



Majuba-Umfoloji 765kV Transmission Power Line Environmental Impact Assessment

DEAT PROJECT NO. 12/12/20/748

DRAFT ENVIRONMENTAL IMPACT REPORT

MARCH 2006

SUBMITTED BY:



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Title: Draft Environmental Impact Report for the proposed Majuba-Umfolozi 765kV Transmission power line and associated substation infrastructure at Majuba and Umfolozi substations (DEAT Ref. No. 12/12/20/748).

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DIRECTOR

PURPOSE OF THE DRAFT ENVIRONMENTAL IMPACT REPORT

Eskom Transmission has commissioned an Environmental Impact Assessment to investigate the potential environmental impacts of the proposed construction of a 765kV Transmission Power Line from the Majuba Power Station in Mpumalanga to the Umfolozi sub-station near Ulundi in KwaZulu-Natal. The Environmental Impact Assessment is being undertaken by BKS (Pty) Ltd as independent consultant, and is being done in terms of the Environment Conservation Act (Act 73 of 1989) (ECA), in particular, Regulations R1182 (as amended), R1183 (as amended), and R1184

The environmental studies are required to address the potential impacts associated with the proposed project, and provide an assessment of the project in terms of the biophysical, social and economic environments. It is this assessment, which aids both the environmental authorities (in this case Mpumalanga Department of Agriculture and Land Administration (MDALA), KwaZulu-Natal Department of Agriculture and Environmental Affairs, (DAEA) and the Department of Environmental Affairs and Tourism (DEAT) and the proponent (i.e. Eskom Transmission) in making decisions regarding the future of the project. The DEAT will ultimately consider this application as the proposed project will affect the environment across the boarder of two provinces (Section 4(3), Regulation 1183 of the ECA). The Environmental Impact Assessment commenced with the Scoping Phase during which public, specialist and technical issues and concerns were identified to inform the terms of references for the studies that were undertaken by the specialists in the Impact Assessment Phase as presented in this report. The Scoping Phase of this project was completed in November 2005. The Impact Assessment, including five specialist studies has subsequently commenced. The results of these studies have been integrated and are presented in this Draft Environmental Impact Report (DEIR).

In keeping with environmental legislation, it is the responsibility of the independent environmental consultant to ensure that the public is provided the opportunity to participate meaningfully in the environmental investigation process. This includes identification of issues and review of reports. Accordingly, interested and affected parties (I&APs) are invited to review the Draft Environmental Impact Report to verify that their issues raised during Scoping have been adequately addressed. The public has the opportunity to review the report from 1 April 2006 until 1 May 2006 and submitting their comments to the Public Participation Office.

The comments received during this period will be incorporated into a Final Environmental Impact Report that will be submitted to DEAT, MDALA and DAEA, who will consider the report with a view to issuing a Record of Decision on the proposed project.

DRAFT ENVIRONMENTAL IMPACT REPORT DISTRIBUTION

If you wish to view these findings, the following options are available to view the DEIR:

Town	Venues	
	Main Report	Main Report & CD
Amersfoort	Main Library	Municipal Offices
eMondlo	eMondlo Library	
Paulpietersberg	Main Library	Emergency Centre
Utrecht	Main Library	Municipal Offices
Volksrust	Main Library	Municipal Offices
Vryheid	Main Library	Municipal Offices
Wakkerstroom	Library	Municipal Offices
ESKOM WEBSITE: www.eskom.co.za/eia		

The various farmers' organisations in the study area have also been provided with copies of the report to make available to its members. The report is also on the Eskom website: www.eskom.co.za/eia. Written comments should be sent to the Public Participation Office below before 1 May 2006. A round of public meetings will be held to present the DEIR. Those wishing to attend any of the meetings should confirm their attendance with the Public Participation Office by Wednesday 19th April 2006.

Date	Town	Venue	Time
Mon 24 April 2006	Paulpietersburg	KZN261 Control Centre	09:30 - 12:30
Tues 25 April 2006	Vryheid	Vryheid Farmers Union Hall, Stretch Crescent	09:00 - 12:00
	Utrecht	Utrecht Country Club	14:30 -16:30
Wed 26 April 2006	Wakkerstroom	Wakkerstroom Town Hall	10:00 -12:00

YOUR COMMENTS PLEASE

Please submit your comments or confirm your public meeting attendance to			
Public Participation Office Karin Bowler Enterprises, Karin Bowler or Joseph Masilela 13 Sydney Carter Street, Roosevelt Park, 2195		E-mail: josephbow@iafrica.com karinbow@iafrica.com	Telephone & Fax: (011) 782 4744
The due date for comments on the Draft Environmental Impact Report is 1 May 2006			

SUMMARY

INTRODUCTION

Eskom Transmission has commissioned an Environmental Impact Assessment (EIA) to investigate the potential environmental impacts of the proposed construction of a 765kV Transmission Power Line from the Majuba Power Station in Mpumalanga to the Umfolozi sub-station near Ulundi in KwaZulu-Natal. The Environmental Impact Assessment is being undertaken by BKS (Pty) Ltd as independent consultant, and is being done in terms of the Environment Conservation Act (Act 73 of 1989), in particular, Regulations R1182 (as amended), R1183 (as amended), and R1184.

BACKGROUND TO THE PROJECT

Eskom is the supplier of electricity in South Africa. The electricity demand in KwaZulu-Natal (KZN) is increasing at a much faster rate than was originally expected. Studies have shown a steady 3 to 5% per annum average load growth for the area. If Eskom is to honour its commitment to meet the increasing needs of end users, it has to establish and expand its infrastructure of Transmission power lines and substations in the Eastern Grid on an ongoing basis. It has, therefore, become necessary to reinforce the existing electrical infrastructure.

After assessing the practical alternatives available, Eskom Transmission has decided to address this need by strengthening the existing network to ensure a reliable electricity supply. A 765kV Transmission power line between the Majuba Power Station near Amersfoort in Mpumalanga and the Umfolozi Substation near Ulundi in KZN is therefore proposed. The line will initially be operated at 400kV and can be energised at 765kV by integrating it into the Alpha or Zeus substations, near Standerton, when required.

TECHNICAL DETAILS OF THE PROPOSED PROJECT

Cross-rope suspension towers are proposed for the majority of the route. The tower is approximately 45 m high. The average span between towers will be 450 m. Self-supporting strain towers will be used at bend points along the line. Self-supporting angle towers are more expensive than the cross-rope suspension towers due to higher steel content. They also have a higher visual impact. Transmission line routes are therefore planned with as few bends as possible. Where required, a V-guyed tower can be used in constrained areas as well as to increase the span lengths.

An 80 m servitude is required to accommodate the towers on which the overhead line will be strung. The servitude is required to ensure safe construction, maintenance and operation of the line and Eskom will be entitled to unrestricted access. Where 765kV Transmission power lines are constructed in parallel to any other power line, a minimum separation distance of 80 m between the centre lines is required. The minimum vertical clearance between the lines and the ground is 10.4 m. The land beneath the overhead lines can be used for most farming activities by the landowners. No dwellings or crops higher than 4 m will generally be allowed in the servitude.

No additional land acquisition is anticipated at either the Majuba or the Umfolozi substation, as there is existing space in vacant bays to accommodate the proposed new line.

THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The environmental studies were undertaken in two phases; a Scoping Phase followed by an Impact Assessment Phase. In the Scoping Phase, information was gathered, and together with specialist and technical input, used to identify potential impacts (social, economic and biophysical) associated with the proposed project, and to highlight areas, which should be avoided in order to minimise these biophysical and social impacts. A public participation process was undertaken to identify issues and concerns of key stakeholders and Interested and Affected Parties (I&APs). The results are documented in the Scoping Report.

The Environmental Scoping Studies undertaken for the Scoping Report did not identify any fatal flaw issues within any of the three potential corridors for the proposed Transmission power line. However, a number of potentially significant issues were highlighted and further investigated in the Impact Assessment phase in order to assess their significance, and to determine the need for the implementation of mitigation measures in order for the overall project to be environmentally sustainable.

The following key issues with related potential impacts were identified in the Scoping Phase:

- Potential impacts on sensitive vegetation that may be threatened by the project;
- Potential impacts on the oribi and the minor black millipede;
- Potential impacts on wetlands;
- Birds - impact of the lines on flight paths and potential bird collisions;
- Socio-economic Impacts (including land-use specifically forestry and irrigation);
- Eco-tourism;
- Visual impacts;
- Heritage resources; and
- Construction impacts.

In order to identify and evaluate the potential impacts of the Transmission line, a team of specialists competent in the following areas have been included in the project team:

- Ecology (indi Flora: Johan Bodenstein);
- Avi-fauna (birds) (Endangered Wildlife Trust: Chris van Rooyen);
- Socio-economic, land-use and tourism (MasterQ Research: Anita Bron);
- Visual impacts (Cave Klapwijk and Associates: Menno Klapwijk); and
- Heritage Resources (eThembeni Cultural Heritage: Len van Schalkwyk and Beth Wahl).

The assessment of impacts has been done in accordance with the requirements stipulated in the Integrated Environmental Management Procedures, DEAT, 1998. Impacts can be positive or negative, and can be caused by the construction of the power line on the environment or by the environment on the power line. Descriptions of the nature of the

impact, any specific legal requirements and the stage (construction/decommissioning or operation) have been included in the draft EIR. Impacts are considered to be the same during construction and decommissioning. Impacts have been described and evaluated in terms of extent, duration, intensity, probability and confidence. Significance was assigned to each potential impact, before and after recommended mitigation measures. The possible cumulative impacts are also considered. Mitigation for significant issues have been determined and incorporated into the Environmental Management Plan (EMP) for construction, and a recommended corridor has been identified by the study team based on the assessment of all impacts.

ENVIRONMENTAL MANAGEMENT PLAN

A framework EMP for construction, incorporating recommended mitigation measures, has been compiled as a separate document. The EMP covers the construction phase of the project only, and includes a monitoring programme that should be legally binding on Eskom, and its contractors. A separate EMP for the operation and maintenance phase of the project will have to be compiled at a later stage.

PUBLIC PARTICIPATION PROGRAMME (PPP)

A comprehensive public participation process that included consultation with the Municipalities, Traditional Authorities and Farmers' Organisations, as well as extensive efforts to identify and involve potentially affected landowners in the project has been undertaken. This included the distribution of documents by mail and e-mail, use of the printed media, telephonic consultations, individual meetings, focus group meetings, and public meetings. The public participation process for the EIA does not include the final servitude negotiations with the landowners that will be directly affected by the final route. The servitude negotiations task will be done by a negotiator from Eskom once authorisation for the project has been issued by DEAT. The Eskom negotiator has, however, been involved in the project team site visit and discussions regarding the selection of a recommended corridor for the proposed line. Issues raised by stakeholders and an indication of how they have been addressed in the study have been recorded in an Issues and Responses Report.

PROJECT ALTERNATIVES

The investigation of alternatives has taken place on three levels: strategic, route corridor alternatives and design alternatives.

Eskom explored several strategic alternatives during the feasibility studies, to determine the preferred solution to the transfer constraint of the Eastern Grid. These included:

- Do Nothing;
- Alternative Energy Sources;
- Network Strengthening Alternative;
- Majuba-Pegasus 765kV line, initially run at 400kV; and
- Majuba-Umfolozi 765kV line, initially run at 400kV (Proposed Option).

Three possible, technically feasible, route corridor alternatives have been identified (**Figure 1.1**). These corridors, and possible variations on them, have been considered by specialist investigations and input from the public participation process.

The design alternatives that can be considered on the local level relate to the use of different types of towers. These options will be discussed with the individual directly affected landowners, to minimise the negative impacts on their use of the land.

DESCRIPTION OF THE STUDY AREA AND POSSIBLE ROUTE CORRIDORS

The study area falls in the provinces of Mpumalanga and KwaZulu-Natal and covers a number of District and Local Municipalities. The main towns in the study area include Vryheid, Utrecht and Wakkerstroom, with PaulPietersburg and Volksrust near the boundaries of the study area all of which seem to be building a reputation as tourist destinations based on, amongst others, birding activities and a high scenic quality.

Agriculture is one of the most important economic activities in the study area and accounts for a significant proportion of land use. The Green Corridor (Corridor 1) originates at the Majuba Power Station and passes through Wakkerstroom and Utrecht. The land use in the northern grassland section is mixed commercial and subsistence agriculture (mainly sheep, and maize). The central area is predominantly eco-tourism based with several lodges and some agriculture. The eco-tourism is based on the cultural resources, visual diversity and high scenic quality. The southern section is mainly cattle grazing and some forestry.

The Yellow Corridor (Corridor 2) passes from the Majuba Power station past Wakkerstroom, where the land use is mixed commercial and subsistence agriculture (mainly cattle, sheep and maize). From there, forestry is the main land-use with some commercial and subsistence agriculture and eco-tourism. Cattle and game farming occurs in the bushveld and savannah areas.

The Blue Corridor (Corridor 3) passes from the Majuba Power Station towards Volksrust and Newcastle-Osizweni-Madadeni. The land-use is mixed commercial and subsistence agriculture (mainly sheep, cattle and maize). It then passes through traditional rural settlements until just past eMondlo.

The Blue-Green Corridor follows the blue corridor until just before eMondlo where it crosses over to the Green corridor where maize farming and grazing occur. Centre pivot irrigation is practised in the vicinity of this area.

At least 50% of the study area falls within the proposed Ekangala Grassland Biosphere Reserve (EGBR), which has some of the last remaining rolling grasslands left in South Africa. Due to the short growing season, the grasslands in the study area have escaped much of the ecological carnage caused by the transformation of most grassland into

agricultural monocultures. The dominant land-use (pastoral with cattle and sheep farming), has less impact on the environment than some other land uses, resulting in much of the fauna and flora remaining intact. The study area below the escarpment is an open savannah with scattered *Acacia sieberiana* (*Paperbark Thorn*) and sour grasslands consisting of such species as Common Thatch Grass. Towards the south of the study area, below the escarpment, there has been significant thornveld encroachment, partly due to sustained overgrazing for more than a century.

The area contains some very important wetlands and dams, including permanent reed and sedge swamps, several seasonal pans, innumerable small sponges and seeps, numerous farm dams and hundreds of small perennial drainage lines as well as a few larger rivers, such as the White Mfolozi River and the Blood River.

A number of rare and endangered bird species and specifically larger species that may conflict with Transmission power lines are present in the study area.

KEY FINDINGS OF THE EIA

A recommended corridor (**Figure 1.1**) within the blue-green corridor, that is technically feasible and which avoids all significant environmental issues, has been identified based on the key outcomes of the specialist studies and a rating of the preferred corridor for key environmental issues (vegetation, animals including birds, social, land-use, tourism, visual and heritage resources).

The following particular aspects should receive attention in the implementation of the Transmission power line project:

- The final route of the Transmission power line should:
 - Be within the recommended corridor;
 - Be aligned through the lower lying landforms and off the ridge lines;
 - Cross existing main roads as close to 90° as possible;
 - Avoid alignment along the top of ridges; and
 - Position the towers on a midslope of a landform that rises to a plateau and koppie so that the plateau or koppie will form a background to the line.
- Vegetation, avi-faunal and heritage resources specialists should undertake a site inspection of each tower position and any new access roads to assess and ensure that no endangered vegetation, sensitive avi-faunal habitat or heritage resources are compromised and advise on mitigation prior to construction.
- No towers or access roads should be placed in wetlands. If this is unavoidable, then authorisation from the Department of Water Affairs and Forestry (DWAF) must be obtained prior to construction.
- An avi-faunal specialist must identify the sections of the line that require demarcation for anti-collision devices once the route has been finalised. The following areas should be marked:
 - The entire section running through the Ekwangala Grasslands Biosphere Reserve;

- All sections of the line crossing a wetland or within 500 m of a wetland;
- All river crossings for at least one span beyond the river crossing;
- All sections of the line crossing a centre pivot or within 500 m of it; and
- Sections of grassland identified as being particularly sensitive for cranes, bustards and korhaans.
- The galvanising of pylons should be allowed to weather to a matt grey finish rather than be painted in any colour.
- Self-supporting strain towers must be protected with bird guards.
- The location of construction camps should be carefully considered. Newcastle, Utrecht, and Vryheid are better locations compared to eMondlo, Osizweni, and Nquthu.
- In addition to the standard process followed by Eskom for the resettlement of households, an interpreter, who is also preferably a sociologist, should accompany the negotiator when negotiations with the Nkosi/affected parties take place. The impact should be softened by enhancing positive impacts. The sociologist should assess whether the mitigation is concluded satisfactory, to the benefit of the affected parties. The sociologist should be in contact with the affected parties after resettlement has taken place to gauge the well-being of the affected parties.
- Petronet requirements for pipeline crossings must be honoured.
- Specific mitigation requirements included in the EMP must be adhered to.

CONCLUSION

The EIA team believes that the EIA for the proposed Majuba-Umfolozi 765kV Transmission power line fulfils the process requirements of current environmental legislation. Issues and associated impacts have been investigated by a team of qualified specialists who have reported on their findings without reservation. Extensive efforts have been made to identify and involve all potentially affected parties in the Public Participation Process. The public has been afforded numerous opportunities to participate in the EIA and all concerns raised have been addressed.

The recommendations set out in the Key Findings of the EIA section above are therefore presented for project implementation and the EIR will be presented to the relevant authorities for decision making on this basis.

Eskom Holdings Limited

MAJUBA-UMFOLOZI 765kV TRANSMISSION POWER LINE EIA (DEAT REF. NO. 12/12/20/748)

Draft Environmental Impact Report

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APPENDICES

- APPENDIX A: Layout of Majuba and Umfolozi Substations**
- APPENDIX B: Stakeholder Database and Maps**
- APPENDIX C: Issues and Responses Report**
- APPENDIX D: Social, Tourism and Land-use Specialist Report**
- APPENDIX E: Visual Impact Assessment**
- APPENDIX F: Heritage Resources Specialist Study**
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- APPENDIX I: Framework Environmental Management Plan for Construction**

LIST OF ABBREVIATIONS

BRG	Bio-resource Groups
CLN	Customer Load Network
DAEA	KwaZulu Natal Department of Agriculture and Environmental Affairs
DEAT	National Department of Environment Affairs and Tourism
DEIR	Draft Environmental Impact Report
DM	District Municipality
DSR	Draft Scoping Report
ECA	Environment Conservation Act 73 of 1989
EGBR	Ekgangala Grassland Biosphere Reserve
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
GCIS	Government Communication and Information System
IRPA	International Radioactive Protection Agency
KZN	KwaZulu Natal
LM	Local Municipality
MDALA	Mpumalanga Department of Agriculture and Land Affairs
NEMA	National Environmental Management Act 107 of 1998
POS	Plan of Study for Scoping
PPP	Public Participation Process
ROD	Record of Decision

GLOSSARY OF TERMS

Study area	The area that will be covered by the EIA within which possible route corridors will be investigated.
No-go area	An area in which the transmission power line cannot be routed due to resulting significant impacts.
Route corridor	A corridor, approximately 5 km wide that is technically feasible to route the transmission power line.
Route	A strip approximately 500 m wide within which the 80 m servitude for the transmission power line could be built.

Eskom Holdings Limited

MAJUBA-UMFOLOZI 765kV TRANSMISSION POWER LINE

EIA (DEAT REF. NO. 12/12/20/748)

Draft Environmental Impact Report

1. INTRODUCTION

1.1 BACKGROUND

Eskom is proposing the construction of a new 765kV Transmission power line from the Majuba Power Station (near Amersfoort) to the Umfolozi substation (near Ulundi) (**Figure 1.1**). Although the line will be built for a 765kV load, it will initially be operated at 400kV. The route passes through parts of the provinces of western Mpumalanga and northern and central KwaZulu-Natal (KZN).

BKS (Pty) Ltd has been appointed by Eskom Transmission as the independent consultant to undertake an environmental impact assessment (EIA) for the proposed Majuba - Umfolozi 765kV Transmission power line.

1.2 PURPOSE OF THE STUDY

In terms of Schedule 1, Item 1(a) of Regulation 1182 promulgated in terms of Sections 21, 22 and 26 of the Environment Conservation Act (ECA), i.e “facilities for commercial electricity generation with an output of at least 10 megawatts and infrastructure for bulk supply”, the proposed Transmission power line requires environmental authorisation. The National Department of Environmental Affairs and Tourism (DEAT) will consider this application as the proposed development will affect the environment across the border of two provinces (Section 4(3), Regulation 1183 of the ECA). Application for authorisation and declaration of independence have therefore been submitted to the Mpumalanga Department of Agriculture and Land Affairs (MDALA) and the KwaZulu-Natal Department of Agriculture and Environmental Affairs (DAEA) with copies to DEAT. The Plan of Study for Scoping, Scoping Report and Plan of Study for EIA as well as this Environmental Impact Report and all future documents will therefore be submitted to DEAT with copies to DAEA and MDALA. This process has been agreed to by all the Departments involved.

Figure 1.1: Locality Map

The BKS Division for Environmental Management meets the requirements for independent consultants and will not derive any benefit or interest from the construction of the Majuba-Umfolozi 765kV Transmission power line and associated substation infrastructure.

The work will be undertaken in compliance with the EIA Regulations published in Government Notices R1182, R1183 and R1184 of 5 September 1997 in terms of Section 21 of the Environment Conservation Act (No 73 of 1989) (ECA), as well as the National Environmental Management Act (No 107 of 1998) (NEMA). Cognisance will also be taken of other relevant legislation.

The environmental studies address the impacts associated with the project, and provide an assessment of the project in terms of the biophysical, social and economic environments to assist both the environmental authorities (in this case DEAT,MDALA and DAEA) in making decisions regarding the authorisation of the proposed project. These studies also provide the project proponent, i.e Eskom Transmission, with valuable information which will inform the implementation of the project, if the application is authorised by the environmental authorities.

1.3 PURPOSE OF THIS REPORT

The environmental studies for this project have followed a two-phased approach. The Scoping Phase of the project has been completed, and the Scoping Report has been approved by the authorities. This report is a product of the second phase; the Impact Assessment Phase, of the project.

1.4 STRUCTURE OF THIS REPORT

The following information is included in this report:

- an overview of the purpose and need for the proposed project (Chapter 2);
- a description of the proposed project, including a locality map (Chapter 2);
- an overview of the EIA process, including the public participation process (Chapter 3);
- a description of the project alternatives (Chapter 4);
- a description of the affected environment (Chapter 5);
- a summary of the findings of specialists undertaken (Chapter 6);
- assessment and mitigation of key environmental impacts (Chapter 7);
- integration of findings and identification of a recommended corridor (Chapter 8);
- a conclusion and recommendations (Chapter 9); and
- a framework construction Environmental Management Plan (Appendix I)

Comments received during the public and authority review period on the DEIR from 1 April 2006 to 1 May 2006 will be incorporated into a Final Environmental Impact

Report (EIR) for submission to the authorities for review with a view to issuing a Record of Decision (ROD) on the proposed project.

2. OVERVIEW OF THE PROPOSED PROJECT

2.1 INTRODUCTION

Electricity for large-scale use cannot be stored and it is therefore necessary to generate and deliver power over long distances at the very instant it is needed. The power which is required in KZN is generated mainly from the Power Stations located at the Mpumalanga coal fields, including the Majuba Power Station, and transmitted via power lines to major substations where the voltage is reduced for distribution to industry, businesses, homes and farms all over the country.

Most towns and cities purchase electricity in bulk from Eskom and sell it to households, industries and other end-users within their areas of jurisdiction, while Eskom also sells electricity directly to bulk end-users in some parts of South Africa.

Eskom has a mandate to satisfy potential customer needs as an essential service, which implies certain responsibilities. One of the most significant of these is to find and maintain the balance between satisfying the needs of society for electricity without having a detrimental effect on the environment. In order to achieve this, Eskom must continually re-assess its present infrastructure and take into account new developments to ensure that growing needs for electricity are satisfied, without significantly impacting on the environment.

2.2 THE NEED FOR ADDITIONAL TRANSMISSION CAPACITY

Hundreds of kilometres of 400 kV Transmission power lines that form part of the Eastern Grid feed electricity from the power stations in Mpumalanga to substations in KZN. The existing Transmission power lines are becoming heavily loaded and are expected to reach their transfer limits by 2008.

It is becoming difficult to operate the system with one line out of service for maintenance or other reasons, since the other lines then have to carry the entire load and become overloaded. Insufficient routine maintenance causes the condition of the operating lines to deteriorate resulting in poor line performance (faults etc.).

The electricity demand in KZN is increasing at a much faster rate than was originally expected. Studies have shown a steady 3 to 5% per annum average load growth for the area. If Eskom Transmission is to honour its commitment to meet the increasing needs of end-users, it has to establish and expand its infrastructure of Transmission power lines and substations on an ongoing basis. It has therefore become necessary to reinforce the existing electrical infrastructure.

2.3 MAJUBA-UMFOLOZI 765KV TRANSMISSION POWER LINE

Of the practical alternatives available, as described in more detail in **Chapter 4**, Eskom has decided to address the increasing need by strengthening the existing network to ensure a reliable supply. A 765kV Transmission power line between the Majuba Power Station near Amersfoort in Mpumalanga and the Umfolozi Substation near Ulundi in KZN is therefore proposed. The line will initially be operated at 400kV and can be energised at 765kV by integrating it into the Alpha or Zeus substation near Standerton when required.

The proposed Majuba-Umfolozi 765kV line will bring the following benefits to end-users:

- Improved reliability and quality of service in the Eastern Grid by preventing a voltage collapse (i.e. avoid load shedding);
- Strengthening of the Eastern Grid network thus enabling it to support future load growth; and
- Reduced network losses.

The new Transmission power line will be brought into operation before the load growth and demand exceeds the supply. An additional line from Mpumalanga to KZN will also ensure a firm supply into the area at all times. It is therefore necessary to secure the required servitudes timeously, to ensure that this will be possible.

2.4 TECHNICAL DETAILS

2.4.1 The Majuba Power Station

The Majuba Power Station (**Figure 2.1**) is situated between Volksrust and Amersfoort in Mpumalanga. Construction on the Majuba site started in September 1983 and the power station first produced power on 1 April 1996. Eskom took over management from the contractors on 1 April 2001. Majuba is the only Eskom Power station that is not linked to a specific coal mine and receives its coal from various sources.

The Majuba Power Station employs 550 people and has the following capacity:

- Installed capacity – 4 110 MW
- Three 665MW dry-cooled units
- Three 716MW wet-cooled units

The proposed 765 kV Transmission power line will be accommodated in the existing substation at Majuba which has a vacant bay (**Figure A.1** in **Appendix A**). No additional land acquisition is therefore required. No additional power will be generated (therefore there will not be an increase in e.g. air pollution in the area). Power currently generated that will feed the proposed new line is currently delivered

into the National Grid via other lines. The new 765kV line from Majuba operating at 400kV will just aid in getting the power into the Grid, and more directly into the KZN area.



Figure 2.1: Majuba Power Station (Photograph: Eskom Website)

2.4.2 The Umfolozi Substation

The 400kV Umfolozi Substation is situated just northwest of Ulundi in KwaZulu-Natal (28°12' 52"S, 31°11'13"E). No additional land acquisition is anticipated at the Umfolozi substation to receive the proposed line, as there is a vacant bay (**Figure 2.2** and **Figure A.2** in **Appendix A**). When the line is energised to 765kV, another substation closer to Richards Bay will be identified for 765kV integration and will be extended to accommodate the 765kV integration.



Figure 2.2: Umfolozi sub-station (Photograph: Menno Klapwijk)

2.4.3 Towers

Cross rope suspension towers (**Figure 2.3**) will be used for most of the route. The tower is approximately 45 m high. The average span between towers will be 450 m.



Figure 2.3: Cross rope suspension tower

Self-supporting strain towers (**Figure 2.4**) will only be used at bend points of greater than 3° along the line, and where the ground is unstable or the terrain is too steep to accommodate the cross-rope suspension structure, or where space is limited.

