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## EXECUTIVE SUMMARY

In order to support increased electricity demand in the Eastern Cape, Eskom Transmission is planning to strengthen the existing network with additional 765kV capacity between the Zeus Substation, near Standerton (Mpumalanga) and Grassridge Substation near Port Elizabeth (Eastern Cape). This 1300km distance has been broken into three sections, of which the link between Zeus and Perseus Substations (approx. 430km) is seen to be critical to maintain reliability of supply in the short-term.

At the initial stage of the planning process, two options were decided upon:

- A direct 765kV link between Zeus and Perseus (near Dealesville, Free State), or
- Provide a 765kV link from Zeus and Mercury (near Orkney, North West) and then utilise an already approved new line between Mercury and Perseus.

Three routes were identified in the Zeus-Mercury option (namely ZM1, ZM2 and ZM3) and four routes in the Zeus-Perseus option (namely ZP1, ZP2, ZP3 and Z4).

At the end of the scoping phase it was recommended that routes ZP1 and ZM2 no longer be considered further for the project. Hence the routes focused on during the EIA phase of the project were ZM1 and ZM3 and ZP2, ZP3 and ZP4.

The study area is large and layers of human occupation of South Africa have left their mark on this area. It also contains important historic or prehistoric sites and includes the Vredefort Dome that was the result of a meteorite impact with the earth some 3 billion years ago near Vredefort and Parys.

Heritage resources are non-renewable, finite and fragile and if they are not managed properly they deteriorate and are destroyed. Heritage resources are both tangible and intangible. The intangible or living heritage is often only identified during discussions with community members and individuals. Sites may include places where people gather for spiritual or religious purposes or where a significant occurrence took place that forms part of the history of a specific community or group of people.

Tangible heritage resources that occur in the study area include graves, structures of historical significance, remains of dwellings and other structures that could be examples of South Africa's vernacular architecture, sites that form the layers of the country's infrastructure development such as old roads, bridges, mining shafts and military sites including memorials, battlefields and remains of forts and blockhouses.

An assessment of the routes revealed a number of heritage resources including a Black refugee camp cemetery from the 2<sup>nd</sup> Anglo-Boer War, 1899-1902, memorials and battlefields from earlier conflicts between white settlers and black inhabitants and traces of original roads and bridges revealing infrastructure development of that specific area. A number of old dwellings and stone structures were found in the study areas that are examples of vernacular architecture of the country.

After detailed studies were undertaken and discussions held, it was decided that ZM1 and ZP3 were the preferred routes. With regard to ZP3, it was also decided that because of congestion at Virginia

and a high concentration of centre pivot irrigation systems in the Sand Vet Water Scheme southwest of Virginia, the proposed line should drop down to ZP2 before it reaches Virginia thus avoiding the above problem areas.

The following recommendations relate to the preferred routes only:

- Walk-throughs of sections of the preferred routes will be undertaken by the heritage specialist during the detailed design phase of the project where there are concerns about the impact of proposed lines on heritage resources.
- If the routes cross ridges or hills then a careful assessment of these areas by the heritage specialist is recommended as these areas were used by both the British and Boer forces during the Anglo-Boer War.
- Some sites of heritage significance were located along the top section (Zeus substation to Atlas substation) of ZM1 and ZP3 routes and there is a strong possibility that other sites will be found. It is therefore recommended that the heritage specialist walks parts of this section of the routes during the detailed design phase to identify other heritage sites and mitigate the effect of the power line.
- It is recommended that the proposed power lines follow a route between the existing power lines along the top section of the ZM1 and ZP3 route and it is strongly recommended that the new line runs north of the existing most northern power line in order to move the line away from the heritage sites between Zeus and Atlas substations.
- The area south of Meloding and Virginia and along the Merriespruit is undisturbed and it is recommended that the heritage specialist walk this area during the detailed design phase as there is a possibility of finding heritage resources in this area.
- The recommendation to drop the line near the Nestor substation to the ZP2 line in order to avoid congestion around Virginia and the concentration of centre pivots at the Sand Vet Water Scheme is supported on condition that the above recommendation is implemented.

The impact of the proposed power lines on heritage resources along the preferred routes can be mitigated successfully if the above mitigation measures are adopted as discussed in the impact assessment hence these two routes can be accepted for the proposed power lines.

