

APPENDIX 2A

EXECUTIVE SUMMARIES OF ZEUS-MERCURY EIA STUDY

**ZEUS-MERCURY
765KV TRANSMISSION LINE
&
ZEUS & MERCURY SUBSTATIONS
ENVIRONMENTAL IMPACT ASSESSMENT
DRAFT ENVIRONMENTAL IMPACT REPORT**

EXECUTIVE SUMMARY

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.

Two new 765kV Transmission lines are required to strengthen this section of the network:

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

A full EIA processes for both these projects is being undertaken. They are being run in parallel even though only one is required by the end of 2008. The second is anticipated around 2011.

This Draft Environmental Impact Report (DEIR) follows the submission of the Draft Scoping Report in November 2005, and further detailed investigations in early 2006. This DEIR sets out the findings to date and is released to the public for comment and input. Any comments received will be incorporated in the Final Environmental Impact Report (DEIR) that will be submitted to the authorities for consideration, approval and award of environmental authorisation with the issue of the Record of Decision (RoD).

APPROACH

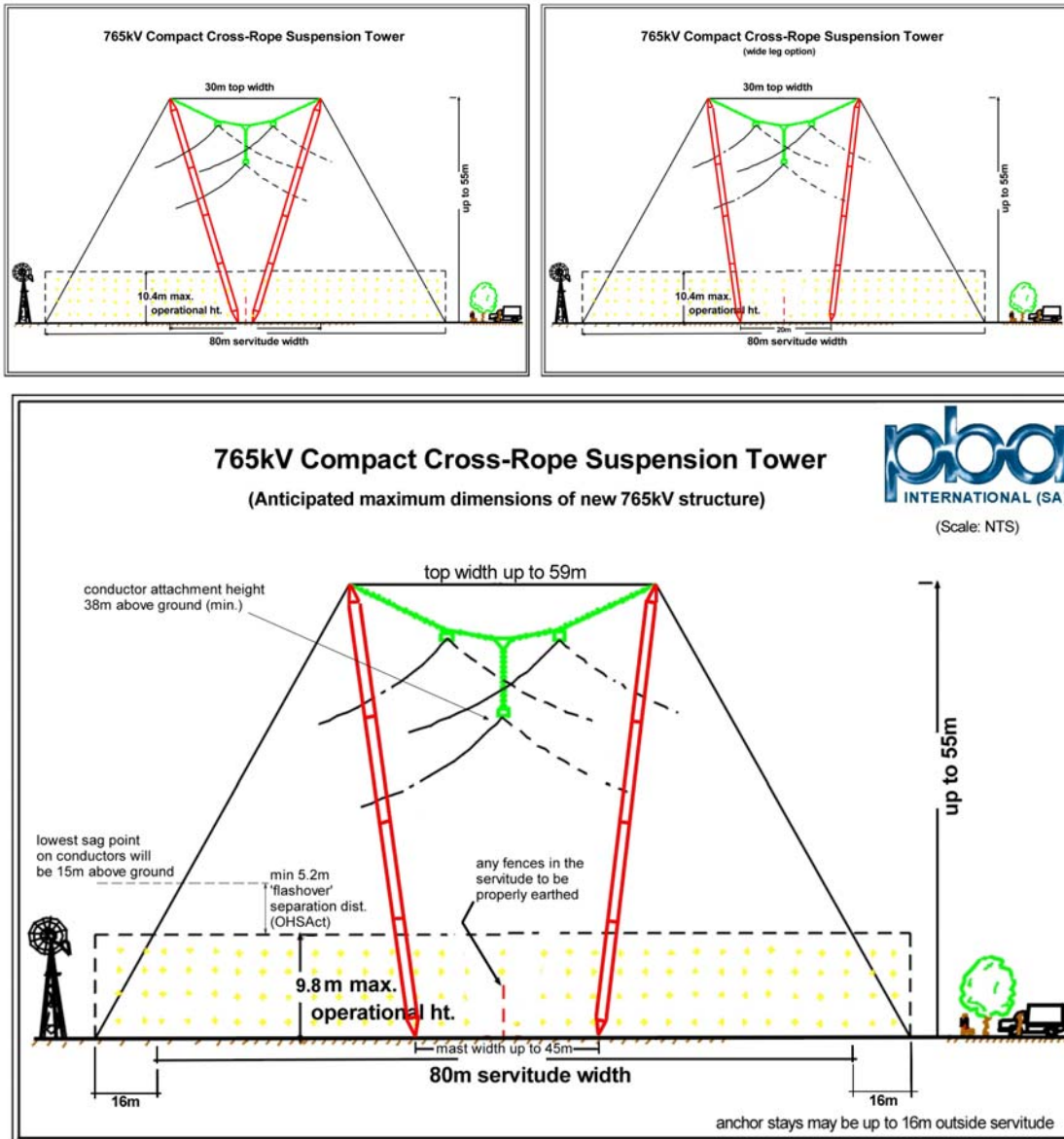
The study area falls in the Mpumalanga, Free State, Gauteng and North West provinces. The lead authority will be the National Department of Environmental Affairs and Tourism (DEAT) who will issue the final Record of Decision (RoD). Separate applications have been submitted for each project.

