

ESKOM TRANSMISSION

**PHASE 1 CULTURAL AND ARCHAEOLOGICAL HERITAGE  
ASSESSMENT SPECIALIST STUDY FOR THE PROPOSED  
CONSTRUCTION OF 400/50kV NIEUWEHOOP SUBSTATION AND  
20KM 400kV LOOP-IN AND LOOP-OUT POWER LINES BETWEEN  
GARONA AND ARIES IN THE NORTHERN CAPE PROVINCE**

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**PREPARED FOR**

ESKOM TRANSMISSION

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## REPORT DETAILS

<b>PROJECT NAME:</b>	CONSTRUCTION OF 400/50kV NIEUWEHOOP SUBSTATION AND 20KM LOOP-IN AND LOOP-OUT POWER-LINE BETWEEN GARONA AND ARIES IN THE NORTHERN CAPE PROVINCE
<b>REPORT TITLE:</b>	PHASE 1 CULTURAL AND ARCHAEOLOGICAL HERITAGE ASSESSMENT SPECIALIST STUDY FOR THE PROPOSED CONSTRUCTION OF 400/50kV NIEUWEHOOP SUBSTATION AND 20KM 400kV LOOP-IN AND LOOP-OUT POWER LINES BETWEEN GARONA AND ARIES IN THE NORTHERN CAPE PROVINCE
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## **MANAGEMENT SUMMARY**

### **BACKGROUND**

Nzumbululo Heritage Solutions (South Africa) (HeSSA) was been appointed by Eskom Transmission to conduct an Environmental Impact Assessment for the proposed construction of 5 substations and an associated power-line infrastructure between Sishen and Saldanha which are located in the Northern and Western Cape provinces respectively. In turn, Nzumbululo commission an Archaeological and Cultural Heritage Impact Assessment study for the proposed construction of the 400/50kV Nieuwehoop substation and the associated 20km 400kV loop-in and loop-out power-line. The proposed development site is situated between Garona and Aries substations in the Northern Cape Province. Three (3) possible substation sites, including the preferred site, were identified and assessed during this HIA study. The preferred and alternative project sites for the proposed substation development fall within Farm Gemsbok Built 120. The farm is situated in Kheis Local Municipality within Siyanda District of the Northern Cape Province

### **SUMMARY RESULTS**

The survey covered the proposed substation site, two alternative sites and the 20km loop-in and loop-out power-line servitude route for each proposed alternate site. By its nature, the proposed power-line development's potential impact footprint is limited to individual power-line pole positions. Furthermore, the proposed substation and power-line route are situated on land historically used for agricultural and residential purposes. No significant archaeological sites or material remains were identified on the direct path of the substation power-line route. There were no other physical cultural properties of any significance threshold that were identified within the project area during this study.

### **SUMMARY RECOMMENDATIONS**

There are no archaeological or cultural heritage resources barriers to the proposed construction of Nieuwehoop substation and its associated loop-in and loop-out power-line. We recommend that a heritage-monitoring program be designed to deal with potential chance finds should archaeological or historical finds be found accidentally during construction of substation and digging of a power line pylon foundations. We concluded that the proposed development may proceed subject to the following recommendations:

- There being no significant archaeological or physical cultural properties recorded within the project area, the development may proceed as planned subject to a construction monitoring program.
- A monitoring programme is essential during the excavation of substation and pylon foundations. This study cannot rule out the possibilities of encountering subsurface chance archaeological remains. Should archaeological materials be identified on the project site or Powerline route during the construction phase, particularly in association with pole footprints, heritage authorities should be informed.
- Communities living close to the proposed power line route should be consulted and kept informed about the development. The local communities may come forward with relevant information previously unavailable on heritage resources such as previously unidentified graves, as well as sites that do not show any structures, but have emotional significance, such as battlefields, etc.

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## ABBREVIATIONS

<b>HIA</b>	Heritage Impact Assessment
<b>EIA</b>	Environmental Impact Assessment
<b>HeSSA</b>	Nzumbululo Heritage Solutions (South Africa)
<b>SAHRA</b>	South African Heritage Resources Agency

## DEFINITIONS

**Archaeological** material remains resulting from human activities, which are in a state of disuse and are in, or on, land and which are older than 100 years, including artefacts, human and hominid remains, and artificial features and structures.

**Chance Finds** archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified during cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

**Cultural Heritage Resources** same as Heritage Resources as defined and used in the South African Heritage Resources Act (Act No. 25 of 1999). Refer to physical cultural properties such as archaeological and palaeontological sites; historic and prehistoric places, buildings, structures and material remains; cultural sites such as places of ritual or religious importance and their associated materials; burial sites or *graves* and their associated materials; geological or natural features of cultural importance or scientific significance. Cultural Heritage Resources also include intangible resources such as religion practices, ritual ceremonies, oral histories, memories and indigenous knowledge.

**Cultural Significance** the complexities of what makes a place, materials or intangible resources of value to society or part of, customarily assessed in terms of aesthetic, historical, scientific/research and social values.

**Excavation** principal method of extracting data in archaeology, involving systematic recovery of archaeological remains and their context by removing soil and any other material covering them.

**Grave** a place of interment (variably referred to as burial), including the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery.

**Historic** material remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

**In Situ material, material** culture and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

**Material culture** buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

**Site** a distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

# **PHASE 1 CULTURAL AND ARCHAEOLOGICAL HERITAGE ASSESSMENT SPECIALIST STUDY FOR THE PROPOSED CONSTRUCTION OF 400/50kV NIEUWEHOOP SUBSTATION AND 20KM 400kV LOOP-IN AND LOOP-OUT POWER LINES BETWEEN GARONA AND ARIES IN THE NORTHERN CAPE PROVINCE**

## **1. INTRODUCTION**

Eskom Transmission appointed Nzumbululo Heritage Solutions as the independent Environmental Assessment Practitioner to undertake an Environmental Impact Assessment (EIA) process for the proposed new substations and the associated loop-in and loop-out power lines as a requirement to boost current power supply along the railway line between Sishen and Saldanha in Northern and Western Cape Provinces. Eskom Transmission proposes to develop a demand increase related power-line to supplement the current energy supply for the railway line between Sishen and Saldanha Bay. The project in question will involve construction of a new substation and linear powerline construction work.