## **ZEUS-PERSEUS 765KV TRANSMISSION LINE EIA**

### **ENVIRONMENTAL IMPACT REPORT**

#### **HERITAGE IMPACT ASSESSMENT**

##### **1. INTRODUCTION**

In order to support increased electricity demand in the Eastern Cape, Eskom Transmission is planning to strengthen the existing network with additional 765kV capacity between the Zeus Substation, near Standerton (Mpumalanga) and Grassridge Substation near Port Elizabeth (Eastern Cape). This 1300km distance has been broken into three sections, of which the planned link between Zeus and Perseus Substations (approximately 430km) is seen to be critical to maintain reliability of supply in the short-term.

At the initial stage of the planning process, two principal options are seen to exist that will enable the required link to be achieved:

- A direct 765kV link between Zeus and Perseus (near Dealesville, Free State), or
- Provide a 765kV link from Zeus and Mercury (near Orkney, North West) and then utilise an already approved new line between Mercury and Perseus.

Three routes were identified in the Zeus-Mercury option (namely ZM1, ZM2 and ZM3) and four routes in the Zeus-Perseus option (namely ZP1, ZP2, ZP3 and Z4).

At the end of the scoping phase it was recommended that routes ZP1 and ZM2 no longer be considered. Hence the studies, during the EIA phase, focused on ZM1 and ZM3 for the Zeus-Mercury route and on ZP2, ZP3 and ZP4 for the Zeus-Perseus route with some alternatives that are combinations of these routes (ZM3+ and ZP3-4 and ZP3/2).

## 2. BACKGROUND

The construction of the power line is a scheduled activity in terms of Schedule 1 of Regulation 1182 (1997) of the Environmental Conservation Act No. 73 of 1989 accordingly and as such requires environmental authorisation:

- ⇒ *Construction, erection of facilities for commercial electricity generation with an output of at least 10 megawatts and infrastructure for bulk supply;*
- ⇒ *Change of land use from agricultural or zoned undetermined use or an equivalent zoning to any other land use.*

In order to comply with section 38 of the National Heritage Resources Act (NHRA), No. 25 of 1999, Eskom requires knowledge of the presence and significance of any heritage resources that may occur in the routes referred to above. The aim of the heritage assessment undertaken during the EIA phase was to;

- establish whether any types of heritage resources (see below) occur in or near the various proposed routes and determine the nature and extent of the significance of any heritage resources located during the assessment
- propose mitigation measures to reduce the impact of the development on any identified heritage resources of significance.

The NHRA, No. 25 of 1999 outlines the following types and ranges of heritage resources that qualify as part of the national estate, namely:

- (a) places, buildings structures and equipment of cultural significance;
- (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 of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological 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 individuals designated by the Minister by notice in the Gazette;
  - (v) historical graves and cemeteries; and
  - (vi) other human remains which are not covered by in terms of the Human Tissue Act, 1983 (Act No 65 of 1983)
- (h) sites of significance relating to the history of slavery in South Africa;
- (i) moveable objects, including -
  - (i) objects recovered from the soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens;
  - (ii) objects to which oral traditions are attached or which are associated with living heritage;
  - (iii) ethnographic art and objects;
  - (iv) military objects;
  - (v) objects of decorative or fine art;
  - (vi) objects of scientific or technological interest; and

(vii) books, records, documents, photographs, positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No 43 of 1996).

This report will discuss the heritage resources in the study area but **NOT** archaeological and paleontological sites that have been investigated and will be reported on by the archaeologist.

Heritage resources are non-renewable, finite and fragile and if they are not managed properly they deteriorate and are destroyed. Heritage resources are both tangible (that can be touched) and intangible. The intangible or living heritage is often only identified during discussions with community members and individuals. Sites may include places where people gather for spiritual or religious purposes or where a significant occurrence took place that forms part of the history of a specific community or group of people. Heritage is basic to a person's self-awareness.

Tangible heritage resources that occur in the study area include graves, structures of historical significance, remains of dwellings and other structures that could be examples of South Africa's vernacular architecture, sites that form the layers of the country's infrastructure development such as old roads, bridges, old mining shafts and military sites including memorials, battlefields and remains of forts and blockhouses.

