31 13 12 E
27 31 CA	16	ISA LIA AND HISTORIC SURFACE SITE	27 33 38 S 31 12 57 E
27 31 CA	17	LSA LIA AND HISTORIC SURFACE SITE	27 33 51 S 31 14 14 E
27 31 CA	32	LSA AND ROCK ART PAINTING AND STRUCTURE	27 44 19 S 31 14 13 E
27 31 CA	33	HISTORIC STRUCTURE SITE	27 30 38 S 31 01 07 E
27 31 CA	34	HISTORIC STRUCTURE SITE	27 31 04 S 31 01 13 E
27 31 CA	35	ROCK ART AND HISTORIC SITE ENGRAVING AND STRUCTURE	27 31 05 S 31 01 17 E
27 31 CA	36	ROCK ART AND HISTORIC SITE ENGRAVING	27 39 56 S 31 01 59 E
27 31 CA	37	ROCK ART AND HISTORIC SITE ENGRAVING	27 40 36 S 31 01 46 E
27 31 CA	38	HISTORIC STRUCTURE SITE	27 30 40 S 31 02 09 E
27 31 CA	39	HISTORIC STRUCTURE SITE	27 31 07 S 31 02 03 E
27 31 CA	40	HISTORIC STRUCTURE SITE	27 30 15 S 31 03 13 E
27 31 CA	41	HISTORIC SURFACE SITE	27 30 36 S 31 03 15 E
27 31 CA	42	HISTORIC STRUCTURE SITE	27 30 46 S 31 03 08 E
27 31 CA	43	HISTORIC STRUCTURE SITE	27 30 52 S 31 03 05 E
27 31 CA	44	ROCK ART AND LIA PAINTING SITE	27 30 58 S 31 03 07 E
27 31 CA	45	LSA ROCK ART AND HISTORIC PAINTING SITE	27 31 19 S 31 03 02 E
27 31 CA	46	HISTORIC STRUCTURE SITE	27 32 15 S 31 02 51 E
27 31 CA	47	LIA AND HISTORIC STRUCTURE SITE	27 33 14 S 31 03 59 E
27 31 CA	48	ISA ANS IIA SURFACE SITE	
27 31 CC	1	IIA STRUCTURE	27 48 S 31 14 E
27 31 CC	2	LSA SURFACE SITE	27 47 40 S 31 04 30 E
27 31 CC	3	LSA MSA AND ESA SURFACE SITE	27 55 S 31 03 E
27 31 CC	4	LSA ROCK ART PAINTING	27 54 47 S 31 05 36 E
27 31 CC	5	LSA ROCK ART PAINTING	27 54 48 S 31 05 35 E
27 31 CC	6	LSA ROCK ART PAINTING	27 54 48 S 31 05 50 E
27 31 CC	7	LSA ROCK ART PAINTING	27 54 49 S 31 05 41 E
27 31 CC	8	LSA ROCK ART PAINTING	27 53 41 S 31 04 05 E
27 31 CC	9	LSA ROCK ART PAINTING	27 53 48 S 31 03 16 E

27 31 CC	10	HISTORIC STRUCTURE SITE	27 53 49 S 31 03 22 E
27 31 CC	11	HISTORIC STRUCTURE SITE	27 53 56 S 31 03 30 E
27 31 CD	1	NGOME	
27 31 CD	2	NGOME	
27 31 CD	3	LIA AND HISTORIC STRUCTURE SITE AND ROCK ART PAINTING	27 59 58 S 31 16 44 E
27 31 CD	4	HISTORIC SURFACE SITE	27 59 47 S 31 16 50 E
27 31 DA	1	ISA SURFACE SITE	27 39 38 S 31 43 10 E
27 31 DA	2	ESA SURFACE SITE	27 39 43 S 31 43 16 E
27 31 DA	3	ESA SURFACE SITE	27 40 07 S 31 41 20 E
27 31 DA	4	EIA SURFACE SITE	27 39 58 S 31 40 52 E
27 31 DA	5	ESA SURFACE SITE	27 39 09 S 31 43 35 E
27 31 DA	6	ESA SURFACE SITE	27 40 17 S 31 40 06 E
27 31 DA	7	LIA AND HISTORIC SURFACE SITE	27 32 34 S 31 33 52 E
27 31 DC	1	ROCK ART HISTORIC ENGRAVING	27 54 S 31 40 E
27 31 DC	2	ESA SURFACE SITE	27 57 S 31 39 E
27 31 DC	3	HISTORIC MIDDEN SITE	27 56 20 S 31 36 15 E
28 31 AD	1	ESA MSA SURFACE SITE	28 21 02 S 31 25 24 E
28 31 AD	2	ESA SURFACE SITE	28 20 09 S 31 22 44 E
28 31 AD	3	MSA SURFACE SITE	28 20 16 S 31 22 32 E
28 31 AD	4	ESA MSA LIA AND HISTORIC STRUCTURE	28 26 08 S 31 16 08 E
28 31 AD	5	MSA SURFACE SITE	28 26 19 S 31 20 50 E
28 31 AD	6	ISA SURFACE SITE	28 22 S 31 20 E
28 31 AD	7	MSA LSA IIA SITE	28 25 45 S 31 15 45 E
28 31 AD	8	MSA ISA SURFACE SITE	28 21 10 S 31 16 00 E
28 31 AD	9	ESA MSA LIA SITE	28 18 15 S 31 24 02 E
28 31 AD	10	LIA HISTORIC STRUCTURE SITE	28 19 25 S 31 28 00 E
28 31 AD	11	LIA HISTORIC SURFACE SITE	28 20 34 S 31 22 38 E
28 31 AD	12	LIA SITE	28 20 30 S 31 22 40 E
28 31 AD	13	MSA HISTORIC SURFACE SITE	28 18 47 S 31 27 26 E
28 31 BA	1	ESA SURFACE SITE	28 04 05 S 31 32 50 E
28 31 BC	1	LIA SURFACE SITE	28 20 55 S 31 44 55 E
28 31 BC	2	LIA SURFACE SITE	28 21 05 S 31 44 55 E
28 31 BC	3	LIA SURFACE SITE	28 17 55 S 31 43 45 E
28 31 BC	47	LSA LIA AND HISTORIC SURFACE SITE	28 21 20 S 31 42 54 E
28 31 BC	48	MSA LSA IIA AND HISTORIC STRUCTURE SITE	28 22 03 S 31 43 16 E
28 31 BC	49	HISTORIC SURFACE SITE	28 22 16 S 31 43 22 E
28 31 BC	50	HISTORIC SURFACE SITE	28 21 55 S 31 43 11 E
28 31 BC	51	MSA AND HISTORIC STRUCTURE SITE	28 12 40 S 31 42 57 E
28 31 DB	1	MSA SURFACE SITE	28 43 20 S 31 46 51 E
28 31 DB	2	ISA SURFACE SITE	28 40 18 S 31 48 28 E
28 31 DB	3	MSA SURFACE SITE	28 39 02 S 31 49 06 E
28 31 DB	4	MSA SURFACE SITE	28 42 08 S 31 47 27 E
28 31 DB	5	LIA AND HISTORIC SURFACE SITE	28 31 S 31 51 10 E
28 31 DB	6	LIA SURFACE SITE	28 39 S 31 46 E
28 31 DB	7	ESA MSA SURFACE SITE	28 38 38 S 31 56 56 E

