



**ZEUS-MERCURY  
765KV TRANSMISSION  
POWER LINE PROJECT**



**VREDEFORT DOME  
EXTENDED STUDY**

Prepared by: J. Beater

Checked by: Stuart Dunsmore

Date: 1 November 2007

DEAT Ref.: 12/12/20/433

Project ref: 326

November 2007

Proponent

Eskom Transmission Services  
P.O. Box 1091  
Johannesburg  
2000

Environmental Consultant

Margen Industrial Services  
PO Box 12822  
Leraatsfontein  
1038

Contact:

Carol Streaton  
Tel: 011 800 5411  
Fax: 011 800 3917

Contact:

Moses Mahlangu  
Tel: 013 656 1212  
Fax: 013 656 2233

Jean Beater (PBA International (SA))

Tel: 086 1106091  
Fax: 011 646 3758

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## **EXECUTIVE SUMMARY**

### **Introduction**

In July 2006, the Final Environmental Impact Report for the Zeus-Mercury 765kV Transmission Line & Zeus and Mercury Substations Project was submitted for authorisation to the Department of Environmental Affairs and Tourism (DEAT), the lead authority for the project. The final route corridor (referred to as ZM1) for the proposed 765kV transmission power line was provided as well as a number of proposed alignments to the route including alignments to the corridor route adjacent to the Vredefort Dome World Heritage Site (WHS).

Due to issues raised by landowners and the Dome Meteorite Park Association regarding the visual impact of the proposed power line, the visual impact specialist was requested to undertake an assessment of three alignments (western, central and eastern alignments) to the northwest of the WHS. This was done and the assessment was included in the above report.

Section 4.1.4.2 of the above-mentioned report provided the background to the proposed alignments considered during that EIA phase of the overall project. The Final EIR concludes that: *the ecological, avifauna and archaeological impact on any of the alternatives are generally seen to be low and can be mitigated in all cases. The two key issues are seen to be socio-economic impacts and the heritage impact in relation to the WHS. These are in opposition, but both are considered of similar significance. On balance, the eastern alignment is considered the better route, and is put forward as such in the EIR.*

DEAT issued a Record of Decision (RoD) for the project on 2 March 2007. Under Section 3.1 of the RoD, the decision taken by DEAT is stated as follows: *The proposed new route will follow the ZM1 alignment ... except close to the Vredefort Dome World Heritage Site, where it must follow the western alignment.*

Although reasons for this decision were not included in the RoD, they were supplied to landowners along the western alignment who appealed the RoD. In order to address the appeals, the applicant decided to undertake an additional or extended study of the alignments with input from relevant specialists including the visual impact specialist referred to above.

### **Study Process**

It was decided that a public meeting would be held with affected landowners as well other interested parties (including the Dome Meteorite Park Association and organised agriculture) to discuss the reasons for the additional study and to receive input from them in this regard.

The public meeting was held on 8 August 2007. Those attending the meeting were informed that the extended study was a completely new study and that a re-assessment of the alignments would be undertaken by a number of specialists including an ecologist, archaeologist, and avifauna specialist and by social and visual impact specialists.

One of the issues raised by those attending the public meeting was the status of the extended study. It was requested that this be established with DEAT and a response was received from the Office of Minister of Environmental Affairs and Tourism on 8 October 2007 stating that it would be used by the Minister when deciding on the outcome of the appeals.

### Receiving Environment

The study area is located in the North West Province southeast of Potchefstroom and northwest of the Vredefort Dome WHS. Land use in the study area includes chicken farming, horse studs, crop farming, smallholdings and game farms.

An existing 400kV transmission power line runs through the study area. The whole study area falls within the grassland biome. Ridges and rocky outcrops occur in the study area as well as smaller areas of undisturbed grassland and larger areas of cultivated land.

### Impact Assessment

The **Eastern Alignment** is the **preferred route** from a cultural heritage perspective as the few cultural heritage sites located close to the alignment and alignment alternatives will not be affected by them.

The **Central Alignment** is the **preferred alignment** in terms of bird impacts, ecology and social impacts. It is a proven fact that placing a new line next to an existing line reduces the risk of collisions to birds as it creates a more visible obstacle to birds and resident birds become used to an obstacle in that geographic location and have learnt to avoid it.

In terms of ecology, the presence of existing access roads that service the existing 400kV power line means that no additional access roads will need to be built hence limiting the impact on biodiversity of the alignment, whilst building the power line along the other alignments where there is no existing line nor access roads means that the impact on the biodiversity along these alignments will be far more than the central alignment.

In terms of social impact, it is preferred that the proposed power line follows the existing line as those living close to the existing line have adapted their land use activities and developments to the presence of the line and a change in alignment will impact directly on these activities and developments. The central alignment will have a low impact on current land use along the alignment.

**Western Alignment 2** is the **preferred alignment** in terms of visual impact as the area through which the alignment runs is assessed as having the lowest visual quality of all the alignments and the alignment will be screened from the Vredefort Dome World Heritage site and immediate area to the east of the ridges. **Western Alignment 1** is not recommended by any of the specialists.

The table below reflects the preferred alignment of each specialist with *most preferred* given a ranking of 1 and *least preferred* with a ranking of 4.

Speciality / Alignment	Avifauna	Ecology (ignoring ecological alignments)	Heritage	Social	Visual	PREFERENCE
Eastern	3	4	1	2 (1)	3	13 (12)
Central	1	1	3	1	4	10
Western 1	2	2	4	3	2	13
Western 2	4	3	2	4	1	14

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## Concluding Remarks

Reflecting on the wider study that covered the entire length of line between Zeus and Mercury Substations, it was clear that running the new line next to existing power lines had a number of advantages. Surrounding developments and land uses have already adjusted to the existence of the lines.

Habitats have already been disturbed and have adapted to the lines, and bird flight paths were already disrupted. Power line and servitude maintenance activities were already committed to a linear corridor and the "invasion of privacy" by Eskom contractors on private land was already affecting landowners along the existing power line. As a result the new 765kV Zeus-Mercury line runs next to existing lines for much of the route between Zeus and Mercury Substations.

The above is supported by many of the I&APs in the study area, including those who already have the existing 400kV line on their property. Landowners interviewed by the social specialist mentioned that they had become used to the existing line and that they had adapted their activities and developments around the existing line. Hence the placing of the new power line in an area without existing power lines introduces a new and permanent impact to the area whilst spreading the impact on land use and sense of place.

It is recognised that placing new power lines next to existing power lines places an additional burden on landowners and there is an accumulative impact that needs to be considered. However in much of the wider Zeus-Mercury study area, the outcome of the EIA was that the net increase in negative impact of running the new line next to the existing line is **less** than running the new line over a new area. This is considered to be the case in this local study area.

Furthermore, in the context of this study, the accumulative impact of the placing the new line next to the existing line is seen to be very localised and the alternative alignments do little to relieve the accumulative impact on the area as a whole.

Pending the outcome of the public review of this report, the EIA consultant proposes the Central alignment as the preferred alignment for the reasons given above; that is, that the environment has largely adapted to the existing line and the new line will offer a smaller net increase in impacts than an alignment over a new area.

# Vredefort Dome Alignments

## Zeus-Mercury 765kv Transmission Power Line Project

### EXTENDED STUDY

#### 1. INTRODUCTION

In July 2006, the Final Environmental Impact Report for the Zeus-Mercury 765kV Transmission Line & Zeus and Mercury Substations Project was submitted for authorisation to the Department of Environmental Affairs and Tourism (DEAT), the lead authority for the project. The final route corridor (referred to as ZM1) for the proposed 765kV transmission power line was provided as well as a number of proposed alignments to the route including alignments to the corridor route adjacent to the Vredefort Dome World Heritage Site (WHS).