DEVELOPMENT PROPOSAL

An important change in the design of the tower structure and their separation distance from other lines emerged during the EIA phase. Details of these changes are set out below:

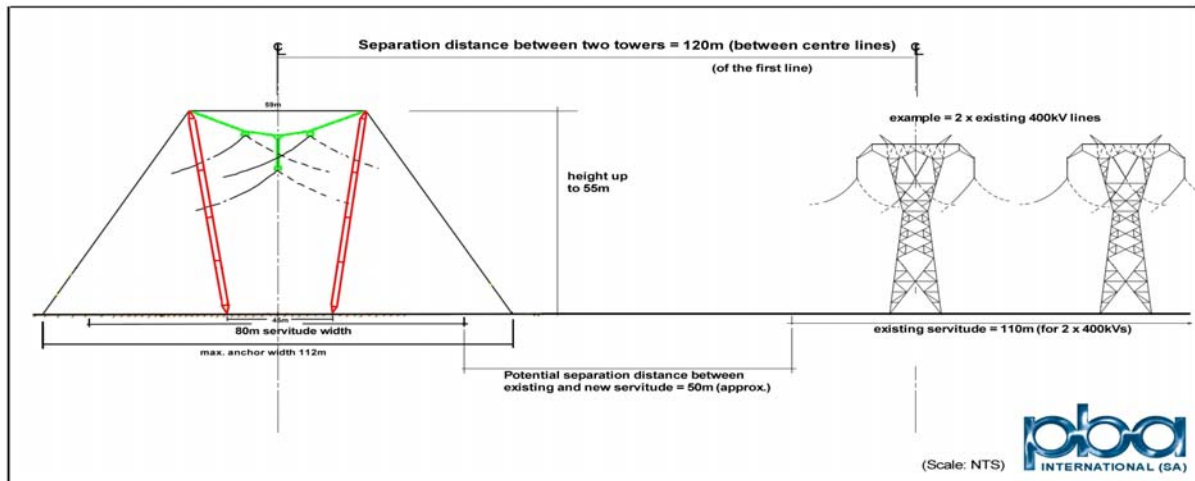
- It is stated that the construction phase for one the new lines on one of the options must be completed by the end of 2008. the second is planned for 2011.
- Each of the substations will need to be expanded to accommodate the new 765kV yard. At Zeus the additional area will be 28ha (700m x 400m), while at Mercury the additional area will be 44ha (1100m x 400m).
- The distance between the Zeus and Mercury substations is approximately 255km
- A new 80m servitude will be needed for each line (40m on either side of the centre line)

- The proposed line will be a pylon construction of a compound cross-roped suspension design utilising strain towers on difficult terrain and on bends greater than 3°. The height of the pylons can be up to 55m high. Anticipated designs are shown below.



The small diagrams above set out the tower configurations presented in the Scoping phase of the study (and were presented in the Draft Scoping Report). In the interim, further design work has revealed the configuration in the larger diagram. Key differences include the top width of the tower at almost 60m, and the width of the anchor foundations at 56m from the centre line of the structure – **this being 16m outside the servitude.**

A further development has been the separation distance between the new line and an adjacent line. This was previously understood to be 80m between the centre lines of the two structures, but it now been stated it may be as much as 120m. This is illustrated below.



The reasons behind these changes are two-fold:

The 765kV Cross-roped suspension tower structure is still under design, and further adjustments may occur. However, the configuration shown above is seen to be conservatively large, and it is anticipated that any future adjustment will see a reduction in size.