28 31 DA	1	ISA SITE	28 43 45 S 31 34 30 E
28 31 DA	2	LSA SURFACE SITE	28 44 S 31 31 E
28 31 DA	3	ESA MSA SITE	28 36 50 S 31 43 50 E
28 31 DA	6	IIA SURFACE SITE	28 40 30 S 31 42 30 E
28 31 DA	7	MSA SURFACE SITE	28 36 34 S 31 42 48 E
28 31 DA	8	HISTORIC ENGRAVING SITE	28 36 S 31 44 E

Implication of Sites Identified

This register of sites identified within the study area is by no means a comprehensive catalogue of all the heritage sites within the study area. The purpose of this register is only to assist in identifying the option with the least impact on cultural heritage resources. The sites identified are seen as representative of the cultural sensitivity of the areas studied and will be used as a guide to make a decision on the most appropriate option.

Chapter 3

IMPACT ASSESSMENT

MEASURING AND EVALUATING THE CULTURAL SENSITIVITY OF THE SELECTED OPTIONS

In this section the various alternatives as outlined in the previous sections will be evaluated as to their cultural sensitivity. These options will then be compared against each other and the least sensitive option from a cultural heritage resource perspective will be indicated.

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

TYPE OF RESOURCE;

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

TYPE OF SIGNIFICANCE

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

   It has strong or special association with the life or work of a person, group or organisation of importance in history;
   - Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

   It has significance relating to the history of slavery
   - Importance for a direct link to the history of slavery in South Africa.

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

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

4. SOCIAL VALUE
   - 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.

DEGREES OF SIGNIFICANCE

1. RARITY

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

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

2. 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.

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

What other similar sites may be compared to this site?

Assessment of Impacts

Activities that will affect the heritage environment

Although power lines affect long sections of landscape, the impact of the overhead lines themselves is minimal when the effect on the ground is evaluated. The most direct impact on the surface of the landscape will be the construction of the base plates (footings) for the pylons. These will consist of concrete platforms of around one to two square meters set into excavated foundations. The direct impacts of these could be mitigated through micro variation

of pylon placement as well as through the selection of the type of pylon design (some designs have more legs resulting in more base platforms). Should guide-wire design pylons be used the impact of the anchor point for these should also be taken into account.

The servitude of the power line will also be subject to a service road in accessible areas. The servitude will also be subjected to deforestation.

Periodic impacts are also anticipated during the construction phase of the power line when construction camps and other activities could directly affect the surface of the surrounding areas.

Heritage sites can be affected by developments through the destruction of the site, disturbances to the land surface and alteration of the sense of place of sites of heritage significance. It is therefore anticipated that the direct surface impact of power lines will be minimal with the largest impact expected on the cultural landscape character.

The following is impacts that can be anticipated for this activity.

Alternative 1(AB, BC, CD, DE, EF2, FG, GH, HI, IJ)

Paleontology

Very few areas of paleontological value is located within this corridor and the impact on below ground paleontological sites is anticipated to be very low to negligible.

Nature of Impacts: Due to the limited size of the pylon footprints, no impacts are anticipated on paleontological sites within this corridor.

Extent of Impact: Due to the lack of paleontological sites within this area, the extent of impacts will be zero.

Nature of Impact: Possible uncovering of sub-surface deposits of fossiliferous materials.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	Walk-down phase involvement by an archaeologist will limit the effects of the pylon footings. Possible positive results could be had from inspecting subterranean strata for fossil bearing materials during the excavation of the footing foundations.	
Cumulative impacts	Due to the small surface impact of the pylon footings, cumulative impacts are negligible.	
Residual impacts	Not applicable	

Pre-Contact Archaeology (Prehistoric)

Alternative 1 has relatively low concentrations of pre-contact sites and the preservation of these can be ensured through micro-placement of pylons during the walk-down phase. A higher concentration of these types of heritage sites are located around the Wakkerstroom area and it is therefore recommended that alternative alignment BC via Volksrust is followed as well as alternative CD through Claremont rather than Utrecht. Further south, alternative GH will ensure that a wide berth is given to the very sensitive Emakoshini Cultural Landscape located close to alternative LH. Some spiritually important sites (Zulu Royal Pathways) is situated along the last sections (HI, IJ), however these can be mitigated during the walk-down. Compared to some of the other alternatives, Alternative 1 has a low impact on pre-contact sites.

Nature of Impacts: The development can result in the localized exposure of sites from the pre-contact era.