In order to obtain environmental clearance from the Department of Environmental Affairs and Tourism (DEAT), Eskom appointed Nzumbululo Heritage Solutions to conduct an environmental impact assessment for the proposed substation and power-line construction project. In turn, Nzumbululo Heritage Solutions commissioned the Archaeological and Cultural Heritage Assessment specialist study for the proposed development. Terms of reference of the HIA study are summarised in Table 1 below.

## **2. AIMS OF THE STUDY**

This HIA study primarily seeks to:

- ❑ Identifying heritage resources affected by the proposed substation construction and the associated power line and infrastructural development.
- ❑ Assess the significance of the physical cultural resources that maybe associated with the affected project area.
- ❑ Evaluate the impact thereon with respect to the socio-economic opportunities and benefits that would be derived from the proposed power-line.
- ❑ Consult with the affected and other interested parties in regard to the impact on the heritage resources in the project's receiving environment.
- ❑ Make recommendations on mitigation measures with the view to reduce specific adverse impacts and enhance specific positive impacts on the heritage resources.

- ❑ Identify and discuss with local communities (where applicable) on potential impacts of the proposed power-line construction on graves and burials sites within the affected area and make the necessary recommendations on how to handle the matter.
- ❑ Take responsibility for communicating with the SAHRA and other related authorities in order to obtain the heritage relevant permits and authorization.

**Table 1:** Terms of Reference for the HIA Study associated with the construction of a Nieuwehoop substation between Garona and Aries

PURPOSE	ACTIVITIES
<ul style="list-style-type: none"> <li>❑ Fulfil the statutory requirements of the National Heritage Resources Act, Act 25 of 1999, Section 38.</li> <li>❑ To identify and describe (in terms of their conservation and / or preservation importance) sites of cultural and archaeological importance that may be affected by the proposed construction of substation and power-line. This study should include the identification of gravesites.</li> <li>❑ Identify and describe impacts to archaeological and cultural resources.</li> <li>❑ Make recommendations on mitigation measures.</li> <li>❑ Identify and describe management measures.</li> </ul>	<ul style="list-style-type: none"> <li>❑ Identify, describe and map sites of archaeological, historical or cultural interest affected by the proposed development.</li> <li>❑ Identify, where possible, the gravesites affected by the development.</li> <li>❑ Liaise with the local communities (if applicable) with regards to the impact of the development on the heritage resources.</li> <li>❑ Describe the importance or significance of these sites and whether these sites need to be conserved, protected or relocated.</li> <li>❑ Describe the procedures for mitigation or relocation of sites and provide an indication of time required for these management measures to be implemented.</li> <li>❑ Document findings and recommendations.</li> </ul>

### 3. STATUTORY REQUIREMENTS

From a planning perspective, the proposed development is guided and governed by legislative acts and guidelines including environmental and heritage management laws and regulations. This Heritage Impact Assessment (HIA) study was conducted to fulfil the requirements of the National Heritage Resources Act, Act 25 of 1999 Section 38. The HIA study focus on identifying and assessing archaeological, cultural, possible palaeontological and historical heritage resources associated with the proposed construction project's receiving environment. Heritage resources protected by applicable legislations include the following:

- Archaeology
- Palaeontology
- Built Heritage
- Architectural Heritage
  - Architectural Conservation Areas
  - Protection of the Architectural Heritage



- Significant Graves and Burial grounds
- Natural Heritage
  - Local Biodiversity
  - Protected Species
  - Trees
  - Avi-fauna
  - Fauna
- Intangible cultural heritage & community identity

In terms of Section 35 (4) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999)

...no person may, without a permit issued by the relevant heritage resources authority, destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or material or any meteorite; or bring onto, or use at an archaeological or palaeontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

By law, archaeological and palaeontological sites, materials, and meteorites are seen in the NHRA as “the source of our understanding of the evolution of the earth, life on earth and the history of people.” In this context, the law emphasize that the management of heritage resources is integrated with environmental resources and this means that heritage resources should be assessed and, if necessary, rescued before development is allowed to take place.

In areas where there has not yet been systematic survey to identify conservation-worthy places, a permit is required to alter or demolish any historic structure older than 60 years or military installation of over 75 years old. This will apply until a survey is done and identified heritage resources are formally protected.

#### **4. DESCRIPTION OF THE PROPOSED PROJECT**

The proposed project includes the following activities:

- Construction of the 400kv/50kv substation within an area of 500m x 500m (Fig. 1)
- Construction of 400kv 20km loop in and loop out power lines

The construction of the Nieuwehoop substation will also include the following scope of work:

- Installation of 2x40MVA 400/50KV single phase transformers
- Installation of 400kv busbars (Fig. 1)

#### 4.1. PROJECT MOTIVATION

Spoornet wants to increase the carrying capacity of the Sishen-Saldanha railway line from 29 Mega Tons per year up to 67 Mega Tons per year. This is crucial for the economic well-being of the Sishen area which is dependent on the export of mineral ores particularly iron and manganese. This requires substantial increase in the number of locomotives that run within different supply loops at given time intervals. The 50kV loops will be halved in physical distance by creating new phase break points. The demand at the MTS level will also increase to about 40MW per substation. The railway capacitation project is anticipated to be operational by mid to end of 2010.

