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**HERITAGE IMPACT ASSESSMENT OF BRAAMHOEK INTEGRATED  
POWER SUPPLY PROJECT,  
NORTHERN KWAZULU-NATAL, SOUTH AFRICA**

**Assessment and report by**



**for**

**PBA International (SA)  
engineers and environmental consultants**

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## Management summary

eThembeni Cultural Heritage was appointed by PBA International to undertake a heritage impact assessment of the area affected by a proposed power supply project in northern KwaZulu-Natal, in terms of the KwaZulu-Natal Heritage Act No 10 of 1997. An eThembeni staff member attended pre-feasibility and Scoping Study specialist workshops and inspected the proposed development area on 6, 7 and 8 October 2004 and 13 and 14 January 2005, completing controlled-exclusive surface surveys, as well as a database and literature search.

We identified two abandoned labour tenant homesteads with six definite and two possible attendant ancestral graves on the proposed Braamfontein Substation site on the farm Zaaifontein. The structures have low local heritage significance, but the graves have high significance, in terms of the KwaZulu-Natal Heritage Act and the guidelines included in the Appendix to this report. We recommend that:

- The graves are exhumed and relocated to a more appropriate burial site. This would require a process of negotiation with living relatives to obtain their consent and to ensure that proper ceremony and procedure is followed in exhumation and re-interment, as well as a permit from Amafa aKwaZulu-Natali.
- No destruction permit from Amafa aKwaZulu-Natali is required to alter the homestead structures, given their poor state of conservation.
- The scarp slopes in the vicinity of the substation are inspected for the presence of rock painting sites that could be damaged by tunnel blasting activities.

Furthermore,

- A physical inspection of proposed tower placements on the turn-in from the Majuba-Venus #2 and Braamhoek-Venus 400kV transmission lines will be necessary once the routes have been finalised to ensure that no in situ heritage resources are compromised.

If permission is granted for development to proceed, the client is reminded that the Act requires that a developer cease all work immediately and notify Amafa aKwaZulu-Natali should any heritage resources, as defined in the Act, be discovered during the course of development activities.

We have submitted this report to Amafa aKwaZulu-Natali in fulfilment of the requirements of the KwaZulu-Natal Heritage Act. The client may contact Ms Corinne Winson at Amafa's Pietermaritzburg office (telephone 033 3946 543) in due course to enquire about the Council's decision.

## Introduction

eThembeni Cultural Heritage was appointed by PBA International to undertake a heritage impact assessment of the proposed Braamhoek power supply project, in terms of the KwaZulu-Natal Heritage Act No 10 of 1997. Section 27(1) of the 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 –
  - (i) exceeding 10 000 m<sup>2</sup> in extent;
  - (ii) involving three or more existing erven or subdivisions thereof; or
  - (iii) 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 -
  - (i) ancestral graves,
  - (ii) royal graves and graves of traditional leaders,
  - (iii) graves of victims of conflict,
  - (iv) graves of important individuals,
  - (v) historical graves and cemeteries older than 60 years, and
  - (vi) other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
- (h) movable objects, including -
  - (i) objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
  - (ii) ethnographic art and objects;
  - (iii) military objects;
  - (iv) objects of decorative art;
  - (v) objects of fine art;
  - (vi) objects of scientific or technological interest;
  - (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
  - (viii) any other prescribed categories,but excluding any object made by a living person;
- (i) battlefields;
- (j) traditional building techniques.

**Nature and description of proposed activities** (information obtained from the client)

In December 2002 the Department of Environment Affairs and Tourism awarded Eskom environmental authorisation for the construction of the Braamhoek Pumped Storage Scheme in the uKhahlamba mountains on the provincial border between the Free State and KwaZulu-Natal. Eskom Transmission is tasked with connecting the scheme to the national grid and has assumed responsibility for the Environmental Impact Assessment for the power lines. The extent of the development to effect this connection includes:

- The construction of a 400kV transmission substation, to be called the Braamhoek Substation, near the scheme,
- Provision of an initial connection to the national grid via a 'turn-in' from the nearby Majuba-Venus #2 400kV Transmission line,
- Ensuring the reliability of the network by linking Braamhoek Substation directly to the existing Venus Substation near Estcourt with a new 400kV transmission line.

Braamhoek Substation will be situated on the farm Braamhoek 1220 at 28° 19'S; 29° 35'E. The existing Pegasus Substation is located southeast of Dundee, off the R33 to Greytown, at 28.48889° S; 30.326389° E. Venus Substation is northeast of Estcourt at 28.938000° S; 29.845729° E. The direct distance between Braamhoek and Pegasus Substation is 84km. The direct distance between Braamhoek and Venus substation is 79km.

Over the last two decades Eskom has investigated close to ninety possible pumped storage scheme sites across the country, including over twenty in KwaZulu-Natal. Between 1989 and 1995 a shortlist of sites was drawn up, including the Braamhoek Pumped Storage Scheme (PSS) site. It was subsequently selected for implementation and an Environmental Impact Assessment was undertaken. Depending on peak demand capacity requirements, other sites may also be identified for development in the future.

It is clearly necessary for the Braamhoek PSS to be connected to the national grid; accordingly the 'need and desirability' of the three transmission projects associated with the Braamhoek PSS is not questioned further. It has been noted during the public consultation process on this study that there has been considerable debate surrounding the Braamhoek PSS. Accordingly, it is important to note that it is not within the focus of this Environmental Impact Assessment to question the need for the Braamhoek PSS nor its environmental authorisation. Instead, it is necessary to review the manner in which the Braamhoek will be connected to the national grid.

The new power station will require two connections to the national grid to provide the necessary reliability of supply. The three main elements required to achieve this are:

- a. A new substation at the power station site = the Braamhoek Substation
- b. Two independent links to the transmission network (= national grid). These could either be achieved by 'turn-ins' from existing lines, or by new lines connecting to nearby Transmission substations.