A higher risk can be expected for this around the Utrecht and Wakkerstroom areas.

Extent of Impacts: Taking into account the small surface impact of the pylon bases as well as the option of micro-manipulation of these, the extent of these impacts can be seen as minimal.

Nature of Impact: Possible uncovering or damage to surface sites associated with the pre-contact phase of occupation by pylon foundation excavations, construction camp placement and the construction of access roads along the servitude.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	N/A
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Neutral to negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	Walk-down phase involvement by an archaeologist will limit the effects of the pylon footings. Possible positive results could be had from inspecting subterranean strata for archaeological materials during the excavation of the footing foundations.	
Cumulative impacts	Due to the small surface impact of the pylon footings, cumulative impacts are negligible.	
Residual impacts	Not applicable	

Post-Contact Heritage

Alternative 1 passes through some areas that are rich in post-contact (colonial) archaeology. Most of this is associated with the South African War and includes sites of battles, graves of victims of conflict and concentration camp sites. Further sites are also found associated with the Voortrekker / Zulu conflicts. Major sites such as Ncome / Bloodriver is located close to Nondweni.

Many of the towns in this region also holds buildings and sites of historic importance (to be discussed under Built Environment section). Some of the old farm homesteads along this route also have historic significance, such as the Buhrman Landgoed where many sites of historic importance is still being preserved by the landowners.

Nature of Impacts: Much of this period"s sites consist of buildings and as a rule, power line alignments avoid crossing over buildings.

Many of the conflict sites, such as battlefields, have very little material remains, however their location is of great importance. The value of these sites lies within their location and history and is reinforced by the landscape. Running a power line through a historically and emotionally sensitive site will greatly affect the heritage value of such a site. Of particular concern here are the battlefield sites around Volksrust (such as Amajuba) as well as Utrecht and the site of Ncome / Bloodriver, close to Nondweni and the memorial site of the Prince Imperial.

In the case of Ncome/Bloodriver it is recommended that alternative alignment EF1 is taken.

Extent of Impacts: Although direct impacts on the surface can be mitigated through micro-alignment of pylons, the most significant effect anticipated on these sites are the visual impact on the cultural landscape. These sites have value due to their historic setting. It is the historic matrix that endows them with their heritage value. Intrusion by a power line will have a very negative impact on this atmosphere and this effect is nearly impossible to mitigate without drastic alterations to the power line alignment.

Nature of Impact: Possible damage to surface structures of a historic nature. Alterations to the *sense of place* of historic landscape types, resulting in the degradation of the heritage value of sites located within.		
	Without Mitigation	**With Mitigation**

Extent	Local	Local
Duration	Long term	Long term
Magnitude	Moderate	Low
Probability	Probable	Possible
Significance	Medium	Low
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Unlikely
Mitigation	Selection of alternative alignment EF1 will avoid impacts to the site of Ncome. Careful alignment of power lines to be as unobtrusive as possible could assist in lowering impacts on landscape. Keeping tower designs consistent along the power line will also assist in making the line less invasive.	
Cumulative impacts	No. Following existing alignments is seen as a mitigative measure and does not result in cumulative impacts. The impact on the landscape already exists.	
Residual impacts	Not applicable	

Cultural Landscape

The northern section of Alternative 1 is associated with large-scale agriculture, mainly grain farming and some livestock farming, some of the farmsteads date to the early 19th century. Much of the area is still natural Highveld grass plains. The area has in recent years been affected by the construction of numerous water-cooled, coal-fired power stations located here due to the rich coalfield deposits. This development is also associated with a myriad of power lines supplying power to the whole country form this area. Many areas has also been subject to extensive mining activities.

The southern section of Alternative one is characterized by the classic rolling green hills of KwaZulu Natal. Much of the area is used for commercial farming although many areas are also still under traditional authority management. Impacts on this landscape is due mainly to forestry activities, with large areas having been developed into pine and eucalyptus plantations.

Nature of Impacts: Three significant cultural landscape types are found along or close to this alignment. The first is the battlefields of the Volksrust / Wakkerstroom / Utrecht areas. Secondly the culturally and historically important area of Ncome / Bloodriver close to Nondweni and thirdly the eMakhosini Cultural Landscape close to Babanango.

All of these could be affected by different alignment options within Alternative 1.

Extent of Impacts: Where the power line will be visible from a particular site or landscape area, the impacts will be negative. The extent of this impact will be dependent on the form of the landscape and the proximity of the power line itself.

In some areas there is existing Eskom power lines and although adding a new line to an existing alignment could result in cumulative effects, this is preferred to running a new line through unaltered landscapes. Where existing lines are found they are usually already seen as part of the landscape and following the existing alignments will result in the least visual impacts. An exception to this is where power lines already bisect an existing important cultural landscape; in this case it would be preferable to follow a new alignment not visible from the sensitive landscape rather than the cumulative effects of another power line.

The mitigation of the effects of the power line on sensitive landscapes lies within the domain of the Visual Impact Assessment (VIA).

Nature of Impact: Visual Impact on sensitive Cultural Landscapes.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term

Magnitude	Moderate	Small - Moderate
Probability	Probable	Probable
Significance	Medium	Low
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	Yes	Yes
Mitigation	To minimize the effects on the landscape, it is recommended that the existing corridors be used, as far as possible. Pylon designs should be kept consistant.	
Cumulative impacts	Visual intrusion will be heightened by combining power lines along the same corridor.	
Residual impacts	Not applicable	

Assessment of Alternatives

For Alternative 1 it is suggested that alignment option BC be chosen over BK. Although both these alternatives have the same heritage sensitivity, option CD is chosen over KD (due to historic sites around Utrecht). This will make alignment with DE easier. Alternative EF2 is chosen over EF1 due to EF1"s proximity to the site of Ncome / Bloodriver. Although alternative EF2 passes closer to the Prince Imperial heritage site, the site of Ncome encompasses a heritage landscape of higher significance. Alternative GH is preferred to alternative LH due to LH"s closer proximity to the no-go area defined by the eMakoshini Cultural Landscape.