#### 4.2 PROJECT TEAM MEMBERS

**Table 2:** Details of the project team members

DETAILS OF THE PROJECT APPLICANT	DETAILS OF THE ENVIRONMENTAL IMPACT PRACTITIONERS
<b>ESKOM HOLDING LIMITED</b> P.O. Box 1091; Johannesburg; 1091	<b>NZUMBULULO HERITAGE SOLUTIONS</b> Suite 345 Postnet; Private Bag X9307; Polokwane; 0700
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#### 4.3. PROJECT LOCATION

The project area is located in the Northern Cape Province. The area falls under the jurisdiction of Kheis Local Municipality within Siyanda District. The proposed project study area is located on Farm Gemsbok Built 120. The project will take place between the existing Eskom Transmission substations, of Garona and Aries. The existing Garona substation lies approximately 18.5km north of Groblershoop town while Aries substation is situated approximately 44km south west of Kenhardt town. The study area is located at the following co-ordinates readings: S29° 09'10.0" and E021° 20'38.6" (Appendix 1).

#### 4.4 TECHNICAL DETAILS OF THE PROPOSED SUBSTATION AND POWERLINE

##### Substation

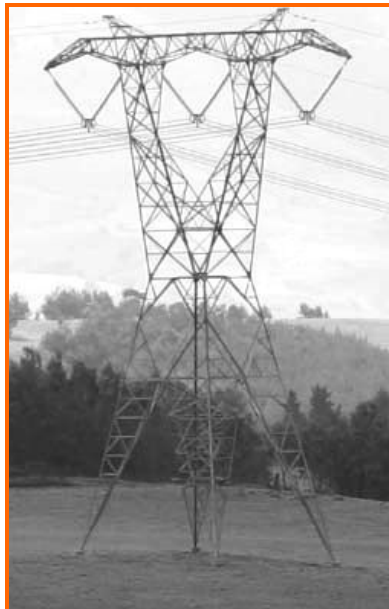
The minimum size required for the substation is 500mx500m. Figure 1 indicates the generic substation footprint.

##### 400kV Loop-in and Loop-out Transmission Powerlines

The proposed power line, pylon type and servitude details are as follows:

- 400kV overhead transmission line

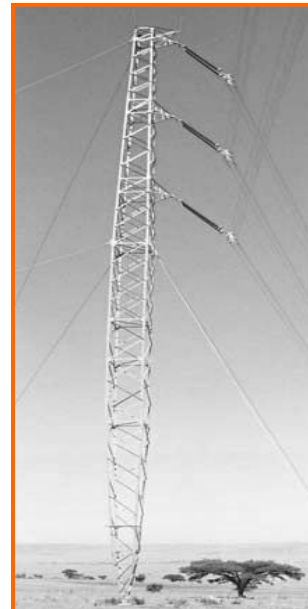
- Pylon construction will typically be cross-roped suspension design, 35 – 40m high (Plate 1), or a compact cross-roped suspension design (see Plate 2 below) of similar dimensions.
- Strain towers may be required on difficult terrain and on bends greater than 3° (Plate 1),
- Single-pole lattice structures with anchor guys may also be used on bends as appropriate. These are much less visually intrusive and are cheaper than conventional strain towers (Plate 3).
- Conductor ground clearance between towers is 8.1m
- Maximum operational height under conductors of 4.0m
- Servitude width 55m (27.5m either side of centre line). It is to be noted that the anchor cables for cross rope towers usually fall outside the 55m servitude width.