The new separation distance gives recognition to the national importance of the new line and the need to minimise all risk of potential failure. This includes the possible collapse of adjacent structures on to the new line, and safety requirements for helicopter access for maintenance and emergency work.

Alternatives

Alternatives to the scheme are limited by the timeframes for the provision of the additional electricity (target date end of 2008), and the availability of substantial alternatives for power supply. These are discussed in more detail in the main report.

Instead the EIA study has focussed on alternative routes for the new line. These are summarised in the table below:

| Alternative | Description |
|-------------|---|
| ZM1 | Follows a northern route between Zeus and Mercury. Runs north of the Vaal Dam, but then dips south below Sasolburg before turning north again past Parys. Follows the northern Vredefort Dome WHS boundary. (an early deviation in this option saw a route through the northern areas of Sasolburg) |
| ZM2 | Follows a southern route to Mercury, running below the Vaal Dam, past Heilbron, Koppies, and Vredefort. This route has effectively been superceded by ZM3. |
| ZM3 | Similar to ZM2, but avoids mining applications near Heilbron and Koppies, as well as dense center-pivot irrigation schemes near Villiers. |

PUBLIC CONSULTATION

A comprehensive first round of consultation in the Scoping phase included:

- 3 Key Stakeholder Workshops in October 2005 (Welkom, Parys, Frankfort)
- 22 Public Open Day Sessions (September and October 2005)
- Over 18 Focus Group Meetings (held with Farmers Unions and Associations, various Government Departments, businesses, etc., October to December 2005)

In addition Background Information Documents and lists of potentially affected farms have been sent to all District Farmers Unions in the study area.

Thus far in the EIA phase, ongoing consultation with District Farmers Unions (DFUs) and Farmers Associations (FAs) has continued by attending their scheduled meetings and providing information on the study. As progress was made in identifying preferred routes, these were discussed with landowners. Also an update on the list of affected farms, with registered names of the owner, has been sent to all DFUs and FAs.

A updated summary of issues raised is presented below:

| Theme | Issue |
|-----------------------------------|--|
| Impact on Agricultural Activities | Effects of EMFs on animals, including sterility and milk production |
| | Croplands: impacts on crop spraying activities due to safety concerns and cost |
| | Croplands: towers reduce productive area with resulting drop in land value |
| | Croplands: towers increase time for ploughing, planting, harvesting, etc., due to difficulties in maneuvering farm implements around tower bases and anchor foundations. This results in a loss in investment (in previously preparing the land) and even a change in farming practices. |
| | Croplands: towers interfere with irrigation systems, especially center-pivots |
| | Rather move new power lines on to grazing land where impact on farming activities is much less. |
| | Impact of the power lines on GPS instruments in tractors. |
| | EMFs and impacts on livestock (fertility and milk production) |
| | EMFs and impacts on vegetable crops |
| | Feedlots and chicken farms along the corridors near Sasolburg, Parys and Potchefstroom will be affected by EMFs. |
| | Impacts of EMFs on tractor GPS systems |
| | Impacts of lines on use of helicopter for game capture on game farms. |
| Security | Eskom gates get left open by contractors & maintenance crews with resulting loss of livestock |
| | Cross-breeding of cattle because gates get left open. |
| | Gates installed at inappropriate places |
| Coal reserves | New coal reserves in the northern Free State. Does this mean there will be new power stations there? If so what is the need for these new lines? |
| Mining | Expansion of mining applications in the northern Free State. Open cast mines will affect power line routes, and shallow underground mining may affect lines (depending on method of mining) |
| Amenity & recreation | Power lines over dams, especially the Vaal Dam, will limit use of sailing boats with high masts. |
| Land value and economics | Croplands: towers reduce productive area with resulting drop in land value |
| | Potential game farm investors turned away because of power lines. |
| | Tourists, visitors to hunting lodges complain about the existing lines in the area. Similarly other eco-tourism ventures will be affected by new lines of this size. |
| | High value properties will be devalued by power lines crossing them. |
| Landuse and urban development | Concern that urban expansion may be affected by power line corridors (eg Deneysville, Virginia, Dealesville) |
| | Need to fence servitudes near areas of settlement to prevent informal development within servitude |
| Natural environment | Concern of erosion of river banks where lines cross rivers (due to maintenance vehicles crossing the rivers) |
| | Impacts on secretary birds, flamingoes and blue cranes. |
| | Impacts of EMFs on game. |
| Heritage | Important heritage sites at Tafelkop in the Free State. |

(note: a number of issues have been raised by the public that are not seen to affect the assessment of the power line corridors. They are not listed here, but are recorded in the main report. They include issues such as job creation and local electricity distribution problems)

All stakeholder queries are recorded in the main project database that is published in Volume III of the Main Report. Also where stakeholders have provided comment at Farmers Association meetings these are recorded in notes of those meetings in the same document. Furthermore, a comprehensive Comment and Response Document has been prepared showing specific response to queries raised in this process. This too is presented in Volume III.