The two nearest 400kV transmission lines that may be turned in to the Braamhoek substation are the Majuba-Venus #1 and Majuba-Venus #2 lines (MV #1 and MV #2). The nearest point to the MV #1 line is 25km, while MV#2 is some 10km from Braamhoek. For reasons of network stability only one of these may be considered for turning in to Braamhoek and the shorter of the two has clear preference in this instance.

There are also three Transmission substations to connect to - Drakensberg, Venus and Pegasus, each a similar distance from Braamhoek at around 80 kilometres. However, Drakensberg Substation will require a substantial upgrade, making it considerably more expensive than the other two. Technical analysis of Venus and Pegasus showed both to have very similar electrical performance and it was left to environmental considerations to determine which would be the preferred option.

Eskom commissioned a pre-feasibility study on these two options prior to the start of the Environmental Impact Assessment, the outcome of which is summarised below. Therefore, prior to the pre-feasibility study, the three transmission projects identified for the connection of the Braamhoek PSS to the national grid were:

- a. Braamhoek Substation
- b. Turn-in from the Majuba-Venus #2 400kV Transmission line

c. A new 400kV Transmission line linking Braamhoek Substation to either Pegasus or Venus Substations

To address item (c) Eskom commissioned a team of independent specialists to undertake a pre-feasibility study to establish whether it was possible to identify a clear preference for either the Braamhoek-Pegasus or Braamhoek-Venus study areas. A summary of the findings is given below:

| Environmental Issue | Preferred Option | Clear preference? |
|---------------------|------------------|-------------------|
| Economic            | Braamhoek-Venus  | No                |
| Social              | Braamhoek-Venus  | No                |
| Visual              | Braamhoek-Venus  | Yes               |
| Natural environment | Braamhoek-Venus  | Yes               |
| Heritage resources  | Braamhoek-Venus  | Yes               |
| Avifauna            | Braamhoek-Venus  | Yes               |
| Construction        | Braamhoek-Venus  | Yes               |
| Technical           | Braamhoek-Venus  | Yes               |
| Cost                | Braamhoek-Venus  | Yes               |

From both the economic and social perspectives, the potential impacts in the two study areas appeared similar. In both areas agriculture and eco-tourism would be affected similarly and there was a similar risk of relocation of homesteads and dwellings. However, the greater extent of linear development (roads, rail and power lines) in the Braamhoek-Venus area offered greater opportunity to minimise these impacts. Hence this option was preferred.

In all other cases the preference for the Braamhoek-Venus option was stated with more confidence. The natural environment is more diverse and generally less disturbed along the Braamhoek-Pegasus area and therefore more difficult to mitigate. There is a greater area of wetlands and high altitude grasslands that are both sensitive in themselves and are valuable crane, secretary bird and bustard habitats; all these birds being particularly vulnerable to collisions with power lines. There is a very strong preference for the Braamhoek-Venus option in this regard.

The landscape of the Braamhoek-Venus area has a greater ability to absorb the visual intrusion of a new 400kV transmission line. Again, the existence of existing linear infrastructure is a significant factor in this aspect, but the relief of the area and nature of the land use also contribute to this assessment. By contrast, the northern areas of the Braamhoek-Pegasus study area are considered a 'no-go' from a visual impact perspective.

Heritage resources are similar in both areas, including battlefields and Stone and Iron Age sites. However, the landscapes of the Braamhoek-Pegasus area have important heritage resource value and significance, especially in the northern areas. Thus this assessment is closely associated with the visual impact assessment and once again, the greater occurrence of linear infrastructure in the Braamhoek-Venus study area provides greater opportunities to minimise impacts.

Terrain and access make the Braamhoek-Venus option a clear preference to the Braamhoek-Pegasus option. Technical issues are likely to be simpler and less expensive and the likely environmental impact of construction is expected to be easier to manage and minimise.

There are no 'fatal flaws' in either study area that will effectively rule-out the entire study area. However, there is consensus among all the specialists that the Braamhoek-Venus option offers more opportunity for a new line with a lower environmental impact than the Braamhoek-Pegasus option. Furthermore, there are sufficient environmental concerns in the Braamhoek-Pegasus option that there is generally a strong view among the study team that the Braamhoek-Venus option has clear preference for further environmental investigation.

In addition, it became known at the end of the pre-feasibility study that both the Majuba-Venus #1 and #2 lines have vacant servitudes running parallel to the existing lines. Though it is understood that these servitudes will need to be widened by up to 20 metres for a new 400kV line, their existence placed additional emphasis on the preference for the Braamhoek-Venus study area.

Though not a given condition, it is common for many of the environmental impacts of power lines to be minimised by running the new line immediately parallel to existing lines of similar magnitude. Such environmental issues include:

- Access – this is usually already established and would be used for the construction and operation of the new line, thereby minimising the need for new access roads,
- Visual – the added visual impact is usually less than for a new route,
- Birds – the increased risk of collision is much less than on new line on a new route,
- Erosion – there should be minimal additional disturbance and there is the possibility of rehabilitating existing problems,
- Relocations – are usually much less and should be none if a vacant servitude exists;
- Land use planning – new land development or improvement plans should already have accounted for the vacant servitude and the associated possibility of a new line in the future.

Following the pre-feasibility study, the development proposals for examination in a Scoping Study were refined as follows:

- a. Braamhoek Substation
- b. Turn-in from the Majuba-Venus #2 400kV transmission line
- c. New Braamhoek-Venus 400kV transmission line

#### Scoping Study approach

- a. Braamhoek Substation site options

An important aspect of the proposed Braamhoek Substation is that it will be constructed on a working platform created during the power station tunnel construction. Spoil and waste rock material will result from the tunnelling process, with some of the suitable material used for the surfacing of access roads and the rest for creating a terraced working platform for the power station construction. This platform will be located near the access tunnel and exploratory tunnel portals and will be used as a construction camp and storage area for the power station construction. Once this phase is complete, the substation will be constructed on this platform, thereby causing minimal additional damage to the local area.