The report addressed the issues raised by landowners and the Dome Meteorite Park Association regarding the visual impact of the proposed power line on landowners and visitors to the WHS. The visual impact specialist for the project was requested to undertake an assessment of the three alignments (western, central and eastern alignments) to the north west of the WHS from a visual impact perspective. This was done and the assessment was included in the final report.

Section 4.1.4.2 of the above-mentioned report provided the background to the proposed alignments considered during that EIA phase of the overall project. The Final EIR concludes that: *the ecological, avifauna and archaeological impact on any of the alternatives are generally seen to be low and can be mitigated in all cases. The two key issues are seen to be socio-economic impacts and the heritage impact in relation to the WHS. These are in opposition, but both are considered of similar significance. On balance, the eastern alignment is considered the better route, and is put forward as such in the EIR.*

DEAT issued a Record of Decision (RoD) for the project on 2 March 2007. Under Section 3.1 of the RoD, the decision taken by DEAT is stated as follows: *The proposed new route will follow the ZM1 alignment ... except close to the Vredefort Dome World Heritage Site, where it must follow the western alignment.*

Although reasons for this decision were not included in the RoD, they were supplied to those who appealed the RoD and are contained in *Appendix 2*. [Please note that *Appendix 1* is a map of the study area].

In light of the above decision, a number of appeals were received by DEAT from landowners along the western alignment. The appeals were based on the lack of public participation undertaken when the western alignment was put forward as a possible alignment option, the impact of the proposed power line on the property and the Department's decision not to follow the consultant's recommendation regarding the alignment to be utilised.

In order to address the above appeals and to find an acceptable alignment, the applicant decided to undertake an additional or extended study of the alignments with input from relevant specialists including the visual impact specialist referred to above. A letter, setting out the

reasons for the extended study and approach to the study was addressed to DEAT, dated 1 August 2007 (see *Appendix 3*).

This extended study report, with comments and input from the public, will be submitted to the Office of the Minister of Environmental Affairs and Tourism to assist in his decision regarding the appeals lodged against the current authorisation.

## **2. STUDY PROCESS**

As mentioned above due to the appeals lodged at DEAT against the RoD, the applicant decided to undertake an extended study of the proposed alignments to the northwest of the Vredefort Dome WHS. The alignments (that will be described in more detail in Section 5) are the Eastern Alignment, Central Alignment and Western Alignment 1 and Western Alignment 2.

It was decided that a public meeting would be held with affected landowners on all the possible alignments as well as other interested parties (including the Dome Meteorite Park Association and organised agriculture) to discuss the reasons for the additional study and to receive input from them in this regard.

The public meeting was held on the 8<sup>th</sup> of August 2007 and the minutes of which can be viewed in *Appendix 12-8, Public Participation Appendices*. Those attending the meeting were informed that the extended study was a completely new study and that a re-assessment of the alignments would be undertaken by relevant specialists, namely an ecologist, archaeologist, and avifauna specialist and by social and visual impact specialists. The Terms of Reference for the specialists were presented at the public meeting.

The meeting was also informed that examples of the proposed power line and towers would be superimposed on photographs of the study area at various viewsheds so that the visual impact of the power line on the study area could be seen and assessed by the public and authorities. Attendees of the meeting were invited to identify critical viewsheds for this exercise.

One of the issues raised by those attending the public meeting was the status of the extended study. It was requested that this be established with DEAT and a meeting was held with DEAT officials in this regard on the 20<sup>th</sup> of August 2007 where a letter requesting DEAT to comment on the status of the project was made. A letter, dated 3 September 2007 was sent to DEAT (see *Appendix 4*) and a response, dated 8 October 2007, was received from the Office of Minister of Environmental Affairs and Tourism (see *Appendix 5*).

The study was put on hold for a brief period because of the uncertainty regarding the status of the project but the applicant requested that study proceed in mid-September 2007. During the public meeting a number of alternatives or site-specific changes to the alignments was suggested and was included in the study. These are indicated on the map (Figure 1 below and *Appendix 1*).

A number of panoramic photographs from several viewsheds have been compiled and can be seen in *Appendix 6*.



The program for the study is as follows:

Activity	Dates	Status/Action
Public Meeting with I&APs	8 August 2007	Meet DEAT re status of project
Meeting with DEAT	20 August 2007	Letter to DEAT re status of project 3 September 2007; Response received 8 October 2007
Site Visit by Specialists	26 – 28 September; 01 - 05 October 2007	Assessment of alignments by specialists
Submission of Specialist reports	19 October 2007	
Compilation of Overall Study report + inclusion of 3D imaging of power line as identified viewsheds	22 – 26 October 2007	
Report to Eskom for comment	29 – 31 October 2007	
Advertise availability of Report	01 November 2007	
Submission of Report for public comment	02 November – 07 December 2007	
Advertise Public Meeting to take place in Potchefstroom	26 October 2007	
Public Meeting to discuss Report	21 or 23 November 2007	
Distribute/Post the Minutes to I&APs and allow comment period until 29 November 2007	27 November 2007	
Amendment of Report (if necessary)	10 – 11 December 2007	
Submit to Office of Minister	14 December 2007	
Decision regarding Appeals	Approx. 30 days	

### 3. DEVELOPMENT PROPOSAL

The location of the study area is shown in Figure 1 here below. The proposed transmission line, tower type and servitude details are as follows:

- 1x 765kV overhead transmission line
- Tower design is understood to be the 'Guyed V' design, the same as the existing 400kV transmission power line. Figure 2 shows this design
- Height: up to 55m high.

- Strain towers will be required on difficult terrain and on bends greater than 3°. See Figure 3 for an example of a strain tower.
- Conductor ground clearance between towers will be approx. 15m
- Maximum safety working height under conductors is 9.8m
- Servitude width is 80m (40m either side of centre line)