Heritage resources can be difficult to locate in an area as large as the Zeus-Perseus study area unless there is prior knowledge of their location and was also not possible to visit all areas of the routes. However, as part of the mitigation process where there are concerns about sections of the routes, it is recommended that the heritage specialist walk these areas to establish or locate heritage resources in these areas.

### **3. BRIEF HISTORICAL OVERVIEW**

Some of the earliest human populations lived in Southern Africa and evidence from various sites has inspired debates on the emergence of modern humans.<sup>1</sup> The internationally known fossil hominid sites of the Cradle of Humankind World Heritage Site in Gauteng and the Florisbad site in the Free State are mentioned in research dealing with the evolution of modern humans (*Homo sapiens*).<sup>2</sup>

Prior to this, a meteorite struck earth over 3 billion years ago in the vicinity of Vredefort and Parys in the northwest of the Free State Province that left a crater of between 250-300km wide. The area is now known as the Vredefort Dome and is a declared World Heritage Site. The area is deemed a 'no-go' area for this project because of its status and high heritage value.

Although hotly debated by archaeologists, fossils found near the mouth of the Klasies River in the Eastern Cape indicated that *homo sapiens* may have lived in South Africa as early as 90 000 years

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<sup>1</sup> <http://books.google.co.za/books>, p.1

<sup>2</sup> Free State Province State of Environment Report (Final Draft). Chapter 12. Heritage Resources, p.1

ago.<sup>3</sup> The descendents of those who lived in what is now known as South Africa are the San or Khoi-San. They were hunter-gatherers who did not domesticate animals nor did they cultivate crops and were essentially migratory, moving around in search of game and plant foods.<sup>4</sup>

Some 2,500 years ago, a gradual but far reaching change occurred when early inhabitants acquired livestock and domesticated them so that herding became more and more the dominant economic activity replacing hunting and gathering. These pastoralists were known as the Khoikhoi.<sup>5</sup>

At about the same time the above was occurring, Bantu-speaking people began to arriving South Africa. Originally from the Niger Delta area in West Africa, they had started to make their way south in small waves rather than in one cohesive migration. They also had domestic animals and were agriculturalists and skilled iron workers who lived in settled villages.<sup>6</sup>

In the last 400 years European settlers moved into Southern Africa and shaped the boundaries of South Africa. As the settlers moved further north they encountered settled communities and South Africa's history is littered with skirmishes, battles and co-operation between various groups within Southern Africa.

These waves of human migration impacted on the study area in various ways and the area encompasses much of the above history with the remains of old structures, corballed huts, battlefields, cemeteries, amongst others that still can be found in various stages of preservation.

The study area, as the rest of South Africa, was also affected by various wars between the two white communities and the area has a several sites of the 1<sup>st</sup> and 2<sup>nd</sup> Anglo-Boer War in it. The industrial and economic growth of the country has also left marks on the area where structures such as sections of the original bridges, roads, can still be found that tell of the development of the country.

These layers of human occupation of the landscape have helped to mould South Africa as we know it, and form part of our heritage. It is important to acknowledge the past through the preservation and conservation of important historic or prehistoric sites

#### **4. METHODOLOGY**

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<sup>3</sup> [http://wikipedia.org/wiki/History\\_of\\_South\\_Africa](http://wikipedia.org/wiki/History_of_South_Africa), p. 2

<sup>4</sup> Reader's Digest, 1992. Illustrated History of South Africa. The Real Story, p.20

<sup>5</sup> Ibid, p.21

<sup>6</sup> [http://wikipedia.org/wiki/History\\_of\\_South\\_Africa](http://wikipedia.org/wiki/History_of_South_Africa), p. 2



The purpose of this report is to identify the best environmental route and in terms of heritage impacts. The identification process included a field trip to investigate the routes selected. It should be noted that because of the heavy rains and tall vegetation, the identification of sites was sometimes difficult.

Desktop research included analysing field maps, agricultural potential maps, searches on the internet, perusing relevant provincial reports on the State of the Environment and consulting with various heritage specialists regarding matters such as the blockhouse system. Meetings were held with the client and other specialists and there was ongoing interaction with the archaeological team.

The study area covers four provinces, Mpumalanga, North West, Gauteng and Free State. The Zeus-Perseus routes cover three provinces, viz., Mpumalanga, Gauteng and the Free State with the largest portion of all the proposed routes falling in the Free State province. The routes recommended for Zeus-Mercury fall in all four provinces.