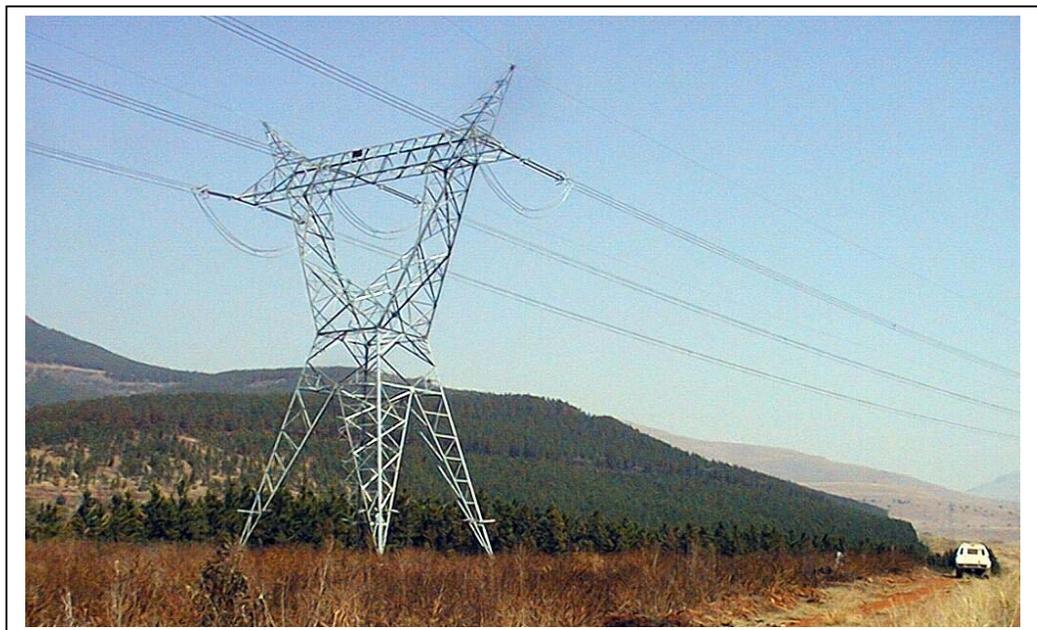


Figure 2.4: Self-supporting strain tower

Self-supporting strain (and angle) towers are more expensive than the cross rope suspension towers due to higher steel content. They also have a higher visual impact. Transmission line routes are therefore planned with as few bends as possible.

The galvanising of pylons will be allowed to weather to a matt grey finish and will not be painted.

2.4.4 Servitude Requirements

An 80 m servitude (40 m on either side of the centre line) is required to accommodate the towers on which the overhead line will be strung. The servitude is required to ensure safe construction, maintenance and operation of the line, and Eskom will be entitled to unrestricted access. Where 765kV Transmission lines are constructed in parallel, a minimum separation distance of 80 m between centre points is required. The minimum vertical clearance between the line and the ground after construction is 10.4 m. The land beneath the overhead lines can continue to be used for some activities by the landowners. No dwellings or crops higher than 4 m will, however, generally be allowed in the servitude.

With the cross-rope suspension structures, anchor stays may, in some instances, be outside of the 80 m servitude.

2.5 THE CONSTRUCTION PROCESS

The construction process is expected to take approximately 18 months, and is planned to commence in early 2007.

The co-ordinates of the centre-line of the route and position of the towers will be determined by surveyors after a final route corridor has been approved by the environmental authorities.

The construction process consists of the following phases:

- Contractor site establishment;
- Survey and pegging of tower positions;
- Access road negotiation and construction;
- Gate installation and vegetation clearing;
- Foundation excavation and installation;
- Tower assembly and erection;
- Conductor stringing and tensioning; and
- Servitude clean-up and rehabilitation.

The establishment of two construction camps along the route to accommodate approximately 100 people each will be required for the construction of the Transmission power line. The exact position of the construction camps will be negotiated with the relevant landowners. Strict conditions, including the approval of the location of the construction camp by the Environmental Control Officer (ECO), as well as for the use and management of resources are set out in the Construction Environmental Management Plan Construction (EMP) (**Appendix I**) and will have to be adhered to.

An 8 m wide strip directly under the position of the power lines will be cleared of all vegetation for construction purposes. Any plants that could interfere with the construction, maintenance or operation of the power line, will be removed or trimmed. Standards to be adhered to for vegetation clearing and protected species management have been specified in the EMP (**Appendix I**). Once the centre line has been cleared, the tower positions will be pegged.

Vehicle access is usually required along the entire route for construction, maintenance and operation purposes. Existing roads will be used as far as possible and the construction of roads and bridges will be kept to the minimum. Any roads within the servitude are considered to be included in this authorisation. If an access road falls outside of the servitude, authorisation from the provincial authorities will be necessary. Any additional authorisations (from DWAF, MDALA or DAEA) is a condition of the EMP (**Appendix I**) and must be obtained during the implementation phase of the project. Gates will be installed on all fences that the line crosses. Any existing infrastructure will be maintained in its existing condition. Access points and roads will be negotiated with the relevant landowners.

The type of foundation required for each tower is dependant on the geotechnical conditions. The minimum working area required for the erection of a self-supporting strain tower is 40 m by 40 m, and for a cross-rope suspension tower is 50 m by 50 m. bushy areas will be cleared, but grasslands will just be trampled by activities.

Foundations may be drilled, mechanically excavated, or dug by hand. No blasting will take place. Concrete is then placed. Helicopters may be used to transport equipment and materials if tower positions are inaccessible. Due to the costs involved, this is not the standard method of accessing the towers and line and access roads will still be used for the majority of the route.

Any incomplete excavations will be protected to prevent animals and people from injury. All foundations are back-filled, and stabilised through compaction and capped with concrete at ground level. Towers are lifted into position by cranes or helicopters.

The conductor is then strung between towers by first passing a guide wire through the desired position. Cable drums (containing 2.5km of cable, can be steel or wooded approximately 2.5 to 3 m in size) are placed at 5 km intervals in the cleared section of the servitude, and passed 2.5 km in each direction.

2.6 MAINTENANCE

Ongoing maintenance of the Transmission power line will be required throughout its lifespan. Line inspections are usually undertaken once or twice a year. This may be done via the access routes, or by helicopter. A Maintenance Environmental Management Plan (separate from the construction one) will specify these requirements.

3. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

3.1 STUDY APPROACH

An assessment of the environmental impacts of this proposed project is being undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations published in Government Notice R1182 to R1184 of 5 September 1997 in terms of the Environment Conservation Act (No 73 of 1989), as well as the National Environmental Management Act (NEMA), No 107 of 1998. In terms of Government Notice R1182 (Schedule 1, Item 1(a)) under the ECA, the construction of facilities for commercial electricity generation and infrastructure for bulk supply is a listed activity, which triggers the need for an environmental impact assessment. This application includes the upgrading of the Majuba and Umfolozi substations and access roads that fall within the servitude.

The environmental studies are being undertaken in two-phases; a Scoping Phase followed by an Impact Assessment Phase.

3.2 SCOPING PHASE

In the Scoping Phase of the project, information was gathered, and together with specialist and technical input, used to identify potential impacts (social, economic and biophysical) associated with the proposed project, and to highlight areas, which should be avoided in order to minimise these biophysical and social impacts. A public participation process was undertaken to identify issues and concerns of key stakeholders and Interested and Affected Parties (I&APs). The results are documented in the Scoping Report.

The Environmental Scoping Studies undertaken for the Scoping Report did not identify any fatal flaw issues within any of the three corridors for the proposed Transmission power line. However, a number of potentially significant issues were highlighted and further investigated in the Impact Assessment phase in order to assess their significance, and to determine the need for the implementation of mitigation measures in order for the overall project to be environmentally sustainable.

The following key issues were identified in the Scoping Phase:

- Potential impacts on sensitive vegetation that may be threatened by the project;
- Potential impacts on the oribi and the minor black millipede;
- Potential impacts on wetlands;
- Birds - impact of the lines on flight paths and potential bird collisions;
- Socio-economic Impacts (including landuse specifically forestry and irrigation);
- Eco-tourism;
- Visual impacts;
- Heritage resources; and
- Construction impacts.

3.3 IMPACT ASSESSMENT PHASE

All potential significant environmental issues (social, economic and biophysical) associated with the proposed Majuba–Umfolozi Transmission power line that were identified in the Scoping phase of the study have been investigated through specialist studies in the Impact Assessment Phase. Mitigation measures have been proposed, where required.

3.3.1 Specialist Involvement

In order to identify and evaluate potential impacts of the Transmission line, a team of specialists competent in the following areas have been included in the project team:

- Ecology (indi Flora: Johan Bodenstern);
- Avi-fauna (birds) (Endangered Wildlife Trust: Chris van Rooyen);
- Socio-economic, landuse and tourism (MasterQ Research: Anita Bron);
- Visual impacts (Cave Klapwijk and Associates: Menno Klapwijk); and
- Heritage Resources (eThembeni Cultural Heritage: Len van Schalkwyk and Beth Wahl).

The specialist's role during the Scoping Phase was to assist in the identification of areas that should be avoided because of potential significant impacts, and to identify what specialist studies should be undertaken during the EIA Phase of the Project. Specialist studies were completed in the Impact Assessment Phase (**Appendices D to H**).

3.3.2 Assessment System

An assessment of impacts has been undertaken in accordance with the requirements stipulated in the Integrated Environmental Management Procedures. Impacts can be positive or negative, and of the project on the environment or of the environment on the project.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) have been given. Impacts are considered to be the same during construction and decommissioning.

Impacts have been evaluated in terms of extent, duration, intensity, probability and confidence. Significance is then assigned to each potential impact, before and after recommended mitigation. The possible cumulative impacts are also considered. A description of the criteria is provided in **Chapter 7**.

Mitigation for significant issues have been determined and incorporated into the EMP for construction (**Appendix I**).

Evaluation of the alternative corridors (**Chapter 4**) in terms of key environmental aspects is presented in **Chapter 8**.

3.4 ENVIRONMENTAL MANAGEMENT PLAN

A framework EMP for construction, incorporating recommended mitigation measures, has been compiled as a separate document (**Appendix I**). The EMP covers the construction phase of the project only and should be legally binding on Eskom, and its contractors.

A separate EMP for the operation and maintenance phase of the project will have to be compiled and approved by DEAT at a later stage.

3.5 AUTHORITY CONSULTATION

The National and Provincial authorities were contacted telephonically and by e-mail and fax with regard to the project. The following individuals were initially identified as being responsible for the project and invited to the site visit:

- Vincent Matabane (DEAT);
- Sam Msibi (MDALA); and
- Gerald Willis-Smith (DAEA).

The site visit with helicopter inspection took place on 10 – 12 August 2005. The following people attended:

- John Geeringh (Eskom)
- Bobby Richardson (Eskom)
- Bob Pullen (BKS)
- Terry Baker (BKS)
- Charles Mathoma (BKS)
- Chris van Rooyen (Birds)
- Johan Bodenstein (Natural Environment)
- Len van Schalkwyk (Archeology and Heritage Resources)
- Menno Klapwijk (Visual)
- Gert Botha (GIS)
- Erika Cruywagen (GIS)
- Gerald Willis-Smith (DAEA)
- Vincent Matabane (DEAT)

Mr Sam Msibi indicated that he would attend the site visit, but did not arrive.

Mr Thandiwe Silubane (MDALA) later took over the responsibility of the project from Mr Msibi. She attended the public meeting in Wakkerstroom on 17 November 2005.

The Draft Scoping Report was presented to DEAT, MDALA and DAEA at DEAT's officers in Pretoria on 11 November 2005. The Draft Environmental Impact Report will be presented on 11 April 2006.

3.6 PUBLIC PARTICIPATION PROGRAMME (PPP)

Public Participation is an integral part of the environmental investigations that have been undertaken for the Majuba – Umfolozi 765kV Transmission Power Line.

3.6.1 Objectives and General Approach

The objective of the public participation process (PPP) is to create a communication structure through which sufficient and understandable information can be provided to interested and affected parties (I&APs) and to allow them to respond accordingly.

The approach and methodology as well as the legal framework for the PPP are based on the principles embodied in the following legal framework:

- The Constitution of the Republic of South Africa Act. No. 108 of 1996;
- The National Environmental Management Act. No. 107 of 1998 (NEMA); and
- The Environment Conservation Act. No. 73 of 1989 (ECA).

The principles which are most relevant to the PPP include *inter alia*;

- Meaningful and timeous participation of I&APs;
- Accountability for information used and for recommendations made; and
- Application of “due process” particularly with regard to public participation in environmental governance as provided for in the Constitution.

The following assumptions guided the approach and methodology for the PPP:

- The PPP timeframes are closely aligned with the rest of the project programme. Inherent in these timeframes is the timeous receipt of responses from the environmental authorities at key milestones during the EIA process;
- Information provided by Eskom Transmission and other stakeholders is accurate; and
- The selection of appropriate media for publishing the EIA advertisements as required by legislation was approved by the authorities.

Scope of work

The scope of work that provided the framework for the PPP during the Scoping Phase is as follows:

- The initial and on-going identification and categorisation of stakeholders, making use of existing data bases where possible;
- The establishment and maintenance of a communication channel between the specialist team, the client and the stakeholders;
- The arrangement, co-ordination, facilitation and documentation of all Public Participation Programme activities, processes and results, including Key Stakeholder Workshops, Public Open Days (PODs) and focus group meetings that may be required as part of the EIA;
- Through a range of information dissemination activities, including a Background Information Document (BID), general correspondence and media

announcements, to announce the EIA study and keep the stakeholders informed of the project and allow for constructive engagement; and

- Facilitate the recording of issues raised in an Issues and Responses Report for attention during the Environmental Impact Assessment phase.

Methodology

Any programme in the public domain should be iterative in nature, allowing for changes that may be required to meet the objectives, particularly when taking into account sensitivities that may be present in certain communities or where stakeholders are not able to meet specific deadlines in the programme. Within reason, changes would be accommodated in the programme timeframes. The manner in which the various activities were carried out during the Scoping Phase and Impact Assessment Phase is detailed below in the following categories:

- Study phases;
 - Scoping Phase:
 - Pre-study;
 - EIA Study notification;
 - Consultation.
 - Impact Assessment Phase.
- Products;
 - Media announcements;
 - Public documents;
 - Database.
- Stakeholder consultation.

3.6.2 Servitude Negotiations Process

The public participation process undertaken for the EIA does not include the final servitude negotiations with the landowners that will be directly affected by the final route. It is important that the aims of the EIA and servitude negotiation processes are seen as separate. They share a common cause (the construction and operation of a Transmission line) and may share common landowner databases, but they have different aims. The servitude negotiations task will be undertaken by a negotiator from Eskom if a positive ROD for the project has been received. The Eskom negotiator has, however, been involved in the project team site visit and discussions regarding the selection of a recommended corridor for the proposed line. Therefore, while an extensive effort was made to identify and involve all possibly affected landowners through representative organisations such as the municipalities, Traditional Authorities and farmers' organisations and as far as possible, with individual landowners, the PPP was not able to consult individually with all the potentially affected landowners during the EIA study.

SERVITUDE NEGOTIATION AND THE EIA PROCESS

Transmission lines are constructed and operated within a servitude (80 m wide for 765 kV lines) that is established along its entire length. The servitude allows Eskom Transmission certain rights and controls that support the safe and effective operation of the line.

The process of achieving the servitude agreement is referred to as the Servitude Negotiation Process, or just the negotiation process.

- The negotiation process is undertaken directly by Eskom Transmission. Important points relating to the EIA process are as follows:
- Servitude negotiation is a private matter between Eskom Transmission and the landowner concerned.
- The negotiation process involves a number of stages (see text box below), and culminates in the 'signing' of a servitude. Here Eskom Transmission enters into a legal agreement with the landowner.
- The agreements will detail such aspects as the exact location and extent of the servitude, and access arrangements and maintenance responsibilities.
- Compensation measures are agreed in each case.
- It may take place at any time in the planning of a new line.
- It must be completed (i.e. the agreement must be signed) before construction starts on that property.
- It is independent of the EIA process.

The EIA process has become important in the initial planning and route selection of a new Transmission line. For this reason, it would normally be preferable that the negotiation process begins after the EIA has been completed. At this stage there is greater confidence in the route to be adopted, and it would be supported by environmental authorisation.

However, it may be required that the negotiation process needs to start earlier, and may begin before or run in parallel to the EIA process. This may be due to tight timeframes, knowledge of local conditions and constraints, etc. Eskom Transmission has a right to engage with any landowner at any time, though they do so at risk if environmental authorisation has not been awarded.

Source: Eskom Transmission, Gamma-Omega 765kV Transmission Line, Draft Environmental Impact Report, Main Report, March 2002

THE NEGOTIATION PROCESS

The negotiation process can be extensive, often running in to years on the longer lines. It is therefore critical that it is correctly programmed into the planning of a new line. The negotiation process involves:

- Initial meeting with the landowner.
- The signing of an 'option' to secure a servitude (this indicates that the owner will accept that the line will cross his property, subject to conditions to be finalised in the negotiation of the servitude agreement). An option is valid for one year.
- Once the route is confirmed (i.e. options signed with the upstream and downstream landowners) the servitude agreement will be finalised with the individual landowners. This agreement will set out the conditions for the establishment and operation of the servitude, and will be site specific (different landowners may have different requirements). Compensation payments are made when the servitude is registered at the Deeds office.
- Once the construction is complete and the land rehabilitated to the landowners satisfaction, the landowner signs a 'Final Release' certificate. Until such time Eskom Transmission remains liable for the condition of the land.
- Once the clearance certificate is signed, the responsibility for the line and servitude is handed over to the regional Eskom Transmission office. Prior to this the Eskom national office is responsible for the process.

Source: Eskom Transmission, Gamma-Omega 765kV Transmission Line, Draft Environmental Impact Report, Main Report, March 2002

3.6.3 Pre-EIA Study Phase

Due to the tight time constraints on this project, and a risk of not receiving final approval from the environmental authorities to proceed with the study before the first round of public meetings, it was considered prudent to introduce an additional pre-EIA notification phase. This approach was approved by Eskom Transmission and the authorities.

The pre-EIA notification phase included visits to the Traditional Authorities in the study area to alert them to the proposed PPP for the EIA. Discussing details of the project was avoided. The products and consultations during this phase are detailed in **Table 3.1**.

Table 3.1: Pre-study announcement activities

Pre-Study Announcement		
Products	Towns/villages	Venues
A3 Poster announcing the intention to conduct an EIA study and inviting stakeholders to register early. This poster also reflected a Map of the study area.	Vryheid Utrecht Wakkerstroom Volksrust Groenvlei eMondlo	Municipal offices Libraries Farmers Co-ops Traditional Offices Bhekumthetho Clinic, eMondlo Publicity offices
I&AP registration forms accompanied the poster.	Claremont Vukuzakhe eSizimeleni	Mangosuthu Art & Craft, Utrecht Sekusile Emantungwini Meals, Claremont
Letters to municipalities requesting them to display the posters.	Mundozo Majuba Power Station	Umfolozi Substation Birdlife SA., Wakkerstroom Balele Mountain Lodge, Groenvlei
English and Afrikaans Press Releases were issued to the local media	Northern Natal Farmer Newcastle Advertiser Vryheid Herald Recorder, Volksrust	
<i>All the above-mentioned documents were also available on the Eskom website.</i>		
Consultation	Town	Traditional authority
The Traditional authorities were the focus of the pre-EIA notification. The Traditional authorities were identified during this phase, but only a few were in a position to meet with the PPP during this period.	eMondlo Utrecht Waaihoek Vryheid Nhlanzatshe	Egazini Traditional Authority Mrs B A Zulu, wife of Inkosi T A Zulu Emantungweni Traditional Office, Joseph Malindi; Thekwane Traditional Authority, Sphiwe Shabalala; Othaka Traditional Authority, Inkosi J B Mdlalose; KwaNsimbi Traditional Authority, Inkosi B Zulu

3.6.4 Public Participation in the Scoping Phase

Project announcement

The PPP Office formally announced the EIA study and provided I&APs with project information. I&APs were also informed of the various ways in which they could register to participate in the study. **Table 3.2** records the products that were disseminated in the public domain.

Table 3.2: Project announcement products

EIA Announcement			
Products	Newspaper	Language	Dates
Adverts These publications were agreed to with the environmental authorities.	Newcastle Advertiser	English	15 September 2005
	Vryheid Herald	Afrikaans & Zulu	15 September 2005
	Vryheid Herald	English	22 September 2005
	Recorder (Volksrust)	Afrikaans	15 September 2005
	Recorder (Volksrust)	English	22 September 2005
	Natal Mercury	English	16 September 2005
	Beeld	Afrikaans	16 September 2005
	Sowetan	English	19 September 2005
	Newcastle Advertiser	English	15 September 2005
	Vryheid Herald	Afrikaans & Zulu	15 September 2005
A3 Posters	Towns	Venues	
These posters formally announced the project start-up and invited I&APs to participate	Wakkerstroom Volksrust Utrecht Vryheid	Municipalities Libraries Publicity Associations	
Background Information Documents (BIDs)		Farmers' Organisations/ Associations	Other venues
These documents were distributed to all I&APs registered on the database, via post, fax or e-mail. Importantly, the KwaZulu-Natal Agricultural Union (KWANALU) provided contact details for the agricultural unions/farmers' associations in the study area; pre-stamped envelopes containing BIDs and I&AP registration forms were either delivered to the post office counters or the chairpersons of these organisation for dissemination to their members. This course of action is necessary as most of the organisations have policies of not providing postal details of their members.		Amersfoort Wakkerstroom Volksrust Bloodriver Kingsley Vryheid	Traditional authorities Public Open Days Key Stakeholder workshops
<i>The background information document was also available on the Eskom website.</i>			
Draft Scoping Report availability announcement			
Products	Newspaper	Language	Dates
Adverts	Newcastle Advertiser	English & Afrikaans	28 October 2005
	Vryheid Herald	English Afrikaans & Zulu	28 October 2005
	Recorder (Volksrust)	English & Afrikaans	28 October 2005
	Natal Mercury	English	28 October 2005
	Beeld	Afrikaans	28 October 2005
	Sowetan	English	28 October 2005
Press releases	Press releases were also drafted and sent to the above-mentioned publications in		

EIA Announcement		
	the week prior to the advertisements.	
I&AP Letters	The content focused on the venues at which the Draft Scoping Report could be access and the public meeting venues. I&APs were invited to submit their comments and participate in the meetings. These letter were sent to all the stakeholders on the database.	Mailed on 25 th & 26 th October 2005
Draft Scoping Report Summary	A summary of the Draft Scoping Report was compiled in English and translated into Zulu and Afrikaans. This document was sent to all the I&APs who had formally registered to participate in the project and also to those who had not yet registered, but were considered to be key stakeholders.	The reports were e-mailed on 24 th & 25 th October 2005 and fast-mailed to I&APs who do not have access to e-mail.
Dissemination of the Draft Scoping Report		
Each venue which received a copy of the Draft Scoping Report, also received two A3 posters and a viewing register in which I&APs could register comments.		
Town/organisation	Venue	
Amafa AkwaZulu-Natali	P O Box 2885, Pietermaritzburg 3200	
Amersfoort	Amersfoort Farmers' Association (c/o Agri Sybrand van Niekerk Street Amersfoort)	
Amersfoort	Amersfoort Main Library (Bree Street (Opposite Amersfoort municipal buildings))	
Amersfoort	Amersfoort Municipal Offices (Delivered to: Pixley KaSame Municipality C/o Joubert and Laingsnek Streets Volksrust)	
eMondlo	eMondlo Clinic no 1 (Main entrance to eMondlo from Vryheid. eMondlo)	
eMondlo	eMondlo Library (Section B – Between old and new clinics eMondlo, Vryheid, KZN)	
Paulpietersburg	KZ261 Control Centre (KZ261 Control Centre 40 Church Street Paulpietersburg)	
Paulpietersburg	Paulpietersburg Main Library(c/o eDumbe Municipal Offices 10 Hoog Street Paulpietersburg)	
Paulpietersburg	Paulpietersburg Municipal Offices (c/o eDumbe Municipal Offices 10 Hoog Street Paulpietersburg)	
Utrecht	Utrecht Farmers' Association (Church Street No 5 Behind Caltex Garage)	
Utrecht	Utrecht Main Library (c/o Utrecht Municipality 60 Kerk Street Utrecht)	
Utrecht	Utrecht Municipal Offices (c/o Utrecht Municipality 60 Kerk Street Utrecht)	
Volksrust	Volksrust farmers' Association (c/oBKB Joubert Street 49 Volksrust)	
Volksrust	Volksrust Main Library (Behind Municipal Offices, Volksrust)	
Volksrust	Volksrust Municipal Offices (Pixley KaSame Municipality C/o Joubert and Laingsnek Streets Volksrust)	
Vryheid	Vryheid Agricultural Chamber (Stretch Crescent Opposite Bhekuzulu Township)	
Vryheid	Vryheid Main Library (c/o High and Market Streets Vryheid)	
Vryheid	Vryheid Municipal Offices (c/o High and Market Streets Vryheid)	
Wakkerstroom	Wakkerstroom Farmers' Association(c/o Wakkerstroom Country Inn 124 Badenhorst Street)	
Wakkerstroom	Wakkerstroom Library (156 van Riebeeck Street Wakkerstroom)	
Wakkerstroom	Wakkerstroom Municipal Offices (152 Van Riebeeck Street Wakkerstroom)	
The Draft Scoping Report is also available on the Eskom Website		

The PPP has been structured in a manner that will allow for consultation with I&APs at various levels and with different focus groups. The programme also allows for the various groupings to direct to the project team as to the approach which is best suited to the group, which included:

- Key Stakeholder groups (government, NGOs) (**Table 3.3**);
- Eskom employees (**Table 3.4**);
- Traditional authorities (**Table 3.5**);
- Farmers' Organisations (**Table 3.6**);
- The farmers' organisations were requested to mark the members property on maps for purposes of the landowner database;
- Key Stakeholder Workshops (**Table 3.7**);
- This group is made up of relevant government departments (national, provincial and local), non-government organisations (environmental), civil society, Spoornet, Telkom, schools, etc.; and
- The general public and other landowners (**Table 3.8**).

The stakeholder consultation which was conducted during the Draft Scoping Report Comment Phase is reflected in the following tables:

- Public meetings (**Table 3.8**)
- Traditional authorities (**Table 3.9**).

Table 3.3: Stakeholder consultation: Government and non-government

This table reflects the various organisations that have been invited to participate in the study. The government departments are at national, provincial and local level.

Organisation
Department of Education
Department of Health (including Department of Environmental Health)
Department of Minerals and Energy
Department of Transport
Department of Regional and Land Affairs
Department of Water Affairs and Forestry
Department of Traditional and Local Government Affairs
Department of Environmental Affairs and Tourism
Department of Public Works
KZN Department of Agriculture and Environmental Affairs
South African Local Government Association
Mpumalanga Department of Agriculture and Land Affairs
AMAFA

Organisation
SAHRA
Ezemvelo KZN Wildlife
eDumbe Municipality
Abaqulusi Municipality
Utrecht Municipality
Pixley KaSeme Municipality
S A Tourism
Ekgangala Grassland Biosphere Reserve
WESSA
Earthlife Africa
Birdlife SA
Botanical Society of South Africa.

Table 3.4: Stakeholder consultation: Eskom

Eskom Focus Group				
Town	Venue	Date	Time	Focus of group
Amersfoort	Majuba Power Station	06-09-05	11:30	Eskom Generation, Eskom Transmission and Eskom Distribution employees

Table 3.5: Stakeholder consultation with Traditional authorities in the Scoping Phase

Traditional authorities					
Town	Venue	Date	Time	Traditional Authority/Group	Inkosi
Vryheid	Geluk Farm	15-09-05	09:00	Othaka Traditional Authority	Inkosi B J Mdlalose
Vryheid	Geluk Farm	15-09-05	09:00	Empangisweni Traditional Authority	Inkosi Zondo
Vryheid	Geluk Farm	15-09-05	09:00	Msiyane Traditional Authority	Inkosi Xulu
Nhlazatshe	KwaNsimbi Traditional Office	15-09-05	14:00	KwaNsimbi Traditional Authority	Inkosi B Zulu
Utrecht	Amantungwa Traditional Office	16-09-05	09:00	Amantungwa Traditional Authority	Inkosi L R H Khumalo
Utrecht	Kingsley Mbatha Traditional Office	16-09-05	14:00	Mbatha Traditional Authority	Inkosi Mbatha
Utrecht	Zaaihoek Thekwane Traditional	17-09-05	09:00	Thekwane Traditional Authority	Inkosi S Shabalala

Traditional authorities					
Town	Venue	Date	Time	Traditional Authority/Group	Inkosi
	Office				
Luneburg	Dlamlenze Traditional Office	06-10-05	12:00	Dlamlenze Traditional Authority	Inkosi Z P Nzima
Louwsburg	Ikhambi Traditional Office	07-10-05	09:00	Ikhambi Traditional Authority	Inkosi B M Zulu
Utrecht	Mgundeni Traditional Office	08-10-05	10:00	Mgundeni Traditional Authority	Inkosi Z G Mabaso
Vryheid	Gluckstadt	07-10-05	14:00	Egazini Traditional Authority	Inkosi T A Zulu

Table 3.6: Stakeholder consultation with Farmers' Organisations in the Scoping Phase

Farmers' Organisations				
Town	Association	Date	Time	Comment
Volksrust	Volksrust Farmers Association	20-09-05	11:30	The chairperson also attended the Key stakeholder workshop at Wakkerstroom on 28/09/2005.
Vryheid	Vryheid Agricultural Business Chamber	26-09-05	10:00 & 14:00	Members from the Chamber arrived at the Key Stakeholder Workshop and the Public Open Day.
	Bloodriver Farmers' Association	26-09-05	10:00 & 14:00	Members from the Association arrived at the Key Stakeholder Workshop and the Public Open Day
	Kingsley Farmers' Association	26-09-05	10:00 & 14:00	Members from the Association arrived at the Key Stakeholder Workshop and the Public Open Day
Utrecht	Utrecht Farmers' Association	27-09-05	10:00 & 14:00	Only a few members arrived at the meetings. However, these individuals raised issues on behalf of those absent.
Wakkerstroom	Wakkerstroom Farmers' Association	28-09-05	10:00	The initial meeting had to be postponed due to a crisis situation. The chairperson attended the Key stakeholder workshop at Wakkerstroom.
Wakkerstroom	Groenvlei Farmers' Association	13-10-05	14:00	This meeting was well attended and issues raised are recorded in the IRR (Appendix C).
Paulpietersburg	Luneberg Farmers' Association (the name of this organisation has changed to the KZN 261 Control Centre)	19-10-05	14:00	This meeting was well attended and issues raised are recorded in the IRR (Appendix C).