Impact Statement

Paleontological sites

No paleontological sites of high value could be identified along this alignment. It is possible, but unlikely, that fossiliferous deposits could be identified during the excavation of the pylon bases or any associated excavations. This possibility is seen as positive since the scale of the impact will be low compared to the value of discovering new fossil bearing sites.

Mitigation

It is recommended that a paleontologist do spot-checks on excavated base foundations during the construction phase of the power line.

Archeological Sites

Archaeological sites with high heritage significance are limited in the northern section of this alternative with its occurrences increasing the further south it moves. Some Stone Age sites as well as Late Iron Age sites are anticipated along this alignment. It is thought that due to the low surface impacts of this activity, the benefits of documenting new archaeological sites in this area outweighs the potential limited damage that some of them might suffer due to the placement of pylons. It is anticipated that these impacts are also easily mitigated.

Mitigation

It is recommended that an archaeologist be involved in the walk-down planning phase of the project to ensure that impacts on archaeological sites are kept to a minimum.

Built Environment

Due to legal and practical restrictions, power lines do not cross directly over man-made structures. For this reason the impact on heritage sites within the built environment is anticipated as being very low. The only impacts that could come into play would be the visual impacts on the landscape associated with the built environment.

Mitigation

For Alternative 1 it is recommended that alignment alternative EF2 be chosen over EF1 due to its

proximity to the monuments and cultural landscape associated with the Ncome/Bloodriver monument.

Cultural Landscape

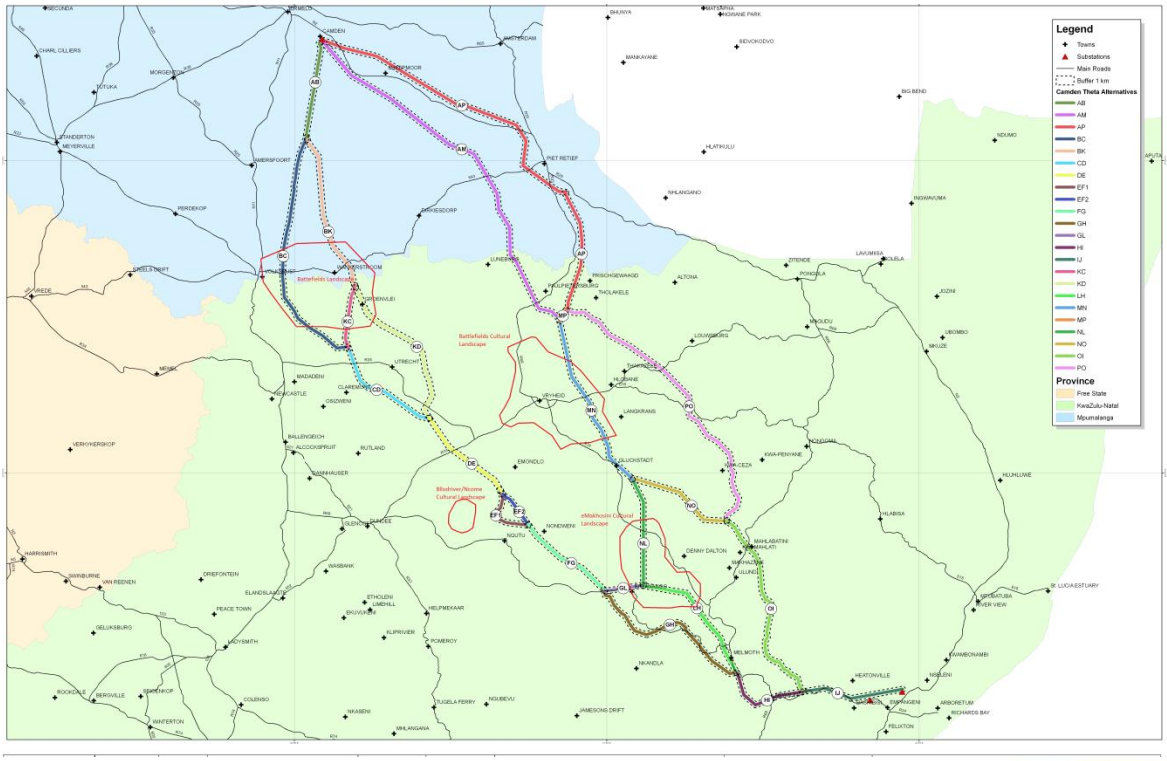
For the northern section of Alternative 1 it is anticipated that the different alignments will have similar effects on the cultural landscape due to the homogeneous nature of this area"s cultural context. Further south the cultural landscape identifies strongly with the South African War around the areas of Volksrust and Utrecht. Close to Nondweni the cultural landscape associated with Ncome/Bloodriver is an important area and close to Ulundi and Babanango the very important cultural landscape of eMakhosini is located.

Mitigation

It is suggested that option EF2 be chosen over EF1 to minimize the effect on the Ncome/Bloodriver site. Further south, alternative GH is preferred over alternative LH. This will by-pass the culturally important eMakhosini Cultural Landscape area (and area already identified as a no-go area).

The Volksrust and Utrecht areas are very similar in their cultural significance, however the Wakkerstroom area shows indications of higher sensitivity and therefore option BC and CD is recommended for this area.

Mitigation of the actual visual impacts falls within the domain of the visual impact assessment.



Alternative 2(AM, MN, NL, LH, HI, IJ)

Palaeontology

Very few areas of paleontological value is located within this corridor and the impact on below ground paleontological sites is anticipated to be very low to negligible.

Nature of Impacts: Due to the limited size of the pylon footprints, no impacts are anticipated on paleontological sites within this corridor.

Extent of Impact: Due to the lack of paleontological sites within this area, the extent of impacts will be zero.