RECOMMENDED ROUTE & IMPACT ASSESSMENT

The recommended route is ZM1. There is a clear preference for this route as shown below:

- ZM3 is similar to ZM2, but avoids potential open cast mining areas near Heilbron and Koppies, and also avoids sensitive ecological areas south of the Vredefort Dome. ZM2 was therefore not considered in any detail in the EIA phase.
- ZM3 was preferred above ZM1 with respect to mining, social and visual impacts.
- However, the environmental benefits in other aspects of ZM1 outweighed these concerns. See table below.

| <u>Zeus-Mercury</u> | | | | |
|----------------------------------|-----------|-----------|-----|---|
| 'Normal' Construction Management | | | | |
| | weighting | ZM1 | ZM3 | |
| Visual | 3 | 1 | 4 | 4 |
| Landuse | 4 | 4 | 1 | 1 |
| Mining | 5 | 1 | 4 | 4 |
| Social | 3 | 1 | 4 | 4 |
| Ecology | 5 | 4 | 1 | 1 |
| Birds | 3 | 4 | 1 | 1 |
| Archaeology | 4 | 4 | 1 | 1 |
| Heritage | 3 | 4 | 4 | 4 |
| Tourism | 2 | 4 | 1 | 1 |
| Preference | | 95 | 74 | |

The main social related concerns of ZM1 – passing through the planned urban expansion between Deneyville and Sasolburg – can be minimised through careful planning.

It is further understood the mining impacts can be mitigated using a combination of mining and tower design techniques, though it is likely that coal reserves directly under the towers will be sterilised by the development.

The visual impacts are difficult to mitigate, though it is seen to be some mitigation that the new lines are recommended to follow existing lines, thereby confining the impact to a limited corridor.

A summary of the impact assessment of ZM1 is presented below:

| ISSUE | DETAILS | PHASE OF CONCERN | POTENTIAL SIGNIFICANCE OF IMPACT | |
|--|--|------------------|----------------------------------|------------------|
| | | | Before Mitigation | After Mitigation |
| 1. ECONOMIC | | | | |
| 1.1 National and Provincial Importance | National and provincial importance of project in terms of promoting economic growth in the region and South Africa | Operation | High (positive) | High (positive) |

| ISSUE | DETAILS | PHASE OF CONCERN | POTENTIAL SIGNIFICANCE OF IMPACT | |
|--|---|-----------------------------------|----------------------------------|-----------------------------------|
| | | | Before Mitigation | After Mitigation |
| 1.2 Local Benefits | Economic benefits that the Substation will bring to local communities | Construction (Mainly) & operation | Low to Moderate (positive) | Moderate (positive) |
| 1.3 Job Creation | Employment of local labour (South African citizens and people local to the area) and preference given to a local contractor | Construction (Mainly) & operation | Medium (positive) | Medium (positive) |
| 1.4 Tourism | The substation will detract from the aesthetic appeal of the natural environment, and will therefore negatively impact on tourism activities | Construction & Operation | Low | Low |
| 2. WELL BEING: | | | | |
| 2.1 Electro-magnetic fields-Health Effects | Impact of electromagnetic fields (EMFs) on animals, people and vegetation | Operation | Potentially High (perceptive) | Low |
| 2.2 Dust & Noise (within plant area) | Dust & noise control during construction | Construction | Low | Low |
| 2.3 Corona (noise) | The effect of the corona (low "buzzing" noise) may be noticeable in properties immediately adjacent to the substation. | Operation | Potentially High | Low |
| 2.4 Fire hazard | The construction and operation of the line may alter the occurrence and management of fires in the area. The change in the nature of fire hazards and events can have safety, economic and ecological implications. | Construction and Operation | Potentially High | Moderate to Low |
| 2.5 EMF Electric shocks | Effect of induced currents on adjacent infrastructure, and risk of shock or electrocution. | Operation | Potentially High | Low |
| 2.6 Use of Creosote poles | Creosote poles may be used during the project and may have a negative health implications and an ecological impact | Construction | Low | Low |
| 2.7 HIV/AIDS | Refer to Inmigration of construction workers | | | |
| 2.8 Lightning | Risk of damage to property and injury to animals and people in close proximity to the lines | Operation | Potentially High | Moderate to Low |
| 3. AESTHETICS: | | | | |
| 3.1 Visual impact | Visual impacts will be significant in the local area | Operation & Construction | Moderate | Moderate |
| 3.2 Lose of Sense of Place | Negative impact on the spiritual, aesthetic and therapeutic qualities associated with the area in the vicinity of the substation | Operation | Moderate | Moderate |
| 4. SOCIAL: | | | | |
| 4.1 Relocation of people | Will there be a need to relocate people, and their property/houses? What are the likely impacts? Will they be compensated? | Construction | Potentially High | Moderate negative to Low positive |