Farmers' Organisations				
Town	Association	Date	Time	Comment
Amersfoort	Amersfoort Farmers' Association			As only a few members may be affected, the chairperson has indicated that he will consult with his members as to when it would be a suitable time to consult with the study team.

Table 3.7: Stakeholder consultation: Key Stakeholder Workshops and public open days in the Scoping Phase

Town	Date	Comments on the Key Stakeholder Workshop	Comments on the Public Open Day
Vryheid	26/09/2005	This was well attended with representation of a broad base of stakeholders, including the district municipality, councillors and the local farmers.	A wide range of I&APs attended this session. A strong representation from school principals and landowners.
Utrecht	27/09/2005	Although this meeting was not well attended in terms of numbers, those present represented a broad base of I&APs from the municipality, eco tourism and landowners.	This session was poorly attended with only two stakeholders attending.
Wakkerstroom	28/07/2005	Apart from the Pixley KaSeme Municipality, the workshop was attended by the most important key stakeholders and the input was very constructive, particularly from an eco-tourism, wetland, avifaunal and landowner perspective.	The afternoon session was attended by a group of young people associated with schools and youth groups who raised a number of issues.

Stakeholder consultation during the Draft Scoping Report Comment Period

Table 3.8 and Table 3.9 reflect the consultation that occurred during the comment period 1 November to 30th November 2005.

Table 3.8: Public meetings in the Draft Scoping Report Comment Period

Town	Date	Comments on the Public Meetings
Vryheid	15 /11/2005	A wide range of stakeholders were present at this meeting, covering most of the potentially affected sectoral groups in the area. The input from the forestry and agricultural sectors was constructive. The community representatives focused primarily on distribution related issues.
Paulpietersberg		Contrary to the well attended meeting that was held on 19 October 2005 with the KZN261 Control Centre (incorporating Paulpietersburg & Luneberg Farmers' Associations), only four participants arrived. The reasons that were given for this poor showing were twofold: <ul style="list-style-type: none"> Members were attending another agricultural meeting in

Town	Date	Comments on the Public Meetings
		Pietermartizburg; <ul style="list-style-type: none"> The members would prefer attending once the preferred route corridor had been identified.
Utrecht	16 /11/2005	As with the first round of meetings, this was a poorly attended meeting in terms of numbers. However, the individuals who attended represented a broad base of stakeholders: <ul style="list-style-type: none"> The Utrecht Municipality; The Utrecht Farmers' Association; <ul style="list-style-type: none"> An opinion was expressed that landowners would only participate once they had a clearer understanding of the preferred route corridor. Balele Game Park (brings to the table the eco-tourism perspective)
Wakkerstroom	17 /11/2005	This meeting was well attended by the local community and constructive comment and input was received from participants. Strong opinions were expressed about the various route corridors. Correspondence was also received from absent landowners prior to the public meeting.
Local authority consultation		The social consultant also met with the various municipalities while in the field to obtain information on the Integrated Development Plans (IDPs). The only municipality that did not respond to the request for a meeting at this stage, was the Pixley KaSeme Municipality.
Additional landowner consultation		During the week in which the Traditional authority meetings which were conducted, additional meetings were held with landowners in the study area to assist with the identification of landowners.

Table 3.9: Stakeholder consultation with Traditional authorities in the Draft Scoping Report Comment Period

Town	Venue	Date & Time	Traditional Authority/ Group	Inkosi	Comment
Vryheid	Swart-Mfolozi Empangisweni Traditional Office	23-11-05 11:00	Empangisweni Traditional Authority	Inkosi V D Zondo	This meeting was well attended by Indunas and community members. The Indunas signed the attendance register on behalf of the community members. Additional comments raised have been recorded in the Issues & Responses Report (Appendix C).
Vryheid	Swart-Mfolozi Empangisweni Traditional Office	23-11-05 11:00	Othaka Traditional Authority	Inkosi B J Mdlalose	Inkosi Mdlalose apologised for not being able to attend the meeting, but his Indunas attended the meeting on his behalf. No new issues were raised.
Vryheid	Swart-Mfolozi Empangisweni Traditional Office	23-11-05 11:00	Msiyane Traditional Authority	Inkosi Xulu	After confirming the previous evening that he and his Indunas would attend the meeting, no-one arrived at the venue for the joint meeting with Othaka Traditional authority.
Nhlazatshe	KwaNsimbi	24-11-	KwaNsimbi	Inkosi B	The meeting was well attended.

Town	Venue	Date & Time	Traditional Authority/ Group	Inkosi	Comment
	Traditional Office	05 10:00	Traditional Authority	Zulu	New comments were raised and incorporated in the Issues and Response Report (Appendix C).
Utrecht	Amantungwa Traditional Office	25-11-05 12:00	Amantungwa Traditional Authority	Inkosi L R H Khumalo	The meeting was well attended. New issues were raised and incorporated in the Issues and Response Report (Appendix C).
Utrecht	Kingsley Mbatha Traditional Office	25-11-05 09:00	Mbatha Traditional Authority	Inkosi Mbatha	The Inkosi, two Indunas and community members attended this meeting. New issues that were raised are incorporated in the Issues and Responses Document.
Utrecht	Zaaihoek Thekwane Traditional Office	27-11-05 14:00	Thekwane Traditional Authority	Inkosi S Shabalala	Arrangements were made for Inkosi Shabalala to collect Mr Masilela when he arrived at Wakkerstroom. However the MTN network was down in the area and Mr Inkosi Shabalala and Mr Masilela could not contact one another. There was also no additional transport to the Traditional authority office on Sunday. Inkosi Shabalala and Mr Masilela met at a later stage.
Luneburg	Dlamlenze Traditional Office	21-11-05 14:00	Dlamlenze Traditional Authority	Inkosi Z P Nzima	The meeting was well attended. New issues that were raised have been incorporated in the Issues and Responses Report (Appendix C).
Louwsburg	Ikhambi Traditional Office	23-11-05 14:00	Ikhambi Traditional Authority	Inkosi B M Zulu	This meeting was on 24th November 2005 after being postponed. The meeting was well attended and new issues raised were incorporated in the Issues & Responses Report (Appendix C).
Utrecht	Mgundeni Traditional Office	22-11-05 09:00	Mgundeni Traditional Authority	Inkosi Z G Mabaso	The meeting went well and the new issues were raised and recorded in the Issues and Responses Report (Appendix C).
Vryheid	Gluckstadt	24-11-05 14:00	Egazini Traditional Authority	Inkosi T A Zulu	Numerous attempts since the inception of this project to involve Inkosi Zulu and his Indunas have not been successful. The team will continue in its efforts to involve him.

3.6.5 Public Participation in the Impact Assessment Phase

A range of documents were issued during the Impact Assessment Phase. These are listed in **Table 3.10**.

Table 3.10: Public Documents issued during the Impact Assessment Phase

Draft Environmental Impact Report			
Products	Newspaper	Language	Dates
Adverts These publications were agreed to with the environmental authorities. These adverts announced the availability of the Draft EIR and Public meetings	Newcastle Advertiser	English	31 March 2006
	Vryheid Herald	Afrikaans & Zulu	31 March 2006
	Vryheid Herald	English	31 March 2006
	Recorder (Volksrust)	Afrikaans	31 March 2006
	Recorder (Volksrust)	English	31 March 2006
	Natal Mercury	English	31 March 2006
	Beeld	Afrikaans	31 March 2006
	Ilanga	Zulu	30 March 2006
	Sowetan	English	31 March 2006
A3 Posters	Towns	Venues	
These posters formally announced the availability of the Draft EIR	Wakkerstroom Volksrust Utrecht Vryheid	Municipalities Libraries	
Press releases	Press releases were also drafted and sent to the above-mentioned publications in the week prior to the advertisements.		
I&AP Letters	The content focused on the venues at which the Draft EIR could be accessed and the public meeting venues. I&APs were invited to submit their comments and participate in the meetings. These letter were sent to all the stakeholders on the database.		Mailed on 14 March 2006
Draft EIR Summary	A summary of the Draft EIR was compiled in English and translated into Zulu and Afrikaans. This document was sent to all the I&APs who had formally registered to participate in the project and also to those who had not yet registered, but were considered to be key stakeholders.		Mailed on 24 March 2006
Dissemination of the Draft EIR Report			
Each venue which received a copy of the Main Draft EIA, also received two A3 posters and a viewing register in which I&APs could register comments.			
Town/organisation	Venue		
Amafa AkwaZulu-Natali	P O Box 2885, Pietermaritzburg 3200		
Amersfoort	Amersfoort Main Library (Bree Street (Opposite Amersfoort municipal buildings))		
Amersfoort	Amersfoort Municipal Offices (Delivered to: Pixley KaSame Municipality C/o Joubert and Laingsnek Streets Volksrust)		
eMondlo	eMondlo Library (Section B – Between old and new clinics eMondlo, Vryheid, KZN)		
Paulpietersberg	eDumbe Main Library(c/o eDumbe Municipal Offices 10 Hoog Street Paulpietersberg)		
Paulpietersberg	Paulpietersburg Municipal Offices (c/o eDumbe Municipal Offices 10 Hoog Street Paulpietersberg)		
Utrecht	Utrecht Main Library (c/o Utrecht Municipality 60 Kerk Street Utrecht)		

Draft Environmental Impact Report	
Utrecht	Utrecht Municipal Offices (c/o Utrecht Municipality 60 Kerk Street Utrecht)
Volksrust	Pixley Municipal Offices (Pixley KaSame Municipality C/o Joubert and Laingsnek Streets Volksrust)
Vryheid	Vryheid Main Library (c/o High and Market Streets Vryheid)
Vryheid	Abaqulusi Municipal Offices (c/o High and Market Streets Vryheid)
Wakkerstroom	Wakkerstroom Farmers' Association(c/o Wakkerstroom Country Inn 124 Badenhorst Street)
Wakkerstroom	Wakkerstroom Library (156 van Riebeeck Street Wakkerstroom)
Wakkerstroom	Wakkerstroom Municipal Offices (152 Van Riebeeck Street Wakkerstroom)
The Draft Scoping Report is also available on the Eskom Website	

Focus Group Meetings

Table 3.11 lists the Traditional Authority meetings that will be held during the 30 day comment period.

Table 3.11: Focus Group Meetings with Traditional Authorities during the Draft EIR Comment period

Town	Venue	Date & Time	Traditional Authority/ Group	Inkosi
Vryheid	Swart-Mfolozi Empangisweni Traditional Office	To be confirmed	Empangisweni Traditional Authority	Inkosi V D Zondo
Vryheid	Swart-Mfolozi Empangisweni Traditional Office	To be confirmed	Othaka Traditional Authority	Inkosi B J Mdlalose
Vryheid	Swart-Mfolozi Empangisweni Traditional Office	To be confirmed	Msiyane Traditional Authority	Inkosi Xulu
Nhlazatshe	KwaNsimbi Traditional Office	To be confirmed	KwaNsimbi Traditional Authority	Inkosi B Zulu
Utrecht	Amantungwa Traditional Office	To be confirmed	Amantungwa Traditional Authority	Inkosi L R H Khumalo
Utrecht	Kingsley Mbatha Traditional Office	To be confirmed	Mbatha Traditional Authority	Inkosi Mbatha
Utrecht	Zaaihoek Thekwane Traditional Office	To be confirmed	Thekwane Traditional Authority	Inkosi S Shabalala
Luneburg	Dlamlenze Traditional Office	To be confirmed	Dlamlenze Traditional Authority	Inkosi Z P Nzima
Louwsburg	Ikhambi Traditional Office	To be confirmed	Ikhambi Traditional Authority	Inkosi B M Zulu
Utrecht	Mgundeni Traditional Office	To be confirmed	Mgundeni Traditional Authority	Inkosi Z G Mabaso
Vryheid	Gluckstadt	To be confirmed	Egazini Traditional Authority	Inkosi T A Zulu

Farmer's Organisations

Numerous discussions were held with the various Farmers' Organisations during the Scoping Phase, both at the key stakeholder workshops and on an individual organisation basis. The Farmers' Organisations' chairpersons have been provided with maps of the recommended corridor and corridor alternatives; these maps also indicate all the landowners that have been identified to date on the project (**Figure B.1** in **Appendix B**). The chairpersons have been asked to assist with identification of additional members who may be affected by the proposed route corridors.

Key Stakeholder and Public Meetings

Public meetings scheduled for the impact assessment phase are indicated in **Table 3.12**.

Table 3.12: Public Meetings in the Impact Assessment Phase

Date	Town	Venue	Time
Mon 24 April 2006	Paulpietersburg	KZN261 Control Centre	09:30 - 12:30
Tues 25 April 2006	Vryheid	Vryheid Farmers Union Hall, Stretch Crescent	09:00 - 12:00
	Utrecht	Utrecht Country Club	14:30 -16:30
Wed 26 April 2006	Wakkerstroom	Wakkerstroom Town Hall	10:00 -12:00

3.6.6 Key stakeholders still to be contacted for consultation

Public participation is an ongoing process. The following key stakeholders that have been contacted for consultation during the Impact Assessment Phase include:

- Telkom;
- Civil aviation;
- Vodacom,
- MTN and Cell C; and
- Spoornet.

The following two groups would have been contacted by the end of the Impact Assessment Phase

- SANDF; and
- Transtel.

3.6.7 Visual representation of stakeholder consultation

A map providing a visual representation of the farmers' organisations and landowners that were involved in the PPP are indicated on **Figure B.1** in **Appendix B**. Traditional Authorities are indicated on **Figure B.2** in **Appendix B**. The intention is to illustrate how much of the study area is covered by these three potentially directly affected groups. A full list of stakeholders that have registered as I&APs is included in **Appendix B**.

All the issues and concerns that have been raised by I&APs through various channels during the Scoping and Impact Assessment Phases; including I&AP registration forms, Key Stakeholder Workshops, Public Open Days, Traditional Authority and Farmers' Organisation meetings have been captured in an Issues and Responses Report (**Appendix C**).

3.7 SUMMARY OF EIA PROGRAMME

The planned key dates for the completion of the EIA are listed in **Table 3.13**.

Table 3.13: Planned key dates in the Majuba-Umfolozi 765kV Transmission Line EIA

Date	Activity
August 2005	Submission of application forms
10 August 2005	Site visit and pre-application consultation
14 September 2005	Submission of Plan of Study for Scoping
15 November 2005	Approval of Plan of Study for Scoping received
14 – 21 September 2005	Authority Review of Plan of Study for Scoping
6 – 28 September 2005	Focus Group Meetings
1 November 2005	Submission of Draft Scoping Report
1 November 2005 to 30 November 2005	Public Review of Draft Scoping Report
8 December 2005	Submission of Final Scoping Report
1 November 2005 – 31 January 2005	Authority Review
30 January 2005	Approval of Scoping Report received
2 February 2006	Submit Plan of Study for EIA
16 March 2006	Approval of Plan of Study for EIA received
1 April 2006	Submission of Draft EIR
1 April 2006 – 1 May 2006	Public Review of Draft EIR
11 May 2006	Submission of Final EIR
1 April – 11 May 2006	Authority Review
1 June 2006	Record of Decision

3.8 LEGAL CONSIDERATIONS

3.8.1 Applicable Environmental Legislation

A limited scoping of relevant legislation was undertaken in order to identify only the key legal issues related to the proposed project. Applicable environmental legislation, which must be considered by Eskom during the implementation of the proposed project is summarised in **Table 3.13**.

Table 3.14: Summary of applicable legislation

Legislation	Sections	Relates to
The Constitution Act (No 108 of 1996)	Chapter 2	Bill of Rights
	Section 24	Environmental rights
	Section 25	Rights in property
	Section 32	Administrative justice
	Section 33	Access to information
National Environmental Management Act (No 107 of 1998) as amended	Section 2	Defines the strategic environmental management goals, principles and objectives of the government. Applies through-out the Republic to the actions of all organs of state that may significantly affect the environment
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care
Environment Conservation Act (No 73 of 1989) and regulations	Sections 21, 22, 25, 26 and 28 EIA Regulations, including listed activities	
	Sections 19 and 19A	Prevention of littering by employees and subcontractors during construction and the maintenance phases of the proposed project
	Section 28A	Exemptions
	Section 31A	Clean-up provisions
The National Parks Act (No 57 of 1976) – only Section 2(1) and Schedule 1 demarcating National Parks		
NEM: Protected Areas Act (No 57 of 2003)		The Act came into operation on 01 November 2004. The aim of the Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes. In 2004, the National Environmental Management: Protected Areas Amendment Act 31 of 2004 was promulgated to amend Act 57 of 2003 with regard to the application of that Act to national parks and marine protected areas. The NEM: Protected Areas Amendment Act was

Legislation	Sections	Relates to
		published for public information on 11 February 2005 and came into operation on 01 November 2005. The NEM: Protected Areas Act, as amended by the NEM: Protected Areas Act 31 of 2004, repeals sections 16, 17 & 18 of the ECA as well as the National Parks Act with the exception of section 2(1) and Schedule 1.
The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations	Section 6	Implementation of control measures for alien and invasive plant species
National Heritage Resources Act (No 25 of 1999)	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

Legislation	Sections	Relates to
	Section 38	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decisions on the HIA.
Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations	Sections 27 - 35	Dust control
	Section 36 - 40	Air pollution by fumes emitted by vehicles
National Environmental Management: Air Quality Act (No 39 of 2004)	Section 32	Control of dust
	Section 34	Control of Noise
	Section 35	Control of offensive odours
Occupational Health and Safety Act (No 85 of 1993) and regulations	Section 8	General duties of employers to their employees
	Section 9	General duties of employers and self employed persons to persons other than their employees
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA),		Strategy for achieving the objectives of the United Nation's Convention on Biological Diversity, to which South Africa is a signatory

Legislation	Sections	Relates to
	Sections 65-69	These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species
	Sections 71 and 73	These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species.
National Forests Act (No 84 of 1998) and regulations	Section 7	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette.
	Sections 12-16	These sections deal with protected trees, with the Minister having the power to declare a particular tree, a particular group of trees, a particular woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. In terms of section 15, no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.
Fencing Act (No 31 of 1963)	Section 17	Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be

Legislation	Sections	Relates to
		read in conjunction with the environmental legal provisions relevant to protection of flora.
National Water Act (No 36 of 1998) and regulations	Section 19	Prevention and remedying the effects of pollution
	Section 20	Control of emergency incidents
	Chapter 4	Use of Water and licensing
Hazardous Substances Act (No 15 of 1973) and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations	Sections 3 to 10	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard.
All relevant Provincial Legislation and Municipal bylaws		

3.8.2 Water use licence application process for towers within wetlands

National Water Act

The National Water Act (Act 36 of 1998) (NWA) provides for tiered regulatory control over eleven water uses as identified in section 21 of the NWA. After providing for the Reserve and international obligations, the basis for granting authorisation to use the available water quantity and/or quality in an area will be the achievement of beneficial use in the public interest. This is also referred to as “optimum use”, i.e. use which achieves the most desirable combination of social, economic and environmental objectives, irrespective of whether such use is consumptive or non-consumptive. This includes the erection of towers and related construction activities, within the riverine and wetland environments.

Thus, a person who wishes to use, or who uses water in a manner that is not covered under Schedule 1, General Authorisations, or in a manner that is not regarded or declared as, an existing lawful use, may only use that water under the authority of a Water Use Licence. Therefore, the need exists to motivate and justify the use of water for power generation by Eskom.

The General Authorisations replaces the need for a water user to apply for a licence in terms of the NWA for the identified water uses, provided that the water use is within the limits and conditions set out in the General Authorisation. These General Authorisations are catchment and water use specific and should be dealt with on a case by case basis.

Water Use Licence Application Process

The “Generic Licensing Process” highlights seven stages of a Water Use Licence Application. It is a phased approach, which is essential to consider and follow ensuring that an applicant of a water use licence is assured of the correct process to follow, determines the validity of the application, and the level of detail required for motivation of the water use. Without the phased approach the applicant runs the risk of expending unnecessary time and effort on aspects not required or worse certain critical aspects are missed.

a) Application

Pre-application liaison should take place with the relevant departmental officials and a lead regional office and officer should be identified. In this instance two regional offices will be involved, namely the Gauteng and the Kwa-Zulu Natal Regional Offices. Furthermore, the initial formal water use licence application forms must be completed and payment (R114.00) to the regional offices made to initiate the tracking process for the application.

b) Validation

During the initial contact with the regional offices and after submitting the formal water use licence application forms the validity of the application against legal requirements, determining the type of water use authorisation, and checking the completeness of provided information are also undertaken and confirmed.

c) Pre-position Information

During this stage, an evaluation is made of the available information and whether this information is sufficient to support the motivation and justification of the water uses applied for.

The above phases are normally captured in an “Initial Assessment Report” that is submitted to the DWAF. The applicant only continues with the next phases after confirmation is received from DWAF.

Based on the feedback of the DWAF a final Integrated Water Use Licence Application could then be submitted, incorporating the results of detailed investigations of the potential impacts that the proposed water use could have on the water resources, including Section 27 requirements. The revised formal water use licence application forms, if changed, should be re-submitted.

Section 27(1) Requirements

The NWA includes considerations set out in section 27(1) that must be applied in the assessment of licence applications for water use. Although the Act states that this is a DWAF responsibility, the applicant should supply the “minimum” information required in terms of section 27(1) to allow the Department to evaluate the application.

Technical Information in Support of Integrated Water Use Licence Application

To enable the DWAF to prepare a water use licence, specific water use details are required. This information should be captured in the formal water use licence application forms and elaborated on in the initial assessment and final reports. Information such as title deed numbers on which the water use take place, water abstraction points (co-ordinates), water discharge points (co-ordinates), volume of water abstracted per day as an average and a peak quantity on any day, and water quality of final effluent to be discharged.

It should be noted that not only the consumptive use of water should be described but the general management of stormwater, storage of raw materials, disposal of waste material from the construction site and drilling liquid should be described. Best practice should be used as norm for these management measures.

4. THE INVESTIGATION OF ALTERNATIVES

The investigation of alternatives commenced in the Scoping Phase of the project and took place on three levels i.e. strategic alternatives, route corridor alternatives and design alternatives.

4.1 STRATEGIC ALTERNATIVES

Several strategic alternatives were explored by Eskom during the feasibility studies to determine the preferred solution to the transfer constraint of the Eastern Grid.

4.1.1 Do Nothing

The do-nothing alternative refers to the option of not undertaking any activity.

This option is not desirable, as the forecasted load growth in the Eastern Grid will result in voltage decline with the following consequences:

- a) Under-voltages that contravene contractual and Grid Code mandated limits;
- b) Voltage collapse on the Transmission network leading to load shedding; and
- c) Inability of the network to meet natural and step load increases.

As the national electricity supply authority, Eskom Holdings Limited, is responsible for the supply of electricity to consumers throughout the country. Without the completion of this project, the regional network will not be able to function effectively in the future, potentially resulting in significant negative impacts on economic growth and sustainability of the region. The do-nothing option is therefore rejected as a feasible alternative.

4.1.2 Alternative Energy Sources

Eskom has considered the development of alternative energy sources as part of their strategic assessments. Currently Eskom has existing generation capacity at the Majuba Power Station, and therefore there is no need for new generation facilities.

The possibility of an Independent Power Provider developing an alternative source of power in the region (e.g. in Richards Bay) is also feasible. No such development is, however, a certainty at this stage, and Eskom cannot afford to assume that such a development will commence.

4.1.3 Network Strengthening Alternative

Eskom Transmission has taken measures to get the most out of the existing Transmission system so that the construction of the new line will be implemented only when needed. These measures include:

- Comprehensive checks on the existing lines to ensure that they are within the legal ground clearance. Lines sag when placed under heavy load conditions, due

to heating of the conductors, hence the restriction on placement of structures higher than 4 m under the line.

- Installation of line monitoring devices that measure the prevailing atmospheric conditions. This allows Eskom Transmission to decide whether the lines can cope with more load (e.g. on a cold day the line can be loaded to more than usual levels since the lines cool down and they do not sag as much.)
- When reinforcement options were evaluated, the best option was chosen to ensure that an optimised mix of cost, technical benefit and environmental impact was achieved.

An analysis of this alternative demonstrated that new Transmission power lines will be needed as all options for optimisation of the existing infrastructure have already been studied and implemented.

4.1.4 Majuba-Pegasus 765kV, initially run at 400kV

This option proposes the construction of a 765kV line, initially to be operated at 400kV from the Majuba Power Station to the Pegasus substation. The advantage of this option is that The Pegasus Substation is already designed to accommodate a 765/400kV transformation. The disadvantages are that this option would provide a lower transfer limit and lower saving in losses than the Majuba-Umfolozi option. The Pegasus substation would also remain the common node in the Eastern Grid thus leaving the risk of a loss of supply from Pegasus.

4.1.5 Majuba-Umfolozi 765kV line, initially run at 400kV (Proposed Option)

This option proposes the construction of an approximately 186 km 765kV line, initially to be operated at 400kV, from the Majuba Power Station to the Umfolozi Substation. This option offers better transfer limits than the Majuba-Pegasus option, and will create a separate point of supply to the Eastern Grid reducing the risk of a common mode failure. The line will have an improved transfer to the Empangeni and Pinetown Customer Load.

4.1.6 Outcome of the Scoping Phase

The public, specialists and authorities agreed in the Scoping Phase of the project that on a strategic level, the Majuba-Umfolozi 765kV line, initially run at 400kV is the best solution to address the project requirements. The strategic alternatives have not been investigated further in the Impact Assessment Phase.

4.2 ALTERNATIVE TRANSMISSION LINE ROUTE CORRIDORS

An exact or final route for the proposed Transmission power line was not defined in the Scoping phase of the study. One of the objectives of the Scoping phase of the EIA was to identify areas that should be avoided because of sensitive environments or potential significant impacts, and to identify alternative corridors. Towards this end, and in order to focus the investigations, three technically feasible corridors were

identified (**Figure 1.1**). These corridors, and possible variations of them, were considered by initial specialist investigations and input from the public participation process as part of the scoping phase. Feasible alternatives have been assessed in detail in the EIA phase.

The following modifications to the original corridors have been suggested by specialists and stakeholders, accepted by the EIA Team, and incorporated in the investigations:

- Moving the blue corridor (Corridor 3) to the south-east to avoid areas sensitive to endangered bird species; and
- Crossing from the blue corridor (Corridor 3) to the green corridor (Corridor 1) north of the eMondlo complex in order to avoid the area of high population density.

The outcome of the Scoping phase of the study was that all three corridors were found to be technically and economically feasible and were recommended for study in more detail in the EIA Phase.

A project team integration meeting took place once the specialists had completed their specialist investigations. At this meeting, the outcomes of the specialist studies were considered separately and jointly. Each specialist rated their preferred corridor in terms of the impacts on their specialist areas (**Table 8.2**).

The outcome of the integration exercise is that the preferred, and therefore recommended corridor, is the fourth option, i.e. the blue corridor (Corridor 3) until north of the eMondlo complex at which point the route should traverse in an easterly direction until joining with the green corridor (Corridor 1) from where it continues southwards to the Umfolozi Substation (**Figure 1.1**). The motivation for the preferences for each aspect of the environment are explained in **Chapter 8** supported by the assessment of impacts presented in **Chapter 7** and the specialist studies presented in **Appendices D to H**.

4.3 DESIGN ALTERNATIVES

The option of burying the Transmission power line as opposed to an overhead line has been considered by Eskom. This option would require an excavation width of a twelve lane highway 1.5 m deep in order to allow for the spacing required to avoid overheating. Trees and shrubs would be prohibited on or near the servitude due to root invasion. Excavation in the servitude would be restricted to 0.5 m deep. In addition to a significantly greater environmental impact (except for the visual aspect), underground lines are significantly more costly to construct and maintain. This option is therefore not considered viable.

The alternatives that can be considered on the local level relate to the use of different types of towers (e.g. the Compact cross rope suspension tower (**Figure 3.2**) or the V-Guyed tower). Different tower types have different impacts on land use. These options will be discussed with the directly affected landowners, to minimise the negative impacts on their use of the land.