Nature of Impact: Possible uncovering of sub-surface deposits of fossiliferous materials.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	Walk-down phase involvement by an archaeologist will limit the effects of the pylon footings. Possible positive results could be had from inspecting subterranean strata for fossil bearing materials during the excavation of the footing foundations.	
Cumulative impacts	Due to the small surface impact of the pylon footings, cumulative impacts are negligible.	
Residual impacts	Not applicable	

Pre-Contact Archaeology (Prehistoric)

The southern part of Alternative 2 contains significantly more pre-contact archaeological sites than any of the other alternatives. While the northern section is similar to the other options, the southern section has significantly more dense concentrations of pre-contact sites. Most of these sites is associated with the origins and early history of the Zulu ethnic group.

Nature of Impacts: The development can result in the localized exposure of sites from the pre-contact era. A higher risk can be expected around the eMakhosini Cultural Landscape.

Extent of Impacts: Even though the impacts on these sites will be limited due to the small footprint of the pylons it should be taken into consideration that a large amount of information has already been recovered from these sites and that new information recovered will not outweigh the negative impacts on these sites.

Nature of Impact: Possible uncovering or damage to surface sites associated with the pre-contact phase of occupation by pylon foundation excavations, construction camp placement and the construction of access roads along the servitude.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	N/A
Magnitude	Significant	Medium
Probability	Unlikely	Unlikely
Significance	High	Medium
Status	Negative	Negative
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	No
Mitigation	The area around the eMakhosini Cultural Landscape has been indicated as a no-go area by the provincial heritage authority, therefore no further development will be allowed here.	
Cumulative impacts	Due to the small surface impact of the pylon footings, cumulative impacts are negligible.	
Residual impacts	Not applicable	

Post-Contact Heritage

Alternative 2 passes through some areas that are rich in post-contact (colonial) archaeology. Most of this is associated with the South African War and includes sites of battles, graves of victims of conflict and concentration camp sites. Further sites are also found

associated with the Voortrekker / Zulu conflicts. Major sites such as the eMakhosini Cultural Landscape is located close to Ulundi.

Many of the towns in this region also holds buildings and sites of historic importance (to be discussed under Built Environment section). Some of the old farm homesteads along this route also have historic significance.

Nature of Impacts: Much of this period"s sites consist of buildings and as a rule, power line alignments avoid crossing over buildings.

Many of the conflict sites, such as battlefields, have very little material remains, however their location is of great importance. The value of these sites lies within their location and history and is reinforced by the landscape. Running a power line through a historically and emotionally sensitive site will greatly affect the heritage value of such a site. Of particular concern here are the battlefield sites around Ulundi (such as as well as Babanango and the sites associated with the eMakhosini Cultural Landscape.

The alignment option NL is indicated as a no-go area.

Extent of Impacts: Although direct impacts on the surface can be mitigated through micro-alignment of pylons, the most significant effect anticipated on these sites are the visual impact on the cultural landscape. These sites have value due to their historic setting. It is the historic matrix that endows them with their heritage value. Intrusion by a power line will have a very negative impact on this atmosphere and this effect is nearly impossible to mitigate without drastic alterations to the power line alignment.

Nature of Impact: Possible damage to surface structures of a historic nature. Alterations to the *sense of place* of historic landscape types, resulting in the degradation of the heritage value of sites located within.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	High	High
Probability	Likely	Likely
Significance	High	High
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Unlikely
Mitigation	Option LH is indicated as a no-go area by the provincial heritage authority.	
Cumulative impacts	Several power lines already bisects the eMakhosini Cultural Landscape. The cumulative effect of further power lines across this areas will be negative.	
Residual impacts	Not applicable	

Cultural Landscape

The northern section of Alternative 2 is also associated with large-scale agriculture, mainly grain farming and some livestock farming, some of the farmsteads date to the early 19th century. Much of the area is still natural Highveld grass plains. The area has in recent years been affected by the construction of numerous water-cooled, coal-fired power stations located here due to the rich coalfield deposits. This development is also associated with a myriad of power lines supplying power to the whole country form this area. Many areas have also been subject to extensive mining activities.

The southern section of Alternative one is characterized by the classic rolling green hills of KwaZulu Natal. Much of the area is used for commercial farming although many areas are also still under traditional authority management. Impacts on this landscape are due mainly to forestry activities, with large areas having been developed into pine and eucalyptus plantations.

Nature of Impacts: Two significant cultural landscape types are found along or close to this alignment.

The first is the battlefields of the Vryheid area. Secondly the culturally and historically important area of the eMakhosini Cultural Landscape close to Babanango.

Both of these could be affected by different alignment options within Alternative 2.

Extent of Impacts: Where the power line will be visible from a particular site or landscape area, the impacts will be negative. The extent of this impact will be dependent on the form of the landscape and the proximity of the power line itself. The option LH passes through the eMakhosini Cultural Landscape area that has been indicated as a no-go area by the provincial heritage authority.

Where power lines bisects an existing important cultural landscape it would be preferable to follow a new alignment not visible from the sensitive landscape rather than the cumulative effects of another power line.

The mitigation of the effects of the power line on sensitive landscapes lies within the domain of the Visual Impact Assessment (VIA).

Nature of Impact: Visual Impact on sensitive Cultural Landscapes.		
	Without Mitigation	**With Mitigation**
Extent	Regional	Regional
Duration	Long term	Long term
Magnitude	High	High
Probability	Likely	Likely
Significance	Medium	Medium
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Unlikley
Mitigation	To minimize the effects on the landscape, it is recommended that the existing corridors be used, as far as possible. Pylon designs should be kept consistant.	
Cumulative impacts	Visual intrusion will be heightened by combining power lines along the same corridor.	
Residual impacts	Not applicable	

Alternative 3(AP, PO, OI, IJ)

Palaeontology

No areas of paleontological value is located within this corridor and the impact on below ground paleontological sites is anticipated to be very low to negligible.