Eskom has identified three possible substation sites, though only one will allow the use of the working platform described above. This site is located near the tunnel portals on the farm Zaaifontein and will require no overhead cabling from the tunnel portal to the substation (the other two sites are on the farm Bramhoek). This is the preferred site and was given the greater focus in the Scoping Study. Other sites were inspected, but the consensus of a specialist workshop and site inspection was that Zaaifontein is the preferred option.

From a heritage resource and socio-economic perspective, an important consideration is that labour tenants reside in close proximity to the proposed options on Bramhoek while the Zaaifontein site is uninhabited. However, we identified two abandoned labour tenant homesteads with six attendant ancestral graves that will be affected directly by the proposed substation on Zaaifontein (further details of these heritage resources are provided in the Observations section below).

- b. Turn-ins from the Majuba-Venus #2 transmission line

Initial investigations for route options for turn-ins from the Majuba-Venus #2 line and Braamhoek Substation are similarly limited. Largely determined by the terrain, a route along the foothills of the uKhahlamba escarpment stands out as the clear preferred option. The environment in this area is uniform in most aspects and comprises a combination of open grasslands and wetlands. These are sensitive environments and will require careful management during construction, but the impacts and mitigation requirements will be similar wherever the line passes through the area.

Another option has been considered, comprising a route along the top of the escarpment, utilising access roads already planned for the Braamhoek PSS, but then dropping down the steep escarpment at a location between the upper and lower reservoirs of the PSS. However, this option was criticised for its cultural landscape, visual and avifaunal impacts, as well as likely construction problems in dropping the lines down the escarpment. The Scoping Study addressed both options, but focused on the route along the foothills of the escarpment as the preferred route.

c. New Braamhoek-Venus 400kV transmission line

Three route alternatives were considered for the new 400kV line connecting Braamhoek to an existing transmission substation:

- Running parallel to Majuba-Venus #1 along the eastern side of the study area,
- Running parallel to Majuba-Venus #2 along the western side of the study area,
- Following a middle route between the first two.

Since there are two vacant servitudes on the Majuba-Venus #1 and #2 lines, for the reasons given above these options already have significant environmental advantages over a new route through the area. Nevertheless, a middle route was identified during the pre-feasibility study and further refined after stakeholder consultation and specialist investigation and this option was addressed in the Scoping Study.

At the pre-feasibility stage there were already important differences between the options:

- Following the Majuba-Venus #1 line would still require the new line to divert across 'new' ground for a considerable distance, either through the settlements of Driefontein, Peace Town and Watersmeet.
- Following a middle route between Venus and Braamhoek would cross large irrigation lands near Colenso and would then have to divert around the new Qedusizi Dam that lies to the west of Ladysmith. This diversion would bring it closer to the Majuba-Venus #1 or #2 options depending on whether it runs east or west of the dam and it would therefore be best following either of these routes from that point on to Braamhoek. In this event it is preferable to follow either Majuba-Venus #1 or #2 from the start and avoid the middle route altogether. Nevertheless, this option was considered in the Scoping Study in the event that there were problematic areas on the other two options.
- Following the Braamhoek-Venus #2 line had the advantage of being the shortest line, with a vacant servitude for the greater part of the route, running parallel to other 400kV lines for the entire route (i.e. it would run parallel to the Majuba-Venus #2 turn-in). However, it would also traverse sensitive grassland areas and there were concerns that with the number of other lines in the area, the accumulated impact of the lines would be significant. Nevertheless, this option appeared to offer the least environmental impact and it was therefore the preferred route at the start of the Scoping Study.

Technical details of the proposed transmission infrastructure are as follows:

400kV transmission lines and turn-ins

- 400kV overhead transmission line;
- Pylon construction will typically be cross-rope suspension design, 35 to 40 metres high;
- Strain towers may be required on difficult terrain and on bends greater than 3°;
- Single-pole lattice structures with anchor guys may also be used on bends as appropriate. These are much less visually intrusive and are cheaper than conventional strain towers;
- Conductor ground clearance between towers is 8.1 metres;
- Maximum operational height under conductors of 4.0 metres;
- Servitude width is 55 metres (27.5 metres on either side of the centre line).

400kV Substation

The typical substation size and equipment includes the following:

- New station, transformers, reactors, etc.;
- No PCBs<sup>1</sup>, but cooling oils still needed for equipment;
- Max height of infrastructure expected at 45 metres;
- Footprint approximately 320 x 160 metres;
- Located close to tunnel outlet;
- Connected to national grid via 400kV Turn-in from Majuba-Venus #2;
- Second 400kV connection direct to Venus (Estcourt) for reliability of supply.

**Site description and environmental issues** (information obtained from the client)

## Description of the Scoping Study area

## a. Braamhoek Substation

The immediate environments of the proposed Braamhoek Substation sites on the farms Braamhoek and Zaaifontein comprise a combination of open grasslands and wetlands on the interfluvies between drainage lines emanating off the escarpment. Patches of montane forest occur on the steeper scarps and along the headwaters of drainage lines. However, the latter have been seriously invaded by black wattle. Labour tenants reside in close proximity to the proposed options on Braamhoek while the Zaaifontein site is uninhabited.

- Turn-ins from the Majuba-Venus #2 transmission line

Open high altitude grasslands and wetlands occur within the major drainage lines, supporting extensive livestock husbandry to create a sub-montane agrarian landscape.