Figure 1: Location of Study Area

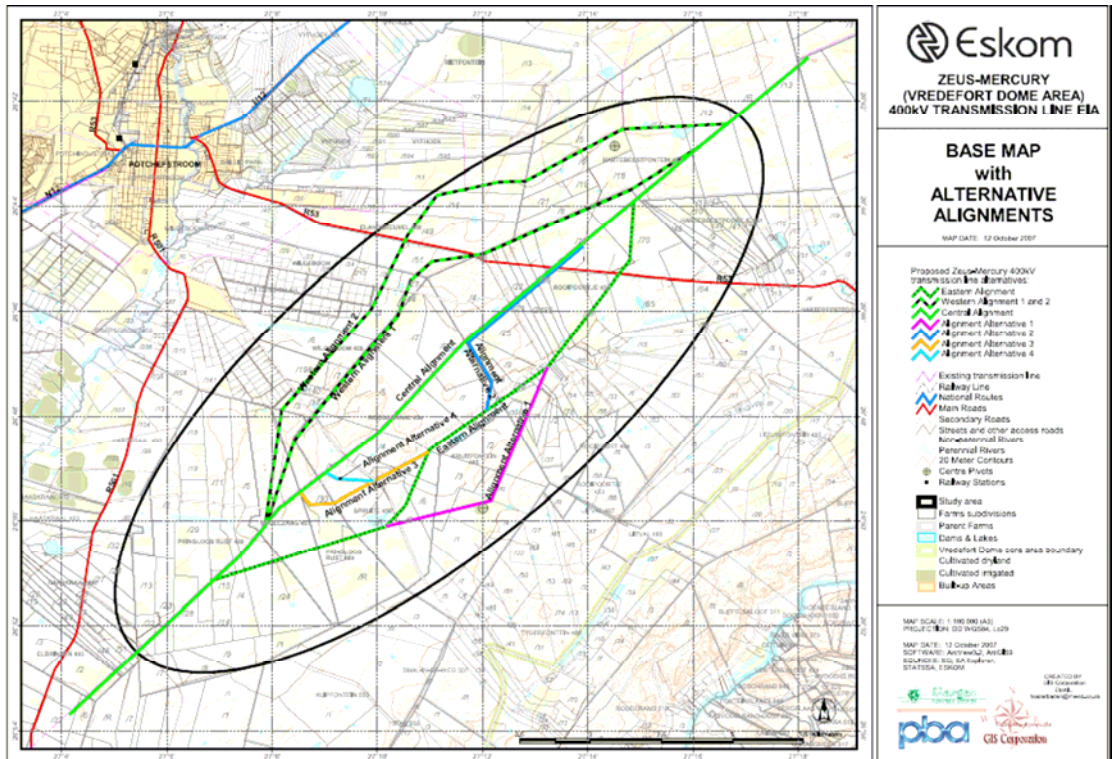


Figure 2: Example of Guyed V Tower Structure



**Figure 3 – Example of 765kV Strain Tower**



#### **4. LOCATION OF STUDY AREA**

The study area is located the North West Province southeast of Potchefstroom and northwest of the Vredefort Dome WHS (see Figure 1 above). Land use in the study area includes chicken farms, horse studs, crop farming, smallholdings and game farms together with dwellings of landowners and their employees.

An existing 400kV transmission power line runs through the study area as well as the R53 linking Potchefstroom and Parys and numerous secondary and minor roads. The whole study area falls within the grassland biome. Ridges and rocky outcrops occur in the study area as well as smaller areas of undisturbed grassland and larger areas of cultivated land.

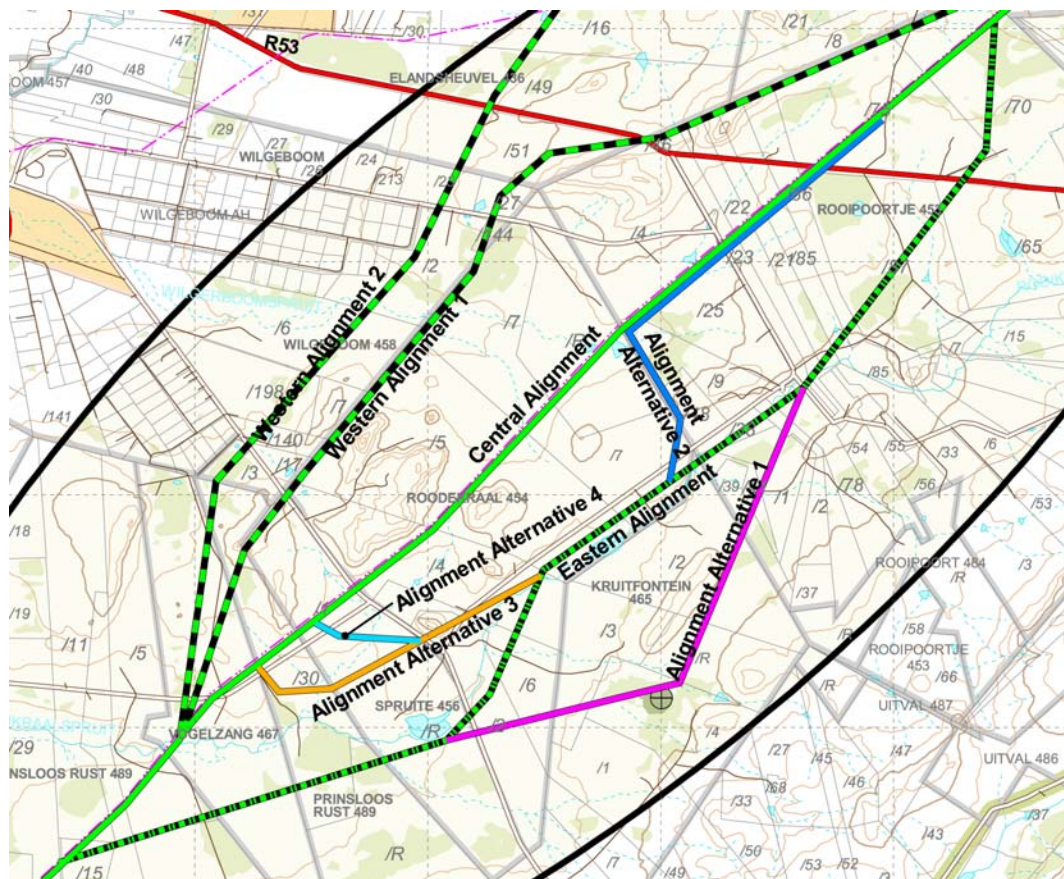
#### **5. ENVIRONMENTAL EVALUATION OF ALIGNMENTS**

Four alignments were considered during the extended study together with several alignment alternatives that are described hereunder (going from the northeast to the southwest). See also section of base map showing alignments hereunder:

##### ***Eastern Alignment.***

This alignment is situated closest to the Vredefort Dome WHS. From the northeast, this alignment runs parallel to the existing 400kV power line. Just before the R53 Parys-Potchefstroom road, it turns to the south, crosses the R53 to run in a south-easterly direction to run south of the Rooipoortjie/Rooikraal gravel road before bending again to the south to cross the Schoemansdrift road and skirting a dam before linking up with and running parallel to the existing 400kV power line.





**Central Alignment:**

The central alignment runs parallel to and south of the existing 400kV power line that bisects the study area.

**Western Alignment 1:**

This alignment initially runs parallel to the existing 400kV power line before heading southwest to follow the ridge line that is roughly parallel to but west of the existing power line. It avoids a number of hills by running at the base of these hills just after crossing the R53 and then runs for a distance along farm boundaries crossing the Schoemansdrift before turning in a southeasterly direction to join with and run parallel to the existing 400kV power line.

**Western Alignment 2:**

This alignment follows a similar route to that of Western Alignment 1 but is situated more west and closer to the outskirts of Potchefstroom. After crossing the R53, it skirts the Wilgeboom smallholdings and crosses cultivated land between the R53 and the Schoemansdrift road. Once it crosses the Schoemansdrift road, it turns sharply to run parallel to Western Alignment 1 before joining and running parallel to the existing 400kV power line.

**Alignment Alternatives:**

**Alignment alternative 1** is an alternative on the eastern alignment that passes to the south east of a ridge on the farm Kruitfontein very close to the Vrededorp Dome buffer area before turning southwest to eventually join the existing power line.

**Alignment alternative 2** is an alignment joining the central and eastern alignments having followed the existing power line for a longer distance than that of the eastern alignment before turning sharply south to follow the farm boundary between the farms Roodekraal 545 and Rooipoortjie 453 before crossing the Rooipoortjie/Rooikraal gravel road and joining the eastern alignment.

**Alignment alternative 3** is an extension of the eastern alignment that continues running westwards as opposed to the eastern alignment that turns southwest. This alternative runs parallel to the Rooipoortjie/Rooikraal road, crosses the Schoemansdrift road before turning to the north to join the existing 400kV power line.