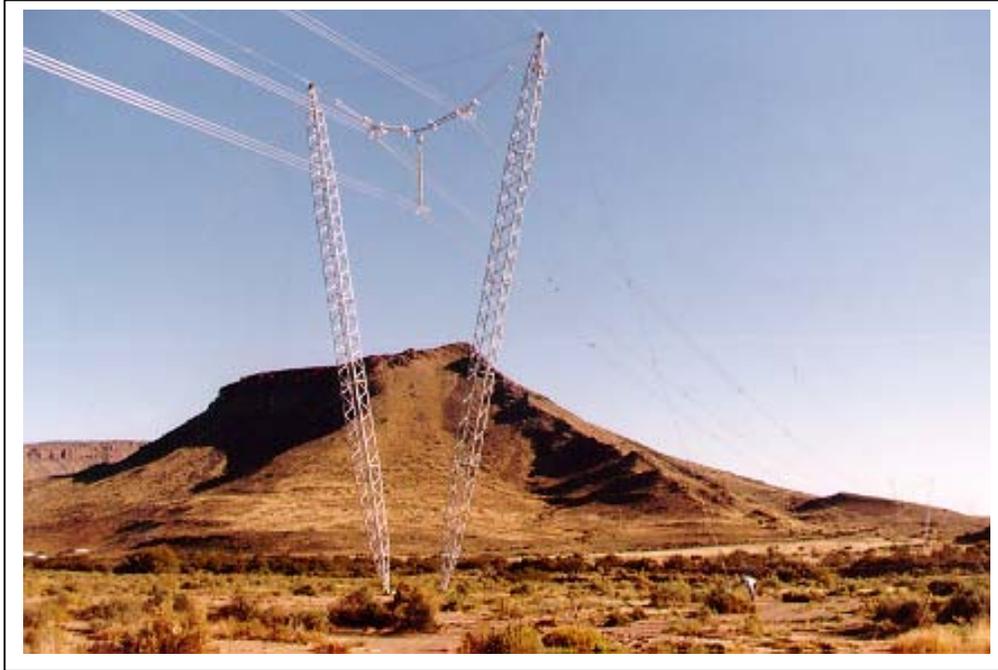


Figure 4.1: Compact Cross-Rope Suspension Tower (Photo: Carol Steaton)

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1 CLIMATE AND ATMOSPHERIC CONDITIONS

The study area falls in the summer rainfall area. This means warm summers with rain and cool dry winters. The areas above the escarpment, including Volksrust and Wakkerstroom, experience mild summers with average temperatures of 14°C - 32°C. Rain falls from October to March. Rainfall can be 700 - 1 000 mm per year. Precipitation also takes place in the form of hail, which appears to be common and often associated with thunderstorms and frequent lightening strikes.

Winters are dry and cold with average winter temperatures between 0.4°C- 16.5°C. Snow falls in parts of the study area are almost annual occurrences. Below the escarpment the climate is very similar to above the escarpment in terms of the summer climate. Areas such as Newcastle, Utrecht and Vryheid experience the colder winters. Rainfall increases to 1 200 mm per annum. Winters are also dry and cold between 0.5°C and 18°C. The Umfolozi sub-station is situated in the area of Zululand where it is markedly warmer during the summer and winter months. The summers are warmer with averages around 26°C going up to 35°C. Winters are milder with the average between 8°C and 18°C.

For the entire study area there is a daily swing between berg and onshore air movement. The main direction of air movement is from the south-west alternating with winds from the north-east. The south-westerly winds are often associated with cold fronts that are preceded by warm fronts. The hot air ahead of cold fronts is often the cause of veld fires in winter when the veld is dry.

Lightning strikes are very prevalent in the study area with one of the two areas receiving the highest frequency of strikes close to the Paulpietersburg area. The entire study area falls into the above average potential for lightning strikes raising the potential for veld fires starting from lightning strikes to Transmission pylons (see lightning density map in **Appendix G**).

5.2 TOPOGRAPHY, GEOLOGY AND SOILS

5.2.1 Topography and landforms

The study area forms part of the eastern plateau slope (Van Riet. W, Claasen. P, Van Rensburg. J, Van Viegen. T, and Du Plessis. L. 1997) which is a relatively flat plateau above the Drakensberg escarpment with rolling hills. The slopes of the rolling hills range from 0° to 70°. There are steep mountains, formed by the Drakensberg escarpment, in the southern part of the Mpumalanga Highveld where some slopes exceed 70°. Landforms range between 450 m and 900 m above mean sea level (ams1). Below the escarpment the terrain is also relatively flat, at 30 to 210 m ams1, with rolling hills with slopes that range from 0° to 70° in the south-

eastern part of the study area. Further south-east the terrain becomes low mountains and mountains with lowlands at 130 - 450 m above sea level.

In terms of erosion potential, the study area appears to be stable as it is mostly still under natural vegetation. In the east of the study area, where human settlement has exposed the soil and erosion is more prevalent, soils may become unstable due to the erosion risk.

5.2.2 GEOLOGY

Geologically, the study area can be divided in three main sub-areas:

- Amersfoort, situated in the west and Paulpietersburg in the north-east;
- Below the escarpment the Utrecht area is situated in the west of the study area with the Bloodriver and eMondlo areas in the centre of the study area; and
- The Mhlazatshe area situated towards the eastern end of the study area.

Above the escarpment in the Amersfoort area to the west of the study area, the main geological formations is dolerite. Shale and siltstone are the second most common rock types. Eccla shales of the Vryheid formation appearing as sandstone, shale and grit with coal and oil-shale beds occur in much lower quantities. The least common is Eccla shale of the Volksrust formation with shale and siltstone. As one moves towards the east pockets of sandstone, mudstone and siltstone with thin coal seams lie unconformally with the landscape and become prevalent around the Wakkerstroom area and southwards to the Balelesberg. Further east, it is an almost evenly split between dolerite and Eccla shale of the Vryheid formation (Engelbrecht, L.N.J. 1985).

Below the escarpment west of Utrecht at the base of Balelesberg dolerite from the Jurassic era is most common with Eccla shale of the Volksrust formation occurring scattered in pockets in the dolerite. The grassy plain beyond the foot of the mountain is underlain by Eccla shale of the Vryheid formation interrupted by small intrusions of dolerite. Further east-south-east of Utrecht dolerite and Eccla shale of the Vryheid formation are fairly evenly distributed lying unconformally with the landscape. In the area of Uyskop Eccla shale of the Volksrust formation appears as an island with smaller pockets further south. On the same koppie, a small deposit of Eccla shale of the Estcourt formation exists. South-east of this koppie Eccla shale of the Volksrust formation is the most common deposit (Engelbrecht, L.N.J. 1985).

In the last sub-area South-east of eMondlo Dwyka becomes most common extending south-eastwards with pockets of dolerite interrupting the extant of Dwyka in large unconfirmed areas. From the Sandspruit southwards granite becomes prevalent. Towards the eastern limit of the study area Rooirand (area of Leopard Rock) there are a variety of rock types that occur in almost north-west to south-east striations. The striations include Mandeva and Mpunga formations from the Mozaan Group and

rock from the Chobeni, Nhlebela and Thembeni formations of the Nsuzi Group of the Swazian era. Small intrusions of Diabase from the Radium Era are also present in the area (Engelbrecht, L.N.J. 1985).

Throughout the study area there are pockets of basal boulder beds with yellow-brown sandy clay which is consistent with the drainage lines above and below the escarpment.

There is an extensive fault line in a north-west to south-east alignment south of Wakkerstroom almost following the escarpment of the Balelesberg. Numerous small faults occur in the Rooirand mountains near Leopard Rock close to Nhlazatshe substation with an alignment almost perpendicular to the railway line from Vryheid to Richards Bay (Engelbrecht, L.N.J. 1985).

In the Utrecht district, ferrous mineral deposits occur on the farm Spookmill and mineral pigments on the farms Novembersdrif and Dicks. Coal occurs on the farms Tussenbei, Vaalbank, Northhill, Weltevreden and further north-east on the farm Vaalkop near Vryheid (Engelbrecht, L.N.J. 1985). Mining in the Utrecht is being re-opened to the north of the town (Vincent, D. 2006 *Pers. Comm.*)

In the Blood River area there are ferrous deposits on the farm Brakspruit and copper is mined on the farm Sandfontein near eMondlo. Copper, zinc and talc are mined on the farm Barklisside. Wolfram tungsten occurs on Lot 10965 in this district. Gold is mined in the Nondweni area on Lot 10878. In the same area there are gold deposits on the farm Vergenoeg (Engelbrecht, L.N.J. 1985).

At Nhlazatshe, copper is mined on the farm Blauwbank and talc is mined on the farm Langgewacht (Engelbrecht, L.N.J. 1985).

The study area ranges between low on the mining intensity index to just over midway to high where the highest intensity occurs in the Newcastle/Dannhauser area west of the study area. The intensity is highest for fossil fuels being mined per magistrate area in the study area with very minor precious metals mining operations and no precious minerals being mined (Van Riet et al, 1997).

5.2.3 Soils

The soils present in the study correspond with the underlying rock formations. Towards the north-west of the study area Plinthic catena upland duplex marginalitic soils, which is a clayey soil and are common in offsets with Glenrosa soils where lime is rare in high lying land but present in low lying areas. A narrow band of Red-yellow apedal dystrophic and mesothrophic soil lies in a north-south line to the east of the Glenrosa and Plinthic soils. East of the narrow band of apedal soil lies a vast area (extending to beyond Paulpietersburg) of red-yellow apedal soil that is freely drained

and red-yellow dystrophic or mesotrophic in character. The soils mentioned thus far support *Hyparrhenia* dominated grassveld and are planted with timber plantations towards the east.

The Balelesberg escarpment has a narrow band of Glenrosa soil in which the uplands are lime depleted and the lowlands richer in lime. This narrow band is echoed by another narrow band of Plinthic catena upland duplex marginalitic soil. South-west and south east of Utrecht are large expanses with Plinthic catena soils that are dystrophic or mesotrophic red soils. Around Utrecht the soils are complex as it changes frequently between six types of soil supporting Sour sandveld vegetation in the form of grasslands. It is also in these soils that extensive cultivation takes place. This pattern of frequent soil type changes continues south-eastwards to the eastern end of the study area. A total of 11 soil types cover the study area.

Plinthic soils are characterized by the iron mottling caused by periodic saturation with water. It may be that these soils have a high clay content in the lower horizons which may make them unstable from a construction point of view. Proper geo-technical assessments will be required for each tower base and anchor post position prior to construction commencing.

The biological productivity ranges between 6.25 tons per hectare to 10 tons per hectare per growing season for the study area. Most of the study area has a biological productivity per capita range between 25 and 100 tons per growing season. The western half of the study area below the escarpment has the highest productivity where it reaches 100 tons per capita per growing season. Towards the eastern end of the study area where the tribal land is situated and subsistence farming is mainly practiced productivity per capita per growing season ranges only between 1 and 10 tons.

The area above the escarpment and the area immediately below the escarpment are still in a very natural state and have a very limited erodibility index. Further south and further east the erodibility index jumps across all the grades to the highest erodibility index. Significant dongas are visible in this part of the study area supporting the argument of highly erodible soils. Where disturbance to the natural vegetation through overgrazing, inappropriate burning and physical damage through ploughing and construction takes place, there is a high likelihood that erosion will occur.

5.3 TERRESTRIAL VEGETATION

At least 50% of the study area falls within the proposed Ekangala Grassland Biosphere Reserve (EGBR). The importance of this area is largely due to it being some of the last remaining rolling grasslands left in South Africa. It contains several types of grassland, including moist sandy highveld grassland, north-eastern mountain grassland and moist clay highveld grassland. Rocky slopes, gullies and ravines

contain thickets dominated by *Ouhout Leucosidea sericea*, forming thickets in places (Young *et al.* 2003). Due to the short growing season, the grasslands in the study area have escaped much of the ecological carnage caused by the transformation of most grasslands into agricultural monocultures. The dominant land-use is pastoral with cattle and sheep farming, which is more benign to the environment, resulting in much of the fauna and flora remaining intact.

The grassland area consists of the Moist Sandy Highveld Grassland and the Wet Cold Highveld Grassland of the Grassland Biome (Low and Rebelo, 1996) (**Figure 5.1**).

The study area below the escarpment forms part of the Natal Central Bushveld of the Savanna Biome (Low and Rebelo, 1996). The landscape is an open savannah with scattered *Acacia sieberiana* (Paperbark Thorn) and sour grasslands consisting of species such as Common Thatchgrass.

Towards the south of the study area, below the escarpment, there has been significant thornveld encroachment, partly due to sustained overgrazing for more than a century (Young *et al.* 2003). Detailed information on the grasslands and vegetation in the study area is provided in **Appendix G**.

There are 85 species of grassland flora (listed in **Appendix G**) that are on the Red Data list that potentially occur in the study area above the escarpment.

There are three Red data species potentially present in the area below the escarpment associated with untransformed grasslands. They are *Selago longicalyx*, *Kniphofia galpinii* and *Kniphofia breviflora*. Other plants potentially occurring in the area include: *Bowkeria citrina* (Vulnerable), *Craterostigma nanum var nanum* (Vulnerable), *Encephalartos msinganus* (Endangered) and *Protea nubigena* (Critical).

Plants used for medicinal purposes, and alien species occurring in the study area are listed in **Appendix G**.

5.4 AGRICULTURAL LAND AND POTENTIAL

The land capability map in **Figure 5.2** (ARC, 2005) shows eight classes of dominant land capability occurring in the study area. Classes I-IV are arable and Classes V-VIII are not arable (no land types with dominant land capability Class I were encountered, although smaller areas of land capability Class I will certainly occur within several of the individual land types).

Figure 5.1: Vegetation and Conservation ar

Figure 5.2: Land Capability

Most of the central zone of the study area falls into land capability Class III, while the western and eastern zones contain more areas with poorer soils, mainly land capability Class VI. However, there is significant variation in land capability, with land types occurring with dominant land capability classes between II and VIII.

5.5 SURFACE WATER

The study area is located in the Mfolozi/Pongola catchment. The mean annual runoff is between 1 600 and 3 200 million m³ per secondary catchment above the escarpment and between 800 and 1 600 million m³ per annum below the escarpment. The main rivers include the Vaal River (for the western portion of the study area above the escarpment flowing into the Orange River and ultimately into the Atlantic Ocean on the west coast of South Africa) and the Pongola River (in the eastern area above the escarpment flows into the Indian Ocean in Mozambique). Below the escarpment the main rivers include the Pongola River, the Tugela River and the Mfolozi Rivers (White and Black).

The area contains some very important wetlands and dams, e.g. Fickland Pan, BP's Dam, Clarens Pan, Wim Rabe Pan, Heyshoek Dam, Zaaihoek Dam, Wakkerstroom Vlei, a large wetland west of Utrecht called Boshoffsvlei, (just below the escarpment at the confluence of the Wasbankspruit and Dorpspruit) and Blood River Vlei and associated wetlands situated about halfway between Utrecht and Vryheid. Apart from these, the study area also has permanent reed and sedge swamps, several seasonal pans, innumerable small sponges and seeps and numerous farm dams (Tarbotton 2001). The study area contains hundreds of small perennial drainage lines e.g. the Slang River near Volksrust, but few larger rivers, such as the White Mfolozi River and the Blood River.

5.6 TERRESTRIAL FAUNA

5.6.1 Mammals

The mammals occurring in the study area are listed in **Appendix G**. The following three have Red data status:

Common Name	Scientific Name	Conservation status
Honey badger	<i>Mellivora capensis</i>	Vulnerable
Aardwolf	<i>Proteles cristatus</i>	Rare
Antbear	<i>Orycteropus afer</i>	Vulnerable

Oribi (*Ourebia ourebia*) are known to occur in the area of Strathcona west of Vryheid. Oribi are presently considered to be vulnerable (Lotter, M.C. and Ferrar, A.A. 2006).

5.6.2 Avi-fauna

The proposed corridors may conflict with 7 species of bird that are listed in the Red-data list for birds. This includes the white winged flufftail (Globally endangered and nationally critical) associated with wetlands. Striped flufftails (Nationally vulnerable) are associated with grasslands with long grass where over-grazing and too regular burning is limited. The wattled crane (Globally vulnerable and nationally critical) is associated with grasslands and wetlands. Blue cranes (Globally and nationally vulnerable) are found in grasslands and wetlands. Crowned cranes (Nationally vulnerable) are associated with grasslands and wetlands. Ground hornbills (Nationally vulnerable) are associated with grasslands and woodlands. Blue korhaan (globally and nationally near threatened) are associated with grasslands with short grass. Botha's lark (are Indeterminate) and associated with grasslands. Rudd's lark are vulnerable and also associated with grasslands. Bald ibis are associated with wetlands and kranzes and are Out of danger. Blackbellied korhaan are presently being Monitored and are associated with grasslands. Stanley's bustard are Vulnerable and are associated with grasslands. Little bittern are considered to be Rare and are associated with wetlands. Cape Eagle Owl are being Monitored and are associated with savanna.

Korhaan is known to be much reduced in number in the study area due to landuse practices and the status of the flufftails needs further investigation. The cranes are present in the study area and are likely to conflict with the proposed powerlines. Detail reporting on the impact with the larger birds is to be reported on by a bird specialist appointed for this purpose.

Above the escarpment Rudd's lark and Botha's lark are known to occur in the area east of Amersfoort and north of Wakkerstroom.

The majority of the study area, and all of the corridors investigated, encompass the grassland biome. The avi-faunal analysis therefore concentrated on this biome.

Whilst much of the distribution and abundance of the bird species in the study area can be explained by the description of vegetation types (**Chapter 5.3**), it is more important to examine the micro habitats available to birds. These are generally evident at a much smaller spatial scale than the vegetation types, and are determined by a host of factors such as vegetation type, topography, land-use and man-made infrastructure.

The micro habitats observed in this study area during the field visit are described below. Examples of each micro habitat can be seen in **Appendix H**.

- Wetlands and rivers (described in **Chapter 5.5**): Both wetlands and dams are of particular importance for birds in the study area particularly for all three crane species that occur in the area. Wakkerstroom Vlei is known to hold a significant

proportion of the national Whitewinged Flufftail population, a globally endangered species. The drainage lines and artificial dams in the study area are important for waterfowl.

- Grassland (**Chapter 5.3**): The Ekangala Grassland Biosphere Reserve (EGBR) is regarded as the most important Important Bird Area (IBA) in the whole of South Africa (Important Bird Area SA020). The grassland habitat is of particular importance for several Transmission large power line sensitive grassland “specialists” such as Bald Ibis, Wattled Crane, Blue Crane, Grey Crowned Crane, Stanley’s Bustard, Blue Korhaan Whitebellied Korhaan and Blackbellied Korhaan. Several smaller species such as Botha’s Lark, Rudd’s Lark and Yellowbreasted Pipit also favours this habitat, but fortunately the impact of the proposed Transmission power line on these species is negligible.
- The Thornveld: Towards the south of the study area below the escarpment (**Chapter 5.3**) is significantly less sensitive as far as bird habitat is concerned, but some large terrestrial species have been recorded such as the Secretary bird and Ground Hornbill. This habitat also favours vultures, several of which were recorded roosting on the existing Transmission power lines near Ulundi during the field visits.
- Commercial plantations: On the eastern side of the study area, around Vryheid and Paulpietersburg, significant afforestation has taken place over the past fifty years (Young et.al. 2003). Apart from commercial plantations, there are stands of predominantly *Eucalyptus* species, presumably originally planted as windbreaks. They may be significant for birds in terms of roosting or nesting as few indigenous tall trees exist in the landscape. However, they do not represent an important micro-habitat in the context of this study. The afforestation has caused irreparable damage to the grassland habitat, resulting in those areas being ruined for large terrestrial bird species.
- Arable land: Limited crop cultivation is practiced, often in conjunction with irrigation, but the sandy soils are generally not very nutrient rich, therefore cultivation is limited. Crops include maize, wheat, sorghum, soya beans, sunflower and a few pastures. This habitat has some importance for cranes, particularly the Grey Crowned Crane and to a lesser extent Blue Cranes, as well as White Storks, particularly irrigated pivots. Blue and Grey Crowned Cranes sometimes use harvested maize fields for foraging (Tarbotton 2001).
- Afro-montane Forest: There are several isolated patches of Afro-montane forest on southern slopes in the study area. The most extensive patch of Afro-montane forest occurs in the Pongolo Bush Nature Reserve, near Paulpietersburg and in the south of the study area between Vryheid and Ulundi. This habitat has limited importance from a Transmission power line interaction perspective, but it does contain breeding pairs of Crowned Eagles.
- A large wetland west of Utrecht, just below the escarpment at the confluence of the Wasbankspruit and Dorpspruit; and Blood River Vlei and associated wetlands situated midway between Utrecht and Vryheid.

5.6.3 Amphibia

Fifteen frogs are expected to occur in the study area as listed in **Appendix G**.

Frogging has become an important pastime for eco-tourists in the Wakkerstroom area. This activity mainly takes place at night when the frogs are out calling.

There appears not to be any potential conflict between any of the proposed alignment corridors and any amphibian species on the Red data list.

5.6.4 Reptiles

Six lizard species may occur in the study area as listed in **Appendix G**. Four endemic species occur in the study area and are also listed. In the Red data list.

Twenty-three (23) snake species may occur in the study area as listed in **Appendix G**. Only the African rock python is listed in the Red data list.

Only one tortoise, the Natal hinged tortoise (*Kinixys natalensis*), occurs in the study area and is listed in the Red data list as Rare.

There is no potential conflict between reptiles occurring in the study area and the proposed Transmission power line.

5.6.5 Fish

There appear to be no fish or crustaceans on the Red-data list within the study area.

5.6.6 Invertebrates

The red-data listed millipede, *Doratogonus minor* (Minor black millipede), occurs in the western portion of the study area below the escarpment. Their distribution is localized around the Utrecht area in the Biosphere Reserve.

5.7 CONSERVATION AREAS

There are various forms of conservation areas within the study area. At Utrecht town there is a Biosphere Reserve. Closer to Vryheid on the farm Strathcona there is a contractual conservation reserve and another jointly between Leopard Rock and Zulu Rock. A very large co-operative contractual nature reserve has recently come about in the Luneberg area and another in the Paardeplaats Nature Reserve area. Conservancies are operative in the study area. There is a municipal nature reserve managed by KZN Wildlife outside Vryheid.

5.8 SOCIAL PROFILE

This section is based on the specialist report presented in **Appendix D**.

5.8.1 Socio-economic Profile

The study area traverses Mpumalanga and KwaZulu-Natal (as described in **Appendix D**). A number of District Municipalities (DM), Local Municipalities (LM) and towns may be affected by the proposed Transmission power line (**Figure 5.3**), as listed in **Table 5.1**. A summary of key information is reflected in **Table 5.2**. The socio-economic profile of the study area is discussed in **Appendix D** and summarised below.

Table 5.1: Potentially Affected Municipal Areas and Towns

District Municipality	Local Municipality	City/Town	Potentially affected by corridor
KwaZulu Natal			
Zululand	Abaqulusi	eMondlo	Blue, Green
Zululand	Abaqulusi	Vryheid	Green & Yellow
Zululand	eDumbe	Paulpietersburg	Yellow
Zululand	Ulundi	Ulundi (falls just outside the study area)	Green, Yellow, Blue
Amajuba	Utrecht	Utrecht	Green
Amajuba	Newcastle	Newcastle (falls just outside the study area)	Blue
Amajuba	Newcastle	Osizweni-Madadeni	Blue
Umzinyathi	Nquthu	Nquthu (falls just outside the study area)	Blue
Mpumalanga			
Gert Sibande	Pixley ka Seme	Wakkerstroom/eSizameleni	Green
Gert Sibande	Pixley ka Seme	Volksrust/ Vukuzakhe	Blue

Table 5.2: Population and Employment

Municipality	Total population	Rural population	Unemployment (excl. not active)
Zululand DM	1 024 713	65%	61%
eDumbe LM	82 241	not reflected	57%
Ulundi LM	340 127	84%	67%
Abaqulusi LM	191 022	63%	60%
Amajuba DM	468 040	43%	41%
Utrecht LM	32 277	90%	40%
Newcastle LM	332 981	23%	54%
Umzinyathi DM	160 000	90%	62% (Nquthu: 80%)
Pixley ka Seme LM	80 737	32%	50%

Figure 5.3: Municipalities and Infrastructure

GERT SIBANDE DM (Mpumalanga)

The total population of the Gert Sibande DM is 3 122 991, and of the economically active, persons, 26% unemployed. 3% of the population resides in Pixley kaSeme LM.

PIXLEY KA SEME LOCAL MUNICIPALITY (Mpumalanga: Volksrust, Wakkerstroom)

The Pixley kaSeme LM lies on the eastern border between Mpumalanga and KwaZulu-Natal. A total of 80 737 people reside within the area in 16 726 households (average 4.8 people per household). Of these residents 68% of the people live in urban areas, with the remaining 32% residing in largely rural areas. In 2001, just over half (51%) of the people were unemployed, which differs significantly with the unemployment rate of 1996 where it was estimated that only 33% of the population were unemployed. Of those employed, the majority (24%) are employed in the agriculture/forestry and fishing economic sectors. This is closely followed by employment in private households (20%). Another significant percentage (16%) of the people work in the community/social and personal sectors.

According to the Pixley kaSeme Municipality, approximately 76% of all households have access to water within their dwelling. Only 12% of all residents have no access to sanitation services. Close on 67% of all the households have access to electricity services, followed by 30% who still make use of candles for lighting.

Volksrust (Blue corridor)

This town forms the Northern gateway to the Battlefields Route. The first 'Voortrekkers' settled in this area during the 1850's. In 1876, Rowland Meek bought the farm Zandfontein and opened a store on premises to be called Llanwarne. This gave way to the birth of Volksrust in March 1889.

Decisive local battles of Laingsnek, Ingogo and Amajuba took place during the War of Independence (1880). Majuba Mountain, the final point of conflict between Boer and Brit during the First War of Independence, forms an imposing backdrop to the town. A Peace Treaty was signed on at O'Neill's Cottage. Dorie de Jager, sister to Dirk Uys, gave the town its name Volksrust (the people rest) when the Boer soldiers came to rest at Rooibult during the signing of the Peace Treaty.

Volksrust is one of the largest urban settlement areas within the Pixley ka Seme Municipality. It has a population of 5 676 people, which accounts for 7% of the local municipality's total population.

The Volksrust area is completely reticulated in terms of water provision. There are two water purification works for the area as well as six reservoirs. The refuse removal site in Volksrust is the only site servicing the whole of the municipal area.

Wakkerstroom (Green corridor)

The village was founded by Dirk Cornelius Uys (Swart Dirk), who surveyed the area and measured all the erf sizes in Wakkerstroom using a 50 yard long thong cut from an eland bull, which he shot on his arrival in Wakkerstroom. Wakkerstroom was occupied by troops of the 58th Regiment North Staffordshires, the 80th Regiment of the South Staffordshires and the 1st Kings Dragoon Guards during 1880/1881. Remains of the camps of the South Staffordshire Regiment and the Scots Guards can be seen on the summits of Ossewakop and Voortrekkerkop south of Wakkerstroom.

Wakkerstroom is mostly an urban area surrounded by wetlands, which is currently a large tourist attraction. It has a very small population, consisting of 776 people, which accounts for 1% of the total population in the Pixley kaSeme Municipality's area of jurisdiction.

Water for Wakkerstroom is mostly sourced from the local Martin's Dam. The refuse removal site in Wakkerstroom is not permitted since it is not operating according to the set minimum standards.

ZULULAND DISTRICT MUNICIPALITY (KZN: Vryheid, PaulPietersburg, eMondlo, Ulundi)

Within the Zululand DM, the proposed Majuba-Umfolozi transmission line may potentially affect the local municipalities of Abaqulusi (with eMondlo and Vryheid towns in the study area), and eDumbe (with Paulpietersburg town in the study area). Although the Ulundi Local Municipality will most probably not be directly affected, it will be discussed to draw a clear picture of the area.

The name Zulu means "heaven" in isiZulu. The Zululand District Municipality (DM) comprises 15 307 km² to the north-eastern part of KwaZulu-Natal and houses approximately 1 024 700 people. It was estimated in 2001 that 61% of the employable population was unemployed.

During the apartheid era, the Zululand DM was classified as a "homeland" and as such did not receive any government funding for infrastructure and services development. Zululand is one of the poorest areas in South Africa and has a high incidence of HIV/AIDS. The economy and settlement pattern is mostly rural in nature. The majority (65%) of the inhabitants live in rural villages, some quite a distance away from any road networks. The minority (12%) who live in urban areas are mostly located in the towns of Ulundi, Vryheid, eMondlo, Paulpietersburg and Pongola. There are 872 settlements in total. About half the area falls under the jurisdiction of Traditional Authorities, the remainder being privately owned commercial farms, or protected areas. Due to the rural nature of the DM, service delivery and development

is hampered because of inaccessibility. Most of the rural settlements are small, making service delivery costly.

ABAQULUSI LOCAL MUNICIPALITY (eMondlo, Vryheid)

The area is named after one of King Shaka's Royal homesteads i.e. abaQulusi, which simply means "wanderers". The area makes up approximately 30% of the Zululand DM in an area covering 4 185 km². During Census 2001, the population in Abaqulusi stood at 191 022 people living in 36 000 different households (averaging 5.3 people per household). Of these households, only 50% had access to municipal services in one form or another. The majority (63%) of the population lived in rural settlements, while the rest (37%) lived in urban areas. Of the population, it was estimated in 2001 that 60% was unemployed. The main employment sectors are community/social and agriculture followed by private households.