- Braamhoek-Venus 400kV transmission line

The alignment of this option is approximately north south from Braamhoek. The main towns in the area are Ladysmith, Colenso and Frere; with the settlements of Driefontein, Watersmeet and Peace Town to the north of Ladysmith, Roosboom just northwest of Colenso and Cornfields and Thembalihle northeast of Estcourt. Estcourt is just south of the study area.

The Braamhoek-Venus zone lies in the in the Uthukela District Council and covers a number of municipal areas, namely Umtshezi Local Municipality (Estcourt) - KZ234; Emnambithi Municipality (Ladysmith) - KZ232; Imbabazane Municipality - KZ236; Okhahlamba Municipality - KZ235 and Indaka Municipality - KZ233.

Until the late 1980s the towns of Estcourt, Colenso and Ladysmith were on the main road route between Durban and Johannesburg and the passing trade was an important element of their local economies. With the construction of the new N3 National Road this trade has been reduced markedly. As a result, published Integrated Development Plans for these municipalities focus on the development of eco-tourism (mainly in neighbouring areas) to regenerate this element of the local economy. Visitors to the recently declared uKhahlamba Drakensberg Park World Heritage Site to the west along the Lesotho border and the battlefield sites around Colenso, Ladysmith and Dundee are among the main opportunities.

The Integrated Development Plans for Umtshezi and Emnambithi Municipalities do not identify specific eco-tourism opportunities in the study area, though some potential exists in the north around Braamhoek and along the uThukela River valley that bisects the study area. While the ecology of the area is more disturbed than the Braamhoek-Pegasus option, there are still important grasslands (mainly in the central areas), woodland bushveld (mainly in the western areas) and wetlands (mainly in the northern areas). However, with the exception of the wetland areas, these environments are fairly robust, with good chances of recovery after disturbances if these are properly managed.

Arable agriculture is more prevalent in this study area than in the Braamhoek-Pegasus option, with active irrigation along many of the main watercourses (uMtshezi, uThukela, Sand/emNambithi). These include centre-pivot and dragline systems. Linear infrastructure is also greater in the Braamhoek-Venus area. The N3 National Road runs through the western sections of the area and the planned De Beers Pass route of the N3 passes close to the site of the Braamhoek Pumped Storage Scheme. Other major roads include the N11 (Ladysmith – Newcastle) and R103 (Estcourt – Colenso – Ladysmith). Both transmission and distribution lines are present, including Majuba-Venus #1 400kV line (running just east of Ladysmith); Majuba-Venus #2 400kV line (running parallel to the N3); Ingagane-Bloukrans #2 275kV line; Ingagane-Danskraal #1 275kV line (parallel to the former line); Drakensberg-Pegasus #1 400kV line (running to the north of Ladysmith); Tugela-Venus #1 275kV; Bloukrans-Tugela #3 275kV and approximately eight distribution lines at 132kV or lower.

There is also the Danskraal substation near Ladysmith, Bloukrans substation near Colenso and the decommissioned Colenso power station. The density of the infrastructure is mainly in the southern half of the Braamhoek-Venus study area.



## Methodology

One eThembeni staff member participated in the pre-feasibility workshop on 4, 5 and 6 October 2004. The specialist team drove and walked over the major portion of the route alternatives discussed above and contributed to consolidatory workshops concerning terrain and landscape analysis. During field visits soil surface visibility was poor to moderate overall, favouring the identification of structures and landscapes above artefacts. Accordingly, field methodology for this workshop favoured a controlled-exclusive surface survey, where 'sufficient information exists on an area to make solid and defensible assumptions and judgements about where [heritage resource] sites may and may not be' and 'an inspection of the surface of the ground, wherever this surface is visible, is made, with no substantial attempt to clear brush, turf, deadfall, leaves or other material that may cover the surface and with no attempt to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures that are observed by accident' (King 1978).

An eThembeni staff member attended a further workshop on 13 and 14 January 2005 to complete the Scoping Study, comprising inspection of the Braamhoek Substation sites, the turn-ins from Majuba-Venus #2 and the Braamhoek-Venus power line route. Methodology was similar to that employed for the pre-feasibility study.

We consulted various provincial databases, including historical, archaeological and geological sources and undertook a limited literature review. Site locations were recorded with a handheld Garmin 72 global positioning instrument.

## Heritage resource background

No activities associated with the proposed development had started prior to our assessment.

The general area is one of variable heritage resource significance and the following tables provide a brief summary of archaeological time periods:

|                |                                  |                                   |
|----------------|----------------------------------|-----------------------------------|
| <b>E arly</b>  | 1.5 million to 180 000 years ago | Only stone artefacts remain from  |
| <b>S tone</b>  |                                  | this time period, including large |
| <b>A ge</b>    |                                  | choppers, cleavers and hand axes  |
|                |                                  |                                   |
| <b>M iddle</b> | 180 000 to 35 000 years ago      | Stone tools smaller than in ESA;  |
| <b>S tone</b>  |                                  | include blades and flakes; human  |
| <b>A ge</b>    |                                  | and animal remains also found     |
|                |                                  |                                   |
| <b>L ater</b>  | 35 000 years ago to the time     | Variety of artefacts made from    |
| <b>S tone</b>  | of European settlement           | organic and inorganic materials;  |
| <b>A ge</b>    |                                  | human remains, shell middens etc  |

|               |                    |                              |
|---------------|--------------------|------------------------------|
| <b>E arly</b> | 400 – 500 AD       | Mzonjani phase               |
| <b>I ron</b>  | 500 – 700 AD       | Msuluzi phase                |
| <b>A ge</b>   | 700 – 900 AD       | Ndondondwane phase           |
|               | 900 – 1200 AD      | Ntshekane phase              |
|               |                    |                              |
| <b>L ate</b>  | 1200 – 1500 AD     | Settlement by Nguni speakers |
| <b>I ron</b>  | 1500 – 1700 AD     | Introduction of maize        |
| <b>A ge</b>   | 1700 – 1850 AD     | Pre-European settlement      |
|               | 1850 AD to present | Historical                   |

Numerous Stone and Iron Age sites have been recorded in the area (Maggs 1989, Mazel 1989).