**Alignment alternative 4** is an extension of alignment alternative 3. Once alignment alternative 3 crosses the Schoemansdrift road, alternative alignment 4 turns sharply in a northwesterly direction to link the central and eastern alignments.

## 5.1. ALIGNMENT ASSESSMENT

### 5.1.1 Eastern Alignment (EA)

► **Avifauna:** The specialist assessment (see Appendix 7) indicates that this alignment crosses nearly 16 kilometres of natural grassland that is used as an indicator of sensitivity because the vast majority of Red Data bird species prefer natural grassland to all other habitats hence posing a high bird collision risk.

In addition, there are wetlands within 500m of the alignment and this was assessed as a negative as wetlands are great draw-cards for many birds and are generally areas of high risk from a bird collision perspective if power lines are situated run parallel to wetlands and the alignment is assessed as posing the second highest risk in terms of bird interaction with power lines. Mitigation of these impacts is however possible hence reducing the risk quite significantly

► **Soils, Vegetation and Mammals:** According to specialist assessment (see Appendix 8), the eastern alignment is the **least preferred** alignment from an ecology perspective.

This alignment crosses 13km of sensitive soil. The impact on sensitive soils (that may lead to erosion) is assessed as been medium to high before mitigation and even after mitigation (such as management of water run-off) the impact on soil sensitivity remains the highest in comparison to the other alignments.

The impact of the EA on wetland function and hydrology is seen to be medium to high due to the presence of wetlands along the centre of the alignment. Mitigation measures, such as not placing pylons in wetlands and ensuring that construction activities avoid wetlands, can reduce this impact to a medium impact.

The specialist assessment of the impact of the EA on flora is seen to be low overall but high in respect of pristine grassland areas along the alignment where there may be a dominance of Red Grass that will be permanently lost if disturbed.

The impact on fauna is assessed as low to medium as the alignment has no rocky outcrops but crosses areas of natural grassland where a larger diversity of faunal species is expected.

The impact on biodiversity is assessed as medium even after mitigation as the alignment crosses sensitive soils and wetland areas.

► **Heritage:** The Eastern Alignment is the **preferred route** from a cultural heritage perspective even though it is situated closest to the Vredefort Dome. It is assessed that the cultural heritage sites located close to or near the alignment and alignment alternatives will not be affected by them. See *Appendix 9* for the specialist Heritage Report.

The Iron Age sites located in the *study area* were assessed as the most significant archaeological features whilst various historical structures such as old farmsteads, graves and cemeteries, kraals and sites related to the Anglo-Boer South African War were sparsely scattered over the study area.

No Iron Age sites were located along the EA and the number of sensitive areas near the alignment was almost negligible. Various stone artefacts found on the farms Prinsloos Rust 489/30 and Rooipoortje 453 indicate that Stone Age traces may be present in the study area. The sides of the Rooikraal Spruit were examined at several points for artefacts or fossils but no artefacts or fossils were observed.

Alternative alignment 3 (an extension of the EA) passes quite near to a large graveyard (over 200 graves) on the farm Roodekraal 454/4 but on the other side of the Rooipoortje/Roodekraal road and it is therefore recommended that the alignment alternative remain south of the road.

► **Social Impact:** The Eastern Alignment following Alignment Alternatives 1 and 2 is preferred in terms of avoiding potential displacement of people. Following Alternative 1 might necessitate the construction of access roads. In this case, this alternative will interfere less with people's daily movement patterns during construction, as it does not follow the public road that is used by more people. (See *Appendix 10* for the full Social Impact Report).

Additionally, in terms of existing tourist destinations in the study area, it was assessed that the EA would have the least impact on these sites and is the preferred alternative in this regard.

Regarding the social impact specialist's assessment of this alignment, **if the EA is combined with alignment alternative 4 it becomes the preferred alignment**, as it will impact on fewer houses and follows an existing road for some distance therefore limiting impact to an already impacted area.

► **Visual Impact:** This alignment is not a preferred alignment in terms of visual impact as it passes close to a number of homesteads in the central section of the EA where the visual impact will be significant. In addition, it traverses moderate visual quality zones that intimate that the surrounding area is relatively attractive with some diverse visual pattern. See *Appendix 11* for the Visual Impact Report.

However, as the alignment is situated lower down in the landscape it is assessed that it will not be readily visible in silhouette with the hills of the WHS providing some visual absorption of the proposed power line and allowing some of the critical views to look over the proposed line and not directly at it.

### 5.1.2 Central Alignment (CA)

► **Avifauna:** This is the **preferred alignment** from a bird impact perspective. It is a proven fact that placing a new line next to an existing line reduces the risk of collisions to birds. The reasons for this are two-fold, namely, it creates a more visible obstacle to birds and the resident birds, particularly breeding adults, are used to an obstacle in that geographic location and have learnt to avoid it. Hence the impact on bird interaction with the new line is clearly low.

► **Soils, Vegetation and Mammals:** This is the **preferred alignment** due to the presence of the existing power line to which access roads have been already established hence the alignment is already impacted on.

The Central Alignment crosses over approx. 12km of sensitive soils, i.e. the second highest of all the alignments, it is assessed that once mitigation measures are put in place, such as the management of water run-off, then the impact will be reduced to an acceptable level.

The impact of the CA on wetland function and hydrology is assessed as been relatively low compared to the other alignments due to the low number of water bodies along the alignment.

According to the specialist assessment, the assessment that there will be no impact on Red Data flora species only because no Red Data species were observed (this was a dry season assessment). However, it is expected that the alignment will have a medium impact (low after mitigation) on flora in general because of the relatively undisturbed habitat such as natural grassland and rocky outcrops found along the alignment.

The impact of the CA on fauna is seen to be medium with regard to general fauna and low regarding Red Data species. The CA crosses some natural grassland where higher faunal biodiversity is expected hence the impact level.

The impact of the CA on the biodiversity of the study area is assessed as medium but because of the presence of the existing power line with existing access/service roads, less impact is envisaged to biodiversity than it would have with a new route where new access roads would have to established.

► **Heritage:** There are a number of sensitive heritage areas near the proposed Central Alignment including Iron Age stonewalling and possible Anglo-Boer War lookouts on two hills on the farm Roodekraal 454 and is therefore the third choice (of the four alignments) in terms of heritage.

► **Social Impact:** The Central Alignment is the **preferred option** from a social impact perspective, with and without mitigation. In terms of sense of place of local inhabitants, the CA emerges as the preferred alignment because it follows an existing line and the majority of landowners interviewed preferred that the proposed line run parallel to the existing line. The

reasons for this was that it would be easier to manage fires and that the negative visual impact would be kept to one area.

Other advantages are that the maintenance will be easier to manage, that the number of landowners to be affected by maintenance activities will not be increased, and that existing access roads will be used. In terms of new access roads and new access roads not following existing infrastructure these:

- might necessitate the relocation of populations;
- would interfere with people's daily movement patterns and impact on their safety;
- would cut across private property, thereby increasing the number of landowners to be affected by construction and maintenance activities; and
- would interfere with tourism and recreational activities.

It is therefore preferable that existing infrastructure is followed, but also that settlements are avoided to mitigate potential health and safety impacts.

The specialist report indicates preference to the existing line being followed as landowners have planned their developments in such a way as to avoid the power line including the building of dwellings for themselves and their employees.