According to Census 2001, approximately 16 000 households (or 44%) have access to electricity; ranging from just lighting to cooking. About 26 561 households (74%) have access to clean water; ranging from borehole water to potable water. Around 16 993 (47%) households have access to some or other sanitation service; ranging from basic VIP toilets (mostly in the rural areas) to water-borne toilets (in the urban areas). Only about 38% of the households have access to a refuse removal service.

eMondlo (Blue and Green Corridors)

Little information on this town is available. eMondlo is primarily a residential area with limited services and facilities, and few employment opportunities.

Vryheid (Green, Yellow)

The aftermath of the Anglo Zulu War of 1879 left the remnants of the Zulu Kingdom in the hands of Usibhepu, Dinizulu's uncle. Dinizulu, the rightful heir, enlisted military support from the Boers in restoring him as king. Following a successful campaign Dinizulu was sworn in and in return the Boers were granted a large tract of land. Vryheid was the capital of this New Republic.

At the outbreak of the Anglo-Boer War (1899) the Vryheid Commando fought at the battle of Talana, partook in the siege of Ladysmith and captured the British guns at Colenso. Chief Cikibobo, encouraged by the British civil authorities, attacked a Boer camp on the slopes of Holkrans mountain, killing 56 burghers. Skirmishes occurred at Scheepersnek, as well as a major Boer attack at Lancaster Hill just north of Vryheid. A successful invasion into Natal via Bloedriverpoort followed, but the Boers were defeated at Italeni and Fort Prospect.

Vryheid is the Zululand DM's main commercial, industrial and business centre. Of the 191 022 people in the Abaqulusi Municipal area, 24 670 (13%) reside in Vryheid.

EDUMBE LOCAL MUNICIPALITY (KZN: PaulPietersburg)

According to Census 2001, the demographic area of eDumbe Local Municipality is home to 82 241 people, of which only 26% are employed. Despite this low employment rate, only 36% of all households have no income. Of those employed, about a third have an elementary occupation (most probably in the farming industry – Census 2001 indicates that the farming sector is the biggest employer in the area). Other employment sectors include mining, manufacturing, utilities, construction, trade, transport, business and social services. The urban population accounts for 20%.

Only 31% of all the households in the area have access to and make use of electricity. A minority of households (approximately 28%) have no access to any form of sanitation services. There has also been an increase in access to clean water (from 52% in 1996 to 63% in 2001). The majority (79%) of all households have access to refuse removal services.

Paulpietersburg (Yellow corridor)

Paulpietersburg is nestled at the foot of the Dumbe "Mountain of Wonders", where the unique amadumbe edible plant is found. The town has a distinctly German character. The German influence dates back to the 19th century, when Lutheran missionaries and colonists founded settlements at Luneburg, Braunschweig and Augsburg near the town. Of the 82 241 people in the eDumbe Municipal area, 1 465 (2%) reside in Paulpietersburg.

ULUNDI LOCAL MUNICIPALITY (Ulundi)

Ulundi lost its independence to colonial expansion in the latter part of the 19th Century. When King Mpandle Cetshwayo inherited the throne of the Zulu nation, he chose Ulundi as the site of his capital. In 1879 the Anglo-Zulu War culminated in the battle of Ulundi which was won by the British troops.

The urban population accounts for approximately 55 000 people. A further 285 157 people (84%) live in rural areas within Ulundi's jurisdiction. There are approximately 61 810 households in Ulundi (average 5.5 people per household). In 2001, unemployment was estimated at 67%.

Approximately 36% of households have access to water services that are below the RDP standard. In terms of access to sanitation services, 54% of the urban population have no access to sanitation services. Just over half (51%) of the people have access to electricity.

AMAJUBA DISTRICT MUNICIPALITY (KZN: Newcastle and Utrecht)

Within the Amajuba DM, the proposed Majuba-Umfolozi Transmission power line might potentially affect the local municipalities of Newcastle and Utrecht, with the towns Osizweni, Madadeni, and Utrecht. Although Newcastle town will most probably not be directly affected, developments occurring in this area encroach on the Osizweni-Madadeni complex in the Blue corridor.

The Amajuba District Municipality houses approximately 468 040 people within its 6 900 km² area. Of these, 70% is located within the Newcastle Municipality and only 6% in the Utrecht Municipality. Just over half (57%) live in urban areas. Very low population densities (less than 2 people per ha) across the district is evident, with the exception of the Newcastle-Madadeni-Osizweni axis, where densities may reach above 50 people per ha, and the Blaauwbosch area where densities are recorded as reaching up to 10 people per ha.

Overall the area has a rather high unemployment rate with up to 41% of all its residents being unemployed. The main employment sectors are manufacturing and community/social. As a whole, approximately 10% of the area's residents do not have access to water, 5% do not have access to sanitation services, 28% have no electricity, and 40% have no access to refuse removal services.

NEWCASTLE LOCAL MUNICIPALITY (Newcastle town: Blue Corridor)

Geographically situated midway between Port Natal (Durban) and the Zuid-Afrikaansche Republiek (Transvaal) the tiny settlement then known as Post Halt Two was a popular stopover point for wagons and post chaises. The town also formed a transport junction to the Transvaal and the Orange Free State and canteens and hotels sprung up along the routes to cater for travellers. Newcastle is the regional centre for most of the economic development that is taking place within the Amajuba DM. Of the population, 23% live in rural areas. A total number of 332 976 people live in Newcastle in 71 162 separate households (average 4.7 per household). Of these, only 29% are formally employed although the unemployment rate is as low as 23%. The majority of the employed are working in the manufacturing industry (29%), closely followed by social services (22%). It also has a variety of well developed economic sectors, which also includes being the national textile capital hosting approximately 65% of all South Africa's textile manufacturers.

The majority of Newcastle's residents have access to basic services. Only 5% have no access to water, 3% have no access to sanitation, 13% have no access to electricity, and 24% have no access to refuse removal services.

UTRECHT LOCAL MUNICIPALITY (Utrecht town)

One of the five original Voortrekker settlements established prior to 1850, Utrecht played a prominent role in the Anglo-Zulu War of 1876 when for several weeks it was the headquarters of the British army under the command of Lord Chelmsford. The town is home to approximately 32 272 people in 6 193 households (average 5.2 people per household). A total of 24 000 people live in the area of which 90% are living in the rural areas and 10% in the urban area. Of the adult population 23% has no education. Agriculture is the biggest provider of job opportunities and only 18% of the economically active are employed. There is a higher level of unemployment amongst women in Utrecht, approximately 22% higher than amongst their male counterparts. A large proportion of men are employed in the agriculture, hunting, forestry, and fishing industries (approximately 35%). Almost half of the housing facilities in Utrecht consist of traditional housing. These households mostly use wood for cooking and candles for lighting. Utrecht has poor sewage facilities where over one-third of all households reported that they had no toilet facilities. The majority of residents also rely on their own refuse dump for refuse removal.

UMZINYATHI DISTRICT MUNICIPALITY (KZN: Nquthu: Blue Corridor)

Although Nquthu falls outside the study area, this area is discussed because of its close proximity to the Blue corridor, and a concern that development might take place towards the Blue corridor. The town of Nquthu with the Umzinyathi DM is rural in nature and is dependant on its neighbouring municipal areas for economic services. Nquthu is characterised by a rural settlement pattern with a small central node in the form of the Nquthu Village. However, the Nquthu Village lacks certain infrastructure that prohibits it from becoming a dominant force in the UDM. This is largely due to the close proximity of larger towns to Nquthu Village. It is estimated that the population is 160 000. The average population density is 88,5 people per km² and, over 90% of the Nquthu population are essentially rural.

5.8.2 Existing and Future Developments

The local settlement patterns of all the towns in the study area reflect the separate development policies of the former dispensation, with separate developments for black and white people. This form of segregated planning created spatially separate entities and has resulted in the lack of social integration as well as costly infrastructure and service provision and maintenance. In terms of population/development trends, out-migration from rural areas has been seen to be prevalent in those areas where mining and agriculture have been the dominant economic activities. The majority of people migrate in hope of better employment opportunities, and informally occupy land in the developed areas. This uncontrolled development of towns can sometimes result in occupation in the servitude.

There are already some buildings in existing servitudes in the study area. It has been observed that in general communities do not move into servitudes, especially in the more rural, traditional areas. It seems to occur in areas where development has been rapid, for example Osizweni near Newcastle.

Figure 5.3 indicates the human settlements in the area, and the density of the schools plotted on this map further gives an indication of the population density that can be expected. The more the schools, the denser the population usually is. There are concentrations of people in the town areas, with a dispersed population in the remainder of the area. The housing backlog in the study area is high, especially in the Utrecht area. Communities also often prefer traditional houses.

Traditional villages and houses in the rural areas are characterised by round huts, basic brick structures, a few cattle and a maize field. Even the denser populations such as Osizweni are characterised by traditional houses, interspersed with informal and formal housing, and agriculture. The agricultural activities are neither commercial agriculture, nor subsistence agriculture in the true sense of the word. Agricultural activities are primarily to supplement residents' diets and not for commercial purposes.



Figure 5.4: A typical rural scene in the study area



Figure 5.5: A typical urban scene in the study area - Osizweni

The Zululand DM has been elected as a focus area by the national government for its Integrated Sustainable Rural Development Strategy (ISRDS) programme. It is believed that in order to stimulate development, the area needs investment in basic

infrastructure and economic activities which in turn could create employment opportunities.

In the following sections, developments along each of the alternative route alignments are discussed.

Developments in the Blue corridor

- From the Majuba Power Station, the Blue corridor passes far enough from Volksrust and Vukuzakhe not to impact on current or future developments.
- From Volksrust, the Blue corridor crosses the Newcastle-Madadeni-Osizweni-Utrecht area. There is a concentration of people in this area, and densities may reach 50 people per ha, with the area towards Newcastle more densely populated and dispersed with industrial areas. Towards Utrecht the area becomes less densely populated (see **Figure 5.4**).
- The urban edge of the Newcastle-Madadeni-Osizweni complex is defined to prevent urban sprawl, but this is not necessarily adhered to. The Newcastle Municipality is developing a plan for the regulation of development along this corridor.
- Identified developments for the Newcastle-Madadeni-Osizweni complex are
 - Development of the Amangthungwa Trust, bordering onto the southern border of Utrecht (600 households) (**Visual 5 in Appendix D**).
 - The Madadeni road linking Newcastle West to Madadeni, Osizweni and Utrecht has been identified as a mixed activity corridor. Mixed-use development allows for the development of parcels of land as different land uses on adjoining sites.
 - Nodal points of activity will develop along this corridor thereby providing points of opportunity for the provision of services as well as economic activities.
 - Further along the Blue corridor eMondlo can be found. This is primarily a residential area with limited services and facilities, and few employment opportunities. The Strategic Development Rationale of Abaqulusi DM is to strengthen Vryheid as the core of development and to identify secondary nodes in support of the main node and through which social service delivery to the disadvantage rural communities can take place. See Visual 6 of this report.
 - The eMondlo development seems to be taking place from east to west, and not towards Vryheid as planned. The area between Vryheid and eMondlo is currently open, whilst the area in the Blue corridor is populated. Should the Green corridor be the preferred route, future town planning can take place around the servitude.
 - The Blue corridor then passes north of the Nquthu development, and looking at the placement of schools in this area, it does not seem as if Nquthu will develop towards the Blue corridor.

- Groothoekplaas (**Visual 5 in Appendix D**). Government Communication and Information System (GCIS) roll-out their second generation Multi Purpose Community Centers (MPCC's) in the near future, it is anticipated that one will be constructed in the Groenvlei settlement. The choice of Groenvlei is strategic in that it is in the mountains at an accessible transportation junction which links most of the rural communities. These rural communities are also the areas of highest poverty, poorest accessibility and have the poorest levels of service delivery.
- In terms of the future development in this area, the road from the Madadeni-Osizweni complex, towards Utrecht will probably be developed as a secondary corridor. From Utrecht the secondary corridor will continue to Vryheid. The road from Utrecht, north to Wakkerstroom and north-east towards Paulpietersburg is proposed as a future development corridor in terms of the future populations that it will serve once land reform projects are complete. Future development in the area will seek to preserve agricultural land, and develop the specific potentials.

Developments in the Green corridor

- The Green corridor passes Wakkerstroom and will not impact on current developments, but maybe on future developments. Future developments will have to be planned around the corridor, should it be the preferred alignment.
- A township in Wakkerstroom is planned with approximately 129 fully serviced stands. Wakkerstroom is currently viewed as a minor activity zone.
- Going on towards Utrecht, the corridor crosses the Shabalala settlement around Groenvlei (300 households) and Mabaso settlement at Pivaanswaterval (300 households) identified for development.
- The provision of future housing will be concentrated in the urban core of Utrecht. The corridor passes north of Utrecht, and will not impact on current developments or future development in Utrecht.
- Groothoekplaas in the Blue corridor has been identified for development, and encroaches on the Green corridor Groenvlei (**Visual 5 in Appendix D**).
- From Groenvlei to Umfolozi the corridor does not impact on current and future developments.
- In terms of the future development in this area, the road from the Madadeni-Osizweni complex, towards Utrecht will probably be developed as a secondary corridor. From Utrecht the secondary corridor will continue to Vryheid. The road from Utrecht, north to Wakkerstroom and north-east towards Paulpietersburg is proposed as a future development corridor in terms of the future populations that it will serve once land reform projects are complete. Future development in the area will seek to preserve agricultural land, and, develop the specific potentials.
- An airport is planned for Vryheid.

Developments in the Yellow corridor

- It can be said with relative confidence that the Yellow corridor passes all current developments.
- An airport is planned for Vryheid.
- In terms of the future development in this area, the road from the Madadeni-Osizweni complex, towards Utrecht will probably be developed as a secondary corridor. From Utrecht the secondary corridor will continue to Vryheid. The road from Utrecht, north to Wakkerstroom, and north-east towards Paulpietersburg is proposed as a future development corridor in terms of the future populations that it will serve once land reform projects are complete. Future development in the area will seek to preserve agricultural land, and, develop the specific potentials.

5.9 TOURISM AND ECO-TOURISM

The area covered in this study seems to be building on a reputation as a tourist destination. Tourism associations are active in Vryheid, Utrecht, Wakkerstroom, Paulpietersburg, and Volksrust.

The majority of tourist visits to the province (both domestic and international) are leisure followed by visits to friends and family. Business purposes accounted for a very small percentage of the visits.

Battlefield visitor statistics indicate that half of all the respondents were foreign tourists. A total number of 21 000 people visited the battlefields during 2004, of which 11 000 were local visitors accounting for 53% of all visits to the area. A large segment of visitors from the UK also preferred to visit the battlefields (5 500 people in 2005). Overall, a total of 7 % of foreign visitors to the province visited the battlefields, which amounts to 81 916 foreign tourists. The Green corridor goes through two battlefield sites.

Studying the literature, visitor's books and brochures on birding in the area, as well as looking at the development that has taken place in Wakkerstroom in the past years, it seems as if this area is becoming an increasingly popular birding destination. Local community members are trained as bird guides. A curio market has been started to stimulate the local economy. Various products are offered, including traditional/African clothes.

Tourism activities in general seem to be developing as follows:

- The birding routes, Amajuba Balele Route and Amajuba Bivane Route, between Wakkerstroom, Paulpietersburg will be promoted. These routes cross the Yellow and Green corridors.
- Amajuba DM plans the Midway meander, which will include the Amajuba Birding Meander and Battlefields Route. They strive “for the Amajuba, within its scenic, diverse, safe and secure environment, to be recognised as the premier battlefields tourism destination Province of KZN.”
- Abaqulusi DM plans to develop the Bivane Dam into major attraction with hot air balloon trips over the dam. A cultural village is planned for the Klipfontein Dam close to Paulpietersburg.
- Utrecht LM plans to develop a Golf /eco-tourism estate in the town.

Current tourism activities include festivals, birding routes and activities, battlefield routes, and adventure/sport activities (paragliding takes place in Utrecht, Wakkerstroom and Paulpietersburg, micro-lighting, and various races (**Appendix D**) take place across the whole study area.

5.10 LAND-USE

Mining used to be a prominent economic activity in the area, but this has declined significantly in recent years.

Currently, agriculture is one of the most important economic activities. It also accounts for a significant proportion of land-use.

The “forestry” land-use refers to the use of land for timber plantations and includes associated uses such as tree farms, tree nurseries, the gathering of forestry products or the performing of forestry services.

Economic trends in the agricultural sector, specifically in terms of forestry, maize, groundnut, wheat, soya, sheep and cattle are discussed in **Appendix D**.

The land-uses in the various district and local municipalities falling within the study area are shown on **Figure 5.6** and discussed in **Appendix D**. Land-uses along the three alternative route alignments are described below.

Figure 5.6: Landuse and Issue

Blue Corridor

From Majuba just past Wakkerstroom, the land-use is mixed commercial and subsistence agriculture (mainly sheep, and maize). From there, forestry is the main land use with some commercial and subsistence agriculture. Centre pivots are used in the area proposed for the Blue corridor to cross over to the Green corridor.

Green Corridor

From Majuba passing through Wakkerstroom to Utrecht, the land use is mixed commercial and subsistence agriculture (mainly sheep, and maize). From Utrecht, commercial grazing seems to be the main land use, with some commercial maize farming. It passes through a parcel of conservation land. Mining occurs along the Green corridor.

Yellow Corridor

From Majuba going towards Volksrust and Newcastle-Osizweni-Madadeni, the land use is mixed commercial and subsistence agriculture (mainly sheep, cattle, and maize). It then passes through settlements till just past eMondlo.

Blue-Green Corridor

From Majuba going towards Volksrust and Newcastle-Osizweni-Madadeni, the land use is mixed commercial and subsistence agriculture (mainly sheep, cattle, and maize). It then passes through settlements till just before eMondlo. Crossing over to the Green corridor, it crosses maize, and then grazing. Centre pivots occur in this corridor.

6. SUMMARY OF FINDINGS OF SPECIALIST STUDIES

The specialists that undertook specialist studies that have made input to this report are listed in **Chapter 3.3.1**.

Summaries of the findings of the specialist studies detailed in **Appendices D to H** are presented below.

6.1 ECOLOGY

The terms of reference for the ecology specialist study was to evaluate the proposed corridors for the 765 kV Transmission power line, in ecological terms, inclusive of the biophysical aspects of geology, topography, geomorphology, climate, wetlands, fauna, flora, conservation areas and pollution, for its suitability and potential environmental impact. A specialist ecological report is presented in **Appendix G**.

In terms of the specific issues raised in the Scoping Phase:

- The potential impact on the Minor Black Millipede is limited to the Utrecht area;
- None of the proposed corridors impact directly or significantly on the Oribi; and
- In terms of vegetation, the species diversity is high along the green and yellow corridors and some protected areas occur. Any alteration to the landscape will have a significant impact on the habitats along these two corridors. There are fewer potential line and ecological conflicts along the blue corridor.
- The impact on wetlands is a potential ecological concern.

The alternatives have been explored and the blue/green alignment is the best alignment. It will be necessary to select the actual route in great detail during the survey and design stage. It will be possible to position towers on as dry land as possible with clear spans of conductors over the wetter parts.

6.2 AVI-FAUNA

The terms of reference for the avi-faunal specialist study (**Appendix H**) was to investigate the impact of the lines on flight paths and potential bird collisions by a further investigation of:

- Bird collisions with the proposed line;
- Habitat destruction;
- The disturbance of breeding pairs;
- The possibility of Bald Ibises establishing roosts on the strain towers; and
- The presence of endangered species in other parts of the study area.

6.2.1 Significance of the study area for power line sensitive large terrestrial species from a national perspective

Information gathered by the Co-ordinated Avi-faunal Road count project (CAR) was used to evaluate the importance of the study area relative to the rest of South Africa for Transmission power line sensitive species, especially Red Data ones.

The study area overlaps with two CAR precincts (a precinct comprises a series of routes of 50-80 km long on quiet public roads in farmlands) i.e. Northern KZN and Wakkerstroom (**Appendix H**). Both these are important precincts for purposes of this study as they overlap to a large degree with the study area and the proposed alignments, and therefore yield vital clues as to the habitat preferences of several large, power line sensitive terrestrial species.

Several ranking mechanisms, using only Red Data species, were used in the CAR report to rank the different precincts on a national scale, in order to ascertain which agricultural landscapes are most suitable for large terrestrial species. The two most important ones (for purposes of this study) are the species richness score and the density weighted score.

- The Species Richness Score is basically a simple count of the number of Red Data species regularly encountered within the precinct (vagrants and visitors are discarded). Both precincts score high in this regard, with Northern KZN scoring the second highest nationally out of 17 precincts. The Wakkerstroom precinct also scored high, i.e. 5th out of the 17 precincts nationally. This indicates the importance of the study area for large terrestrial Red Data species.
- The Density Weighted Score provides a measure of density at which Red Data species have been encountered in a precinct through a system of points that is awarded to each species, based on its comparative abundance in all the precincts. Here the Northern KZN precinct came out 4th from a field of 17 the precincts, and Wakkerstroom 7th. This indicates that not only is the area rich in species diversity, it also has dense populations of Red Data species.

In summary it can be concluded that the study area as a whole has a very high value for large terrestrial Red Data species when viewed from a national perspective.

6.2.2 Power line sensitive species occurring in the study area

A total of 35 Red Data species and two stork species protected under the Bonn Convention on Migratory Species have been recorded in the quarter degree squares (grids) that are bisected by the various alignments. A list of Transmission power line sensitive Red Data species with a summary of potential impacts, habitat requirements and locality where impacts could be expected is presented in **Appendix H**.

6.2.3 Particulars of technical design

Important aspects from a bird interaction perspective are the following:

- The design (as described in Chapter 2.4) has no inherent electrocution risk for large birds because the clearances between live parts and live and earthed components exceed the wingspan of any bird.
- The structure stands about 45 m high. The mid-span height of the earth wire will be about 36 m. The earth wire will be the biggest risk from a bird interaction perspective. Birds in flight tend to see the bundled conductors, and then gain height to avoid them. In the process, the much thinner earth wire is not noticed and the birds may then collide with it.
- The design of the suspension towers is such that bird streamers are unlikely to be a source of faulting on the line. Birds tend to perch on the highest points first, in this instance the earth peaks. The perching space above the conductors is uncomfortable and restricted. This type of tower has never had suspected bird streamer faulting (Eskom Transmission Engineering *pers.comm*).
- There is a possibility that birds will perch on the strain towers, as these are self-supporting towers with ample perching space above the conductors. However, it is highly unlikely that a bird streamer would be able to bridge the air gap of 765kV line and cause a flashover, even on a strain tower, where the birds could perch, especially if the line is operated at 400kV. No bird streamer faults have been recorded on 765kV lines to date (Eskom Transmission Engineering *pers. comm*). The possibility of Bald Ibis forming roosts on the strain towers can not be ruled out, seeing that the species is relatively common in the study area. Bald Ibis roosts exist for example on the Tutuka-Pegasus 400kV line. Despite this it is still possible for the birds to pollute the insulator strings, which is undesirable. It would therefore be advisable to protect the strain towers with bird guards.

6.2.4 Nature of expected impacts

Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds (and other animals) and birds colliding with power lines. Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, and disturbance and habitat destruction during construction and maintenance activities.

Electrocutions

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). Due to the large size of the clearances on most overhead lines above 132kV, electrocutions are generally ruled out as even the largest birds cannot physically bridge the gap between dangerous components. In fact, transmission lines have proven to be beneficial to many birds, including species such as Bald Ibis, Martial

Eagles, Tawny Eagles, African White-backed Vultures, and even occasionally Verreaux's Eagles by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce (van Rooyen 2004). Cape Vultures have also taken to roosting on power lines in certain areas in large numbers, while Lappet-faced Vultures are known to using power lines as roosts, especially in areas where large trees are scarce (Van Rooyen pers.obs.).

Collisions

Collisions are the biggest single threat posed by transmission lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with Transmission power lines (van Rooyen 2004, Anderson 2001).

Unfortunately, many of the collision sensitive species are considered threatened in southern Africa (**Appendix H**). Of the top five most affected species namely the Blue Crane, White Stork, Greater Flamingo and Cape Vulture are all present in this study area.

The Red Data species vulnerable to power line collisions are generally long-lived, slow reproducing species under natural conditions. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality, with the results that consistent high adult mortality over an extensive period could have a serious effect on a population's ability to sustain itself in the long or even medium term. Many of the anthropogenic threats to these species are non-discriminatory as far as age is concerned (e.g. habitat destruction, disturbance and power lines) and therefore contribute to adult mortality, and it is not known what the cumulative effect of these impacts could be over the long term.

Using Vortex computer modelling, the South African Crane Working Group estimated that an annual mortality rate of 150 adult Blue Cranes could reduce the eastern population of Blue Cranes (approximately. 2000 individuals in Mpumalanga and KwaZulu-Natal) by 90% by the end of the 21st century (McCann *et al* 2001). At that stage the population would be functionally extinct.

From the figures quoted above, it is clear that power lines are a major cause of avian mortality among power line sensitive species, especially Red Data species. Furthermore, the cumulative effects of power lines and other sources of unnatural mortality may only manifest itself decades later, when it may be too late to reverse the trend. It is therefore imperative to reduce any form of unnatural mortality in these species, regardless of how insignificant it might seem at the present moment in time.

Habitat destruction and disturbance

During the construction phase and maintenance of Transmission power lines and substations, some habitat destruction and transformation inevitably takes place. This happens with the construction of access roads, the clearing of servitudes and the levelling of substation yards. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line, which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through modification of habitat. Similarly, the above mentioned construction and maintenance activities impact on birds through disturbance, particularly during breeding activities. This could lead to breeding failure if the disturbance happens during a critical part of the breeding season.

6.2.5 Findings of the avi-faunal specialist study

The findings of the avi-faunal specialist study are:

- The study area as a whole has a very high value for large terrestrial Red Data bird species when viewed from a national perspective.
- The most sensitive corridor is number 2 (yellow), followed by number 1 (green), then number 3 (blue) and finally number 4 (blue-green).
- Corridors 1 (green) and 2 (yellow) are effectively ruled out as viable alternatives due to the high numbers of Red Data species that could be affected by the Transmission power line (the majority of these two corridors is situated in the Ekangala Grassland Biosphere Reserve, the most important bird area in South Africa).
- In order to arrive at a preferred corridor, the following factors were taken into account:
 - Red Data diversity in the study area;
 - Red Data density in the study area; and
 - The distance of each corridor in each quarter degree square (grid) that comprises the study area.
- The most important potential impact is collisions with the earth wire of the potential line, but habitat destruction and disturbance are also important factors.
- Although Bald Ibises might establish roosts on strain towers, bird streamers are not envisaged to be a major factor as the clearances on the 765kV line are too big for streamers to bridge the air gap.

6.3 SOCIAL, TOURISM AND LANDUSE

6.3.1 Approach and Methodology

The SIA that was conducted as part of the impact assessment phase of the EIA (**Appendix D**) is based on the issues that were identified in the scoping phase including:

A. GENERAL IMPACTS:

A1. Theme: Social

- Resettlement of populations;
- Impact on development plans;
- Impact on recreational activities (e.g. paragliding);
- Noise and dust pollution due to maintenance activities;
- Impact on roads due to maintenance activities;
- Fire hazard to communities;
- Injury or damage to property (due to pylons collapsing); and
- Impact on sense of place

A2. Theme: Land use and agriculture

- Loss of land for agriculture/ forestry
- Possible impact of fire on agriculture/ forestry

A3. Theme: Tourism

- Impacts arising from effects of the project on recreational activities
- Impacts arising from effects of the project on surrounding areas' sense of place.

B. IMPACTS SPECIFICALLY RELATED TO CONSTRUCTION AND DECOMMISSIONING:

B1. Theme: Social

- Temporary resettlement/disruption of populations;
- Increased demand water and sanitation services;
- Increased demand for solid waste removal services (to counteract littering);
- Conflict between newcomers and locals (in terms of competition for jobs, housing, etc.);
- Increase in social problems (crime, alcoholism, STDs, etc.);
- Fire hazard to communities (due to construction activities and negligent behaviour of construction workers);
- Increase in traffic due to construction activities;
- Damage to roads due to construction activities;
- Noise pollution; and
- Dust pollution.

B2. Theme: Land use and agriculture

- Temporary disruption of agriculture/forestry activities;
- Poaching of cattle, game; and

- Possible impact of fire on agriculture/forestry.

The approach and methodology used to assess the above issues in order to identify a preferred corridor from four possible alternatives, the Blue, Green, Yellow and Blue-Green options was data collection, assessment of the study area, impact assessment tables, and identification of a preferred alignment.

6.3.2 Socio-economic Profile

Location of construction camps should be carefully considered. The size of the rural population, levels of unemployment, infrastructure and HIV/AIDS incidence makes this area socially sensitive. Newcastle, Utrecht, and Vryheid are better locations compared to eMondlo, Osizweni, and Nquthu.