**Plate 1:** Example of strain tower type.



**Plate 2:** Example of compact cross rope suspension tower types



**Plate 3:** Example of a single pole steel lattice pylon.

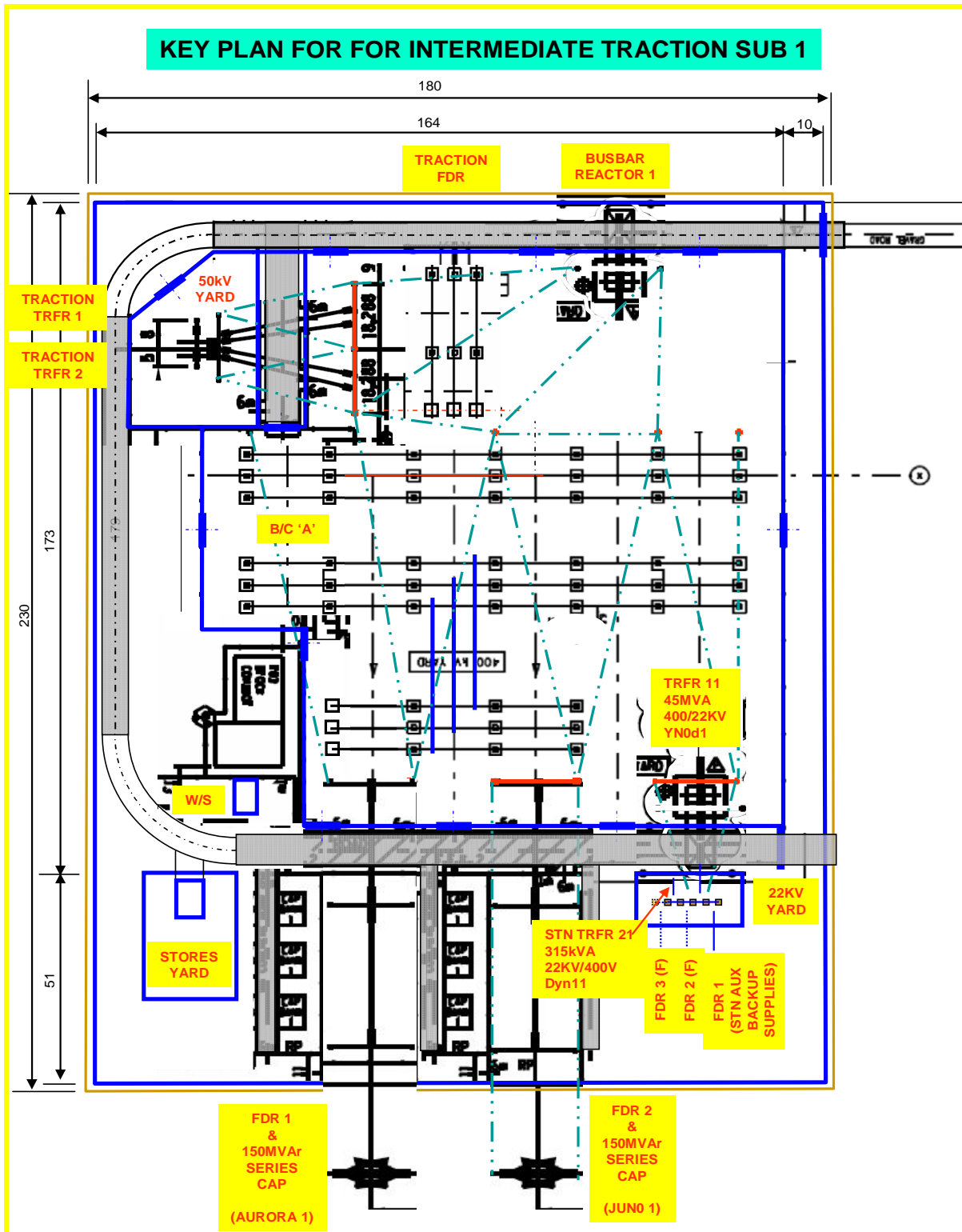


Figure 1: Substation footprint [Source: Eskom Transmission]

## 5. STUDY METHOD

The object of the study was to undertake a detailed site survey and gain an overall understanding of the heritage sensitivities of the project area within which the substation and loop-in Powerline would be developed and indicate how, if any, heritage resources may be

impacted or enhanced through development activities. The preliminary survey was limited to reconnaissance activities conducted In April 2008. The author (Professional Archaeologists and Heritage Specialist) in company of a junior archaeologist and other environmental specialist conducted the reconnaissance of the affected project area.

The detailed field study consisted of standard field survey covering the proposed sites earmarked for the construction of Nieuwehoop substation and power-line route and the respective servitudes for the tracking station. In practice, most archaeological and historical sites are found through systematic survey of the target landscapes. The survey therefore, sought to identify cultural heritage sites including graves, burial grounds and contemporary religious or sacred ceremonial sites associated with the proposed development

The field survey team conducted an impact assessment by transecting the affected landscape on foot looking for indicators of geological, palaeontological, archaeological and any other cultural materials in the affected areas. In part the field officer also inspected soil profiles for potential archaeological materials that may still be trapped *in situ* in an area already disturbed by previous earthmoving activities such as agricultural practices.

### **5.1. STUDY CONDITIONS**

The project area is located on open farm land currently used for livestock grazing. As such there are no restrictions to accessing the project area. The proposed substation site and loop powerline servitude route, including the alternatives sites, are situated on a uniform landscape with sparse vegetation and high ground visibility. Identification of palaeontological, archaeological or historical sites during surveying depends on visibility and accessibility. The surrounding areas of both the proposed substation and power-line route are accessible and within easy reach from the access farm roads. By looking at the nature of the area, the area is presumably dormant in terms of the existence or availability of archaeological or historical resources that can be classified as of high or medium in terms of significance.

### **5.2 HERITAGE RESOURCES VALUATION**

Heritage impact assessment is based on an valuation system that is used o determine the significance or importance of any heritage resources that may be encountered within the project's receiving environment. In order to evaluate the affected significant heritage resources or sites for management purposes, this HIA study adopts the system that ensures that sites or heritage resources are assessed against evaluation criteria described below (Tables 3 & 4). An effective HIA system evolves around three independent but related

aspects: conservation; significance and utilisation with reference to interferences that would result from the proposed development in the project area.

**Conservation** – this element focus on physical condition of the resources (site condition survey), potential threats or vulnerability (exposure of site or resource to immediate interference from development activities, deterioration or damaging elements), and accessibility (frequency of and density of human visitation).

**Table 3:** Conservation valuation system.

Criteria	Valuation Points
Physical condition	<b>No damage = 0 points</b>
Potential threats	Serious damage = 5 points Not vulnerable = 0 points Serious vulnerability = 5 points
Accessibility	Not accessible = 0 points Highly accessible = 5 points

**Significance** archaeological, architectural, palaeontological, historical, scientific, biophysical, socio-cultural, religious, aesthetic, uniqueness, emotional and contextual value of the site, feature and the overall cultural landscape.

**Table 4:** A selection of Significance Valuation details.

Significance	Value details
Scientific significance	<ul style="list-style-type: none"> <li>Relates to the assessment of the research potential of a site and the relevance of any data that the site(s) might contain for the pursuit of academic research questions including geology, geomorphology, palaeontology, etc.</li> <li>This also concerns the potential of a site(s) to address anticipated future trends, research capabilities and interests. The importance of a place will depend on its rarity, quality or representativeness, and degree to which the place may contribute further substantial information (see Burra Charter, 1988. p.12)</li> <li>May be measured against the site(s)'s values as unique sources of information; whether such information is not available from other sites; can it answer pertinent questions (Bickford and Sullivan 1977: 23-24).</li> </ul>
Archaeological Significance	<ul style="list-style-type: none"> <li>The significance of an archaeological site is based on the amount of deposit, the integrity of the context (that is primary versus secondary context), the kind of deposit and the potential to help answer present research questions.</li> </ul>
Historical Significance	<ul style="list-style-type: none"> <li>Historical significance relates exclusively to the last 100 years or a period of importance associated with events, developments, artistic excellence, outstanding achievement and evolution of a nation, group, region or locality.</li> <li>Historical value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all forms of significance valuation.</li> <li>A place may have historical significance because it has influenced, or has been influenced by an historic figure, event, phase or activity. It may value as a site of an important event. For any given place the significance will be greater where the evidence of the association or event survives in situ, or where the settings are substantially in tact, than where it has been changed where evidence does not survive. However, some events or association may be so important that the place retains significance regardless of the subsequent treatment.</li> </ul>