The displacement of households from proposed alignments was also considered and it was assessed that the 2 sets of labourer houses may have to be displaced along the CA that is low in comparison to the western alignments. The inhabitants are negatively affected by the noise of the current line, and might therefore prefer to be resettled far away from the existing line.

In terms of sense of place, the social specialist prefers that existing power lines be followed, meaning that the Central Alignment should then be followed. The reasoning is that an existing line already impacts on the sense of place, and that this disturbance should be minimised in this way. This alternative does cross a game farm that is run as a tourist destination. However, it is not a given that a Transmission power line will result in the closure of tourism destinations.

► **Visual Impact.** This is the **least preferred** alignment. Although the alignment is assessed as being within a moderate quality zone, it is significantly more visible within all the viewing zones as it runs along the crest of the ridge and is often viewed in silhouette with a general lack of screening for it from the surrounding landscape.

It will be highly visible where it crosses the R53 as it will be viewed in silhouette hence negatively impacting on the visual experience of the first views of the Vredefort Dome WHS. However, these views will be brief before travellers pass under and past the power line.

Although the visual absorption capacity of the central alignment is regarded as moderate implying that the landscape is to a certain extent able to accept/accommodate the visual change made to it by the new power line, the cumulative effect of two lines together is viewed as a highly negative impact.



### 5.1.3 Western Alignment 1 (WA1)

► **Avifauna:** This alignment is not preferred as it crosses ploughed land and natural grassland that are important feeding areas for birds. Without the presence of other transmission lines next to it to make it more visible as an obstacle to birds, the new alignment will create a collision risk.

► **Soils, Vegetation and Mammals:** This is the **preferred alignment** (without taking into consideration the ecologist's suggested ecologically preferred alignments) if there was no existing line. This is because it crosses of ploughed land and the least amount of sensitive soils of all the alignments and has no significant water bodies (wetlands and/or dams) to speak of. .

It should be noted that the Ecologist has included two ecological alternatives over and above the alignments and alignment alternatives mentioned above. These will be discussed after section 5.2.4.

With regard to the impact of the alignment on the flora, the specialist assessment indicates this as being low because the alignment crosses cultivated fields where floral diversity is expected to be low or non-existent.

The impact on fauna is assessed as medium to low even with the recent discovery of a mite species, *Bovidromus roussouwi*, a micro-organism invertebrate that is limited to higher lying rock plates on rocky outcrops found on a property along the western section of WA1 as well as an unconfirmed report of the presence of some sort of *Cordyla* species occurring along the eastern section of WA1.

The *Bovidromus roussouwi* species does not yet enjoy protected status but is unique as it is the only species of its kind occurring within the Vredefort/Potchefstroom area and is the only species ever recorded in South Africa and, as far as is known, in the world. By avoiding higher lying rocky outcrops, the impact of the alignment on the species will be low.

With regard to the biodiversity of the study area and the alignment in particular, it was assessed that this could medium to high if the power line or alignment did not avoid the rocky outcrops and if towers were located on the outcrops where a higher diversity of flora and fauna is found. However, where mitigation can take place, it will significantly reduce the impact.

► **Heritage:** This is the **least preferred** of the alignments because of the numerous Iron Age and historical sites along its length. In places, the density of these sites is high. The Iron Age stone walling sites found were along undisturbed areas on the hills and ridges. The number of sensitive heritage sites along or near WA1 was 9 the highest of all the alignments. Again, this can be mitigated but this would involve surveying, recording and removing artefacts before the power line can be built.

► **Social Impact:** In terms of potential health and safety impacts as well as potential future developments, the Western Alignment 2 is the least preferred when considering the number of people that might be impacted on in terms of potential health and safety impacts. Western Alignment 1 is in close proximity to denser populations and potential future developments and

in avoiding the tourist establishment along this alignment, the alignment might be pushed towards the Western Alignment 2, which is not preferable.

By crossing cultivated lands, the proposed power line may have an adverse impact on the use of geographic positioning systems (GPS) if utilised by farmers long the alignment. In addition, the towers impede the use of tractors and large mechanical equipment hence valuable land is no longer usable. This also applies to Western Alignment 2.

► **Visual Impact:** This alignment is the second preferred alignment as the visual quality is considered to be moderate with the alignment located along the crest of and at the foot of the central ridge. It does however cut through a scenic neck and is in close proximity to a number of dwellings along the alignment hence the reason for it been the second choice.

The view from this alignment towards the west is of an area already disturbed by smallholdings, human disturbance and crop farming that is not considered particularly scenic.

#### 5.1.4 Western Alignment 2 (WA2)

► **Avifauna:** This alignment is not a preferred alignment as it runs within 500m of a large dam where WA2 diverts from the central alignment at the northeast section of the study area. Dams are attractive to a large number of bird species and running close to this dam will increase the collision risk for birds attracted to the dam such as the Yellow-billed Stork, Greater and Lesser Flamingos and other Red Data species.

In addition, the alignment crosses cultivated lands where the presence of old seeds, weeds and insects attract birds to the area therefore increasing the collision risk with the proposed alignment.

► **Soils, Vegetation and Mammals:** This alignment is assessed as slightly more sensitive than WA1. In terms of wetland function and hydrology, the alignment passes close to a large dam in the east just after branches off from the central alignment but the overall impact is considered to be low if mitigation measures are enforced.

Although the alignment has less rocky outcrops than WA1, it crosses an area inhabited by the mite species, *Bovidromus roussouwi*, a micro-organism invertebrate towards the west of the study area hence the significance of impact, in comparison to the other alignment options is considered to be high but if the rocky crops can be avoided by power line infrastructure and access roads, the impact will be low.

The impact on flora is assessed as low whilst on the impact on fauna is assessed as medium to high especially for the *Cordyla* species present along or near the alignment where there is some unploughed/conserved grassland on Hutton soils that is the preferred habitat of rare reptile species. Avoiding these areas will reduce the impact significantly.

► **Heritage:** Although this alignment passes or crosses 5 sensitive heritage sites, it is the second choice of the heritage specialist as the sites located near the alignment are sparsely scattered and can be easily avoided by the proposed power line.

In addition, WA2 runs through ploughed fields that make the possibility of finding any heritage sites of significance improbable due to this disturbance.