Nature of Impacts: Due to the limited size of the pylon footprints, no impacts are anticipated on paleontological sites within this corridor.

Extent of Impact: Due to the lack of paleontological sites within this area, the extent of impacts will be zero.

Nature of Impact: Possible uncovering of sub-surface deposits of fossiliferous materials.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	Walk-down phase involvement by an archaeologist will limit the	

	effects of the pylon footings. Possible positive results could be had from inspecting subterranean strata for fossil bearing materials during the excavation of the footing foundations.
Cumulative impacts	Due to the small surface impact of the pylon footings, cumulative impacts are not anticipated.
Residual impacts	Not applicable

Pre-Contact Archaeology (Prehistoric)

The southern part of Alternative 3 contains some pre-contact archaeological sites. None of the identified sites does however constitute a no-go area.

Nature of Impacts: The development can result in the localized exposure of sites from the pre-contact era.

Extent of Impacts: Anticipated impacts should be small due to the limited size of the pylon footprints. Positive impacts cold be had through the discovery of unknown sub-surface sites.

Nature of Impact: Possible uncovering or damage to surface sites associated with the pre-contact phase of occupation by pylon foundation excavations, construction camp placement and the construction of access roads along the servitude.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	N/A
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	High	Medium
Status	Negative	Negative
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	No
Mitigation	An archaeologist should be involved during the walk-down planning phase of the power line.	
Cumulative impacts	Due to the small surface impact of the pylon footings, cumulative impacts are negligible.	
Residual impacts	Not applicable	

Post-Contact Heritage

Alternative 3 passes through some areas that are rich in post-contact (colonial) archaeology. Most of this is associated with the South African War and includes sites of battles, graves of victims of conflict and concentration camp sites. Further sites are also found associated with the Voortrekker / Zulu conflicts. No major sites are located along this route.

Many of the towns in this region also hold buildings and sites of historic importance (to be discussed under Built Environment section). Some of the old farm homesteads along this route also have historic significance.

Nature of Impacts: Much of this period"s sites consist of buildings and as a rule, power line alignments avoid crossing over buildings.

Many of the conflict sites, such as battlefields, have very little material remains, however their location is of great importance..

Extent of Impacts: Most direct impacts on the surface can be mitigated through micro-alignment of pylons during the walk-down phase of the project,

Nature of Impact: Possible damage to surface structures of a historic nature. Alterations to the *sense of place* of historic landscape types, resulting in the degradation of the heritage value of sites located within.		
	Without Mitigation	**With Mitigation**

Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	Sites of heritage significance can be avoided through mitigation based in the walk-down phase of the project. An archaeologist should be involved in this phase.	
Cumulative impacts	No cumulative effects are anticipated	
Residual impacts	Not applicable	

Cultural Landscape

The cultural landscape associated with Alternative 3 is similar to that found at Alternative 2 except for the occurrence of very sensitive cultural landscapes such as eMakhosini. The northern section of Alternative 2 is also associated with large-scale agriculture, mainly grain farming and some livestock farming, some of the farmsteads date to the early 19th century. Much of the area is still natural Highveld grass plains. The area has in recent years been affected by the construction of numerous water-cooled, coal-fired power stations located here due to the rich coalfield deposits. This development is also associated with a myriad of power lines supplying power to the whole country form this area. Many areas have also been subject to extensive mining activities.

The southern section of Alternative 3 is characterized by the classic rolling green hills of KwaZulu Natal. Much of the area is used for commercial farming although many areas are also still under traditional authority management. Impacts on this landscape are due mainly to forestry activities, with large areas having been developed into pine and eucalyptus plantations.

Nature of Impacts: Provided an archaeologists is involved during the walk-down planning phase of the project, no negative impacts are anticipated for this alternative.

Extent of Impacts: Due to a lack of significant, defined cultural landscapes in this area, the effect of the development is seen as minimal.

Where power lines bisects an existing important cultural landscape it would be preferable to follow a new alignment not visible from the sensitive landscape rather than the cumulative effects of another power line.

The actual mitigation of the effects of the power line on sensitive landscapes lies within the domain of the Visual Impact Assessment (VIA).

Nature of Impact: Visual Impact on sensitive Cultural Landscapes.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Unlikely	Unlikely
Significance	Small	Small
Status	Negative	Positive
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	To minimize the effects on the landscape, it is recommended that the existing corridors be used, as far as possible. Pylon designs should be kept consistent.	

Cumulative impacts	Visual intrusion will be heightened by combining power lines along the same corridor.
Residual impacts	Not applicable

Assessment of Alternatives

Alternative 3 is seen as the least destructive alternative from a heritage management point of view.

Impact Statement

Paleontological sites

No paleontological sites of high value could be identified along this alignment. It is possible, but unlikely, that fossiliferous deposits could be identified during the excavation of the pylon bases or any associated excavations. This possibility is seen as positive since the scale of the impact will be low compared to the value of discovering new fossil bearing sites.

Mitigation

It is recommended that a paleontologist do spot-checks on excavated base foundations during the construction phase of the power line.

Archeological Sites

Archaeological sites with high heritage significance are limited in the northern section of this alternative with its occurrences increasing the further south it moves. Some Stone Age sites as well as Late Iron Age sites are anticipated along this alignment. Impacts on possible sites are anticipated as being low due to the small footprints of the pylons and might even be positive when taking into account the possible discovery of new sites.

Mitigation

It is recommended that an archaeologist be involved in the walk-down planning phase of the project to ensure that impacts on archaeological sites are kept to a minimum.

Built Environment

Due to legal and practical restrictions, power lines do not cross directly over man-made structures. For this reason the impact on heritage sites within the built environment is anticipated as being very low. The only impacts that could come into play would be the visual impacts on the landscape associated with the built environment.

Mitigation

Most of the alignment of Alternative 3 runs through rural areas with very little built environments. For this reason mitigation needs are negligible. With an archaeologist involved with the walk-down phase of the project no serious impacts are anticipated.