Aesthetic Significance	<ul style="list-style-type: none"> <li>• Mostly associated with intangible heritage values and cultural landscapes. Deals with visual values. In this context the significance is classified by response derived from the experience of the environment and cultural attributes within the project area.</li> <li>• Important in the context of this study is the observation that aesthetic significance is a product of emotional experience rather than a checklist of attributes.</li> <li>• As such many archaeological sites are sub-surface and therefore will not be able to be assessed on aesthetic criteria. This study uses site to site assessment whether aesthetic significance is a relevant category to assess, rather than taking this as a given.</li> </ul>
Social Significance	<ul style="list-style-type: none"> <li>• Social value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiments to a majority group</li> <li>• Social significance threshold also include religious sites bordering around the fact that they are considered sacred and they are used for rituals.</li> <li>• Data on the ritual activities relating to their significance is not readily available. Access to these sites is normally strictly restricted.</li> <li>• The sites are supposed to be located away from settlements or areas where the public may not have easy access.</li> </ul>
Religious	<ul style="list-style-type: none"> <li>• The significance threshold of religious sites border around the fact that they are considered sacred and they are used for rituals.</li> <li>• Data on the ritual activities relating to their significance is not readily available. Access to these sites is normally strictly restricted.</li> <li>• The sites are supposed to be located away from settlements or areas where the public may not have easy access.</li> </ul>

**Utilisation** relates to the site’s current use and utilisation status varying between two continuums of no utilisation (0 points) to utilised (5 points).

**Scientific utilisation** – Primary aim of scientific research lies in the search for answers to fundamental issues about the biophysical natural and the human world. Evaluation for scientific utilisation value for heritage resources revolves around context, i.e. primary versus secondary contexts whereby primary contexts are original and undisturbed or less disturbed and therefore more important scientifically as opposed to secondary contexts. This also borders around the preservation status of the given site(s). High levels of preservation obviously are very favourable for the site’s scientific utilisation.

**Educational/ interpretative** –This refers to the presence of humans in the region and on heritage sites. This depends on potential for public display and interpretation capacity while embodying conservation principle for sustainability.

## 6. BRIEF HISTORY AND DESCRIPTION OF THE STUDY AREA

### 6.1 GEOLOGY AND GEOMORPHOLOGY

The Northern Cape Province includes a group of schistose and gneissic metasedimentary, metavolcanic and intrusive rock types (Tswelopele Environmental [2006]). The general area is dominated by the Orange River from Prieska in the east bordered by the Kaapvaal Craton

to the Atlantic coast in the west. To the north and south the province is overlain by younger sequences like the Nama Group and the Karoo Super group. The province comprises supracrustal rocks that have been intensely deformed and metamorphosed, and a wide variety of intrusive rock types which are predominantly granitic. Metamorphism that has reached granulite facies, as well as deformation by folding and fluxion in a plastic state during metamorphism, characterise especially the western and central parts of this province.

Rocks of the Brulpan Group structurally overlie the Olifantshoek Supergroup. They comprise a succession of highly folded schists, with minor greenstone and quartzite. The western margin of the Kaapvaal Craton is marked by three volcano-sedimentary successions; the 1300 Ma old Wilgenhoutsdrif and Arachap Groups and the undeformed 1100 Ma old Koras Group. The northern part of the eastern boundary zone is intensely deformed by east-directed folding and thrusting, and metamorphosed to lower greenschist facies. The boundary between the Namaqualand Metamorphic Province and the Kaapvaal Craton is characterized by a number of normal, reverse and wrench faults as well as a sharp transition in the grade of metamorphism and the tectonic pattern (Tswelopele Environmental EIR, March 2006).

The floor to the Namaqualand Metamorphic Province has not been recognised (although some investigators in the past have claimed the recognition of such a floor). The volcanic Orange River Group in the Vioolsdrif area with its related intrusive of the Vioolsdrif batholiths are dated between 2 000 to 1 800 million years. Many rock types in the province are dated at around 1 200 million years, which most likely do not display their true age but rather the age of metamorphic resetting of the radiometric clock by extreme metamorphic conditions. The end of the Namaqua orogenesis is marked by intrusion of the mafic Koperberg Suite (1 100 Ma), as well as the formation of the pegmatite belt, which is dated at around 1 000 million years.

## **6.2 ARCHAEOLOGY**

The proposed substation and the associated loop-in and loop-out Powerline is situated on commercial livestock farmland in Kheis Local Municipality within Siyanda District, Northern Cape Province. From a prehistoric perspective, this region of South Africa is unique in that it was associated with hunter-gatherer cultures from Early (250 000 years ago), Middle (250 000-22 000 years ago) to Late (22 000 to 2 000 years ago) Stone Age.

The Early Stone Age (MSA) sites are generally found across the entire southern Africa region. Such sites are characterised by the Acheulian industries which consists of bifaces,



handaxes and cleavers which were in use up to 250 000 years ago (Deacon & Deacon 1999: 93). Sites like the Roodam near Kimberly in the Northern Cape have yielded ESA materials (Ibid). A new flake technology replaced the bi-faces heralding the emergence of the Middle Stone Age (MSA). Sites such as Hoedjiespunt and Die Kelders in the Western Cape are among the rich MSA sites in the general area where associated with the project region.

Round about 20, 000 years ago, new stone tool microlithic technology emerged to replace the MSA. These lithic tools were associated with rock art (paintings and engravings); deliberate burial of the dead; bow and arrows, bored digging-stick weights; decorative personal items such as shell beads; fishing equipment and earthenware pottery (in the last 2000 years) (also see Beaumont & Vogel 1989; Deacon & Deacon 1999). These are typical characteristics of what came to be collectively known as the Late Stone Age (LSA). Most LSA sites are associated with rock shelters and some of the well known LSA sites in the project region include Kasteelberg, Elands Bay and De Hangen.

The proposed project's receiving environment does not have the characteristics of landscapes associated with Stone Age tradition sites.