6.3.3 Existing and Future Developments

Transmission power lines should avoid human settlements. An overview of existing and future developments is important, as formal or informal residential areas may expand into the servitudes of Transmission power lines. Such expansion may impact on the safety of residents (e.g., through electric shocks if lines are not properly earthed, or through possible catastrophic events such as a tower collapsing), and their sense of place. When a Transmission power line crosses a community, resettlement of people who would be dwelling in the servitude takes place, as people are not allowed to dwell in servitudes, impacting on the sense of place.

It could be possible to find a corridor through the Blue corridor area without compromising the servitude width, but it will not be easy. It could be that people may have to be resettled, impacting on their sense of place. However, the Transmission power line should steer clear of communities.

The Blue corridor crossing over to the Green corridor seems to traverse current communities and future development could be planned around the servitude. The extent of the rural population may result in the Transmission power line having to be re-aligned to pass them.

6.3.4 Sense of Place

Sense of place goes hand in hand with place attachment, which is the sense of connectedness a person/community feels towards certain places. Place attachment may be evident at different geographic levels, e.g. site specific (e.g. a house, burial site, or tree where religious gatherings take place), area specific (e.g. Zululand), and physiography specific (e.g. wetlands). Territorial behaviour is viewed as a set of behaviours and cognition a group exhibits based on perceived ownership. The concept of sense of place attempts to integrate the character of a setting with the personal emotions and memories associated with it.

Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. It is because of a sense of place and belonging that people are loath to be moved from their dwelling place, despite the fact that they will be compensated for the inconvenience and impact on their lives. Places/natural resources should be assessed in terms of its cultural value by studying visiting and consumption patterns, behaviour patterns, etc.

In light of the traditional culture evident in the area, it is implied that areas of cultural value will most probably occur, especially in the Utrecht-Wakkerstroom-Paupietersburg triangle and along the densely populated Blue corridor. This will have to be substantiated prior to construction. Also, people will most probably not be willing to be resettled, should it be necessary.

The Yellow corridor will probably impact least on sense of place, followed by the Green corridor, the Blue-Green corridor and then the Blue corridor. Before construction of the line, places of importance should be identified in co-operation with communities and municipalities.

6.3.5 Tourism and Eco-tourism

The assessment of tourism and eco-tourism issues take place within the context of "sense of place." The concept of sense of place is applicable to tourist areas. People go on holiday for various and different reasons, e.g. to escape, to be entertained, to enjoy nature, to socialise, etc. In choosing a destination the image of the place is being considered, e.g. its authenticity, its offering, and/or its status.

The way in which these landscapes are managed are important to maintain the image (e.g. signs of erosion), and badly managed interference (e.g. not rehabilitating the land once a Transmission power line has been erected) could negatively affect the image of a tourist destination. In essence, expectations of an area have to be met. For example, people will not be accepting of a pylon in the middle of an area marketed as "pristine."

The Blue-Green and the Blue corridor will impact least on tourism activities, followed equally by the Yellow and Green corridor. The final order of preference will have to be substantiated by the Visual Impact Assessment (Chapter 6.4). The Blue corridor from Volksrust to Newcastle should preferably be moved further south into the already disturbed areas. Festivals should be taken into account when planning construction activities. Construction should not interfere with activities and the festival experience.

6.3.6 Landuse

Experience has shown that it is possible to cultivate land around pylons, but it does complicate the process, and land for cultivation is lost. This is because the use of

implements, equipment and centre pivots around/underneath pylons prove problematic. Centre pivots are chosen based on fertility of soil and availability of water. The capital investment made to get production in such a piece of land is high. Although the 765kV line can cross centre pivot irrigation without affecting the operations system, it is preferred that centre pivots are avoided.

Pylons and lines on grazing land pose fewer problems, as cattle move around these. During the construction and operational phase it has happened that construction/maintenance teams leave gates open, don't follow access roads, and cut through fences. The effect could be: less land available for cultivation and grazing, cross breeding of cattle, erosion, and loss of cattle and sheep.

In the servitude, crops higher than 4m are not allowed. This means that forestry land will be lost permanently. This situation is further exacerbated by the fact that no more licenses for forestry will be approved. The fire risk in forestry areas also increases.

Because of the cost and regulations applicable to forestry, the proposed Transmission power line should avoid forestry areas. Therefore the Yellow corridor is least preferred, followed by the Green corridor and the Blue corridor. Centre pivots may pose a problem in the Blue-Green corridor, and mining in the Green corridor.

6.3.7 Summary

From a social perspective, the Yellow corridor is preferred and the Blue corridor least preferred. From a tourism perspective, the Blue-Green corridor is preferred and the Green corridor least preferred. From an adventure sport perspective, the Blue corridor is preferred and the Yellow corridor least preferred. From a land use perspective, the Blue corridor is preferred and the Yellow corridor least preferred.

6.4 VISUAL

The criteria that were used to determine the intensity of the visual impact of the proposed Transmission power line on the area includes the area from which the power line can be seen (the viewshed), the viewing distance, the capacity of the landscape to visually absorb structures and forms placed upon it (the visual absorption capacity), and the appearance of the project from important or critical viewpoints (**Appendix E**).

Genius Loci

The spirit, or sense, of place is that quality imparted by the aspects of scale, colour, texture, landform, enclosure, and in particular, the land-use. According to K. Lynch (1992) "it is the extent to which a person can recognise or recall a place as being distinct from other places as having a vivid, or unique, or at least a particular, character of its own."

The quality of Genius Loci is a function of attributes such as the scenic beauty or uniqueness and distinctive character of the built and cultural landscape.

Visual Quality and Character

The visual quality is the visual significance given to a landscape determined by cultural values and the landscape's intrinsic physical properties (Smardon, et al, 1986), while many factors contribute to a landscape's visual quality. They can ultimately be grouped under three headings: i.e. vividness, intactness and unity.

The Scale of the Landscape

Visual scale is the apparent size relationship between landscape components or features and their surroundings (Smardon, *et al*, 1986).

Landforms, vegetation and landuse, as described in **Chapters 5.2, 5.3** and **5.10** were considered in the Visual Assessment.

6.4.1 Green Corridor (Corridor 1)

Critical Views and Visibilities

The views within this section are, due to the low vegetation and open grasslands, exposed and open north of Volksrust / Wakkerstroom within the Ekangala Grassland Biosphere Reserve. In this area the landscape creates an uninterrupted viewshed that extends often beyond a distance of 5 km. Any vertical object within the viewshed is readily visible depending on its size and distance from the viewer. However, the lack of elevated viewpoints restricts the views in the flat landscape.

The visibility within the area south of the escarpment between Wakkerstroom and Utrecht is relatively restricted and closed due to the diverse and undulating topography and the taller diverse vegetation. These variations and undulations assist in screening the pylons over longer distances.

Critical views are those from the N11 between Amersfoort and Volksrust, the R543 between Volksrust and Piet Retief, the very scenic road linking Wakkerstroom to Utrecht via Groenvlei, the R33 west of Vryheid and the R34. Views are generally restricted and contained in the south to the valleys such as that through which the R34 passes and the White Mfolozi River Valley. Critical areas are the highly visually sensitive areas edged by Wakkerstroom/Utrecht/Vryheid (**Figures 4 & 5** in **Appendix E**).

Genius Loci

The spirit of place varies along the route. The central area of the northern section imparts a rural quality that incorporates aspects of wilderness. The area has a high visual interest due to the mountainous landscape and extended focused views down valleys in relatively unspoilt scenery.

The sense of place to the north can be described as rural agriculture but without a definite scenic ambience. The sense of place in the south is well defined by the mix of diversity of topography and treed savannah, especially in the area around the White Mfolozi River.

Visual Quality and Character

The visual quality of the northern section from the Majuba Power Station to the west of Wakkerstroom is considered moderate due to the uniform and visually monotonous grassland landscape.

The central section of the route is considered as being high due to the relative lack of human intrusion and very diverse topography resulting in a high visual interest and scenic quality.

The visual elements have created a quality that is vivid and one that unifies the visual landscape.

The Scale of the Landscape

The vertical scale of the central section of the green corridor is defined by hills, mountains, ridges and steep valleys which help to screen the Transmission power lines by allowing them to blend in with the diverse landscape.

Tall pylon structures on the ridges will be highly visible from surrounding viewpoints because these features tend to break the skylines through silhouette.

6.4.2 Yellow Corridor (Corridor 2)

Critical Views and Visibility

The views along Corridor 2 are similar to Corridor 1 through the open and exposed grassland of the northern section. The views are generally contained by the diverse topography but still visible due to the short grassland to approximately the Paulpietersburg area. The undulating topography and diverse savannah vegetation from the R33 to the Umfolozi Substation assist in screening the pylons.

Critical views are mainly from the roads such as the N11, R543, R69 and R34. Fortunately the road crossings are generally perpendicular and thus the impact duration is for only a short period. Sections of the route traverse forestry plantations where the Transmission line servitude will have to be cleared. This will result in a highly visible scar. The route crosses through the high visual sensitive zone (**Figures 4 and 5 in Appendix E**) west of Dirkiesdorp to approximately the Pongola River.

Genius Loci

The spirit of place of both the northern and southern sections is similar to that of the Green Corridor. However, this route is modified more by human intrusion and tends more towards a rural agricultural ambience, especially in the central area and where the area is under forestry plantation.

Visual Quality and Character

The visual quality of the northern section is similar to the Green Corridor. Due to the forestry activity and other human intrusion the visual quality of the route is considered moderate. Intrusion of human activity includes major roads such as the R33, R69, R34 and the railway line from Vryheid to Ulundi.

Land Use

The land use along the Yellow Corridor consists of cattle and sheep grazing in the northern grassland area with forestry, grazing and eco-tourism occurring in the central area. Cattle and game farming occurs in the bushveld savannah area.

The Scale of the Landscape

The vertical scale of the area is largely due to the irregular undulations of mountains, lowlands and the flatter horizontal scale of the grasslands.

Tall structures such as the pylons could be highly visible on the ridges from surrounding viewpoints because of the project features breaking the skyline through silhouette.

6.4.3 Blue Corridor (Corridor 3)

Critical Views and Visibility

The views along the Blue Corridor in the north, as with the Green Corridor (Corridor 1) and the yellow (Corridor 2), are exposed, extensive and open, often extending beyond the five kilometre zone.

The section down the foothills of the escarpment is more diverse and views are interrupted by topography. The visual exposure from the bottom of the foothills past Newcastle/Utrecht to the north of Nondweni/Emondlo is open and exposed often extending to the visual horizon. The rest of the route southwards becomes more diverse which helps to contain the views and the visual exposure.

Critical views are from the major roads such as the N11, R543, R34, R33 and the villages and settlements such as Madadeni, Kingsley, Ntabebomva, Nondweni and Emondlo (**Figures 4 and 5 in Appendix E**).

Genius Loci

The spirit of place changes as one moves from north to south. The section from Majuba Power Station to near Volksrust is similar to the Green and Yellow Corridors.

A developed sense of place is imparted down the escarpment south of Charlestown through the Laingsnek and past the Amajuba Mountain.

The section from the base of the foothills to the White Mfolozi River area is decidedly agriculture mixed with rural habitation. The southern section from the White Mfolozi River to Umfolozi Substation exhibits a 'bushveld' spirit of place.

Visual Quality and Character

The visual quality of the grassland northern section is considered moderate due to the lack of intensive human intrusion. However, the grassland area between the Majuba Power Station and Volksrust is not particularly scenic. The scenic quality down the escarpment is moderate to high.

The open landscape to Nondweni / Emondlo is regarded as moderate to low due to the fact that the area is already visually degraded by agriculture, villages and settlements and infrastructure such as roads and Transmission power lines.

The section of 'bushveld' to Umfolozi Substation is considered as having a moderate visual quality.

The Scale of the Landscape

The vertical and horizontal scale can be regarded as broad, expansive and horizontal for much of the corridor due to the flat to rolling open landscape.

The capacity of the landscape to absorb potential visual change is regarded as low to moderate.

6.4.4 Visual Assessment Discussion

The View Distance

The visual impact of the project and associated structures will reduce exponentially as the viewer moves further away from the proposed structures (Hull and Bishop, 1988).

The pylons will exert a high visual impact within the 500 m and 1 000 m zone. The viewshed analysis, based on the field experience, has indicated that the proposed Transmission line will be visible for much of the Blue Corridor beyond the 5 000 m zone and be visible in the flatter areas below the escarpment for up to at least 10 to 20 kilometres. The viewing distance is reduced by the mountainous topography along the Green and Yellow Corridors.

The servitude, if cleared of vegetation, and the construction access road will be visible, especially where the vegetation is diverse, for an extended distance beyond the 5 000 m zone, if viewed from an elevated position. This scar will be visible until rehabilitation is complete. Fortunately much of the vegetation is grassland and will not need to be cleared.

Critical Viewpoints

Due to the linear nature of the proposed route specific viewpoints for the transmission line were not selected. However, areas with high volumes of traffic, areas with tourism potential and undeveloped rural areas with high scenic value were regarded as critical view zones against which the visual impact would be evaluated.

Critical views were determined during the field trip, land cover maps and from the 1:50 000 topographical maps. The major critical viewing area is the area identified as having a high visual sensitivity (**Figure 5** in **Appendix E**). This zone affects the central area of both the Green and Yellow Corridors but is avoided by the Blue Corridor. This area has an eco-tourism based land use based on its scenic resources that has resulted in the establishment of biospheres and lodges that require a visually unspoilt landscape.

The impact of the transmission line of Yellow Corridor is tempered somewhat by the fact that the route is visually modified for extended sections by existing transmissions lines within the corridor, major roads, villages, settlements and agriculture.

6.5 HERITAGE RESOURCES

Various heritage resources of significance, as defined in the South African Heritage Resources Act (No 25 of 1999) and the KwaZulu-Natal Heritage Act (No 10 of 1997) and the criteria contained in **Appendix F** were observed and recorded as being present within the study area namely:

- Ancestral graves, associated with stone-walled settlements and abandoned labour tenant homesteads, with high heritage significance.
- Rock painting sites along and below the eastern uKhahlamba escarpment in the east and west of the study area.
- Stone Age open sites occur throughout the study area, and are easily located in the areas subject to incised erosion and donga formation.
- Stone-walled settlements dating to the Late Iron Age occur ubiquitously in the north and west of the study area.
- The battlefields of Hlobane (1879), Holkrantz (1879), Khambula (1879), Bloed Rivier's Poort (1879), Ncome/Blood River (1838), Fort Newdigate and the Prince Imperial's capture site (1879) lie within and immediately adjacent to the study area (**Figure 5.6**).

The cultural landscape of the greater part of the study area is one of both intensive and extensive agriculture, with infrastructure focussed on local needs. It has high local and regional significance.

The transmission line route will have a permanent adverse effect on the visual aspects of the cultural landscape, wherever it is placed.

Due to the presence of a number of existing transmission servitudes within and immediately adjacent to the blue corridor, this option will have the least impact on the extant cultural landscape if aligned parallel or in proximity to existing lines and servitudes. Where the proposed alignment traverses 'greenfield' areas, cognisance must be taken of the recommendations of the visual impact specialist.

Although the site plots recorded in **Figure 2** in **Appendix H** indicate a greater occurrence of sites within and adjacent to the yellow corridor area this is not a true reflection of reality. This area has been a focus of archaeological research for the last two decades (Hall and Maggs 1979; Hall 1981, Wahl 1995). Further, due to the commissioning of a number of Transmission lines in and adjacent to the yellow corridor in the last fifteen years, a series of archaeological surveys have been undertaken for Eskom and the recorded sites have been entered into the Regional Recording Centre's data base (eThembeni Cultural Heritage 2003, Van Schalkwyk 1994, Whitelaw 1994a and b).

In contrast, the Green and Blue corridor areas have not been subjected to such extensive surveys and research focus, and consequently site occurrence data for these areas are not available. However, the occurrence of discrete heritage sites was recorded within these two corridor options during the field visit for this project.

The potential impacts of a Transmission power line on discrete heritage sites within all three corridor options is thus rated equally (medium) in **Table 7.32** on the understanding that the necessary permits will be obtained for any individual sites identified during a physical inspection after the survey of the route and identification of tower positions.

Approval for the HIA undertaken has been requested from SAHRA and AMAFA. The appropriate permits will be obtained for any site specific mitigation required, as specified in the EMP.

6.6 INFRASTRUCTURE

6.6.1 Access Roads

There is an extensive network of provincial surfaced roads that form the access backbone to the study area. Secondary district gravel roads provide access to farms through which the proposed Transmission Power Lines will pass. Access roads to

the proposed line may therefore only need to be constructed for short distances on private and tribal land in the south of the study area where there are no existing roads.

6.6.2 Road crossing

Where the Transmission power line crosses a road, it will be at as close to 90° as possible. This has been taken into consideration in identifying a recommended corridor.

6.6.3 Petronet Pipeline

The blue corridor and blue-green corridor run parallel to a Petronet pipeline for part of the route (**Figure A.3** in **Appendix A**, for authorities only due to the confidential nature of the positioning of the pipeline and the Petronet requirements for overhead cables, as summarised in the textbox below and detailed in **Appendix B** must be honoured.

Summary of Petronet Standard Crossing Conditions and Requirements for Overhead Cables

- Petronet requires permission for a pipeline crossing and a site visit prior to construction.
- Transmission Power Line route must not to infringe on a 15 m servitude either side of the pipeline except at the crossing.
- No heavy plant or mechanical equipment may operate in the servitude.
- Power lines must be marked at crossings for pipeline monitoring helicopters safety.
- Interstructure earth continuity conductors must be insulated for 800m on either side of the pipeline.

Detailed document from Petronet is included in **Appendix A**.

7. KEY ISSUES, ASSESSMENT AND MITIGATION

The key issues identified during The Scoping Phase are listed in **Chapter 3.2**, and informed the structure of the specialist studies summarised in **Chapter 6**. Each issue consists of components that on their own or in combination with each other give rise to potential impacts, either positive or negative and from the project onto the environment or from the environment onto the project. This chapter assesses these potential impacts for each of the four possible corridors considered, identifies recommended mitigation and provides an indication of the significance of the impact after mitigation. A description of the assessment criteria is provided in **Chapter 3.3**.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) have been given. Impacts are considered to be the same during construction and decommissioning.

The following criteria have been used to evaluate significance:

Extent

Magnitude of the impact and is classified as:

Local: the impacted area is only at the site – the actual extent of the activity

Regional: the impacted area extends to the surrounding, the immediate and the neighbouring properties.

National: the impact can be considered to be of national importance.

Duration

This measures the lifetime of the impact, and is classified as:

Short term: the impact will be for 0 – 3 years, or only last for the period of construction.

Medium term: three to ten years.

Long term: longer than 10 years or the impact will continue for the entire operational lifetime of the project.

Permanent: this applies to the impact that will remain after the operational lifetime of the project.

Intensity

This is the degree to which the project affects or changes the environment, and is classified as:

Low: the change is slight and often not noticeable, and the natural functioning of the environment is not affected.

Medium: The environment is remarkably altered, but still functions in a modified way.

High: Functioning of the affected environment is disturbed and can cease.

Probability

This is the likelihood or the chances that the impact will occur, and is classified as:

Low: during the normal operation of the project, no impacts are expected.

Medium: the impact is likely to occur if extra care is not taken to mitigate them.

High: the environment will be affected irrespectively, in some cases such impact can be reduced.

Confidence

This is the level knowledge/information, the environmental impact practitioner or specialists had in his/her judgement, and is rated as:

Low: the judgement is based on intuition and not on knowledge or information.

Medium: common sense and general knowledge informs the decision.

High: Scientific and or proven information has been used to give such a judgement.

Based on the above criteria the **significance** of issues will be determined. This is the importance of the impact in terms of physical extent and time scale, and is rated as:

Low: the impacts are less important, but may require some mitigation action.

Medium: the impacts are important and require attention, mitigation is required to reduce the negative impacts

High: the impacts are of great importance. Mitigation is therefore crucial.

The possible cumulative impacts are also considered.

Mitigation for significant issues have been determined and incorporated into the EMP for construction (**Appendix I**).

Chapter 8 motivates for a preferred corridor in terms of each key environmental issue. Intensity

7.1 VEGETATION

The most significant terrestrial vegetation in the study area is the Grasslands of the proposed Ekangala Grassland Biosphere Reserve (EGB). A comparative assessment for each corridor of the impact on this vegetation type during construction/decommissioning and operation is provided in **Tables 7.1** and **7.2**. Assessment of the impact on woodlands and forests is provided in **Tables 7.3** to **7.4**. An assessment of the impact of fires on grasslands is included in **Chapter 7.5**.

Table 7.1: Assessment of the Disturbance of Grasslands during Construction/Decommissioning

It is assumed the disturbance caused during construction would have had sufficient time to recover to its former state by the time decommissioning commences, if all the EMP requirements were complied with and additional measures applied if required during the operational phase.

Theme	ECOLOGY			
Nature of impact	Disturbance to the integrity of Grasslands, especially the Ekangala Grassland Biosphere Reserve during construction and decommissioning			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Construction and Decommissioning			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local (goes through approximately 105 km of the proposed EGBR)	Local (goes through approximately 84 km of the proposed EGBR)	Local (goes through approximately 45 km of the proposed EGBR)	Local (goes through approximately 45 km of the proposed EGBR)
Duration of impact	Short term (1 to 3 years)	Short term (1 to 3 years)	Short term (1 to 3 years)	Short term (1 to 3 years)
Intensity	Low	Low	Low	Low

Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative.	Negative.	Negative.	Negative.
Cumulative Impact	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade. The most pristine grasslands occur along this alignment.	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade.	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade.	Low if bush encroachment occurs, overgrazing occurs, alien plants invade it is not as high as the most transformed land occurs along this alignment.
Confidence	High – Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands	High – Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands	High – Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands	High – Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands
Level of significance	High	Medium	Medium	Medium
Mitigation measures	Rehabilitation of construction sites as per the EMP requirements listed below			
Level of significance after mitigation	Medium	Low	Low	Low
EMP requirements	<p>All construction vehicles should practice track discipline when travelling through the veld.</p> <p>Prevent erosion during construction by means of earthen berms 2 m wide and 0.5 m high across the flow of the storm water.</p> <p>Remove all construction rubble and litter.</p> <p>Create permanent storm water deflection and retention with erosion berms across the slope to prevent run-off.</p> <p>Reshape landscape to former natural gradients.</p> <p>Prepare soil after construction by adding compost, fertiliser and moisture holding agent.</p> <p>Seed disturbed areas with indigenous grass seed appropriate to the area.</p>			
Discussion	<p><u>Discussion</u></p> <p>Vehicles travelling through the veld cause major disturbances which takes years to recover. Many vehicles or one vehicle travelling over the same track often effectively wipes out the vegetation which may never recover as the soil is compacted so that roots may not be able to establish in the soil. Specific care with regard to track discipline must be taken when driving up steep slopes to limit the area of disturbance as the risk of erosion is higher on steep slopes.</p>			

Table 7.2: Assessment of the Disturbance of Grasslands during operation

Theme	ECOLOGY			
Nature of impact	Disturbance to the integrity of Grasslands during operation			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Operation			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local (goes through approximately 105 km of the proposed EGBR)	Local (goes through approximately 84 km of the proposed EGBR)	Local (through approximately 45 km of the proposed EGBR)	Local (goes through approximately 84 km of the proposed EGBR)
Duration of impact	Long term	Long term	Long term	Long term
Intensity	Low	Low	Low	Low
Probability of occurrence	Low	Low	Low	Low
Status of the impact	Low	Low	Low	Low
Cumulative Impact	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade. The most pristine grasslands occur along this alignment.	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade.	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade	Medium if bush encroachment occurs, overgrazing occurs, and alien plants invade
Confidence	High – Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands.	High – Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands.	High – Research on grasslands by the Grassland Society of Southern Africa has data on changes in grasslands, second highest arrangement of disturbed grasslands and cultivated fields occur along	High– Research on grasslands by members of the Grassland Society of Southern Africa has data on changes in grasslands, highest arrangement of disturbed grassland and cultivated fields occur along

			this corridor.	this corridor.
Level of significance	Medium	Medium	Medium	Low
Mitigation measures	Scarify soil in exposed areas along the servitude and spread seed of appropriate local grass species over disturbed areas to encourage regrowth. Remove aliens from the servitude. Remove woody species from the servitude not consistent with the surrounding veld.			
Level of significance after mitigation	Low	Low	Low	N/A
EMP requirements	6 monthly monitoring and erosion control actions when needed, exposed soil in servitude must be prepared by scarifying the soil and hand spreading indigenous, local grass seed over the area. Alien invaders must be controlled and woody species if not consistent with surrounding veld must be removed from the servitude.			
Discussion	<p><u>Discussion</u></p> <p>Infrequent movement of inspection and maintenance vehicles over grassland still compress the soil making it difficult for the grass plants to grow as the roots have less space to grow in, less room for air or water movement. The grass species growing in a track through the veld differ from the surrounding veld. Vehicles do impact on the grassland. The driving on the grassland can not be avoided but erosion can which is the gradual removal of suitable soil in which the hardier grass species can grow which must be protected.</p>			

Table 7.3: Assessment of the Disturbance to the integrity of forest and bushveld during construction/decommissioning

Areas of wooded slopes occur on all four alignments but are most prominent along the green corridor. The escarpment of the Drakensberg has pockets of montane forest where Yellowwood trees occur. Along the Yellow Corridor there are numerous commercial plantations

Theme	ECOLOGY
Nature of impact	Disturbance to the integrity of forest and bushveld
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)
Stage	Construction/decommissioning

	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Short term (1 to 3 years),	Short term (1 to 3 years),	Short term (1 to 3 years),	Short term (1 to 3 years),
Intensity	High	High	Low	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	High if alien invaders become established, bush encroachment changes species composition, the bushveld species are cut down causing habitat loss and decreasing biodiversity as the most sensitive bushveld and forest occur along this alignment.	High if alien invaders become established, bush encroachment changes species composition, the bushveld species are cut down causing habitat loss and decreasing biodiversity as the second most bushveld occur along this alignment and many commercial plantations occur along this corridor.	Low if alien invaders become established, bush encroachment changes species composition, the bushveld species are cut down causing habitat loss and decreasing biodiversity.	Low if alien invaders become established, bush encroachment changes species composition, the bushveld species are cut down causing habitat loss and decreasing biodiversity. The most transformed land occurs along this corridor.
Confidence	High	High	High	High
Level of significance	High	High	Medium	Medium
Mitigation measures	Rehabilitation of construction sites as per the EMP.	Rehabilitation of construction sites as per the EMP.	Rehabilitation of construction sites as per the EMP.	Rehabilitation of construction sites as per the EMP.
Level of significance after mitigation	Medium	Medium	Low	Low
EMP requirements	<p>Apply to DWAF for a tree cutting and pruning licence. Place cut logs across the slope and peg to keep it in place. Remove cut branches to the edge of the servitude. Treat tree stumps with registered herbicide to prevent regrowth. Operators to be registered in terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations. Revegetate the exposed forest floor by seeding it with a mixture of appropriate indigenous grass seed allowing the grass and bushveld to recolonize the disturbed areas</p>			
Discussion	The diversity of species and associated forbs will be impacted on negatively. The density of the forest cover and the protection it offers the soil			

	it grows in will be changed. The creation of edge effects where the servitude divides the ecological entity into smaller components will add to the problem. Habitat will be lost to birds and animals.
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Table 7.4: Assessment of the Disturbance to the integrity of forest and bushveld during operation

Theme	ECOLOGY			
Nature of impact	Disturbance to the integrity of forest and bushveld			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Operation			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Long term	Long term	Long term	Long term
Intensity	Low	Low	Low	Low
Probability of occurrence	High	Moderate	Low	Low
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	High if alien invaders infest the servitude, bush encroachment occurs, if the bushveld is denuded of the woody vegetation during bush clearing by farmers or the local population as this corridor is the most wooded corridor.	High if alien invaders infest the servitude, bush encroachment occurs, if the bushveld is denuded of the woody vegetation during bush clearing by farmers or the local population as this is the second most wooded corridor with commercial plantations along this corridor.	Medium if alien invaders infest the servitude, bush encroachment occurs, if the bushveld is denuded of the woody vegetation during bush clearing by farmers or the local population.	Medium if alien invaders infest the servitude, bush encroachment occurs, if the bushveld is denuded of the woody vegetation during bush clearing by farmers or the local population. This alignment has the most transformed land and the lowest concentration of woody plants.