Cultural Landscape

No formally defined cultural landscape types are located along the alignment of Alternative 3.

Mitigation

Mitigation of the actual visual impacts falls within the domain of the visual impact assessment.

Resource Management Recommendations

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in the area. The following indicators of unmarked sub-surface sites could be encountered;

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate)
- Bone concentrations, either animal or human

- Ceramic fragments such as pottery shards either historic or pre-contact
- Stone concentrations of any formal nature

Although no sites of heritage significance were identified within the proposed study area, the following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above;

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site should cease).
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the SAPS should be notified.
- Mitigative measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

Conclusion

After intensive investigation into the heritage sensitivity of the three Alternatives it was found that Alternative 3 would have the least impact on the heritage value of the area under investigation.

The different alternatives are made up of several sections. It is still possible that further alternatives could be constructed from combinations of these sections after submission of the specialist reports. For this reason the relative sensitivity of the sections are indicated in the table below;

Section	Palaeontology	Pre-Contact	Post-Contact	Cultural Landscape
AB	Low	Low	High	Medium
AM	Low	Low	High	Medium
S (AM)	Low	Low	Medium	Low
AP	Low	Low	Medium	Medium
BC	Low	Low	High	Medium
S (BC) – not feasible				
BK	Low	Medium	High	Medium
CD	Low	Low	Low	Low
DE	Low	Medium	Medium	Medium
S(DE) not feasible				
EF1	Low	Medium	High	High
EF2	Low	Medium	Medium	Medium
FG	Low	Medium	Medium	Medium
GH	Low	Low	Medium	Medium
S (GH)	Low	Low	Medium	Low
HI	Low	Medium	Medium	Medium

IJ	Low	Medium	Medium	Medium
S(IJ)	Low	Medium	Low	Low
KC	Low	Low	Medium	Medium
KD	Low	Medium	High	Medium
GL	Low	High	High	High
LH (no-go)	Low	High	High	High
MN	Low	Medium	Medium	Medium
MP	Low	Low	Medium	Low
NL	Low	High	High	High
NO	Low	Medium	Medium	Medium
S (NO 1)	Low	High	High	High
S (NO 2)	Low	High	High	High
PO	Low	Low	Low	Low
OI	Low	Low	Low	Low
S (OI)	Low	Medium	Medium	Low

Options indicated by red represent high-impact or even no-go options as well as options found to be logistically not feasible.

Orange indicates areas with heightened heritage sensitivity.

Yellow indicate areas with some sites of heritage sensitivity or sensitive cultural landscapes.

Green indicates areas with low heritage value.

After analysis of all three alternatives it is the recommendation of this consultant that Alternative 3 represents the option that will impact the least on the cultural heritage sensitivity of the study area.

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APPENDIX A

General Methodology

Methodology

Inventory

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

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

Site Surveying

Site surveying is the process by which archaeological sites are located and identified on the ground. Archaeological site surveys often involve both surface inspection and subsurface testing. For the purposes of heritage investigations, *archaeological sites* refer to any site with heritage potential (i.e. historic sites, cultural sites, rock art sites etc.).

A systematic surface inspection involves a foot traverse along pre-defined linear transects which are spaced at systematic intervals across the survey area. This approach is designed to achieve representative area coverage. Alternatively, an archaeological site survey may involve a non-systematic or random walk across the survey area. Subsurface testing is an integral part of archaeological site survey. The purpose of subsurface testing, commonly called "shovel testing", is to:

(a) assist in the location of archaeological sites which are buried or obscured from the surveyor's view, and

(b) help determine the horizontal and vertical dimensions and internal structure of a site.

In this respect, subsurface testing should not be confused with evaluative testing, which is a considerably more intensive method of assessing site significance (*King, Thomas F., 1978)*.

Once a site is located, subsurface testing is conducted to record horizontal extent, depth of the cultural matrix, and degree of internal stratification. Because subsurface testing, like any form of site excavation, is destructive it should be conducted only when necessary and in moderation.

Subsurface testing is usually accomplished by shovel, although augers and core samplers are also used where conditions are suitable. Shovel test units averaging 40 square cm are generally appropriate, and are excavated to a sterile stratum (i.e. C Horizon, alluvial till, etc.).

Depending on the site survey strategy, subsurface testing is conducted systematically or randomly across the survey area. Other considerations such as test unit location, frequency, depth and interval spacing will also depend on the survey design as well as various biophysical factors. *(Lightfoot, Keng G. 1989)*.

Survey Sampling

Site survey involves the complete or partial inspection of a proposed project area for the purpose of locating archaeological or other heritage sites. Since there are many possible approaches to field survey, it is important to consider the biophysical conditions and archaeological site potential of the survey area in designing the survey strategy.

Ideally, the archaeological site inventory should be based on intensive survey of every portion of the impact area, as maximum area coverage will provide the most comprehensive understanding of archaeological and other heritage resource density and distribution. However, in many cases the size of the project area may render a complete survey impractical because of time and cost considerations.

In some situations it may be practical to intensively survey only a sample of the entire project area. Sample selection is approached systematically, based on accepted statistical sampling procedures, or judgementally, relying primarily on subjective criteria *(Butler, W., 1984)*.

Systematic Survey Sampling

A systematic sample survey is designed to locate a representative sample of archaeological or heritage resources within the project area. A statistically valid sample will allow predictions to be made regarding total resource density, distribution and variability. In systematic sample surveys it may be necessary to exempt certain areas from intensive inspection owing to excessive slope, water bodies, landslides, land ownership, land use or other factors. These areas must be explicitly defined. Areas characterized by an absence of road access or dense vegetation should not be exempted. *(Dunnel, R.C., Dancey W.S. 1983)*.

Judgemental Survey Sampling

Under certain circumstances, it is appropriate to survey a sample of the project area based entirely on professional judgement regarding the location of sites. Only those areas which can reasonably be expected to contain archaeological or heritage sites are surveyed.