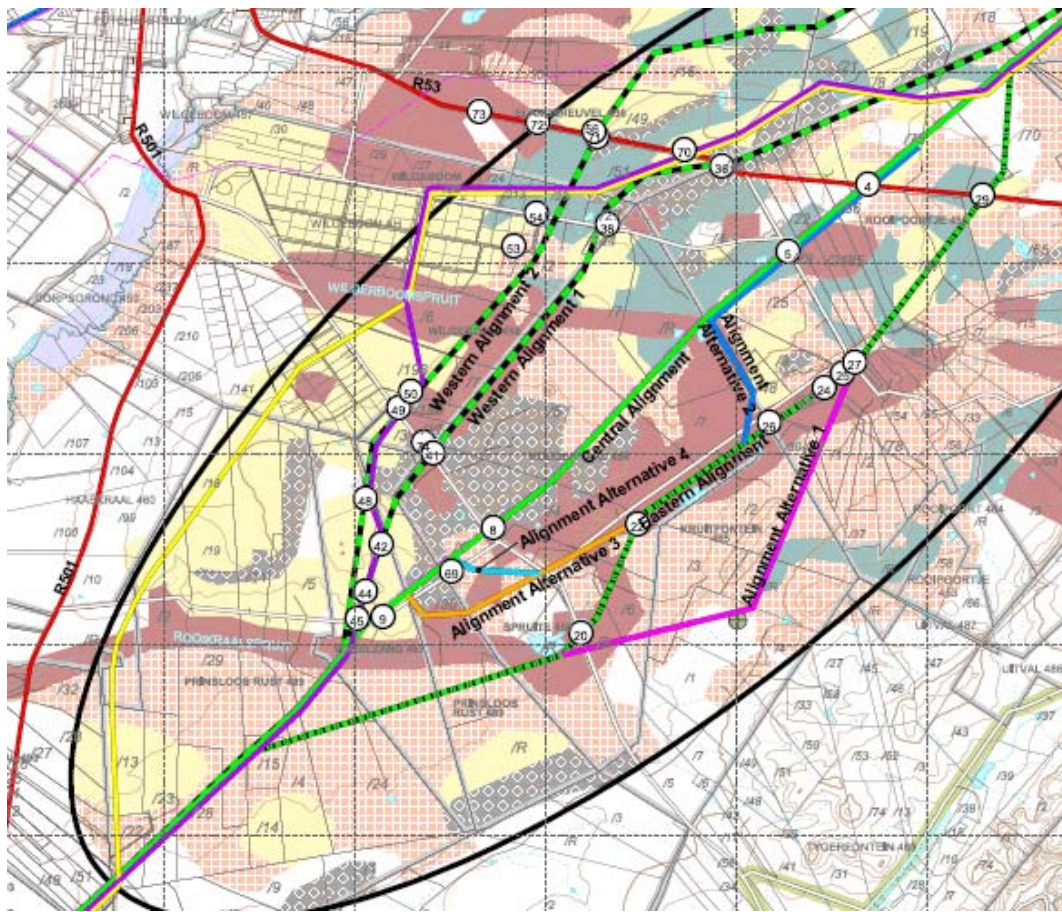
► **Social Impact:** This is the **least preferred** alignment as the alignment passes closest to smallholdings and areas with denser levels of human population. It is assessed that the potential impacts of the alignment on health and safety, displacement and land-use change are significant compared to the other alignment options due to its proximity to higher population levels.

It is preferred that the alignment chosen avoids populated areas to mitigate potential health and safety impacts such as power lines falling over or fires caused by electrical malfunction. Areas of higher population will result that more people will be impacted on by construction activities such as increased traffic volumes and noise levels. By impacting on as few people as possible, it will be easier to manage such impacts.

The number of households that will be affected by WA2 is high, and even with site-specific deviations some dwellings might be avoided, but some households will have to be moved.

► **Visual Impact:** This is the **preferred alignment** in terms of visual impact. The significance of impact is considered to be low as it traverses an area of relatively low scenic value, is off the ridges and traverses an area that is already visually modified by human activity. The activities taking place on the smallholdings are not considered to be reliant on a high scenic quality in order to be sustainable.

► **Ecological Alternative alignments:** As mentioned in section 5.2.3, the ecologist has suggested two preferred ecological alignment alternatives indicated on the map here below:



The purple alignment is ecological alternative alignment 1 (F1) and the yellow alignment is ecological alternative alignment 2 (F2). They both follow the same route when branching off from the central alignment and cross both western alignments and several smallholdings before turning sharply south to cross even more smallholdings before splitting shortly thereafter.

F1 carries on in a southwards direction to join WA2 and running a short distance parallel to WA2 before joining WA1 to eventually join the central alignment.

F2, in contrast, after splitting from F1 heads in a southwesterly direction crossing over more smallholdings after crossing the Schoemansdrift road and then runs close to and parallel to the study area boundary for a distance before crossing the Rookraal Spruit and turning south to join the central alignment/existing power line.

## 5.2. TECHNICAL ISSUES

**Fire Management.** The ecologist has raised the issue of the impact of fires with regard to the placing of the alignments. The interruption of power supply due to fires is expensive for the power utility and placing of power lines together is seen to increase the fire hazard because of the lines running parallel in relative close proximity and the grass cover within the servitudes providing ready fuel for fire.

As the proposed Zeus-Mercury 765kV power line runs along the existing power line all the way to Mercury substation, it is understood that Eskom Transmission are aware of the fire risks and will take measures to limit the impact of fires on the functioning of the power lines.

If the alignment chosen runs parallel to the existing line, the ecologist recommends that the burning of servitudes is better than mowing due to the negative impact of mowing on grass composition, that is, changing a decreaser dominated grass sward to grassland dominated by Thatching Grass with a higher fire risk.

### 5.3. SUMMARY OF ASSESSMENTS

Environmental and socio-economic impacts result from the construction, operation and maintenance of power lines. The specialists were requested to assess impacts both pre- and post-mitigation with regard to the proposed alignments. The post-mitigation scores are based on the understanding that recommended mitigation measures will be implemented.

The specialists were requested to assess the significance of impacts according to specific criteria including extent (distance) of impacts, duration or lifespan of impacts, the magnitude or severity thereof and the probability or likelihood of the impact actually occurring.

A significance rating was applied to all impacts and alignment in order to provide a quantitative comparative assessment of the alignments being considered. These ratings are reflected in Tables 1, 2 and 3.

As the results of this assessment were so evenly spread between impacts, the specialists were also asked to assign to potential impacts a significance weighting (S). The weighting is formulated by adding the rankings assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact. Hence  $S=(E+D+M) \times P$ .

The method and formula is described below but the number allocated is the number in brackets that has been bolded.

**Extent of the impact:** The extent of the impact was assessed accordingly:

- (1) Limited to the site and its immediate surroundings
- (2) Local extending only as far as the development site area;
- (3) Municipal
- (4) Provincial/Regional
- (5) National i.e. South Africa
- (6) Across International borders

**Duration of the impact:** The lifespan of the impact was assessed to be:

- (1) Immediate (less than 1 year)
- (2) Short term (1-5 years)
- (3) Medium term (6-15 years)
- (4) Long term (the impact will cease after the operational life span of the project)
- (5) Permanent (no mitigation measures of natural process will reduce the impact after construction)

**Magnitude of the impact:** The magnitude or severity of the impacts is indicated as either:

- (0) None (where the aspect will have no impact on the environment)
- (2) Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
- (4) Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
- (6) Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
- (8) High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
- (10) Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).

**Probability of occurrence:** The likelihood of the impact actually occurring was indicated as either:

- (0) None (impact will not occur)
- (1) Improbable (the possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures)
- (2) Low probability (there is a possibility that the impact will occur)
- (3) Medium probability (the impact may occur)
- (4) High probability (it is most likely that the impact will occur)
- (5) Definite / do not know (the impact will occur regardless of the implementation of any prevention or corrective actions or if the specialist does not know what the probability will be based on too little published information)

**Status of the impact:** The impacts are assessed as either having a:

- Negative effect (i.e. at a cost to the environment)
- Positive effect (i.e. at a benefit to the environment)
- Neutral effect on the environment.

The results of the above exercise were then placed into Low, Medium and High categories accordingly:

- *Low (less than 30 points):* the impact does not have a direct influence on the decision to develop the area
- *Medium (30-60 points):* the impact could influence the decision to develop in the area unless it is effectively mitigated
- *High (above 60 points):* where the impact must have an influence on the decision to proceed to develop in the area

The outcome of this exercise is reflected in Table 4. All but the ecologist assessment has been evaluated in this manner. The visual impact specialist stated that the assessment for pre-and post mitigation would remain the same as mitigation takes place in the alignment determination.