| ISSUE | DETAILS | PHASE OF CONCERN | POTENTIAL SIGNIFICANCE OF IMPACT | |
|---|--|--------------------------|----------------------------------|---|
| | | | Before Mitigation | After Mitigation |
| 4.2 Disruption of social networks and daily movement patterns | The social routine and social networks may be disrupted during the construction process. | Construction | Moderate | Moderate to Low |
| 4.3 Location of construction camps | The siting of construction camps | Construction | Potentially High | Potential Low Positive |
| 4.4 Gravesites | Protection of gravesites, disinterment of graves | Construction | Low | Low |
| 4.5 Traffic Safety | Road traffic safety, particularly relating to construction traffic. | Construction | Moderate to High | Low to Moderate |
| 4.6 Immigration of Construction workers | Refer to Construction camps | | | |
| 5. LAND ISSUES | | | | |
| 5.1 Property value reduction | Negative impact on property values Potential buyers of a game farm withdrew from negotiations when it became known there is an existing power line on the property. | Operation | Moderate (often perceived) | Low (potentially positive) |
| 5.2 Crop spraying | Power lines have a significant impact on crop spraying, and this method of treatment is increasingly being used in the study area. How will the landowner be compensated for this? | Operation | Moderate to High | Low to Moderate |
| 6. Farming Related Issues | | | | |
| 6.1 Access to properties | The creation of new or improved access to properties, for access to the line, brings potential associated issues that need to be considered | Construction & Operation | Moderate to High | Low |
| 6.2 Access Roads | The physical creation and use of new roads, or increased use of existing roads will also have associated impacts | Construction & Operation | Potentially High | Moderate to Low |
| 6.3 Loss of Agricultural Potential | Restrictions on land use and activities will impact on the agricultural potential of the land | Construction & Operation | Low to Moderate | Low |
| 6.4 Season for Construction activities | Certain activities (construction and operation) may have greater impacts on the environment and agricultural activities at certain times of the year | Construction & Operation | Moderate to High | Moderate to Low |
| 6.5 Use of GPS navigation systems for cultivation | GPS systems are used for land cultivation (ploughing, seed drilling, etc.) in many areas. Will the power line interfere with satellite communication therefore affecting GPS readings? | Operation | Potentially High | Moderate to Low if following existing lines |
| 7. NATURAL ENVIRONMENT: | | | | |
| 7.1 Impact on fauna & flora | Impacts on the natural fauna in the area | Construction & Operation | Moderate to Low | Low |
| 7.2 Impact of herbicides | Herbicides will be used during the construction and operation phases of the project to clear and potentially manage the line. | Operation | Moderate | Low |