Early Stone Age stone scatters occur in raised beach gravels, eroded areas and ancient coastal dunes. No information is available on the foods eaten by the Early Stone Age people in Natal, but it can be assumed on the basis of evidence on Early Stone Age people elsewhere that their diet consisted primarily of animals and plant foods. It was also during this period that people learnt to control fire' (Mazel 1989: 3-5).

'Clear technological differences separate the Middle Stone Age from the Early Stone Age. Whereas Early Stone Age tools were generally core tools [choppers, handaxes, cleavers], Middle Stone Age tools were made of flakes and blades detached from the core [trapezoids, segments, scrapers, points, flakes, blades]. Handaxes and cleavers were absent...

'Relatively little is known about the particular types of food that the Middle Stone Age hunter-gatherers ate. Border Cave [situated in the Lebombo Mountains on the border between South Africa and Swaziland] is the only site from which information is at present available... Small quantities of a wide variety of animals were found in the Border Cave excavations. These included honey badger, dassie, Burchell's zebra, bushpig, warthog, hippopotamus, steenbok, oribi, mountain reedbuck, waterbuck, roan / sable, impala, blesbok, hartebeest / tsessebe, blue wildebeest, springbok, greater kudu, nyala, bushbuck, eland, Cape buffalo and possibly an extinct giant Cape horse (*Equus capensis*).

'A handful of seeds was also found at Border Cave, while grindstones, which may have been used in the processing of plant foods, have been recovered from the Middle Stone Age layers at Umhlatuzana Shelter [located between Durban and Pietermaritzburg]...

'Evidence of the manufacture of cultural articles from materials other than stone first appears during the Middle Stone Age. So also does evidence concerning religious practices, the final Middle Stone Age stage at Border Cave producing the earliest known burial so far attributed to the Middle Stone Age' (Mazel 1989: 6-8).

Recent excavations at Sibhudu Shelter, a near-coastal site located between the Mvoti and uMngeni rivers, promise to shed more light on the Middle Stone Age of KwaZulu-Natal.

Later Stone Age sites occur throughout the province, with high concentrations in places such as the uKhahlamba mountains where rock shelters suitable for occupation are plentiful.

'Stone artefacts are overwhelmingly the most common cultural item recovered from the excavations that have been carried out, followed by pottery (belonging to the last 2 000 years), ground, polished and shaved bone, beads and ostrich eggshell... [Stone] scrapers were probably used for removing the fat from animal skins before these were pegged out to dry. Adzes were probably used for shaving wood and, to a lesser extent, bone; while backed pieces, of which there are different types, were probably employed in hunting and cutting up carcasses.

'A great deal of information about the foods Later Stone Age hunter-gatherers ate has been obtained from animal, plant and marine and freshwater shell remains. In some cases, it has been possible to identify the remains of individual species. As small animals in particular are sensitive to environmental fluctuations, these remains can also tell us much about past environments. Botanical remains are also very useful, for seeds can indicate which fruits and berries Later Stone Age people ate. And, because fruits and berries are seasonal, they can also provide information about the months during the year when sites were occupied' (Mazel 1989: 11-12).

'One of the main themes of Later Stone Age research in South Africa, including Natal, has been that of seasonality. It has been hypothesized, on the basis of the analysis of the seasonal movements of large antelope, that the food resources of southern Natal would have been exploited on a seasonal basis by hunter-gatherers. According to this hypothesis, they would have occupied the Drakensberg in summer and the Thornveld and coastal areas during winter, traversing the Midlands along ridges rather than in the valleys.

'Recent field-work based on this hypothesis has suggested that in southern Natal during the last 3 500 years, hunter-gatherers would have occupied the Drakensberg in spring and summer (October to March), the coastal zone in winter (April / May to August), and the Midlands in autumn and late winter (March / April to September). This seasonal hypothesis...has given rise to the speculation that while they were in the Drakensberg, the hunter-gatherers would have lived in large groups and would have operated from large home-base sites.

'One of the results of the formation of these larger social units could have been an increase in ritual activity. Social organisation in the Midlands, however, would have been characterized by the small mobile groups that traversed the zone, while in the coastal zones larger groups, but not as large as those in the Drakensberg, would have been found' (Mazel 1989: 17).

One feature of the Later Stone Age in southern Africa with great academic and popular appeal is its rock paintings, concentrated particularly in the uKhahlamba / Drakensberg mountains.

'The first recordings of rock paintings in the Drakensberg were made over 100 years ago. Since then, they have been the focus of intensive research and of numerous publications. On completion of a three-year survey of painting sites in the Drakensberg in 1981, 516 sites, containing a total of 29 874 paintings, were known. Rock art occurs, but less frequently, in other areas of Natal but it has never been adequately surveyed and researched.

'A great problem lies in establishing the age of the art, but some advances have been made. The earliest dated paintings in southern Africa are from the Apollo 11 Cave in southern Namibia. Dated to about 26 000 years ago, these paintings are about as old as the earliest Palaeolithic art in western Europe [the latter is now thought to be up to 40 000 years old]. The Apollo 11 dates are based on the age of the deposits in which slabs of painted rocks were recovered. The next oldest known art in southern Africa are pieces of engraved stones from Wonderwerk Cave in the northern Cape, dated to around 11 000 years ago. An increasing number of painted and engraved stones date to within the last 10 000 years, especially the last 4 000 years, but none are from Natal.