The exercise, again, did not assist in highlighting a preferred alignment but clearly showed which alignment was the least preferred; the Western Alignment 1. Most of the impacts fell into

the Medium or Low categories reinforcing the view that the study area does not display significant sensitivities or marked differences with regard to environmental issues.

Below Tables 1 and 2 capture the assessments for pre- and post-mitigation for each specialist field and for each alignment. **It should be noted that the tables must be read in conjunction with the specialist reports in order to understand how they came to their assessments and to have knowledge of the complexities the studies undertaken.**

**Table 1: Pre-mitigation**

Speciality / Alignment	Avifauna	Ecology	Heritage	Social	Visual	Combined
Eastern	M	M-H	L	M-H	M	16
Central	L	M	L	M	M-H	12
Western 1	M	M	H	M	M	17
Western 2	M	M	L	M-H	L	12

**Rankings: High = 5; Med-High = 4; Med = 3; Med-Low = 2; Low = 1, Negligible = 0**

**Table 2: Post-Mitigation**

Speciality / Alignment	Avifauna	Ecology	Heritage	Social	Visual	Combined
Eastern	L	M-L	L	M-L	M	9
Central	L	L	L	M-L	M-H	9
Western 1	L	L	H	M	M	12
Western 2	M	L	L	M	L	9

**Rankings: High = 5; Med-High = 4; Med = 3; Med-Low = 2; Low = 1, Negligible = 0**

The table below reflects the preferred alignment of each specialist with *most preferred* given a ranking of 1 and *least preferred* with a ranking of 4.

**Table 3: Preferred alignment/Least Preferred Alignment**

Speciality / Alignment	Avifauna	Ecology (ignoring ecological alignments)	Heritage	Social	Visual	PREFERENCE
Eastern	3	4	1	2 (1)	3	13 (12)
Central	1	1	3	1	4	10
Western 1	2	2	4	3	2	13
Western 2	4	3	2	4	1	14

Table 4 below provides a summary of the weighting exercise undertaken. It is important to emphasise that the results in the table must be read in conjunction with the specialist reports.

**Summary of impact significance after mitigation**

THEME	ISSUE	EASTERN	CENTRAL	WESTERN 1	WESTERN 2
<b>AVIFAUNA:</b>	Bird collisions	24 (L)	10 (L)	20 (L)	36 (M)
	Disturbance	12 L	12 L	12 L	12 L
	Habitat Destruction	6 L	6 L	6 L	6 L
		42	28	38	54
<b>HERITAGE</b>	Archaeological & Historical Sites	6-16 L	6-16 L	30-80 M-H	6-16 L
	Palaeontology	6-16 L	6-16 L	6-16 L	6-16 L
		32	32	96	32
<b>SOCIAL</b>	Socio-economic (Land use change)	36 M	36 M	44 M	44 M
	Health & Safety	18 L	18 L	18 L	22 L
	Displacement Significance	22 L	44 M	44 M	44 M
		76	218	110	110
<b>VISUAL</b>	Impact on Aesthetics	52 M	60 M	56 M	48 L
		202	218	300	244



## 6. IDENTIFICATION OF PREFERRED ALIGNMENT

From the above tables it is clear that the study area is not particularly environmentally sensitive. This is apparent in the significance impact tables where none of the impacts are assessed as high, most being moderate and low. There is very little difference between the combined scores allocated to the Eastern, Central and Western 2 alignments.

Reflecting on the wider study that covered the entire length of line between Zeus and Mercury Substations, it was clear that running the new line next to existing power lines had a number of advantages. Surrounding developments and land uses have already adjusted to the existence of the lines. Habitats have already been disturbed and have adapted to the lines, and bird flight paths were already disrupted. Power line and servitude maintenance activities were already committed to a linear corridor and the “invasion of privacy” by Eskom contractors on private land was already affecting landowners along the existing power line. As a result the new 765kV Zeus-Mercury line runs next to existing lines for much of the route between Zeus and Mercury Substations.

The above is supported by many of the I&APs in the study area, including those who already have the existing 400kV line on their property. Many of the landowners interviewed by the social specialist mentioned that they had become used to the existing line and that they had adapted their activities and developments around the existing line. Hence the placing of the new power line in an area without existing power lines introduces a new and permanent impact to the area whilst spreading the impact on land use and sense of place.

It is recognised that placing new power lines next to existing power lines places an additional burden on landowners and there is an accumulative impact that needs to be considered. However in much of the wider Zeus-Mercury study area, the outcome of the EIA was that the net increase in negative impact of running the new line next to the existing line is **less** than running the new line over a new area. This is considered to be the case in this local study area. Furthermore, in the context of this study, the accumulative impact of the placing the new line next to the existing line is seen to be very localised and the alternative alignments do little to relieve the accumulative impact on the area as a whole.

Tables 1 to 4 generally show the Eastern and Central alignments to be the least scoring, and therefore least impacting alignments. Apart from localised “hot spots” on both routes, mitigation measures are seen to reduce the overall impact of the new line to a moderate-low to low. On the Western alignment 2 there is concern that mitigation of the potential socio-economic impacts are less assured given the higher density of people and greater intensity of land use in the area.

Pending the outcome of the public review of this report, the EIA consultant proposes the Central alignment as the preferred alignment for the reasons given above; that is, that the environment has largely adapted to the existing line and the new line will offer a smaller net increase in impacts than an alignment over a new area.

## **7. PUBLIC PARTICIPATION (BY MARGEN INDUSTRIAL SERVICES)**

### **7.1. BACKGROUND**

Margen Industrial Services was commissioned to conduct the Environmental Impact Assessment and the related public consultation process regarding the Mercury – Zeus 765 Eskom Transmission Power lines between Mercury Substation (near Vierfontein) and Zeus Substation (near Standerton). Alternative corridors for the line have been investigated and an Environmental Impact Report (EIR) with a recommended corridor was submitted to the Department of Environmental Affairs and Tourism (DEAT) for authorization. After considering the report DEAT gave authorization (**Record of Decision [RoD] dated 02 March 2007**). See *Appendix 12-1*.

The general public, registered stakeholders and landowners were notified about the RoD by a letter and through the advertisement placed in local newspaper in the study area in March 2007 (*Appendix 12-2*). A number of appeals have been submitted in response to the RoD for the section of the route to the northwest of the Vredefort Dome World Heritage Site. To address these appeals Eskom decided to conduct further detailed specialists investigations and related public consultation.

This section of the report outlines the approach followed during the consultation process. The consultation only focussed on the section of the Mercury – Zeus Transmission Power line northwest of the Vredefort Dome WHS.

### **7.2. METHODOLOGY**

The method and approach of this public consultation has been influenced by the appeals received and the information that was gathered during the EIA Phase. The method adopted in this Public Participation Process was structured to mainly address the need for consultation that will address the concerns that led to appeals being lodged for this section of the whole line that stretches to about 250km. The following methods were used during this round of the consultation process:

- Advertisement

Two local newspapers were used to inform the public about the extended study and to give them the details of the public meeting that was going to be held on 08 August 2007. The two local newspapers used are Lentswe and Potchefstroom Herald (*Appendix 12-3*).

- Site Visit (Farm-to-Farm)

In order to make sure that the greater percentage of the landowners in the study area were informed about the project and invited to the meeting farm-to-farm drive through the study area was undertaken on 18 July 2007. Notes of the contacts can be viewed in *Appendix 12- 4*.