However, a sufficient understanding of the cultural and biophysical factors which influenced or accounted for the distribution of these sites over the landscape is essential. Careful consideration must be given to ethnographic patterns of settlement, land use and resource exploitation; the kinds and distribution of aboriginal food sources; and restrictions on site location imposed by physical terrain, climatic regimes, soil chemistry or other factors. A judgemental sample survey is not desirable if statistically valid estimates of total heritage resource density and variability are required *(McManamon F.P. 1984)*.

Assessment

Assessment studies are only required where conflicts have been identified between heritage resources and a proposed development. These studies require an evaluation of the heritage resource to be impacted, as well as an assessment of project impacts. The purpose of the assessment is to provide recommendations as to the most appropriate manner in which the resource may be managed in light of the identified impacts. Management options may include alteration of proposed development plans to avoid resource impact, mitigative studies directed at retrieving resource values prior to impact, or compensation for the unavoidable loss of resource values.

It is especially important to utilize specialists at this stage of assessment. The evaluation of any archaeological resource should be performed by professionally qualified individuals.

Site Evaluation

Techniques utilized in evaluating the significance of a heritage site include systematic surface collecting and evaluative testing. Systematic surface collection is employed wherever archaeological remains are evident on the ground surface. However, where these sites contain buried deposits, some degree of evaluative testing is also required.

Systematic surface collection from archaeological sites should be limited, insofar as possible, to a representative sample of materials. Unless a site is exceptionally small and limited to the surface, no attempt should be made at this stage to collect all or even a major portion of the materials. Intensive surface collecting should be reserved for full scale data recovery if mitigative studies are required.

Site significance is determined following an analysis of the surface collected and/or excavated materials (*Miller, C.L. II, 1989)*.

Significance Criteria

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

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

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

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

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

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

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

Assessing Impacts

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

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

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

(a) destruction or alteration of all or part of a heritage site;

(b) isolation of a site from its natural setting; and

(c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

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

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or

newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

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

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

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

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

Impact Effect	*Score*
Magnitude	0-4
Severity	0-4
Duration	0-4
Range	0-4
Frequency	0-4
Diversity	0-4
Cumulative effect	0-4
Rate of change	0-4
Total score:	0-32

Impact severity table.

Impacts will be defined along the following parameters of severity;

Effect	*Score*
No effect on site	0
Insignificant impact on site	1-5

Significant impact on site	6-16
Major destruction of site and attributes	17-24
Total destruction of sites and attributes	25-32

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

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

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

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

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

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

All sites or possible sites found were classified using a hierarchical system wherein sites are assessed using a scale of zero to four according their importance. These categories are as follows;

Degree of significance	*Justification*	*Score*

Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	13 – 16
High significance	High degree of original fabric. Demonstrates a key element of item"s significance. Alterations do not detract from significance.	9 – 12
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	5 – 8
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 4
Intrusive	Damaging to the item"s heritage significance.	0

Table 1. Site significance table for pre-contact sites.

Degree of significance	*Justification*	*Score*
Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	29 – 24
High significance	High degree of original fabric. Demonstrates a key element of item"s significance. Alterations do not detract from significance.	13 – 18
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	7 – 12
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 6
Intrusive	Damaging to the item"s heritage significance.	0

Table 2. Site significance table for post contact sites.

The qualitative value of a site"s significance will be calculated by tabling its significance characteristics (as outlined in appendix B & C) on a sliding value scale and determining an accumulative value for the specific site. Two tables will be used;

Site significance characteristics slide scale (Pre-Contact Criteria)

Scientific Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
				Total Score	

Table 3. Pre-contact site criteria (0- no value, 4- highest value)

Site significance characteristics slide scale (Post-Contact Criteria)					
Scientific Significance	0	1	2	3	4
Historic Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Other Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
				Total Score	

Table 4. Post-contact site criteria (0- no value, 4- highest value)

The values calculated (as specified in appendix B&C) are attributed to a category within the site significance table to provide the site with a quantifiable significance value. This will only be done for identified sites. Should an area under investigation not show any evidence of human activity this will be stated and no further qualifying will be done.

This information will be contained in a report that will strive to;

Review the purpose, approach, methodology and reporting of archaeological assessment and monitoring and propose guidelines on how to adequately address four key questions:

i. What is the research value and potential of the archaeological remains?
ii. What will the impact of development be?
iii. What types of mitigation (by design modification or further investigation) would be appropriate to mitigate the impact of development and/or make a useful contribution to knowledge?
iv. What will be the likely cost and timescale of any further investigation, analysis and reporting, given the nature of the archaeology and the type and extent of further work required?

Scientific Significance

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

internal stratification and depth

chronologically sensitive cultural items

materials for absolute dating

association with ancient landforms

quantity and variety of tool type

distinct intra-site activity areas

tool types indicative of specific socio-economic or religious activity

cultural features such as burials, dwellings, hearths, etc.

diagnostic faunal and floral remains

exotic cultural items and materials

uniqueness or representativeness of the site

integrity of the site

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

monitoring impacts from artificial or natural agents

site preservation or conservation experiments

data recovery experiments

sampling experiments

intra-site spatial analysis

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

topographical, geomorphological context

depositional character

diagnostic faunal, floral data

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

Public Significance

(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?

Ethnic Significance

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

Economic Significance

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

visitors' willingness-to-pay

visitors' travel costs

Integrity and Condition

(a) Does the site occupy its original location?

(b) Has the site undergone structural alterations? If so, to what degree has the site maintained its original structure?

(c) Does the original site retain most of its original materials?

(d) Has the site been disturbed by either natural or artificial means?

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?

Indicators of Impact Severity

Magnitude

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

Severity

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

Duration

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

Range

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

Frequency

The number of times an impact can be expected. For

example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or ongoing nature.

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

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

Rate of Change

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