| ISSUE | DETAILS | PHASE OF CONCERN | POTENTIAL SIGNIFICANCE OF IMPACT | |
|--|---|----------------------------|--|------------------|
| | | | Before Mitigation | After Mitigation |
| 7.3 Impact on Avifauna (Birds) | Impacts on birds. Particular concern regarding impacts on birds in terms of: <ul style="list-style-type: none"> • Collision • Electrocution • Destruction of Habitat | Construction & Operation | Moderate to Low | Low |
| 7.4 Impact on flora | General impacts on flora. | Construction and operation | Moderate | Low |
| 7.5 Impact on wetlands | Potential damage to wetlands and pans during construction and maintenance | Construction & Maintenance | Moderate to potentially high | Low |
| 7.6 Importation of alien vegetation | Importation of alien vegetation through building materials | Construction | Moderate to high | Low |
| 7.7 Impact of construction camps | The construction camps may have an impact on the natural environment <ul style="list-style-type: none"> • should be at least a hundred meters away from any water source • should be above the 1:100 year flood line. This refers particularly to the placement of toilets. • Should not be placed within any sensitive habitat including sensitive grasslands | Construction | Potentially High | Moderate to low |
| 7.8 Erosion | Erosion on access roads may become a problem | Operation & Construction | Moderate to High | Low |
| 8. CULTURAL AND ARCHAEOLOGICAL SITES | | | | |
| 8.1 Palae-ontological Sites | Impact on fossils. | Construction | Moderate | Low |
| 8.2 Archaeology | Impact on Stone Age and Iron Age sites | Construction | Moderate to Low | Low |
| 8.3 Cultural, Historical and National Heritage Sites | Impact on Blockhouses, Battlefield sites, concentration camp cemeteries and other grave sites | Construction | Potentially High | Low |
| 9. MANAGEMENT RECOMMENDATIONS: | | | | |
| Environmental control officer | Appointment of environmental control officers (or Environmental Officer) | Construction | No impact – see Impact Tables for further background details | |
| 10. CONSTRUCTION CAMP ISSUES: | | | | |
| 10.1 Immigration of construction workers | Immigration of construction workers may lead to: <ul style="list-style-type: none"> • Increased theft and poaching – fruit, stock, farming implements, irrigation pipes due to improved access to farms • Increased social problems – drinking, violence, prostitution and HIV/Aids | Construction | Potentially moderate to high | Moderate to low |
| 11. PROCESS: | | | | |

| ISSUE | DETAILS | PHASE OF CONCERN | POTENTIAL SIGNIFICANCE OF IMPACT | |
|--|---|------------------|--|------------------|
| | | | Before Mitigation | After Mitigation |
| 11.1 Consultation prior to construction | Landowners should be consulted prior to construction. | | No impact – see Impact Tables for further background details | |
| 12. GENERAL | | | | |
| 12.1 Flood risk | Risk of damage to the Transmission line and disruption of services due to flooding. | Operation | Moderate to High | Low |
| 12.2 Potential temporary and long-term disruption of infrastructure and services | Potential disruption of: <ul style="list-style-type: none"> Local services (water, electricity) The local irrigation canal network. Local traffic | Construction | Potentially High | Low |
| 13. MINING RELATED ISSUES: | | | | |
| 13.1 Open Cast Mines | Potential crossing of existing or proposed open cast mines, with associated concerns of: <ul style="list-style-type: none"> sterilising mineral reserves inhibiting mine operations impacts of blasting on the line potential future relocation of the line as mine operations expand | Operation | None | None |
| 13.2 Underground mines | The potential crossing of undermined areas or areas where reserves may be mined in the future | Operation | Potentially High | Moderate |

IMPACTS AT SUBSTATIONS

The anticipated impacts at both the Zeus and Mercury Substations is seen to be relatively low. Both sites are located in similar flat terrain in open agricultural settings. Surrounding landuse is extensive crop and grazing, and given that Eskom will purchase the land required for the substation extensions in each case, the associated economic and landuse impacts is seen to be low.

Visual impacts are also seen to be relatively low given the existence of the present 400kV yards and associated lines. However, the infrastructure in the new yard will be some 15m higher than the existing yard, and the site will be more visible.

The main concerns arise from the drainage of the site and the construction process – both of which can be damaging if not carefully designed and managed. However, Eskom is improving the environmental management of construction sites, and will have a full time ECO (Environmental Control Officer) on site during construction.

Overall, the level of impact for the extensions of both substations is seen to be low.

RECOMMENDATIONS

A substantial set of recommendations is given in the Impact Tables in Volume I – Appendix IB-1 of the main report. These are not repeated here but they form the bulk of the recommendations that will be put to Eskom and the authorities pending public comment on the Draft Environmental Impact Report. However, some of the more general recommendations are set out here.