The Iron Age farming communities began to arrive in southern Africa some 2000 years ago. These communities did not migrate into the Northern Cape region where the project area is situated. However, their migration into the region coincided with the adoption and use of pottery by the LSA Khoesan herders. However, the Khoesan communities did come into contact with the first white settlers on the Western Cape from the mid-1600s. Given the fact that the encounter between the white settlers and the first nation communities were usually unfavourable to the later, the Northern Cape region for long acted as refuge of the last hunter-gatherer communities. However, this did not last forever as the new technology allowed the expanding white settlers to take over the vast Karoo open lands forcing the Khoesan communities into service under colonial administration or into isolated rural communities.

Today the project area falls in an area under commercial livestock farming. During the historical period, the area was brought under colonial administration as the white settlers took charge of the lands.

Given this general background of the Northern Cape region and the overall project area, if any heritage resources were to be encountered in this study, it was anticipated they will be of palaeontological, Stone Age and or historical period in nature. However, the proposed

substation construction will have a limited footprint on the area affected. The servitude of the loop-in and loop-out Powerline will also be limited to footprints of individual pylons.

### **6.3 LAND USE**

The project area is predominantly arid to semi-arid and thus the majority of the land is used for livestock farming (cattle, goat, and sheep). Relatively small areas are reserved for crop farming. Most of the area is dominated by vast open areas of natural vegetation, predominantly grassland. Relatively large land portions within the project can be classified as degraded. The overall area is also sparsely populated with isolated clusters of farm homesteads scattered in the area. The land cover is characterised by various tree species such as the Aloe and Quiver tree, large sections of which remain little affected by land-use practices and are in good condition, though some areas of Karoo bushveld occur where disturbances (sheep-grazing) have occurred and some sections have been disturbed by past impacts (e.g. access farm roads and track crossing, erosion, farm boundary fence lines, distribution powerlines, etc.).

### **6.4. EXISTING INFRASTRUCTURE**

The study area is within a remote area hence the existing infrastructure is quite limited. There is a Spoornet railway line (Plate 5.4) running through the study area, an indication of the level of the history of degradation within the project area. There are service roads which belong to Spoornet. There are several private owned farm access roads across the project area landscape.



**Plate 4:** Existing Spoornet railway line. The proposed loop-in power line will link the new substation to the tracking station next to this railway line.

## 6.5. TOPOGRAPHY

There are a variety of topographical features that make up the study area. The majority of the area is made up of a flat sparsely vegetated landscape with occasional rocky outcrops as indicated in Plate 5.5 below.



**Plate 5:** General topography of the study area. The proposed loop powerline will traverse in this uniform type of landscape.

## 6.6. SOIL

A study carried out by Mr. D.G Patterson of the Agricultural Research Council who was subcontracted by Tswelopele Environmental for the Draft Environmental Scoping for the proposed Garona to Aries 400kv transmission line indicates that the some of the area is made up red, freely drained sandy soils with a high base status occasionally calcareous, the dominant soils being the Hutton and some areas are made up of dominantly very rock areas and the dominant soils are the Glenrosa, Mispah.

## 7. RESULTS

### LOCATION DETAILS

**Province:** Northern Cape

**Magisterial District:** Siyanda

**Name of Properties affected:** Gemsbok Built 120

**Proposed development:** Construction of 400/50kV Nieuwehoop substation and 20km 400kV loop-in loop-out power-line.


### 7.1 BRIEF DESCRIPTIONS OF THE PROJECT SITES


The proposed substation, tracking station and power-line will be constructed in the farm Gemsbok Built 120 in Kheis Local Municipality, Siyanda District, Northern Cape Province. Three proposed substation sites were identified and all sites are located between Garona and Aries. Garona is located approximately 18.5km north of Groblershoop while Aries is situated 44km south west of Kenhardt town. Each proposed substation site is marked by four co-ordinates (see Table above for details of coordinates). This site earmarked for the substation is located approximately 150m away from the existing railway. The earmarked area is situated on the flat surface landscape with clear surface visibility.


The proposed site did not yield any archaeological resources barriers to the proposed development. Nothing of cultural heritage resources was identified on the direct path for the proposed substation and power-line construction site.

The location details and additional field survey findings are presented in Table 5 below.

**Table 5:** Results of CHA study for power-line route.

Location and Description	Cultural Heritage Site Type Found	Cultural Heritage Significance	Recommendations
<p>The proposed site earmarked for the construction of Nieuwehoop substation marked 4A. The site is characterised by sparse low shrubs and thin grass cover. The first site marked as site 4A is the preferred development site. The area is 250x250m in extent and is located 30km north west of Kenhardt town. This site is marked by the following co-ordinates:</p> <ul style="list-style-type: none"> <li>• S29°09'15.7" E21°20'58.7",</li> <li>• S29°09'19.4" E21°20'55.8",</li> <li>• S29°09'21.7" E21°20'58.0",</li> <li>• S29°09'17.7" E21°20'61.5".</li> </ul>	<p>No Cultural Heritage sites were identified in the affected area</p>  <p><b>Plate 6:</b> View of the farmland where the proposed substation marked 4A will be built.</p>	<p>None</p>	<p>This being the preferred substation construction site, we recommend that it be approved. Place site under heritage monitoring program covering the period of construction.</p>

Location and Description	Cultural Heritage Site Type Found	Cultural Heritage Significance	Recommendations
<p>Proposed site earmarked for the alternative site marked 4B. The site is currently used for grazing purpose. No archaeological resources were identified on this site. Site 4B is located within the same commercial farm area as site 4A. Site 4B is the first alternative to 4A which is the preferred site. The land is currently used for livestock grazing. The site is marked by the following co-ordinates:                      S29°06'12.3" E21°23'36.5",                      S29°06'09.8" E21°23'39.2",                      S29°06'13.0" E21°23'36.5"                      S29°06'16.1" E21°23'40.6".</p>	<p>No Cultural Heritage sites were identified in the affected area</p>  <p><b>Plate 7:</b> View of the site earmarked as the first alternative site for the construction of a substation marked 4B. Note the powerline in the background which runs along the railway line.</p>	<p>None</p>	<p>Should this site be approved for construction, the site be placed under heritage monitoring program covering the period of construction.</p>