'In the Natal Drakensberg, besides the paintings of cattle and sheep which, in all likelihood, postdate the arrival of the Iron Age farming communities 1 500 to 2 000 years ago and those of horses, wagons and whites which postdate AD 1 800, we are unable to put dates to the paintings. However, as the area is high in rainfall and experiences great temperature variations, both of which cause weathering in rocks, it is unlikely that the earliest paintings still visible on the rocks are more than a few thousand years old.

'New and improved radio-carbon dating techniques, which have been used with success in the Western Cape, offer some hope of our being able to establish the age of the wall paintings in the not too distant future.

'Interpretation of the paintings is a source of continuing controversy. There are three main theories. The first is that they were executed merely to illustrate what was seen, in other words, 'art for art's sake'. The second is that they represent a form of sympathetic magic, reflecting a belief that the painting of appropriate scenes before a hunt, or after a successful hunt, would enhance the prowess of the hunters. The third is that they are symbolic, related to hunter-gatherer religious practices, primarily trance performance, and perform important social functions.

'Hunter-gatherer historical records as well as ethnography both favour what has been loosely phrased the 'trance hypothesis', for many features of trance performance and trance vision are identifiable in the paintings. During trance dances, shamans enter trance and perform certain tasks such as the maintenance of social relations, the promotion of economic activity by, for example, guiding antelope into ambushes and controlling rain, and the maintenance of sound links between bands by means of 'out of body travel', in which they 'visit' associated bands.

'It has also been speculated that the art may have been a way of preparing novices for religious experience and an instruction for those who had not, or would not, experience trance. Thus, the shaman's art was not 'a luxury indulged in leisure time to provide pleasure and relaxation', but a 'remarkable aesthetic achievement' which lay at 'the very heart of the functioning of San society' (Mazel 1989: 17-19).

Examples of known archaeological sites in the study area include Mgede and Maqonqo Shelters, which were occupied and painted by hunter-gatherers during the Later Stone Age (Mazel 1986 and 1996).

'The advent of the Iron Age saw not only the introduction of metallurgy. Of even greater significance was the introduction of agriculture, necessitating a settled, village way of life instead of the nomadic patterns of the Stone Age. It also provided for an appreciable increase in population density, as well as a more complex life-style. Richly decorated pottery is a hallmark of these early settlements. Domestic animals including cattle, sheep, goats and dogs were also a feature of the Iron Age, although current information indicates that they had already reached parts of South Africa, but apparently not Natal, during the Late Stone Age, through the agency of Khoisan herders...

'... the earliest Iron Age sites in South Africa, including Natal, relate to an eastern coastal and lowland cultural tradition with links as far north as the Kwale sites of eastern Kenya. This tradition has been named 'Matola', after a site in southern Mozambique, which provided close typological links between the Natal and eastern Transvaal sites<sup>1</sup>. [In KwaZulu-Natal] almost all of them are on the belt of ancient dunes, which would have been covered by coastal forest at the time' (Maggs 1989: 29-31).

'Most Early Iron Age sites in Natal are later than the [Mzonjani] period and are classified according to ceramic styles [refer to the table above]... By this time villages, often about eight hectares in size and probably containing a hundred or more people, had become common in the lower-lying and savannah areas, below an altitude of 1 000 metres. They were most common along the major rivers and in the coastal belt, where there was good, deep soil, sweet year-round grazing, and timber for building and fuel...

'Diet was based on agriculture and pastoralism, with a little supplementary hunting, fishing and gathering of wild plants and shellfish. Crops identified from seeds include several grains (bulrush millet, finger millet and probably sorghum), and probably the African melon... Most villages had one or more iron smelting areas and therefore produced their own requirements' (Maggs 1989: 31-32).

The beginning of the Late Iron Age marked a period of significant change in pottery styles, attributable to both socio-political and demographic factors (Maggs 1989). Settlements were no longer located in river valleys, but were built on higher ground where homesteads would benefit from cooling breezes and good views for strategic purposes.

Steep slopes, wetlands and marshy areas were used for grazing domestic animals and gathering wild food and medicinal plants. Settlements appear to have been much smaller, implying that 'society underwent a change away from the large Early Iron Age villages and towards the individual family homesteads of the historic Nguni-speaking peoples (Maggs 1989: 35).

Artefacts on Iron Age homestead sites include ceramic sherds, upper and lower grindstones and human and animal bones. Metalworking sites are often located in areas where iron ore is available and associated debris includes furnace remains, slag, bloom and ceramic sherds.

'The evidence or written sources [from shipwrecked Portuguese and other European mariners, who traversed lowland and coastal Natal on their way northwards to Mozambique] shows that, by the 1550s, while the coastal sourveld of Pondoland was thinly inhabited, coastal Natal from the Mtamvuna northwards was already well populated. A settlement of twenty hemispherical huts built of poles and

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<sup>1</sup> This tradition is now known as Mzonjani in KwaZulu-Natal.

thatch is described as being typical of the coast at that time. A later report confirms that such 'small villages' were the homes of kinship groups, each under the authority of a senior man. There can have been little difference between these homesteads and those of the nineteenth century in Natal and Zululand.

'The agro-pastoral economy of the Iron Age prevailed throughout the coastal regions, with cultivation typically a combination of grains, legumes and vegetables of the pumpkin-melon family. There were three types of grains, one being sorghum and another a smaller-seeded millet, specific identification being difficult to establish from the old Portuguese documents. Vegetables included beans, African groundnuts (both legumes), gourds, watermelons and pumpkins, while sorghum was cultivated for its sweet pith as well as for its seeds... There is evidence to show that tobacco was being cultivated and smoked by 1686. Cattle, sheep and goats were seen in quantities, as were chicken from southern Natal northwards' (Maggs 1989: 39).