Zeus-Mercury 765kV power line:

- ZM1 is the recommended route for the new line.
- Without compromising technical and safety aspects, the configuration of the new towers should seek to keep the anchor foundations within the 80m servitude.
- In the same light, the separations distance between the new line and any adjacent lines should be kept to a minimum. It is generally seen that most environmental impacts are reduced with the smaller distance.
- In particular, where the lines pass over croplands, the maximum separation distance should be 80m (centre line to centre line), and tower structures should be placed next to any existing towers as much as possible.
- The impact assessment has assumed that the new line will follow existing lines along much of the route. Local deviations identified during negotiation of the servitude may be required. It is considered such localised deviations should not compromise this EIA provided they are assessed during the 'Walk-through' surveys, and that they are within a 400m corridor (200m either side) of the route presented in this report.
- Walk-through surveys of the route need to be undertaken by key specialists during the design phase. These include the archaeologist and heritage specialists, ecologist or botanist, and avifauna specialist. This survey should take place after the first power line profile is plotted and before the tower locations are finalised.
- The first version of the Environmental Management Plan (EMP) should be drafted immediately after award of the RoD. It should include the stakeholder database developed during this EIA.
- The Eskom Negotiator should have access to the EIA reports, the RoD and the EMP. The EMP should be updated with information provided by the Negotiator on site specific issues raised by the landowners (e.g. location of gates, access roads, etc.)
- Information provided by the specialist 'Walk-through' surveys need to be incorporated into the EMP before completion of the design phase.
- During the negotiation and design stages (ie before construction starts), landowners and interested parties may contact the following Eskom Transmission representatives regarding environmental matters relating to the development:

| | |
|--|-------------|
| Carol Streaton (EIA Project Manager) | 011-8005411 |
| Koos van der Merwe (Senior Negotiator) | 082-8057605 |

- A separate full time Environmental Control Officer (ECO) needs to be appointed by Eskom for each main contract during the construction phase. If there are two substation contracts (Zeus & Mercury) and one power line contract, there will be at least three ECOs. If the power line contract is split into two main contracts, there will be two ECO's for the power line.
- Contact details for the ECO (name and cell number) should be made available to all directly affected landowners and any interested and affected party (I&AP).
- The location of the construction camps and access roads must be assessed by the ECO and approved by the Eskom EIA Project Manager.
- All recommendations set out in the Impact Tables in Volume I – Appendix IB-1 are to be included in the recommendations put forward in this report.

Substation sites:

- A Geotechnical investigation should be done in the design phase as a matter of course. The drainage requirements must be reviewed in the light of the investigation and the issues raised in this report.
- The location of the construction camps and access roads must be assessed by the ECO and approved by the Eskom EIA Project Manager.
- All construction related issues raised in the Impact tables for the power lines and associated recommendations are seen to be relevant to the substation sites.

**ZEUS-MERCURY
765KV TRANSMISSION LINE
&
ZEUS & MERCURY SUBSTATIONS**

ENVIRONMENTAL IMPACT ASSESSMENT

FINAL ENVIRONMENTAL IMPACT REPORT

EXECUTIVE SUMMARY

During the review period of the Draft Environment Impact Report (DEIR), intensive investigation of the preferred corridor, viz., Zeus-Mercury 1 and related consultation with affected landowners and other interest groups and consideration of Eskom planning requirements took place. This addendum report sets out the findings to date and recommendations made that sections of the proposed corridor be realigned to avoid site-specific problems such as the impact of induced current when running parallel to conducting material such as pipelines and utilising existing vacant power line servitudes assessed during the review period.

It is to be noted that the work undertaken during this period supports the recommendations of the DEIR that the Zeus-Mercury 1 corridor was the preferred route and it also gave the study team the opportunity to refine the route by additional stakeholder consultation, site visits and helicopter flyovers.

The design of the towers to be used for the project is still ongoing but it is anticipated that it will remain largely the same as that presented in the DEIR. However, in contrast to what was stated in the DEIR Eskom has confirmed that anchor cables will lie within the servitude and not, outside the 80m servitude requirements of the 765kV transmission line. This is seen to be better environmentally.

The proposed expansions to the Zeus and Mercury substations have also been amended since the issue of the DEIR and the amendments relate largely to the size of the proposed 765kV yards. The size of both yards has been reduced from what was formerly reported.

This Final Environmental Impact Report (FEIR) is an Addendum Report to the Draft Environmental Impact Report (DEIR) that was submitted for public comment in April 2006.

This Addendum Report addresses detailed investigations that took place in May and June 2006 and sets out the findings to date and includes comments received during the review period of the DEIR. The recommendations contained in the DEIR remain unchanged.

The Addendum Report, together with the DEIR, make up the FEIR that will be submitted to the authorities for consideration, approval and award of environmental authorisation with the issue of the Record of Decision (RoD).