Location and Description	Cultural Heritage Site Type Found	Cultural Heritage Significance	Recommendations
<p>The proposed alternative site earmarked for the construction of substation marked 4C. The site is used as grazing land. Site 4C is the second alternative site for the proposed construction of Nieuwehoop substation to be located between Garona and Aries. Like 4B, the site is within the same commercial farm land. This site is marked by the following co-ordinates:</p> <ul style="list-style-type: none"> <li>• S29°06'30.3" E21°23'37.3",</li> <li>• S29°06'27.5" E21°23'39.1",</li> <li>• S29°06'25.6" E21°23'35.6",</li> <li>• S29°06'27.8" E21°23'33.4".</li> </ul>	<p>No Cultural Heritage sites were identified in the affected area</p>  <p><b>Plate 8:</b> View of the site selected as alternative site for the proposed substation. This site is marked 4C.</p>	<p>None</p>	<p>Should this site be approved for construction, the site be placed under heritage monitoring program covering the period of construction.</p>



## **7.2 INTANGIBLE HERITAGE**

Since the National Heritage Resources Act 25 of 1999 includes “landscape” (and other intangible elements) as part of the National Heritage, it is appropriate to comment on these aspects. The study area is situated within open potentially prehistoric landscape. The study area presents no scenic vistas at all. The landscape is currently used for animal grazing and sparsely populated. From this point of view the study area does not retain any unique visual aesthetics. The area is not sensitive to both types of proposed developments. In fact there are power lines, a major railway line, farm access roads, rail service road, farm boundary fence lines and telecommunication infrastructures within the general project area. As such the proposed development would not be unique or out of place in this environment. The project has no potential to impact the public memory and sense of place on a regional level.

## **7.3 PALAEOLOGICAL, ARCHAEOLOGICAL AND CULTURAL SITES**

Desktop studies, reconnaissance surveys and detailed field survey of the affected project area did not identify or yield any signatures or evidence of potential palaeontological, archaeological or physical cultural properties associated with any of the sites earmarked for the substation construction. No sites or materials were identified in association with the proposed loop-in and loop-out power line route.

## **7.4 HISTORIC MONUMENTS**

The project area is semi arid and very unfavourable for settlement. As such, from a historical perspective, it has always been sparsely populated. Today the region remains sparsely populated and is predominantly used for open livestock grazing. There is no listed monument in the area affected by the proposed project. No historical sites of significance were identified on route of power-line and substation development.

## **7.5 BURIAL GROUNDS AND GRAVES**

In terms of the Section 36 (3) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) no person may, without a permit issued by the relevant heritage resources authority:

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;



(b) destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment, which assists in the detection or recovery of metals.

Therefore, in addition to the formal protection of culturally significance graves, all graves which are older than 60 years and which are not located in a cemetery (such as ancestral graves in rural areas), are protected. Communities, which have an interest in the graves, must be consulted before any disturbance can take place. The graves of victims of conflict and those associated with the liberation struggle will have to be included, cared for, protected and memorials erected in their honour where practical. Regarding graves and burial grounds, the NHRA distinguishes between the following:

- Ancestral graves
- Royal graves and graves of traditional leaders
- Graves of victims of conflict
- Graves of individuals designated by the Minister by notice in the Gazette
- Historical graves and cemeteries
- Other human remains, which are not covered in terms of the Human Tissue Act, 1983 (Act No.65 of 1983).

### **Significance valuation Burial Ground, Historic Cemeteries and Graves**

The significance of burial grounds and gravesites is closely tied to their age and historical, cultural and social context. Nonetheless, every burial should be considered as of high significance. Should any grave previously unknown be identified during construction, every effort should be made not to disturb them. Pole position should be shifted to ensure the grave or burial ground is not disturbed.

### **Grave yards**

No graves or burial ground was identified on sites earmarked for substation development or along the route of the power-line.

### **Previously unidentified burial sites/graves –**

Although the possibilities of encountering previously unknown graves are very limited within the project area during the proposed development, should burial sites outside the NHRA be

accidentally found, they must be reported to the nearest police station to ascertain whether or not a crime has been committed. If there is no evidence for a crime having been committed, and if the person cannot be identified so that their relatives can be contacted, the remains may be kept in an institution where certain conditions are fulfilled. These conditions are laid down in the Human Tissue Act (Act No. 65 of 1983). In contexts where the local traditional authorities give their consent to the unknown remains to be re-buried in their area, such re-interment may be conducted under the same regulations as would apply for known human remains.

## 8. STATEMENT OF OVERALL IMPACTS

From a cultural heritage point of view, any development that alters the ground surface status quo will potentially destroy any or physical cultural properties and heritage resources in its direct path, and the impact will be permanent in nature, extent and duration. Palaeontological, archaeological and physical cultural resources are fixed in space. Any activities that threatens to alter the status quo is, therefore an immediate and direct threat to the heritage resources (Bickford and Sullivan, 1977) However, since there were no indications or signatures of palaeontological, archaeological and physical cultural resources that was identified on the direct path of both the substation sites and the power-line route, the overall impact of the proposed development is considered to be low. As such, generally speaking, the proposed developmental project will have minimal impact upon any cultural heritage resources given the fact that the survey did not encounter any such sites with any significance threshold. Table 6 below give detailed impact matrix of the overall project from a comprehensive environmental perspective.