More recent historical heritage resources include numerous sites associated with the battles of the Anglo-Boer War. Better-known sites are often demarcated and signposted clearly, since they are important cultural markers for extant communities, as well as tourist attractions. However, other war remains are less noticeable, though no less numerous, and include earth and stone fortifications on many a hilltop. These sites often have high local, regional, national and international heritage value and significance, as defined in the KwaZulu-Natal Heritage Act and guidelines such as those included in the Appendix to this report.

## Observations

For the purposes of the Scoping Study, it was useful to distinguish between two broad categories of known heritage resources, namely **discrete sites** and **cultural landscapes**.

In general, resources in the former category are afforded specific definitions and special protection, such as structures older than sixty years, rock art and ancestral graves. Mitigatory measures to avoid site alteration depend largely on heritage value and significance, but a permit from Amafa aKwaZulu-Natali, the provincial heritage management organisation, is usually required before such sites are altered in any way.

Cultural landscapes are less clearly defined; hence their levels of protection and management are more open to interpretation. Examples are places to which oral traditions are attached or that are associated with living heritage; historical settlements and townscapes; and landscapes and natural features. Such resources may receive special protection through declaration as Heritage or Provincial Landmarks, Heritage Conservancies or Sensitive Sites.

The American National Parks Services sets out various criteria for the identification and management of cultural landscapes:

'Cultural landscapes are complex resources that range from large rural tracts covering several thousand acres to formal gardens of less than an acre. Natural features such as landforms, soils and vegetation are not only part of the cultural landscape, they provide the framework within which it evolves. In the broadest sense, a cultural landscape is a reflection of human adaptation and use of settlement, land use, systems of circulation and the natural resources and is often expressed in the way land is organised and divided, patterns of types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls and vegetation, and by use reflecting cultural values and traditions.

'Identifying the character-defining features in a landscape and understanding them in relation to each other and to significant historic events, trends and persons allows us to read the landscape as a cultural resource. In many cases, these features are dynamic and change over time. In many cases, too, historical significance may be ascribed to more than one period in a landscape's physical and cultural evolution.

'Cultural landscape management involves identifying the type and degree of change that can occur while maintaining the character-defining features. The identification and management of an appropriate level of change in a cultural landscape is closely related to its significance. In a landscape significant for its association with a specific style, individual, trend or event, change may diminish its integrity and needs to be carefully monitored and controlled. In a landscape significant for the pattern of use that has evolved, physical change may be essential to the continuation of the use. In the latter case, the

focus should be on perpetuating the use while maintaining the general character and feeling of the historic period(s), rather than on preserving a specific appearance.

'A cultural landscape is a geographic area, including both natural and cultural resources, associated with a historic event, activity or person. The National Park Services recognises four cultural landscape categories: historic designed landscapes, historic vernacular landscapes, historic sites and ethnographic landscapes. These categories are helpful in distinguishing the values that make landscapes cultural resources and in determining how they should be treated, managed and interpreted...

'The four cultural landscape categories are not mutually exclusive. A landscape may be associated with a significant event, include designed or vernacular characteristics and be significant to a specific cultural group.'

However, identification and formal declaration of these resources is not far advanced, either provincially or nationally. Accordingly, it is important to ensure that current development and land use does not permanently compromise the character-defining qualities of these significant, yet less tangible, heritage resources.

- Braamhoek Substation site on Zaaifontein farm

The proposed substation will directly affect two abandoned labour tenant homesteads with six definite and two possible attendant ancestral graves. The stone walled cattle byre and associated dwelling remains are deflated and appear to have been culled for construction elsewhere. The structures are historically recent and have low local heritage significance. However, the graves have high significance.

The abandoned homestead with six ancestral graves is located in the vicinity of 28 16 50.0S; 29 35 21.9E and 28 16 44.6S; 29 35 22.0E. The abandoned homestead with two possible graves is located at 28 16 42.6S; 29 35 11.8E (map datum WGS 84).

- Given the nature of the proposed construction activities it is advisable to exhume the graves and relocate any mortal remains to a more appropriate burial site. This would require a process of negotiation with living relatives to obtain their consent and to ensure that proper ceremony and procedure is followed in exhumation and re-interment, as well as a permit from Amafa aKwaZulu-Natali.
- Given the poor state of conservation of the homestead structures, no destruction permit from Amafa is required to alter them.
- The scarp slopes in the vicinity of the substation will require inspection for the presence of rock painting sites that could be damaged by tunnel blasting activities.

- Turn-in from the Majuba-Venus #2 transmission line

This transmission line route will have a permanent adverse impact on the cultural and visual landscape, wherever it is placed. However, this impact will be minimised by routing the line along valleys rather than ridges or skylines and is considered a best-case compromise, given the necessity of the transmission line.

- A physical inspection of proposed tower placements will be necessary once the final route has been selected to ensure that no in situ heritage resources are compromised.

- Braamhoek-Venus 400kV transmission line

Whether the transmission line follows a new alignment or is routed along the existing servitudes of Majuba-Venus # 1 and # 2 (requiring less field inspection time), a physical inspection of proposed tower placements will be necessary once the final route has been selected to ensure that no in situ heritage resources are compromised.

## Summary of findings in terms of the KwaZulu-Natal Heritage Act 1997 Section 27(3)

### (a) the identification and mapping of all heritage resources in the area affected

- Braamhoek Substation site on Zaaifontein farm

An abandoned homestead with six ancestral graves is located in the vicinity of 28 16 50.0S; 29 35 21.9E and 28 16 44.6S; 29 35 22.0E. A second abandoned homestead with two possible graves is located at 28 16 42.6S; 29 35 11.8E (map datum WGS 84).

Heritage resource identification is not complete; the scarp slopes in the vicinity of the substation require inspection for the presence of rock painting sites that could be damaged by tunnel blasting activities.