## **5. ROUTES**

### **5.1 ZEUS – MERCURY ROUTES**

#### **5.1.1 Zeus-Mercury 1 (ZM1)**

This first section of this route passes close to the towns Greylingstad and Balfour and surrounding farming communities. The area between Zeus and Atlas substations is fairly disturbed by existing power lines and other infrastructure such as provincial roads and railway lines and a fair degree of cultivation and some mining activity.

- From a heritage perspective there is the possibility of finding Anglo-Boer War (1899-1902) sites along this corridor. A black refugee camp cemetery is located on the western outskirts of Greylingstad.

For much of the 20<sup>th</sup> century the existence of Black refugee camps was ignored and only recently have the existence of these camps been acknowledged. Refugee camps were established by the British to house black farm workers, their families and other affected communities displaced by the scorched earth policy of the British. The remains of such camps and cemeteries of those who perished in them are very scarce and hence extremely significant and should be conserved.

- Situated on the hill overlooking the town of Greylingstad are the remains of a British fort built by the Scottish Rifles and other fortifications such as gun emplacements, entrenchments and

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stone walls. The remains of the fort are located at S26:43:39.9; E28:44:34.<sup>7</sup> The hill would have been of great strategic significance as the British were in a position defend the railway line against attacks from the Boers and keep an eye on Boer movements.

**It is recommended that the proposed power lines follow a route between the existing power lines and it is strongly recommended that the new line runs north of the existing most northern power line in order to avoid the above sites.**

- It is recorded that a line of blockhouses stretched between Standerton and Heidelberg. Most of these structures would have been built on ridges and hills and whether any remains are still visible is unknown. However, the presence of these sites on ridges will probably mean that they will not be impacted on if the power lines avoid ridges and hills.

**If the proposed power lines cross ridges or hills then a careful assessment of these areas by the heritage specialist is recommended as such sites were used by both the British and Boer forces during the War.**

- The area running from Zeus substation to Atlas substation has been impacted on by some mining whereas the route from the Atlas substation going southward is riddled with mining, mining applications and power lines, i.e. there is a high level of mixed landuse and the possibility of finding heritage resources in this area is low.
- The route heading north and around the Vredefort Dome is cultivated with some tracts of grassland. Heritage resources are unlikely to be found in cultivated areas (and this applies to all areas that fall in the routes). Various old structures were observed along sections of the Z-M1 route. One of the sites was located at S26:42:861; E027:24:299. It is a rectangular stone structure about waist high with no entrance or exist point. The purpose of the structure is unknown. The structure is deemed to be of no significance.
- The remains of another old stone structure were found along the Roodekraal road at S26:47:117; E027:12:951. Again, the structure is not regarded to be of significance. It may have been an old dwelling or storage structure.

It should be noted however that structures older than 60 years are protected by the NHRA and can only be destroyed or removed once approval has been received from the relevant provincial heritage authority. Both structures mentioned above are older than 60 years.

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<sup>7</sup> E-mail correspondence with Anton van Vollenhoven, 30-01-2006.

**Some sites of heritage significance were located along the ZM1 route and it is therefore recommended that sections of the route from Zeus to Atlas substations are walked by the heritage specialist during the detailed design phase to ensure that other heritage sites are identified and that the routing of the power line and positioning of the tower structures do not impact on these sites.**

### **5.1.2 Zeus-Mercury 2 (ZM2)**

*Although it was recommended that this route not be considered during this phase of the EIA, concerns regarding the impact of the proposed power line on a number of significant heritage sites support this recommendation. These were:*

- The area between Zeus substation and the Vaal River saw a lot of action during the Anglo-Boer War. Graves of several Boer soldiers are found where the farms Rietfontein, Hartbeesfontein and Brandkraal join and on the farm Botha's Kraal, the Battle of Bothaskraal took place on 20 November 1901. It is unknown if the battlefield is still visible but the area should be avoided as traces of the battle may still be evident.
- Near Heilbron, there is the possibility of finding the remains of a Black Refugee Camp and or cemetery on the farm Fairview through which routes ZM2 and ZP4 directly cross. Black refugee camps were set up because of the scorched earth policy of the British that resulted in large groups of black workers and their families having no place to live. Remains are of such sites are extremely scarce and should be conserved as part of our history that was previously ignored and forgotten.
- From Heilbron the route turns northwest and passes just above the town of Koppies. Directly north of Koppies are several Anglo-Boer war sites including a concentration camp cemetery, Rooiwal British gravesite and the possibility of the remains of a Black refugee camp.