**Table 6:** Matrix of impact assessment for proposed substation and powerline development project.

ISSUE	DETAILS	PHASE OF CONCERN	POTENTIAL SIGNIFICANCE OF IMPACT	
			Before mitigation	After mitigation
<b>1. ECONOMIC</b>				
1.1 National and Provincial Impact	National and provincial importance of project in terms of promoting economic growth in the region and South Africa	Operation	High (positive)	High (positive)
1.2 Local Benefits	Economic benefits that the Substation and Loop-in and Loop-out Transmission line will bring to local communities	Construction & operation	Low to Moderate (positive)	Moderate (positive)
1.3 Job Creation	Employment of local labour (South African citizens and people local to the area) and preference given to a local contractor	Construction & operation	Low to Moderate (positive)	Moderate (positive)
1.4 Tourism	The substation and associated line will detract from the aesthetic appeal of the natural environment, and will therefore negatively impact on tourism activities	Operation	Low to moderate	Low to moderate
<b>2. WELL BEING:</b>				
2.1 Electro-magnetic fields	Impact of electromagnetic fields (EMFs) on animals, people and vegetation	Operation	Low	Low
2.2 Dust & Noise (within plant)	Dust & noise control during construction	Construction	negligible	negligible

area)				
2.3 Corona noise	The effect of the corona (low "buzzing" noise) may be noticeable in properties immediately adjacent to the servitude.	Operation	negligible	negligible
2.4 Use of creosote poles	Creosote poles may be used during the project and may have a negative health implications and an ecological impact	Construction	Low	Low
2.5 Fire hazard	The construction and operation of the substation and power line may alter the occurrence and management of fires in the area. The change in the nature of fire hazards and events can have safety, economic and ecological implications.	Operation & Construction	Potentially High	Moderate to Low
<b>3. AESTHETICS:</b>				
3.1 Visual impact	Visual impacts will be significant in the local area	Operation	Moderate to high	Moderate to high
3.2 Sense of Place	Negative impact on the aesthetic qualities associated with the Karoo landscape in the project area in the vicinity of the substation and associated line	Operation	Low to Moderate	Low to Moderate
<b>4. SOCIAL:</b>				
4.1 Relocation of people	Will there be a need to relocate people, and their property/houses? What are the likely impacts? Will they be compensated?	Construction	Low	Low
4.2 Disruption of social networks and daily movement patterns	The social routine and social networks may be disrupted during the construction process.	Construction	Low	Low
4.3 Location of construction camps	The siting of construction camps	Construction	Potentially High	Potentially low (positive)
4.4 Gravesites	Protection of gravesites, disinternment of graves	Construction	Low	Low
4.5 Traffic Safety	Road traffic safety, particularly relating to construction traffic.	Construction	Low	Low
<b>5. LAND ISSUES</b>				
5.1 Property value reduction	Negative impact on property values	Operation	Moderate (perceived)	Low (positive)
<b>6.FARMING RELATED ISSUES</b>				
6.1 Access to properties	The creation of new or improved access to properties, for access to the substation and Loop-in and Loop-out line, brings potential associated issues that need to be considered.	Construction & Operation	Moderate to High	Low
6.2 Access roads	The physical creation and use of new roads, or increased use of existing roads will also have associated impacts	Construction & Operation	Potentially High	Moderate to Low
6.3 Loss of agricultural potential	Restrictions on land use and activities will impact on the agricultural potential of the land.	Construction & Operation	Low	Low
6.4 Season for construction activities	Certain activities (construction and operation) may have greater impacts on the environment and agricultural activities at certain times of the year.	Construction	Moderate to Low	Low
<b>7. NATURAL ENVIRONMENT:</b>				
7.1 Erosion	Erosion on access roads may become a problem.	Construction & Operation	Moderate to low	Low
7.2 Impact on fauna	Impacts on the natural fauna in the area	Construction & Operation	Moderate	Low
7.3 Impacts on Avifauna (birds)	Impacts on birds.	Operation	Potentially high	Moderate
7.4 Impact on flora	General impacts on flora.	Construction & Operation	Moderate	Moderate to Low
7.5 Impact on wetlands	Potential damage to wetlands in during construction and maintenance	Construction & Operation	Potentially high	Moderate
7.6 Importation of alien vegetation	Importation of alien vegetation through building materials	Construction	Moderate to High	Low

7.8 Impact of construction camps	The construction camps may have an impact on the natural environment	Construction	Potentially High	Moderate to low
<b>8. HERITAGE RESOURCES</b>				
8.1 Palaeontological Sites	Impact on fossils.	Construction	negligible	Negligible
8.2 Archaeology	Impact on late stone age and possible iron age sites.	Construction	negligible	Low
8.3 Cultural, Historical and National Heritage Sites	Cultural landscape	Construction	Moderate to Low	Low
<b>9. CONSTRUCTION CAMP ISSUES</b>				
9.1 Immigration of construction workers	Immigration of construction workers may lead to social disruption, increased crime, sexually transmitted diseases.	Construction	Potentially moderate to high	Moderate to low

## 9. OVERALL RECOMMENDATIONS

- No further predevelopment study or mitigation is necessary for cultural heritage resources with regards to the proposed construction of an Eskom 400/50kV substation and a 400kV power-line development project. However, there is always a probability of discovering archaeological sites during sub-surface earth moving activities such as digging the pole foundations or any other trenches. The same applies to the power-line substation.
- The preferred power-line route and the associated substation site are acceptable. Nonetheless, it would not make a difference for the affected cultural landscape should the alternative site be selected for the final development.
- The foot print impact of each pole should be kept to minimal to limit the possibility of encountering chance finds.
- This study recommends that a heritage monitoring plan (as part of the Environmental Management Plan [EMP]) be put in place during construction period to ensure that no chance finds are encountered.
- Furthermore, the construction team should be informed about the value of the cultural heritage resources in general so as to ensure that they do not destroy the chance archaeological sites they may encounter during working on the power-line route and the construction of substation.

## 10. CONCLUDING REMARKS

From a heritage perspective, in the absence of any known heritage resources and taking into consideration the socio-economic and other values of the proposed transmission power-line and substation development, there are no barriers to the proposed development. The cultural landscape affected by the proposed development does not have significance threshold to call for total protection as defined by the NHRA (Act 25, 1999). Although the chances of

encountering significant previously unknown heritage resources are remote, detailed monitoring procedures should be scheduled into the project EMP in order to adequately respond to chance finds that may be found accidentally during construction period. The proposed project may proceed as planned subject to a heritage monitoring programme. With the constraints herein discussed and appropriate monitoring measures adopted, there are no objections to the proposed development project and we recommend to the heritage authorities to approve the project accordingly.

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