Confidence	Medium based on experience in the control of aliens and bush encroachment in the Eskom servitudes.	Medium based on experience in the control of aliens and bush encroachment in the Eskom servitudes.	Medium based on experience in the control of aliens and bush encroachment in the Eskom servitudes as the second least wooded corridor.	High based on experience in the control of aliens and bush encroachment in the Eskom servitudes as this is the least wooded corridor.
Level of significance	High	Medium	Low	Low
Mitigation measures	Control alien invaders Control bush encroachment Maintain ground cover and shrub layer to support biodiversity	Control alien invaders Control bush encroachment Maintain ground cover and shrub layer to support biodiversity	Control alien invaders Control bush encroachment Maintain ground cover and shrub layer to support biodiversity	Control alien invaders Control bush encroachment Maintain ground cover and shrub layer to support biodiversity
Level of significance after mitigation	Medium	Low	Negligible	Negligible
EMP requirements	6 monthly monitoring and erosion control actions when needed. Alien plants need to be removed from the servitude. Bush encroachment must be controlled. Treat tree stumps with registered herbicide to prevent regrowth. Operators to be registered in terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations.			
Discussion	The diversity of species and associated forbs, the density of the forest cover and the protection it offers the soil it grows in, will be affected by the impact of the operation of this line. There is also the creation of edge effects where the servitude divides the ecological entity into smaller components, the canopy level changes through the servitude.			

7.2 ANIMALS

The potential impact on *Oribi* and the *Minor black millipede* were identified as issues in the Scoping Phase. The assessment presented below, however, also considers potential impacts on non-endangered species, based on humans' natural reaction to animals in terms of their inclination to befriend, feed or hunt them for fun or food. **Tables 7.5** and **7.6** present an assessment of the potential impacts on mammals and **Tables 7.7** to **7.8** other forms of wildlife including fish, reptiles, amphibians, invertebrates and insects.

Table 7.5: Assessment of the Disturbance to Mammals during Construction/Decommissioning

Theme	ECOLOGY			
Nature of impact	Disturbance to the Mammals during construction with specific reference to Oribi			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Construction/decommissioning			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Short term	Short term	Short term	Short term
Intensity	High	High	High	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	Medium as overgrazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements change, and the veld becomes unsuitable for Oribi known to occur along this alignment. The most pristine grasslands occur along this alignment.	High as overgrazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements change and the veld becomes unsuitable for Oribi known to occur along this alignment. Grasslands along this alignment are extensively used for grazing.	Medium as overgrazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements change, and the veld becomes unsuitable for Oribi known to occur along this alignment. The second most transformed grasslands occur along this alignment.	Low as overgrazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements change and the veld becomes unsuitable for game species. The least amount of suitable grasslands for game species occur along this corridor. The most transformed grasslands occur along this alignment.
Confidence	High – data is available from the Oribi Working Group	High – data is available from the Oribi Working Group	High – data is available from the Oribi Working Group	High – data is available from the Oribi Working Group

Level of significance	High	High	High	Medium
Mitigation measures	Educate the construction staff Report transgressing staff to authorities	Educate the construction staff Report transgressing staff to authorities	Educate the construction staff Report transgressing staff to authorities	Educate the construction staff Report transgressing staff to authorities
Level of significance after mitigation	Medium	Medium	Medium	Low
EMP requirements	Educate staff before they commence work in the area that poaching is against the law and transgressors will be criminally prosecuted.			
Discussion	This aspect covers the impact of construction on mammals that may occur in the transmission power line corridor. Humans naturally react to animals and want to befriend, feed or hunt them for fun or food. None of this behaviour is acceptable and is to be strongly discouraged.			

Table 7.6: Assessment of the Disturbance to Mammals during Operation

Theme	ECOLOGY			
Nature of impact	Disturbance to the Mammals during operation with specific reference to Oribi			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Operation			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Long term	Long term	Long term	Long term
Intensity	Low	Low	Low	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	Medium as over grazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements	Medium as over grazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements	Medium as over grazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements	Low as over grazing by cattle, veld mismanagement, invasion by alien plants or through bush encroachment the habitat requirements change and the

	change and the veld becomes unsuitable for game species. The most pristine grassland occur along this alignment.	change and the veld becomes unsuitable for game species. The grasslands are extensively used for grazing livestock Oribi occur along this alignment.	change and the veld becomes unsuitable for game species. The second most transformed land is along this alignment at Strathcona. Oribi occur along this alignment at Strathcona.	veld becomes unsuitable, and this corridor has the least suitable grassland as the most transformed land is along this alignment.
Confidence	High – The conservation area at Urecht is very important habitat.	High – data is available from the Mpumalanga Parks Oribi Working Group.	High – data is available from the Ezemvelo KZN Wildlife Oribi Working Group.	High – data is available from the Mpumalanga Parks and Ezemvelo KZN Wildlife Oribi Working Group.
Level of significance	Medium	High	Medium	Low
Mitigation measures	Maintain grassland integrity by preventing erosion, controlling alien invaders and to limit bush encroachment			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Install erosion control measures as soon as it is observed to occur. Spread appropriate local grass seed over the exposed soil. Control the alien invaders. Limit bush encroachment.			
Discussion	Poaching remains the biggest threat to the Oribi. Strict control must be exercised over staff working in Oribi habitat as changes to the habitat is a threat to this species.			

Table 7.7: Assessment of the Disturbance to other Animals during Construction/Decommissioning

Theme	ECOLOGY			
Nature of impact	Disturbance to amphibia, fish, reptiles and invertebrates during construction/decommissioning			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Construction/decommissioning			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred,	4	3	2	1

4=least preferred)				
Extent of impact	Local	Local	Local	Local
Duration of impact	Short term	Short term	Short term	Short term
Intensity	Medium	Medium	Low	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative.	Negative.	Negative.
Cumulative Impact	Medium – the diversity of the habitat can be affected by bush clearing, and alien invaders.	Medium – the diversity of the habitat can be affected by bush clearing, and alien invaders.	Low – more uniform habitat impacted less by bush clearing and alien invaders.	Low – the most transformed land of most uniform habitat impacted less by bush clearing and alien invaders.
Confidence	Medium	Medium	Medium	Medium
Level of significance	Medium – the greatest diversity of habitats occur along this alignment.	Medium	Low	Low
Mitigation measures	Educate staff	Educate staff	Educate staff	Educate staff
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Educate staff to not interfere with other animals (including snakes) but to report their presence to the site foreman. Foreman to summons the regional conservation officer of KZN Wildlife should it be obvious that the organism is resident.			
Discussion	All staff are to be educated about the importance of these animals in their natural habitat. Any staff removing animals from the site are liable and will be prosecuted criminally. Where the organism appears to be resident in the construction site the regional conservation officer for KZN Wildlife must be contacted to remove and relocate the animal.			

Table 7.8: Assessment of the Disturbance to other Animals during Operation

Theme	ECOLOGY
Nature of impact	Disturbance to invertebrates, fish, amphibia and reptiles during operation
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)

Stage	Operation			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Long term	Long term	Long term	Long term
Intensity	Low	Low	Low	Low
Probability of occurrence	High	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	Medium with bush clearing and alien invader infestation	Medium with bush clearing and alien invader infestation	Medium with bush clearing and alien invader infestation	Low
Confidence	Medium	Medium	Medium	High
Level of significance	Medium – most diverse habitats of the various corridors considered.	Low – Many commercial plantations have transformed the habitat.	Low	Low – the most transformed land occurs along this corridor.
Mitigation measures	Avoid movement near known habitat sites	Avoid movement near known habitat sites	Avoid movement near known habitat sites	Avoid movement near known habitat sites
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Educate staff not to interfere with the various forms of other animals in their habitat in the recommended corridor. Report the presence of other animals resident in the servitude to the regional conservation officer of KZN Wildlife to capture and relocate these organisms.			

7.3 AVI-FAUNA

The most significant impact that is foreseen is collisions with the earth wire of the proposed line. Quantifying this impact in terms of the likely number of birds that will be impacted, is very difficult because such a huge number of variables play a role in determining the risk, for example weather, rainfall, wind, age of birds, flocking behaviour, power line height, light conditions, topography, population density and so forth. However, from detailed record keeping by the Endangered Wildlife Trust, it is possible to give a measure of what species are likely to be impacted upon, based on historical records. This only gives a measure of the general susceptibility of the species to Transmission power line collisions, and not an absolute measurement for this specific line.

Table 7.9: Assessment of the impact on avi-faunal habitat destruction and disturbance in the construction and de-commissioning phases

Theme	AVIFAUNA			
Nature of impact	Habitat destruction and disturbance			
Legal requirements	NEMA,ECA			
Stage	Construction and de-commissioning			
	Green corridor	Yellow corridor	Blue corridor	Blue/Green Corridor
Preferred route (1=most preferred, 3=least preferred)	3	2	1	
Extent of impact	Local	Local	Local	
Duration of impact	Medium	Medium	Medium	
Intensity	Low to high depending on species that is impacted. In this instance there are Blue, Grey Crowned and Wattled Cranes that could be affected, making the potential impact critically high.	Low to medium, depending on species that could be impacted. In this instance there are several Blue Crane breeding sites within the corridor.	Low to medium. Based on the available information the impact should be less than in the other two corridors as fewer cranes are breeding in or in close proximity to the corridor. The one exception is Blood River Vlei which has at least two pairs of Grey Crowned Cranes breeding there (Nico Steenkamp pers. comm.).	Same as blue
Probability of occurrence	High	High	Medium	
Status of the impact	Negative	Negative	Negative	
Cumulative Impact	High, the disturbance of Breeding cranes could lead to breeding failure or even permanent abandonment of nesting sites. In the case of Wattled Cranes, this could have a serious cumulative impact as only 4 pairs of this species are known to breed between Amersfoort and Utrecht.	High. At least 11pairs of Blue Cranes, 1 pair of Grey Crowned Crane and 24 pairs of Bald Ibis breed within the corridor. If these were to abandon their breeding efforts, it could have a significant effect on the regional population.	Medium. Only two pairs of Blue Cranes and one Bald Ibis colony (14 pairs) have been recorded in close proximity to the corridor. It must be stressed that it does not rule out that more could occur.	Same as blue
Confidence	High. Data sources are comprehensive, some stretching over ten years or	High. Data sources are comprehensive, some stretching over ten years or	Medium. Data sources not as comprehensive probably because general birding	Same as blue

	more of observation.	more of observation.	opportunities are less.	
Level of significance	High	High	Medium	
Mitigation measures	The only mitigation would be to completely avoid these breeding areas, namely to use another alignment.	The only mitigation would be to completely avoid these breeding areas, namely to use another alignment.	The impacts could be limited by strict adherence to Eskom's EMP requirements. In particular <ul style="list-style-type: none"> no roads should be constructed in wetlands potential breeding habitat in the corridor must be investigated prior to construction starting to identify any breeding activity of Red Data species. 	Same as blue
Level of significance after mitigation	N/A	N/A	Low	
EMP requirements	The impacts could be limited by strict adherence to Eskom's EMP requirements. In particular <ul style="list-style-type: none"> no roads should be constructed in wetlands potential breeding habitat in the corridor must be investigated prior to construction starting to identify any breeding activity of Red Data species. 			

Table 7.10: Assessment of the impact of the proposed project on bird – power line collisions in the operation phase

Theme	AVIFAUNA			
Nature of impact	Collisions			
Legal requirements	NEMA,ECA			
Stage	Operation			
	Green corridor	Yellow corridor	Blue corridor	Blue/Green corridor
Preferred route (1=most preferred, 3=least preferred)	3	2	1	
Extent of impact	Local	Local	Local	
Duration of impact	Long term	Long term	Long term	
Intensity	Low to high depending on species that is impacted. In this instance there are many Red Data species including Blue, Grey Crowned and Wattled	Low to medium, depending on species that could be impacted. In this instance there are several Blue Crane breeding sites within the	Low to medium. Based on the available information the impact should be less than in the other two corridors as fewer cranes are breeding in or	Same as blue

	Cranes, as well as Stanley's Bustard that could be affected, making the potential impact critically high. White Storks are abundant.	corridor, and Stanley's Bustard regularly occurs. White Storks are abundant.	in close proximity to the corridor. The one exception is Blood River Vlei which has at least two pairs of Grey Crowned Cranes breeding there (Nico Steenkamp pers. comm.). Furthermore flocks of up to 200 Grey Crowned Cranes and 40 Blue Cranes are regularly recorded in the vlei and surrounding lands. Two Wattled Cranes are also regular visitors to the vlei and surrounding lands.	
Probability of occurrence	High, the whole of the EGBR contains suitable foraging and breeding habitat for cranes, korhaans and bustards.	High, the whole of the EGBR contains suitable foraging and breeding habitat for cranes, korhaans and bustards	Medium. Although the area does contain suitable breeding and foraging habitat for cranes, korhaans and bustards, it is generally less suitable than the other two corridors. The exception is again Blood River vlei where power line collisions have been recorded (Nico Steenkamp pers. comm)	Same as blue
Status of the impact	Negative	Negative	Negative	
Cumulative Impact	High, the introduction of an artificial mortality source can have serious cumulative effects. In the case of Wattled Cranes, this could lead to local extinction as only 4 pairs of this species are known to breed between Amersfoort and Utrecht.	High. At least 11 pairs of Blue Cranes, 1 pair of Grey Crowned Crane and 24 pairs of Bald Ibis breed within the corridor. If these birds or their off-spring were killed on power lines, it could have a significant effect on the regional population.	Medium. Only two pairs of Blue Cranes and one Bald Ibis colony (14 pairs) have been recorded in close proximity to the corridor. It must be stressed that it does not rule out that more could occur, as suitable foraging and breeding habitat does exist, particularly at Blood River vlei.	Same as blue
Confidence	High. Data sources are comprehensive, some stretching over ten years or more of observation.	High. Data sources are comprehensive, some stretching over ten years or more of observation.	Medium. Data sources not as comprehensive probably because general birding opportunities are less. Good data for Blood River vlei.	Same as blue
Level of significance	High	High	Medium (but high for Blood River vlei)	Same as 3

Mitigation measures	The only suitable mitigation would be to use another alignment.	The only suitable mitigation would be to use another alignment.	The impacts could be limited by the application of suitable marking devices to the earth wire of the transmission line. The following areas should be marked <ul style="list-style-type: none"> • The entire section running through the EDBR • All sections of line crossing a wetland or within 500 metres of a wetland. • All river crossings. • All sections of line crossing a centre pivot or within 500 metres of it • Sections of grassland identified as being particularly sensitive for cranes, bustards and korhaans 	Same as 3
Level of significance after mitigation	N/A	N/A	Low	Low
EMP requirements	<ul style="list-style-type: none"> • The impacts could be limited by the application of suitable marking devices to the earth wire of the transmission line. These areas must be identified during a walk-through of the final alignment by the Endangered Wildlife Trust in conjunction with Eskom. 			

The mitigation of bird impacts caused by power lines is to a large extent determined by the microhabitat within a zone of a hundred metres to about 1 km on both sides of the line. This is particularly relevant as far as mitigation for bird collisions are concerned. At the level of a desk top study for a line of more than a hundred kilometres with several alignments, it is not possible to actually demarcate all the sections that need to be mitigated. This can only be done once the alignment has been finalised, and only by physically travelling the entire length of the final alignment by vehicle and by foot. It is standard procedure by the Eskom Transmission Group to perform this procedure with the assistance of the Endangered Wildlife Trust once the line has been surveyed. At that stage, specific spans are demarcated for anti-collision devices, based on a variety of factors (mentioned earlier), and at that stage minor deviations can still be effected. This is also the stage when site specific measures are suggested to prevent habitat destruction for example what areas access roads should avoid.

Research in the Netherlands has shown that spacing intervals have a major influence on the effectiveness of anti-collision devices (Koops & de Jong 1982, as cited in APLIC 1994). In South Africa, the same has been found (Anderson 2001). See **Figure 7.1** below for a suggested marking method with devices.

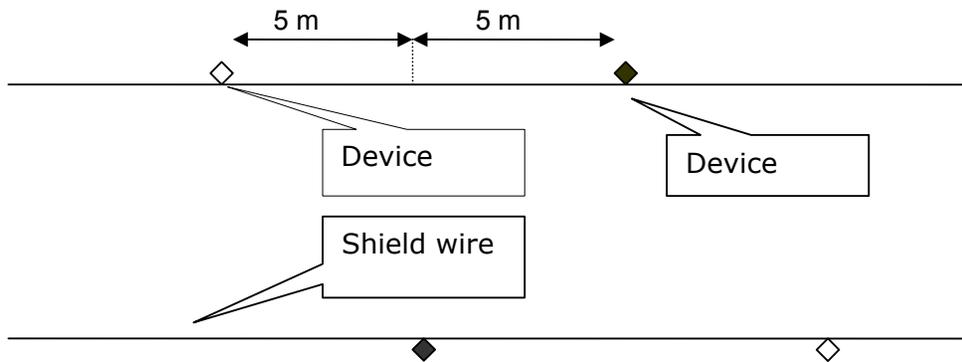


Figure 7.1: Marking method with anti-collision devices on overhead ground wires (viewed from above). Note that both the wires shown above are the shield or ground wires (devices staggered).

There are several devices available in southern Africa for the marking of power lines. Some are dynamic devices (usually called bird flappers), and some are static. Both have advantages and disadvantages. Dynamic devices are very effective in reducing collisions as the birds seem to see them very well (van Rooyen unp. data); probably because of the movement that attracts attention. The disadvantage of dynamic devices is that they are subject to extensive wear and tear, inevitably limiting the lifespan of the device. This has obvious cost implications if a line needs to be re-marked at intervals of a few years. No solution to that problem has been found to date and it must be accepted as a constraint. Examples of bird flappers currently available on the market are given in **Appendix H**.

Static devices are mechanically more durable because they lack the element of wear and tear that moving parts inevitably have. However, in South Africa, static devices, particularly the so called Bird Flight Diverter (also known as the pigtail) has had limited success

(Anderson 2001). The most obvious reason seems to be that they are simply less visible, especially the small ones. A better option would be to use the bigger pigtail, although it is still not the preferred option (**Appendix H**).

Research to find a compromise between durability and visibility is ongoing in South Africa. It is therefore recommended that the Endangered Wildlife Trust is consulted before a final decision is taken on the type of device to be used in this instance, as new products might be available by the time the Transmission power line is constructed.

7.4 WETLANDS

The study area contains numerous wetlands (**Chapter 5.5** and **Figure 5.1**), some of international importance. In addition to their inherent ecological value, wetlands are also recognised in terms of their significance as habitat for endangered bird species (**Tables 7.11 to 7.12**), and the eco-tourism that this provides. Mitigation includes not placing towers in wetlands unless unavoidable, and demarcating the lines to avoid bird collisions for all sections that cross wetlands.

Table 7.11: Assessment of the Disturbance to Wetlands during Construction/Decommissioning

Theme	WETLANDS			
Nature of impact	Disturbance to the wetlands during construction/decommissioning			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Construction/decommissioning			
	Green corridor 1	Yellow corridor 2	Blue corridor 3	Blue/Green corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	2	3	1
Extent of impact	Local	Local	Local	Local
Duration of impact	During construction only	During construction only	During construction only	During construction only
Intensity	High	Low	High	High

Probability of occurrence	Definite	Medium	Definite	Definite
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	Medium if erosion deposits sediment in the wetland, alien plants invade the wetland, over grazing and inappropriate fires destroy the wetlands	Medium if erosion deposits sediment in the wetland, alien plants invade the wetland, over grazing and inappropriate fires destroy the wetlands	Medium if erosion deposits sediment in the wetland, alien plants invade the wetland, over grazing and inappropriate fires destroy the wetlands	Medium if erosion deposits sediment in the wetland, alien plants invade the wetland, over grazing and inappropriate fires destroy the wetlands
Confidence	High – data from the Rennies Wetland projects indicates the significance	High – data from the Rennies Wetland projects indicates the significance	High – data from the Rennies Wetland projects indicates the significance	High – data from the Rennies Wetland projects indicates the significance
Level of significance	Very High – important Ramsar wetlands along this corridor e.g. the Wakkerstroom Vlei.	Medium – fewer wetlands along this corridor.	Very High – Blood River wetlands are along this corridor which are critical for certain bird species	High – Blood River wetlands are along this corridor but the most transformed lands as well.
Mitigation measures	The only suitable mitigation would be to use another alignment.	No towers or access roads to be located in wetlands. Lines crossing wetlands must be demarcated to avoid bird collisions. Apply erosion control measures during and after construction. Reshape the land to natural gradients. Revegetate with appropriate indigenous vegetation.	No towers or access roads to be located in wetlands. Lines crossing wetlands must be demarcated to avoid bird collisions. Apply erosion control measures during and after construction. Reshape the land to natural gradients. Revegetate with appropriate indigenous vegetation.	No towers or access roads to be located in wetlands. Lines crossing wetlands must be demarcated to avoid bird collisions. Apply erosion control measures during and after construction. Reshape the land to natural gradients. Revegetate with appropriate indigenous vegetation.
Level of significance after mitigation	High	N/A	Low	Low
EMP requirements	Apply to DWAF for authorisation to work in a wetland. Apply erosion control measures during and after construction. Reshape the land to natural gradients. Revegetate with appropriate indigenous vegetation.			
Discussion	Authority is to be obtained through a predetermined procedure from DWAF to work within a wetland. Preventative measures will need to be taken to minimise the impact of eroding soils on wetlands. Worker activities are also to be limited to a very small and tight footprint. Immediate			

	rehabilitation is required after construction.
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Table 7.12: Assessment of the Disturbance to Wetlands during Operation

Theme	WETLANDS			
Nature of impact	Disturbance to the wetlands			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Operation			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	2	3	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Long term	Long term	Long term	Long term
Intensity	Low	Low	Low	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	Low	N/A	Low	Low
Confidence	High – data from the Rennies Wetland projects indicate the significance.	High – data from the Rennies Wetland projects indicate the significance.	High – data from the Rennies Wetland projects indicate the significance.	High – data from the Rennies Wetland projects indicate the significance.
Level of significance	Very High – Ramsar Wetlands occur along this corridor e.g. the Wakkerstroom Vlei	Low	Very High – Blood River wetlands are along this corridor which are critical for certain bird species	Negligible
Mitigation measures	The only suitable mitigation would be to use another alignment.	Proactive and preventative erosion control activities on an ongoing basis. Alien plant control.	Proactive and preventative erosion control activities on an ongoing basis. Alien plant control.	Proactive and preventative erosion control activities on an ongoing basis. Alien plant control.

Level of significance after mitigation	High	N/A	High	Low
EMP requirements	6 Monthly monitoring inspections with appropriate actions taken on the identification of any scouring or siltation taking place.			
Discussion	This aspect covers the impact on the wetlands occurring in this corridor. Authority is to be obtained through a predetermined procedure from DWAF to work within a wetland. Preventative measures will need to be taken to minimise the impact of eroding soils on wetlands. Worker activities are also to be limited to a very small and tight footprint. Immediate rehabilitation is required after construction.			

7.5 CONSERVATION AREAS

The study area has an assortment of declared conservation areas. New Contractual Community Game Reserves have been registered at Pongola Bush Nature Reserve and the Paardeplaats Reserve north of the Yellow Corridor. A Contractual Community Game Reserve has been registered south of Vryheid on the farm Brakfontein and another to the south-eastern end of the project area at Leopard Rock. There is a Contractual Game Reserve at the foothills of the Amajuba Mountain. There is a nature reserve north of Utrecht town, namely the Balele Game Park which encompasses the Dorpspruit Valley and the Utrecht Community Game Park. Numerous conservancies consisting of volunteer landowners protect the natural elements on their farms in the study area. The Ekangala Grassland Biosphere Reserve is the largest grassland reserve in the country.

Table 7.13: Assessment of the Disturbance to Conservation Areas during Construction/Decommissioning

Theme	CONSERVATION AREAS			
Nature of impact	Impact on Conservation areas in the form of a disturbance to habitat			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Construction and decommissioning			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1

Extent of impact	Local	Local	Local	Local
Duration of impact	Short term	Short term	Short term	Short term
Intensity	High	High	Medium	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	High if alien invaders are allowed to become established, bush clearing takes place, and habitat destruction takes place as this is the most pristine and diverse habitat.	Medium	Medium	Low
Confidence	High	High	High	High
Level of significance	High – The second highest concentration of Red Data species occur along this corridor.	Significant – The highest concentration of Red Data species occur along this corridor.	High	Medium as the most transformed land is along this corridor.
Mitigation measures	Choose an alignment which impacts the least to the habitats of the Utrecht Community Game Park and the Red Data species along this corridor.	Choose an alignment which impacts the least to the habitats of Red Data species.	Choose an alignment which impacts the least to the habitat of species.	Choose an alignment which impacts the least on the remaining natural veld.
Level of significance after mitigation	Medium	Medium	Medium	Low
EMP requirements	Only cut fences where the landowner agrees and erect temporary fencing. Do not leave gates open.			
Discussion	This aspect covers the impact on the conservation areas along this alignment. Construction activities destroy habitat.			

Table 7.14: Assessment of the Disturbance to Conservation Areas during Operation

Theme	CONSERVATION AREAS			
Nature of impact	Impact on Conservation areas in the form of a disturbance to habitat			
Legal requirements	The Constitution Act (No 108 of 1996), National Environmental Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998)			
Stage	Construction and decommissioning			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Permanent	Permanent	Permanent	Permanent
Intensity	Low	Low	Low	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	Medium if alien invaders become established, bush clearing takes place and habitats are destroyed.	Medium if the veld is overgrazed and mismanaged.	Medium if the veld is overgrazed and mismanaged.	Medium if the remaining natural veld is affected by alien invaders, over grazing and mismanagement.
Confidence	Medium	Medium	Medium	Medium
Level of significance	Low	Low	Low	Low
Mitigation measures	Report mismanagement to Mpumalanga Parks or Ezemvelo KZN Wildlife	Report mismanagement to Mpumalanga Parks or Ezemvelo KZN Wildlife	Report mismanagement to Mpumalanga Parks or Ezemvelo KZN Wildlife	Report mismanagement to Mpumalanga Parks or Ezemvelo KZN Wildlife
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	The ECO should report mismanagement to Mpumalanga Parks or Ezemvelo KZN Wildlife.			
Discussion	This aspect covers the impact on the conservation areas along this alignment. Power lines disturb the "sense of place and wilderness"			

7.6 FIRES

Fires will potentially impact on the natural environment, specifically the grasslands (Tables 7.15 and 7.16), and on people and their activities (Tables 7.17 and 7.18).

Table 7.15: Assessment of the Impact of Fire during Construction/Decommissioning

Theme	FIRE			
Nature of impact	Fire in the grasslands			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998), National Veld and Forest Fires Act (101 of 1998)			
Stage	Construction/Decommissioning			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	3	4	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	During construction only	During construction only	During construction only	During construction only
Intensity	High	High	High	High
Probability of occurrence	High	High	High	High
Status of the impact	Negative.	Negative.	Negative.	Negative.
Cumulative Impact	Medium	Medium	Medium	Medium
Confidence	High	High	High	High
Level of significance	Very High	Very High	Very High	High – Most transformed land along this route
Mitigation measures	Educate staff about veld fires and how they start No open fires for cooking or heating or burning waste	Educate staff about veld fires and how they start No open fires for cooking or heating or burning waste	Educate staff about veld fires and how they start No open fires for cooking or heating or burning waste	Educate staff about veld fires and how they start No open fires for cooking or heating or burning waste

Level of significance after mitigation	Medium	Medium	Medium	Low
EMP requirements	<p>Educate staff on veld fires.</p> <p>Have suitable fire fighting equipment available on site as recommended in the Occupational Health and Safety Act (No 85 of 1993) and regulations.</p> <p>No open fires for cooking, heating or burning waste.</p>			
Discussion	<p>Fire at the inappropriate time is very detrimental for grasslands. On the wide expanses of grassland there is a real risk of run-away fires. The study area is mostly grassland which is used for grazing livestock. Apart from burning away fodder there is also a risk of injuring or killing the livestock and endangering the lives of the local population and the construction crew.</p>			

Table 7.16: Assessment of the Impact of Fire during Operation

Theme	FIRE			
Nature of impact	Fire in the grasslands			
Legal requirements	The Constitution Act (No 108 of 1996), National Environment Management Act (No 107 of 1998), Environment Conservation Act (No 73 of 1998) and regulations, The Conservation of Agricultural Resources Act (No 43 of 1983) and regulations, Atmospheric Pollution Prevention Act (No 45 of 1964) and regulations, NEM: Biodiversity Act (No 10 of 2004), National Environmental Management: Air Quality Act (No 39 of 2004), NEM: Protected areas Act (No 57 of 2003), Occupational Health and Safety Act (No 85 of 1993) and regulations, National Water Act (No 36 of 1998) and regulations, Fencing Act (No 31 of 1963), National Forests Act (No 84 of 1998) and regulations, Hazardous Substances Act (No 15 of 1973) and regulations, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947) and regulations, Nature Conservation Ordinance of KwaZulu-Natal (No 15 of 1974), Conservation Ordinance of Mpumalanga (No 10 of 1998), National Veld and Forest Fires Act (101 of 1998)			
Stage	Operation			
	Green Corridor 1	Yellow Corridor 2	Blue Corridor 3	Blue/Green Corridor 4
Preferred route (1=most preferred, 4=least preferred)	4	3	2	1
Extent of impact	Local	Local	Local	Local
Duration of impact	Long term	Long term	Long term	Long term
Intensity	Low	Low	Low	Low
Probability of occurrence	Probable	Probable	Probable	Probable
Status of the impact	Negative	Negative	Negative	Negative
Cumulative Impact	High Alien plants increase the fuel load making fires hotter and this is alignment has a lot of bushveld and forest.	High Alien plants increase the fuel load making fires hotter and this is alignment has a lot of commercial plantations that are fires risks.	Medium Alien plants increase the fuel load making fires hotter.	Low This alignment is the most transformed with the least amount of natural grasslands although cultivated field also have a fire risk.