- Existing Database

The existing database from the consultation process for the whole Mercury-Zeus line was used as a source of information about landowners in the study area. A list of Landowners already consulted during the consultation process for the servitude was also used to get details of the landowners. The database for the extended study is included in *Appendix 12- 5*.

- Vredefort Dome Meteorite Committee

Mr. De la Harpe provided the list of Dome Meteorite Committee members and letters of invitation was sent out informing them about the study

- Referrals

Some landowners in the study area provided the consultants with names of landowners in the identified study area. *See Appendix 12-6.* These were contacted telephonically to confirm their contact details and they were invited to the Public Meeting.

- Personalised Notices and Invitation Letters

Letters, faxes and emails were sent to stakeholders identified as outlined above firstly notifying them about Eskom's decision to re-evaluate the area close to the Vredefort Dome and secondly inviting them to attend a meeting that took place on 08 August 2007. *See Appendix 12-7.*

- Telephone Calls

On the 2 and 3 August 2007 all registered stakeholders were contacted telephonically to remind them about the meeting of 08 August 2007.

**TABLE OF PUBLIC PARTICIPATION ACTIVITIES**

DATE	ACTIVITY	PARTICIPANTS	PRODUCTS
March 2007	<ul style="list-style-type: none"> <li>• ROD issued by DEAT</li> <li>• Notice of ROD to stakeholders (09/03/07)</li> </ul>	<ul style="list-style-type: none"> <li>• DEAT, Eskom and Consultants</li> <li>• Stakeholders &amp; consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Positive ROD received authorising the project with the western alignment is chosen in the area near Vredefort Dome.</li> <li>• Advertisements in local newspapers in the study area and letters to all registered stakeholders</li> </ul>
March/April 2007	Appeals	Landowners along RoD alignment	Appeal documents submitted to DEAT
	Communications on lodged appeals	DEAT, Eskom and Consultants	Notice given to Eskom and consultants about appellants
June 2007	Eskom takes decision to re-evaluate different route options in the Vredefort Dome area	Eskom and Consultants	Appointment of specialists to conduct study of alignments and continuous public consultation
02 July 2007	Notice to stakeholders about the re-evaluation process	Stakeholders and consultants	Notice letter to stakeholders informing them of <b>Eskom</b> decision to conduct

			additional specialists investigations and related public consultation to select the route with minimum impact to community and environment
18 July 2007	Field Visit (Farm-to-farm)	PIP Consultant and landowners	Received contact detail of more landowners
20 July 2007	Advertise the public meeting	General local public	Two local newspapers viz. Potchefstroom Herald and Lentswe (English)
23 July 2007	Invitation to attend a Public Meeting	Stakeholders and consultants	Invitation letter sent to registered stakeholders
2 & 3 August 2007	Telephonic reminder to registered landowners to attend the meeting	PIP Consultant and landowners	Better attendance at the public meeting
08 August 2007	Public Meeting in Potchefstroom	Eskom, Consultants and stakeholders	Presentation, issues for clarification, comments and minutes.
September 2007	Distribution of the Minutes of meeting held in August	Stakeholders and consultants	Minutes of the meeting, comments sheet and accompanying letter and Attendance register <i>(Appendix 12-8)</i>
September 2007	Telephonic notice to landowners about specialists visits to their farms and study area	Stakeholders and consultants	Specialists visit study area and farms

### 7.3. ASSUMPTIONS

The consultation process followed during the Scoping and EIA Phases of the whole Mercury-Zeus 765kV Transmission lines covered most stakeholders under the different institutions and geographical spread within the study area. Registered stakeholders were informed about the RoD and the appeals came from landowners along the western alignment as recommended in the RoD.

It is therefore assumed that consultation for the extended study will be considered sufficient if it is conducted in a robust manner, focusing on study area that incorporates the alignment that was appealed.

It was also assumed that a more satisfactory outcome will be achieved by agreeing with the potentially affected landowners on the approach for re-evaluating the study area. Of importance are several comments received at the meeting of 08 August 2007. It is hoped that the outcome of the re-evaluation study, though not be satisfactory to all landowners, will be based on an acceptable consultation process. It is expected that the draft report will be made available for comment and debated upon at the meeting to be arranged.

#### **7.4. LIMITATIONS & CONCERNS**

In the original study landowner consultation was mainly dependent on the help from Farmers Associations (FA) and District Farmers Unions (DFU) to identify affected landowners through meetings in which the PIP Team gave presentations on the project. The Potchefstroom area has limited FA and DFU activities.

Eskom negotiators started negotiating with landowners along the eastern alignment as this was the alignment recommended in the final EIR. The authority approved the western alignment in on which limited consultation was done. Hence landowners on the western side appealed the RoD on the basis of lack of consultation amongst other issues.

The whole EIA study was conducted as a “fast track project” and therefore the time factor also restricted the extent to which potentially affected landowners could be contacted in those areas where line deviations took place towards the end of the EIA process.

#### **7.5. COMMENTS ON LANDOWNER CONSULTATION**

The landowners in the study area are predominantly stock, chicken and maize farmers. The western side is also characterised by smallholdings, the owners of which proved difficult to identify. Not all landowners have been identified, but the map of landowner consultation shows that the greater part of the area has been covered (See *Appendix 9*). One more round of farm-to-farm visit will be conducted during the public review period of the extended study report in order to identify the few landowners that have not been contacted.

The attendance at the public meeting and the input received from landowners give a high degree of confidence that the consultation with the landowners is progressing well and by the time a final route is recommended, all landowners shall have been consulted.

#### **7.6. PUBLIC MEETING & COMMENTS RECEIVED**

The landowners that attended the meeting had the opportunity of interacting with the study team (project leader; Eskom representatives and the PIP team). This meeting gave the landowners the opportunity of hearing and understanding each other's concerns regarding the proposed line. The concerns and issues raised were addressed in a meeting and this enabled the landowners from the different sides of the centre line, to understand each others point of view and responses. There is no separate Comment and Response Report generated as the minutes of the meeting serve this purpose and they were sent to all that attended the meeting.

### **7.7. REVIEW OF REPORT & MEETING**

The PIP Team plans to hold another public meeting to present the findings of report and allow landowners another opportunity to discuss the report and raise any other issues and concerns regarding the preferred route.

Landowners will also be given an opportunity to see what their surroundings will look like with the power line in place. This will be done using pictures taken on site and the lines superimposed thereon.

**The report will be placed in the Potchefstroom Public Library for review from 02 November 2007 until 07 December 2007.** The availability of the draft report for review will be advertised in the local newspapers and letters will be sent out to all registered stakeholders.

### **7.8. CONCLUDING REMARKS**

This consultation saw increased landowner participation and it is therefore our belief that the study area specific issues have been raised and the preferred alignment is based on the information of the local community and technical investigation. Steps taken to give stakeholders information to participate meaningfully in the study and the way forward planned for review period give the Study Team enough confidence to consider the consultation process as robust and adequate for the study of this nature.

It is therefore submitted that the consultation process did identify issues and concerns that assisted in identifying the best possible route and the relevant mitigation measures to reduce the negative impacts will be documented in the EMP. Communication with registered stakeholders will be ongoing during the review period to ensure informed decision-making. The decision of the Minister of Environmental Affairs and Tourism regarding the appeals will be communicated to the registered stakeholders by means of posted letter, fax or email.

## APPENDICES

## APPENDIX 1

### ***MAP: Study Area showing Alignments and Alignment Alternatives***