### **5.1.3 Zeus-Mercury 3 (ZM3)**

The section of this route from Zeus substation to where the proposed lines turns north west was briefly visited during the field visit. No sites of significance were noted during the visit.

**However, if this route is considered, it is recommended that sections of the route between Zeus substation until a point just above Heilbron where the proposed route turns northwest, be inspected on foot or by helicopter by the heritage specialist to verify the above statement.**

The area from Zeus substation crosses over the area where a line of blockhouses stretched from Standerton to Heidelberg. It is unknown if the remains of these blockhouses can still be seen or found. According to Anton van Vollenhoven, an expert on blockhouses of the Anglo-Boer War, the only blockhouses he located were in the Suikerbosrand Nature Reserve.<sup>8</sup> However, this does not rule out the possibility of finding the remains of such sites hence the above recommendation.

It should be remembered that the route then heads north west to join with the ZM1 route to go north of the Vredefort Dome and the comments attributed to the ZM1 route also apply to this section of the ZM3 route.

**Due to the possibility of finding heritage sites in the area between the Zeus to Atlas substations, it is recommended that ZM3 and ZM1 routes be combined so that the proposed power line run south west from Zeus following the ZM3 corridor before joining up with ZM1 below Sasolburg to follow the route north of the Dome and then south, south west into the Mercury substation.**

## 5.2 ZEUS – PERSEUS ROUTES

### 5.2.1 Zeus-Perseus 2 (ZP2)

This route runs directly south from Zeus substation passing west of Standerton before turning southwest to run to Dealesville.

- There is a possibility of finding traces of 1<sup>st</sup> and 2<sup>nd</sup> Boer War sites in the first section of the route that passes west of Standerton. It is recorded that there are sites on the farms Goedgevonden, Brakspruit and Rooikoppen.<sup>9</sup> What these sites are is presently unknown but they could be the remains of forts, trenches, gun emplacements, etc.

**It is recommended that further investigation of these sites take place if this route is selected and necessary mitigation measures implemented to ensure that the construction of the power line does not impact on sites found.**

- Where the proposed Z-P2 route crosses the R73 (Virginia - Winburg road), sections of the old road (possibly the predecessor of the R73) and bridge were found. This site is one of few sites that show a historical layer of infrastructure development in the area and it is important that such sites are preserved as there is little left to indicate these developments.

**Although it is not believed that a power line will impact on these structures, it is recommended that if the ZP2 route is selected, the route of the power line avoids this**

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<sup>8</sup> E-mail correspondence with Anton van Vollenhoven, 26-01-2006 to 30-01-2006.

<sup>9</sup> National Museum of Bloemfontein. 2006. Unpublished document. Known Heritage sites on proposed ZP lines, p.1

**site or the heritage specialist informs Eskom where tower structures can be placed to avoid impacting on the structures.**

### **5.2.2 Zeus-Perseus 3 (ZP3)**

The first section of the route follows the same route as ZM1 from the Zeus substation directly west to the Atlas substation. Hence the same concerns and recommendations as documented for ZM1 apply to this route. This also applies to that section of the route that proceeds southwest from Atlas substation, past Denysville and further south due to the high degree of land use and impact this has had on the area.

- The route swings below Virginia and Meloding on the outskirts of Virginia is developing rapidly south from its present location. This undeveloped area south of the township, especially along the Merriespruit, is relatively undisturbed and it is **recommended that the heritage specialist walk this area as there is a possibility of finding heritage resources in this undisturbed area.**
- In routes ZP3 and ZP4, a number of abandoned farmsteads were observed which could be due to a number of factors. These constitute a history of early settlement of the area and are examples of early vernacular architecture of farmhouses or dwellings in the area and measures should be taken to not impact on them.

**Sites of heritage significance were located along this first section of this route from Zeus substation to the Atlas substation. It is recommended if this route is selected, the new line run between the existing lines thus keeping the impact of the power lines to a corridor.**

**If selected, it is recommended that the heritage specialist assesses the undisturbed area south of Virginia as mentioned above.**

**The recommendation that just west of the Nestor substation the Z-P3 line turn south to following existing power lines to Z-P2 to avoid the congestion around Virginia is supported on condition that the area south of Virginia is assessed by the heritage specialist as recommended above.**

### **5.2.3 Zeus-Perseus 4 (ZP4)**

This route is the most direct from Zeus substation to Perseus substation near Dealesville.