- Turn-in from the Majuba-Venus #2 transmission line

Not applicable until after the in situ inspection of tower positions.

- Braamhoek-Venus 400kV transmission line

Not applicable until after the in situ inspection of tower positions.

### (b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in regulations

- Braamhoek Substation site on Zaaifontein farm

The abandoned labour tenant homesteads have low local heritage significance. However, the graves have high significance.

- Turn-in from the Majuba-Venus #2 transmission line

Not applicable until after the in situ inspection of tower positions.

- Braamhoek-Venus 400kV transmission line

Not applicable until after the in situ inspection of tower positions.

### (c) an assessment of the impact of development on such heritage resources

- Braamhoek Substation site on Zaaifontein farm

The abandoned labour tenant homesteads and associated graves will be damaged or destroyed by the proposed development. Further fieldwork is required to assess impacts on any other heritage resources present, particularly rock paintings.

- Turn-in from the Majuba-Venus #2 transmission line

Not applicable until after the in situ inspection of tower positions.

- Braamhoek-Venus 400kV transmission line

Not applicable until after the in situ inspection of tower positions.

### (d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development

Not applicable until after the final inspection of the substation site and power line routes.

### (e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources

The client has undertaken such consultation in terms of statutory requirements and retains the relevant documentation.

**(f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives**

- Braamhoek Substation site on Zaaifontein farm

Given the nature of the proposed construction activities it is advisable to exhume the graves and relocate any mortal remains to a more appropriate burial site. This would require a process of negotiation with living relatives to obtain their consent and to ensure that proper ceremony and procedure is followed in exhumation and re-interment, as well as a permit from Amafa aKwaZulu-Natali.

Given the poor state of conservation of the homestead structures, no destruction permit from Amafa is required to alter them.

The scarp slopes in the vicinity of the substation require inspection for the presence of rock painting sites that could be damaged by tunnel blasting activities.

- Turn-in from the Majuba-Venus #2 transmission line

Not applicable until after the in situ inspection of tower positions; however, relocation of towers to avoid damage to sites is the most likely alternative.

- Braamhoek-Venus 400kV transmission line

Not applicable until after the in situ inspection of tower positions; however, relocation of towers to avoid damage to sites is the most likely alternative.

**(g) plans for mitigation of any adverse effects during and after completion of the proposed development**

As detailed in the final report. If permission is granted for development to proceed, the client is reminded that the Act requires that a developer cease all work immediately and notify Amafa should any cultural heritage remains, as defined in the Act, be discovered during the course of development activities.



## Conclusion

We have submitted this report to Amafa aKwaZulu-Natali in fulfilment of the requirements of the KwaZulu-Natal Heritage Act. According to Section 27(4) of the Act:

- The report shall be considered timeously by the Council which shall, after consultation with the person proposing the development, decide -
- (a) whether or not the development may proceed;
  - (b) any limitations or conditions are to be applied to the development;
  - (c) what general protections in terms of this Act apply, and what formal protections may be applied to such heritage resources;
  - (d) whether compensatory action shall be required in respect of any heritage resources damaged or destroyed as a result of the development; and
  - (e) whether the appointment of specialists is required as a condition of approval of the proposal.

The client may contact Ms Corinne Winson at Amafa's Pietermaritzburg office (telephone 033 3946 543) in due course to enquire about the Council's decision.

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## APPENDIX

## SIGNIFICANCE AND VALUE OF HERITAGE RESOURCE SITES

The following guidelines for determining site significance were developed by the South African Heritage Resources Agency in 2003. We use them in conjunction with tables of our own formulation (see that for the Southern African Iron Age, below) when considering intrinsic site significance and significance relative to development activities, as well as when recommending mitigatory action.

## Type of Resource

Place

Structure

Archaeological Site

Palaeontological Site

Geological Feature

Grave

## Type of Significance

## 1. Historical Value

It is important in the community, or pattern of history

- Importance in the evolution of cultural landscapes and settlement patterns
- Importance in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, Province, region or locality.
- Importance 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.
- Importance 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

- Importance 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

Rarity

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

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

Representivity

It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects

Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.

Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, Province, region or locality.

| Sphere of Significance | High                     | Medium                   | Low                      |       |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| International          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |       |
| National               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |       |
| Provincial             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |       |
| Regional               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |       |
| Local                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |       |
| Specific Community     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ----- |

What other similar sites may be compared to this site?

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**Southern African Iron Age**

|                                | Significance           |                          |                       |
|--------------------------------|------------------------|--------------------------|-----------------------|
|                                | - low                  | - medium                 | - high                |
| Unique or type site            |                        |                          | Yes                   |
| Formal protection              |                        |                          | Yes                   |
| Spatial patterning             | ?Yes                   | ?Yes                     | ?Yes                  |
| Degree of disturbance          | 75 – 100%              | 25 – 74%                 | 0 – 24%               |
| Organic remains (list types)   | 0 – 5 / m <sup>2</sup> | 6 – 10 / m <sup>2</sup>  | 11 + / m <sup>2</sup> |
| Inorganic remains (list types) | 0 – 5 / m <sup>2</sup> | 6 – 10 / m <sup>2</sup>  | 11 + / m <sup>2</sup> |
| Ancestral graves               |                        |                          | Present               |
| Horizontal extent of site      | < 100m <sup>2</sup>    | 101 – 1000m <sup>2</sup> | 1000 + m <sup>2</sup> |
| Depth of deposit               | < 20cm                 | 21 – 50cm                | 51 + cm               |
| Spiritual association          |                        |                          | Yes                   |
| Oral history association       |                        |                          | Yes                   |
| > Research potential           |                        |                          | High                  |
| > Educational potential        |                        |                          | High                  |

Please note that this table is a tool to be used by qualified cultural heritage managers who are also experienced site assessors.