There are a number of heritage concerns along this route. These are:

- As with Z-M2, this route crosses the blockhouse line between Standerton and Heidelberg and care will have to be taken that if this route is selected, the tower structures do not directly impact on remains of structures.

- The area between Zeus substation and the Vaal River and northwest of Villiers saw a lot of action during the Anglo-Boer War. Where the farms Rietfontein, Hartbeesfontein and Brandkraal join are the graves of several Boer soldiers and on the farm Botha's Kraal, the Battle of Bothaskraal took place on 20 November 1901.
- Near Heilbron, there is the possibility of remains of a Black Refugee Camp and or cemetery on the farm Fairview through which routes ZM2 and ZP4 directly cross being found.

**It is recommended that if ZP4 is selected, mitigation measures would entail either moving the line to avoid the sites or the sites are surveyed and documented and the heritage specialist recommends the careful positioning of the towers.**

- Nghoya corballed huts situated close to ZP4 and north east of Edenville on farm Leeupan. Other corballed huts situated on koppies in the area. These are one of the earliest examples of vernacular architecture in South Africa and are the remains of earlier people who occupied the hills and ridges of the Free State.

**It is recommended that the proposed power line is kept to north west of ZP4 corridor and of the above sites avoiding ridges and koppies where these structures may be found. In order to reduce the impact of the power line on the historical or cultural value of these sites, it is recommended that the line be located as far away as is possible.**

- North east of these huts is the Vechtkop Battlefield and memorial. In 1836 or 37, Kalipi, Mzilikazi's famous warrior, attacked a party of Voortrekkers at Vechtkop with 6000 warriors. Although the Voortrekkers fended off the attack, Kalipi and his men drove off most of the Voortrekkers cattle.
- On the outskirts of Thabong near Welkom close to the road between Riebeeckstad and Virginia, is a cemetery that is currently expanding eastwards. As the cemetery is expanding eastwards, Thabong is expanding southwards. The cemetery is located at S27:56:734; E26:50:543.
- The grave and gravestone to Anna Dorethea Stoffelina van der Watt was found at S28:34:359; E025:49:653 not far from Dealesville. She was born in 1889 and died in 1911. This single heritage site can be easily avoided and requires no mitigation.

- The township of Tshwarangang at Dealesville is expanding and the Councillor for the area informed the heritage specialist that the cemetery located at Tshwarangeng is also growing and is expected to expand westwards. This should be taken into cognisance if the power line is to go near this area. The cemetery is found at S28:39:304; E025:46:959.

## 6. ASSESSMENT OF IMPACTS AND MITIGATION

**The impacts of the proposed lines were assessed using the criteria below.** Only the preferred alignments were assessed.

Nature of the impact: This is an appraisal of the type of effect the construction, operation and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.

Extent of the impact: Describe whether the impact will be: local extending only as far as the development site area; or limited to the site and its immediate surroundings; or will have an impact on the region, or will have an impact on a national scale or across international borders.

Duration of the impact: The specialist should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long term (16-30 years) or permanent.

Intensity: The specialist should establish whether the impact is destructive or benign and should be qualified as low, medium or high. The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.

Probability of occurrence: The specialist should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

Legal requirements: The specialist should identify and list the relevant South African legislation and permit requirements pertaining to the development proposals. He / she should provide reference to the procedures required to obtain permits and describe whether the development proposals contravene the applicable legislation.

Status of the impact: The specialist should determine whether the impacts are negative, positive or neutral ("cost – benefit" analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.

Degree of confidence in predictions: The specialist should state what degree of confidence (low, medium or high) is there in the predictions based on the available information and level of knowledge and expertise.

Significance: Based on a synthesis of the information contained in the above-described procedure, the specialist is required to assess the potential impacts in terms of the following significance criteria:

*No significance:* the impacts do not influence the proposed development and/or environment in any way.



*Low significance:* the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.

*Moderate significance:* the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.

*High significance:* the impacts will have a major influence on the proposed development and/or environment. The impacts could have the “no-go” implication on portions of the development regardless of any mitigation measures that could be implemented.

<b>Theme</b>	<i>Heritage sites, i.e. buildings and other features that have historical/cultural significance</i>	
<b>Nature of impact</b>	<i>Impact of proposed transmission line, access roads, pylons on heritage sites, i.e. buildings, structures</i>	
Legal requirements	<i>National Heritage Resources Act, No. 25 of 1999</i>	
Stage	<i>Construction and Decommissioning (these are assumed to have similar impacts)</i>	Operation
Extent of impact	<i>Site specific, local</i>	<i>Use same criteria</i>
Duration of impact	<i>Permanent*</i>	<i>Use same criteria</i>
Intensity	<i>High**</i>	<i>Use same criteria</i>
Probability of occurrence	<i>Probable</i>	<i>Improbable</i>
Status of the impact	<i>Project – negative, environment – neutral ***</i>	<i>Use same criteria</i>
Accumulative Impact	<i>Low</i>	<i>Use same criteria</i>
<b>Level of significance</b>	<i>Low</i>	<i>Use same criteria</i>
Mitigation measures	<i>Walk-through of sections of routes to identify &amp; locate heritage sites (buildings, graves, etc); Advise Eskom re placing of pylons, sites to be avoided; Carry out detailed survey of sites if it is not possible to avoid these sites.</i>	<i>Use same criteria</i>
<b>Level of significance after mitigation</b>	<i>Low</i>	<i>Use same criteria</i>
EMP requirements	<i>Walkthrough of sections of proposed routes during detailed design phase of project; Heritage resources to be avoided where possible; Mitigation measures to be strictly adhered to; If heritage sites are located during construction, work is to be stopped immediately in the vicinity of the finds and a heritage specialist called in to assess the site and propose further action; Construction teams to be made aware of the possibility of finding such sites and what heritage resources could be found</i>	<i>Use same criteria</i>
<b>Discussion</b>		
<i>Heritage sites are sensitive to development as they are largely immovable and will therefore be impacted on by power line projects. *Heritage resources are finite, non-renewable and fragile hence impacts on resources will be permanent if damaged or destroyed. **Heritage resources are unique and if destroyed they are irreplaceable hence the intensity of impact will be high. ***If heritage sites cannot be avoided, then mitigation measures need to be undertaken including the mapping and recording of sites. If heritage sites are discovered during construction, work will have to be stopped until the site has been assessed and mitigation measures completed before work can start again. This has cost and time implications for the project.</i>		

## 7. RECOMMENDATIONS

### ZEUS-MERCURY 1

- Some sites of heritage significance were located along the top section (Zeus to Atlas) of ZM1 route and there is a strong possibility that other sites will be found. It is therefore recommended that sections of the route from Zeus to Atlas substations are walked by the heritage specialist during the detailed design phase to ensure that other heritage sites are located and that the positioning of the tower structures do not impact on these sites.
- It is recommended that the proposed power lines follow a route between the existing power lines along the top section of the ZM1 route and it is strongly recommended that the new line runs north of the existing most northern power line in order to take the line away from the heritage sites between Zeus and Atlas substations.
- If the proposed power lines, for both routes, cross ridges or hills then a careful assessment of these areas by the heritage specialist is recommended as such sites were used by both the British and Boer forces during the War.

### ZEUS-PERSEUS 3 (+ 3/2)

- The recommendations for the top section of ZM1 apply as the top section of ZP3 follows the same route.
- The undisturbed area south of Meloding and Virginia and along the Merriespruit is relatively undisturbed and it is recommended that the heritage specialist walk this area during the detailed design phase as there is a possibility of finding heritage resources in this area.
- The recommendation to drop the line near the Nestor substation to the ZP2 line in order to avoid the congestion around Virginia and the concentration of centre pivots at the Sand Vet Water Scheme is supported on condition that the above recommendation is implemented.

## 8. CONCLUSION

The heritage resources found along the proposed routes can be avoided either by moving the power line or careful placement of the pylons so that the sites are not directly impacted on. The one large heritage site in the study area, the Vredefort Dome, has been identified as a 'no-go' area and will not be impacted on at all by the proposed routes.

The preferred routes can therefore be used and the impact of the lines on heritage resources will be low as long as the recommended mitigation measures are strictly adhered to.

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