Confidence	High	High	High	High
Level of significance	Medium	Medium	Low	Low
Mitigation measures	Educate staff to know the fire season warning signals managed by the fire control committee. Educate the staff to report fires starting to the fire control centre for each district.			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Provide the relevant fire control committee and control centre contact numbers to maintenance staff. Train staff to report fires immediately to the control centre. Train staff in basic fire control drills. Staff should not be allowed to smoke during operational activities in the grasslands.			
Discussion	Fire at the inappropriate time is very detrimental for grasslands and fodder for livestock. On the wide expanses of grassland there is a real risk of run-away fires. The study area is mostly grassland which is used for grazing livestock and provides habitat to a variety of indigenous plants, animals and birds.			

Table 7.17: Assessment of the effect of fires on agriculture during construction and decommissioning

Theme	Fire			
Nature of impact	Fire risk – effect on agriculture			
Legal requirements	National Veld and Forest Fire Act of 1998 Occupational Health and Safety Act			
Stage	Construction and decommission			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)				
Effect on land use	4	3	1	2
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction			
Intensity	Medium	Medium	Medium	Medium
Probability of occurrence	Medium	Medium	Medium	Medium
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium

Level of significance	High	High	High	High
Mitigation measures	<p>In conjunction with land owners and municipalities, Eskom should develop a fire prevention, safety and fire fighting strategy. This strategy should be agreed upon by all parties involved.</p> <p>The strategy should stipulate fire prevention, emergency, and fire fighting procedures that should be followed by Eskom and land owners/municipalities. The strategy should be area specific, and not generic.</p> <p>Where residential areas are in close proximity, special precautions should be taken.</p> <p>An Environmental Control Officer (ECO) should monitor adherence to the strategy.</p>			
Level of significance after mitigation	Medium	Medium	Medium	Medium
EMP requirements	<p>An emergency procedure and fire fighting procedure should be in place.</p> <ul style="list-style-type: none"> • The procedure should have the local fire brigade and emergency numbers available. • It should stipulate the equipment available for use, and where these are stored. • It should take into account fire fighting procedures followed and preferred by farmers and municipalities. • The strategy should not be generic, but should take into account the unique characteristics of the land along the area. Vegetation type, land use, location, seasonal weather conditions and proximity of dwellings should be taken into account. <p>An Environmental Control Officer (ECO) should monitor adherence to strategy.</p>			
<u>Discussion</u>	<p>Fire poses a risk to agricultural activities (in terms of loss of game, livestock, dwelling) and long-term environmental impacts (in terms of erosion, composition change of grassland etc.).</p>			

Table 7.18: Assessment of the impact of fires on communities during construction and decommissioning

B1	SOCIAL			
Theme	Construction workers			
Nature of impact	Fire risk – effect on communities			
Legal requirements	National Veld and Forest Fire Act of 1998 (Government Gazette: 1998) Occupational Health and Safety legislation			
Stage	Construction and decommission			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route				
Effect on communities	4	2	3	1
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction			
Intensity	Medium	Medium	High	High
Probability of occurrence	Medium	Medium	Medium	Medium
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				

Confidence	Medium	Medium	Medium	Medium
Level of significance	Medium	Medium	High	High
Mitigation measures	<p>In conjunction with land owners and municipalities, Eskom should develop a fire prevention, safety and fire fighting strategy. This strategy should be agreed upon by all parties involved.</p> <p>The strategy should stipulate fire prevention, emergency, and fire fighting procedures that should be followed by Eskom and land owners/municipalities. The strategy should be area specific, and not generic.</p> <p>Where residential areas are in close proximity, special precautions should be taken.</p> <p>An Environmental Control Officer (ECO) should monitor adherence to the strategy.</p>			
Level of significance after mitigation	Low	Low	Medium	Medium
EMP requirements	<p>An emergency procedure and fire fighting procedure should be in place.</p> <ul style="list-style-type: none"> ▪ The procedure should have the local fire brigade and emergency numbers available. ▪ It should stipulate the equipment available for use, and where these are stored. ▪ It should take into account fire fighting procedures followed and preferred by farmers and municipalities. ▪ The strategy should not be generic, but should take into account the unique characteristics of the land along the area. Vegetation type, land use, location, seasonal weather conditions and proximity of dwellings should be taken into account. <p>An Environmental Control Officer (ECO) should monitor adherence to strategy.</p>			
<u>Discussion</u>	<p>Fires pose a safety risk in terms of loss of human life, as well as a risk of damage to property. This assessment looks at the potential social and economical impact. From a social perspective, the areas with higher population densities will be impacted on to a greater extent. The assumption is that a forest fire will be less controllable, and therefore have greater potential to have a regional effect on a social and economic level.</p> <p>Fire also poses a risk to agricultural activities (in terms of loss of game, livestock, dwelling) and long-term environmental impacts (in terms of erosion, composition change of grassland etc.). These impacts are discussed under the theme: Land Use and Agriculture.</p>			

Table 7.19: Assessment of the impact of fires during operation

A1	SOCIAL			
Theme	Maintenance			
Nature of impact	Safety - Fire risk			
Legal requirements	National Veld and Forest Fire Act of 1998 (Government Gazette: 1998)			
Stage	Operation – maintenance			
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Effect on land use	4	3	2	1
Extent of impact	Regional	Regional	Regional	Regional

Duration of impact	Intermittent (during maintenance activities)	Intermittent (during maintenance activities)	Intermittent (during maintenance activities)	Intermittent (during maintenance activities)
Intensity	Medium	Medium	Medium	Medium
Probability of occurrence	Medium	Medium	Low	Low
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	Medium	Medium	Low	Low
Mitigation measures	A maintenance agreement between land owners and Eskom should be drawn up. Management of servitudes (controlling vegetation, etc.) is Eskom's responsibility. However, this activity may be effectively subcontracted to farmers. This has been done with other power lines. Farmers were willing to conduct maintenance of servitudes for a minimal fee, since it is also in their own interests to reduce the risk of fire.			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	A maintenance agreement between land owners and Eskom should be drawn up in the design phase. Costs incurred to maintain the servitude should be taken into account.			
<u>Discussion</u>	Fires do not only pose a safety risk (loss of human life), but the economical impact (loss of game, livestock, dwelling) as well as the impact on nature (erosion, composition change of grass) can be significant. Fires can be caused by maintenance workers while at construction camps, e.g. when cooking, or at the construction site, e.g. flicking a way a cigarette stub. The fire hazard (to communities and land use/ agriculture) is probably higher during construction than during operation. It is imperative that a proper maintenance plan be set out, with the responsibilities of the land owners and Eskom clearly stipulated.			

7.7 SOCIAL

The key potential impacts on people identified in this study are:

- Resettlement households, household structures and infrastructure (**Table 7.20**);
- Potential impact on development plans (**Table 7.21**);
- Noise and dust pollution during operation of the line (**Table 7.22**);
- Impacts on road infrastructure (**Table 7.23**);
- Injury or damage to property (
-
-

- Table 7.24); and
- Loss of sense of place (Table 7.25).

Table 7.20: Assessment of the impact of the proposed project on the resettlement of households, household structures and infrastructure

A1	SOCIAL			
Theme	Resettlement			
Nature of impact	Resettlement of households, household structures and infrastructure			
Legal requirements	Extension of Security of Tenure Act (Act 62 of 1997) (ESTA).			
Stage	Construction, decommissioning and operation			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	4	3
Extent of impact	Local	Local	Local	Local
Duration of impact	Permanent	Permanent	Permanent	Permanent
Intensity	Medium	Medium	Medium	Medium
Probability of occurrence	Medium	Medium	High	High
Status of the impact	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative
Accumulative Impact	Where settlements are more dense			
Confidence	Medium	Medium	Medium	Medium
Level of significance	Medium	Medium	High	High
Mitigation measures	The line should be redirected to skirt settlements and discourage encroachment on the servitude. Mitigation should be affected in the planning phase. Compensation for loss of land, property and sense of place should be negotiated.			
Level of significance after mitigation	Low	Low	Medium	Medium
EMP requirements	Mitigation should be effected in the design phase. Assessment should be done by an independent assessor. In the case of farm workers/ tenants, identify tenure rights according to prevailing law as stipulated in the Extension of Security of Tenure Act (Act 62 of 1997) (ESTA).			

Discussion

Eskom regulations state that residence under a transmission line is not allowed. It happens that people live in an area where a new servitude is planned or servitude has to be extended. To comply with Eskom regulation, these people have to be resettled.

It is also strongly recommended that the lines be placed in such a way to avoid encroachment on servitudes. Formal and informal structures in servitudes were observed in servitudes in the study area, and the possibility of this happening in the servitude once the line is operational cannot be ruled out. Eskom holds municipalities and land owners responsible for the resettlement of people, should habitation occur once the line is operational. However, this potential occurrence should be pro-actively addressed prior to the operation of the transmission lines, and be monitored during operation. This will be in line with Eskom's concern with the health, safety and well being of the public, customers, and its staff. Pro-active prevention could include workshops with community members, especially with those in fast developing towns. Signage could also be used to indicate to people that living in servitude is not allowed.

The Blue/Blue-Green corridor goes through populated areas at Osizweni-Madadeni, and although these areas are not always densely populated at places, the likelihood of finding a route without having to resettle people will be challenging. Should a corridor be found, the reality is still that the line will go through communities (either currently or in future) and will not skirt communities in the case of the Blue corridor and the Blue-Green corridor. eMondlo poses the same challenge. Although the Blue-Green route skirts eMondlo, the plan is to develop eMondlo and Vryheid towards each other. Between the Blue and Blue-Green corridor, the Blue-Green option is preferred because future planning will be planned taking the servitude into account. The Blue corridor will go through existing communities. The Green and Yellow corridor skirt communities. However, because of the high incidence of traditional housing in the area, the placement of the servitude and pylons should be carefully planned. The servitude should skirt these traditional houses/villages in the rural areas.

Table 7.21: Assessment of the impact of the proposed project on development plans

A1	SOCIAL			
Theme	Infrastructure			
Nature of impact	Potential impact on development plans			
Legal requirements	Development Facilitation Act, NEMA ,ECA			
Stage	Operation			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	4	3
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Permanent	Permanent	Permanent	Permanent
Intensity	Low	Low	Medium	Medium
Probability of occurrence	Medium	High	High	High
Status of the impact	On project: neutral Environment: negative			
Accumulative Impact	Where settlements are more dense			
Confidence	Medium	Medium	Medium	Medium

Level of significance	Medium	High	High	High
Mitigation measures	If possible, the line should be redirected to skirt settlements and discourage encroachment on the servitude. Mitigation should be effected in the planning phase. The safety of the camp to deter vagrants from entering should be considered.			
Level of significance after mitigation	Low	Medium	Medium	Medium
EMP requirements	Mitigation should be effected in the design phase.			
Discussion				
The Yellow corridor does not encroach on any future developments. The Green corridor does border the Groothoek farm and Groenvlei, which has been earmarked for development. The Blue corridor crosses areas where substantial development will take place.				
The town planning sections of the LMs and DMs should be noticed of the final servitude of the Transmission power line.				

Table 7.22: Assessment of noise and dust pollution during operation

A1	SOCIAL			
Theme	Maintenance			
Nature of impact	Noise and dust pollution			
Legal requirements	NEMA and Environment Conservation Act			
Stage	Operation			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	3	4
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Intermittent- Maintenance	Intermittent- Maintenance	Intermittent - Maintenance	Intermittent -Maintenance
Intensity	Low	Low	Low	low
Probability of occurrence	High	High	High	High
Status of the impact	Project – negative Environment – neutral	Project – negative Environment – neutral	Project – negative Environment – neutral	Project – negative Environment – neutral
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	Low	Low	Low	Low
Mitigation measures	Do not do maintenance after hours.			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Helicopters are mostly used for maintenance. More information is required on the nature and expected frequency of maintenance activities.			

Table 7.23: Assessment of the damage to road infrastructure during operation

A1		SOCIAL			
Theme	Maintenance				
Nature of impact	Damage to road infrastructure				
Legal requirements	National traffic laws, and local by-laws				
Stage	Operations				
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor	
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	4	3	1	2	
Extent of impact	Regional	Regional	Regional	Regional	
Duration of impact	Medium	Medium	Medium	Medium	
Intensity	Low	Low	Low	Low	
Probability of occurrence	Low	Low	Low	Low	
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	
Accumulative Impact	Negligible				
Confidence	Medium	Medium	Medium	Medium	
Level of significance	Low	Low	Low	Low	
Mitigation measures					
Level of significance after mitigation	Low	Low	Low	Low	
EMP requirements	Responsibilities for road maintenance should be clearly set out. Roads must be inspected on a regular basis. "Regular basis" should be defined. An ECO should monitor adherence to the regulations.				
<u>Discussion:</u> A maintenance inspection will take place by road once a year.					

Table 7.24: Assessment of injury or damage to property during operation

A1	SOCIAL			
Theme	Safety			
Nature of impact	Injury or damage to property			
Legal requirements	Common Law, Occupation Health and Safety Act			
Stage	Operation			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	4	3
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Short term - permanent	Short term - permanent	Short term - permanent	Short term - permanent
Intensity	Medium	Medium	Potentially high	Potentially high
Probability of occurrence	Low	Low	Low	Low
Status of the impact	On project: negative Environment: negative	On project: negative Environment: negative	On project: negative Environment: negative	On project: negative Environment: negative
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	Medium	Medium	High	High
Mitigation measures	The line should skirt areas where spiritual, aesthetic and therapeutic qualities associated with an area are experienced. Where lines go over these areas, pylons should be placed outside the boundaries of these areas.			
Level of significance after mitigation	Low	Low	Medium	Medium
EMP requirements	Pylons should be placed in consultation with the heritage specialist during the planning phase. Local residents affected by the line should be consulted to determine which aspects of the local environment they consider to be of value.			
Discussion	Although unlikely, the impact of a pylon falling over or sagging can be disastrous, and this is one of the reasons why lines of this size should skirt communities.			

Table 7.25: Assessment of loss of sense of place during operation

A1	SOCIAL
Theme	Sense of place
Nature of impact	Loss of sense of place
Legal requirements	NEMA, National Heritage Resources Act

Stage	Operation			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	4	3
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Permanent	Permanent	Permanent	Permanent
Intensity	Medium	Medium	Medium	Medium
Probability of occurrence	Medium	Medium	Medium	Medium
Status of the impact	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	High	High	High	High
Mitigation measures	The line should skirt areas where spiritual, aesthetic and therapeutic qualities associated with an area are experienced. Where lines go over these areas, pylons should be placed outside the boundaries of these areas.			
Level of significance after mitigation	Medium	Medium	Medium	Medium
EMP requirements	Pylons should be placed in consultation with the heritage specialist during the planning phase. Local residents affected by the line should be consulted to determine which aspects of the local environment they consider to be of value.			
<p><u>Discussion</u></p> <p>The concept of sense of place attempts to integrate the character of a setting with the personal emotions and memories associated with it. Place attachment is the sense of connectedness a person/community feels towards certain places. Place attachment may be evident at different geographic levels, e.g. site, area specific, and physiography specific. Territorial behaviour is viewed as a set of behaviours and cognition a group exhibits based on perceived ownership.</p> <p>Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. Places/natural resources should be assessed in terms of its cultural value by studying visiting and consumption patterns, behaviour patterns, etc¹. The battlefields are an example of a site of potential cultural value to surrounding communities. The construction process can impact negatively on this sense of place.</p> <p>Traditional huts occur in the study area in both rural and urban areas. This implies that places of cultural value are more likely to occur in the area. It is assumed that these places will be more in areas where the population is denser and where more traditional dwellings occur.</p>				

¹ Snyder, R., Williams, D., and Peterson, G. Culture Loss and Sense of Place in Resource Evaluation: Economics, Anthropology, and Indigenous Cultures (date unknown)

7.8 LANDUSE

The two key environmental impacts on land use identified in the study are:

- Loss of land during construction and decommissioning (**Table 7.26**) and during operation (**Table 7.27**); and
- Para gliding (**Table 7.28**).

Table 7.26: Assessment of loss of land during construction

B2	LAND USE			
Theme	Agriculture			
Nature of impact	Loss of land			
Legal requirements	Conservation of Agricultural Resources Act (43 of 1983), NEMA, ECA			
Stage	Construction and Decommissioning (these are assumed to have similar impacts)			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	4	3	1	2
Extent of impact	Local	Local	Local	Local
Duration of impact	During construction	During construction	During construction	During construction
Intensity	Medium	Medium	Low	Low
Probability of occurrence	High	High	High	High
Status of the impact	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative
Accumulative Impact	May be exacerbated in a pristine area where an existing line does not occur and existing infrastructure can't be used			
Confidence	Moderate	Moderate	Moderate	Moderate
Level of significance	Medium	Medium	Low	Low
Mitigation measures	Mitigation measures should be negotiated with the land owner to ensure that construction is done in an acceptable manner			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	<p>Mitigation should be affected in the planning phase.</p> <p>Where possible existing infrastructure should be used, and kept in its present condition to minimise loss of land.</p> <p>Access points and the use of private roads should be negotiated with the land owner.</p> <p>All erosion and other environmental damage should be rehabilitated before decommissioning.</p> <p>Clear measures should be in place to ensure that construction is responsibly done, not causing more loss of land and income in the short and long term because of construction and management.</p> <p>Farm gates should remain in the state they were found in (open or closed) unless otherwise permitted by the farmer. Where possible, existing</p>			

	<p>gates and roads should be used Responsibilities and conditions should be clearly set out. Compensation for loss of land should be negotiated. An Environmental Control Officer (ECO) should monitor adherence to construction measures in place.</p>
<p>Discussion</p> <p>During construction, more space is needed, resulting in a temporary loss of land. This land becomes available to the farmer after construction (except for forestry). To construct the transmission line, private properties will have to be accessed. In some instances, fences might have to be cut, gates put in and access roads be made. Loss of land can occur when this process is not managed properly. For example, where land is not rehabilitated after construction, erosion could occur.</p> <p>Loss of land during construction will have an economic impact on farming. Construction will have less of an impact on grazing land as opposed to cultivated land. Animals can be moved to alternative grazing land, not so cultivated land where the farmer could have to lose part of his cultivated land to accommodate the construction of the line. Forestry will be impacted on most should trees have to be removed, since trees do not get harvested annually but has to grow over a period of time to be of economic value.</p> <p>Because of the extent of the forestry occurring in the Yellow and Green corridor, the preferred corridor is the Blue corridor.</p>	

Table 7.27: Assessment of loss of land during operation

A2	LAND USE			
Theme	Agriculture			
Nature of impact	Loss of land			
Legal requirements	Conservation of Agricultural Resources Act			
Stage	Operation (43 of 1983),NEMA,ECA			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	4	3	1	2
Extent of impact	Local	Local	Local	Local
Duration of impact	Permanent	Permanent	Permanent	Permanent
Intensity	High	High	High	High
Probability of occurrence	High	High	High	High
Status of the impact	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative
Accumulative Impact	May be exacerbated in a pristine area where an existing line occur			
Confidence	High	High	High	High
Level of significance	High	High	Medium	Medium
Mitigation measures	Mitigation measures should be negotiated with the land owner to ensure that the least possible impact on agricultural activities			
Level of significance after mitigation	Medium	Medium	Low	Low
EMP requirements	<p>Mitigation should be affected in the planning phase.</p> <p>Where possible existing infrastructure should be used, and kept in its present condition to minimise loss of land.</p> <p>Access points and the use of private roads should be negotiated with the land owner.</p> <p>Clear measures should be in place to ensure that maintenance is responsibly done, not causing more loss of land and income in the short and long term because of bad operation.</p> <p>Farm gates should remain in the state they were found in (open or closed) unless otherwise permitted by the farmer. Where possible, existing gates and roads should be used</p> <p>Responsibilities and conditions should be clearly set out.</p> <p>Compensation for loss of land should be negotiated.</p> <p>An Environmental Control Officer (ECO) should monitor adherence to operations measures in place.</p>			

Discussion
A servitude of 80m will be needed to accommodate the 765kV Transmission power line. In the servitude, dwellings are not allowed, and crops higher than 4m. This means that forestry land will be lost permanently. This situation is further exacerbated by the fact that no more licenses for forestry will be approved. With regards to grazing, cattle are allowed to graze in the servitude. Land can be cultivated in the servitude, but ploughing is more time intensive as ploughing has to go around the pylons. Also, cultivation is not done on the land in the pylon. The use of centre pivots are also complicated and although centre pivots can be used under a 765kV line, centre pivots should preferably be avoided. Loss of land can also occur when proper maintenance is not done, for example when access roads are not used. Because of the extent of the forestry occurring in the Yellow and Green corridor, the preferred corridor is the Blue corridor. When looking at the occurrence of grazing and cultivation in the Yellow and Green corridor, as well as centre pivots, the Blue corridor is preferred.

Table 7.28: Assessment of the impact on para gliding

A3	ADVENTURE ACTIVITIES			
Theme	Para gliding			
Nature of impact	Safety			
Legal requirements				
Stage	Construction, decommission and operation			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) i/o Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	4	3	1	2
Extent of impact	Local	Local	Local	Local
Duration of impact	Permanent	Permanent	Permanent	Permanent
Intensity	Medium	Medium	Low	Low
Probability of occurrence	High	High	Medium	Medium
Status of the impact	On project: negative Environment: negative	On project: negative Environment: negative	On project: negative Environment: negative	On project: negative Environment: negative
Accumulative Impact				
Confidence	High	High	Medium	Medium
Level of significance	High	High	Medium	Medium
Mitigation measures	The line should be well marked			
Level of significance after mitigation	Medium	Medium	Low	Low
EMP requirements	The line should be well marked			
Discussion	Because Dumbé mountain is a renowned paragliding venue, in the process attracting many visitors to the area, the Yellow corridor is least preferred. This is followed by the Green corridor, as gliding takes place at Wakkerstroom, Utrecht and Vryheid.			

7.9 TOURISM

The key environmental impacts on tourism have been assessed in terms of loss of sense of place (**Table 7.29**).

Table 7.29: Assessment of the impact on tourism in terms of loss of sense of place

A3		TOURISM			
Theme	Sense of place				
Nature of impact	Loss of sense of place				
Legal requirements	N/A				
Stage	Mainly Operation and somewhat Construction and decommissioning.				
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor	
Preferred route (1=most preferred, 4=least preferred) (to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact))	3	4	1	2	
Extent of impact	Regional	Regional	Regional	Regional	
Duration of impact	Permanent	Permanent	Permanent	Permanent	
Intensity	Medium	Medium	Low	Low	
Probability of occurrence	Medium	High	Medium	Medium	
Status of the impact	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	
Accumulative Impact	A drop in tourism will impact on the local economy.				
Confidence	Medium	Medium	Medium	Medium	
Level of significance	Medium	High	Medium	Medium	
Mitigation measures	<p>The line should skirt areas that add to the experience of tourists. Where lines go over these areas, pylons should be placed outside the boundaries of these areas.</p> <p>Where lines go over these areas, pylons should be placed outside the boundaries of these areas.</p> <p>Where possible industrial areas should be considered to put the line through.</p> <p>Access points and the use of private and public roads should be negotiated with the land owner/municipality to lessen the impact on tourism in the area.</p> <p>Determination of construction camp sites should take into account tourism.</p>				
Level of significance after mitigation	Medium	High	Medium	Medium	
EMP requirements	<p>Clear measures should be in place to ensure that construction and maintenance is responsibly done, not causing a more intense impact on tourism than necessary.</p> <p>An Environmental Control Officer (ECO) should monitor adherence to construction measures in place.</p>				

7.10 VISUAL

7.10.1 Identification of Risk Sources

Various risk sources for the visual impact have been identified for the construction and operation phases and can be classified as both negative and positive.

Construction Phase

It is anticipated that the major risk source during construction would be:

Negative Risk Sources

- Excessive cleaning and stripping of topsoil for site offices, servitudes and temporary access road;
- The relatively random and disorganised lay down of building materials, vehicles and offices;
- Cut and fill slopes of access roads become highly visible if not re-vegetated and shaped to blend in with the existing topography;
- The extent and intensity of the security and construction lighting at night;
- Dust from construction activities;
- Open and unrehabilitated landscape scarring;
- Uncontrolled exploitation of borrow pits and quarries without compliance to environmental controls related to aesthetic rehabilitation;
- High seed bank of alien species such as Black Wattle (*Acacia mearnsii*) in the topsoil can lead to the uncontrolled spread of this exotic invader plant species along the edges of the transmission line servitude. This could create a treed edge that is visually contrary to the low grasslands; and
- Location and layout of construction workers camp if located in proximity of works area.

Positive Risk Sources

- Image of construction activity could lead to a perceived view of progress and benefit to the community.

Operational Phase

Negative Risk Sources

- Site engineering such as cuts and fills, could remain aesthetically incompatible with surrounding landscape. Edges may not blend in with the landscape or cut slopes may be too steep to be adequately re-vegetated;
- Areas and/or specific sites of high aesthetic value may be disfigured by the introduction of project components such as pylons and power lines within the viewshed resulting in a permanent change to the existing visual quality of visually sensitive areas; and
- Need to keep servitudes clear of vegetation, especially in commercial plantation areas, will result in visual scarring.

Positive Risk Sources

- The Majuba-Umfolozi Transmission Line could be the visual affirmation of progress and prosperity for the region.

The visual impact of the project and associated structures in the landscape is a function of many factors or criteria. Some of the factors are measurable such as viewing distance, the visual absorption capacity of the surrounding landscape and the scale of the surrounding environment and landform. Other factors are subjective viewpoints, which are extremely difficult to consistently categorise the opinion of the community. Studies in the U.S.A. have shown that professionals and environmental groups view modification of the natural landscape more negatively than other groups (*McCool, et al 1986*).

Table 7.30: Assessment of Impacts on the Visual Environment during construction/decommissioning

Theme	AESTHETICS			
Nature of impact	Visual impacts			
Legal requirements	National Heritage Resources Act No 25, 1999			
Stage	Construction/decommissioning			
	Green	Yellow	Blue	Blue/Green
Preferred route				
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Short term	Short term	Short term	Short term
Intensity	High	High	Medium to high	Medium to high
Probability of occurrence	Highly probable	Highly probable	Highly probable	Highly probable
Status of the impact	Negative	Negative	Negative	Negative
Confidence	Medium	Medium	Medium	Medium
Level of significance	High	High	Medium	Medium
Mitigation measures	Avoid ridges and peaks. Place route on footslopes so that topography can form a backdrop to avoid silhouette or breaking the skyline. Limit extent of landscape disturbance. Avoid areas of high scenic value and tourism potential.	Avoid ridges and peaks. Place route on footslopes so that topography can form a backdrop to avoid silhouette or breaking the skyline. Limit extent of landscape disturbance. Avoid areas of high scenic value and tourism potential.	Avoid ridges and peaks. Place route on footslopes so that topography can form a backdrop to avoid silhouette or breaking the skyline. Limit extent of landscape disturbance. Avoid areas of high scenic value and tourism potential.	Avoid ridges and peaks. Place route on footslopes so that topography can form a backdrop to avoid silhouette or breaking the skyline. Limit extent of landscape disturbance. Avoid areas of high scenic value and tourism potential.
Level of significance after mitigation	Potentially high	Potentially High	Potentially medium	Potentially medium
EMP requirements	Environmental Rehabilitation			

<p>Discussion:</p>	<p>The area generally to the north of Utrecht to Wakkeestroom exhibits a high scenic rural value on which tourism in the area is based. Although the visual extent is limited by the surrounding topography and the fact that the VAC is regarded as moderate to high, which allows for a degree of natural screening or blending, the significance of the impact is considered to be high due to the high scenic and aesthetic value.</p>	<p>The yellow corridor traverses an area of relatively high diversity and visual interest. This corridor is more transacted by infrastructure such as road and farming activities such as timer production than the green Corridor. The VAC of the area is considered moderate to high which allows for visual screening and blending with the landscape. The topography assists in limiting the extent of visibility. However, the northern section of the route cuts across an area of high visual sensitivity and thus the significance of the impact is regarded as medium to high.</p>	<p>The visual impact of the Transmission power line is medium as it is within a relatively flat and open landscape that does not lend itself to natural screening or blending but that it traverses an area of the country that is not regarded as having a high scenic value. The VAC of the area is considered low and therefore the visibility is expansive and that the landscape has difficulty in visually absorbing the visual change. However, the area is already visually modified by farming activity, roads and power lines and the high weight design of the tower structures is less visible in the landscape. Therefore the significance of the impact is regarded as medium to low.</p>	<p>The visual impact of the Transmission power line is medium as it is within a relatively flat and open landscape that does not lend itself to natural screening or blending but that it traverses an area of the country that is not regarded as having a high scenic value. The VAC of the area is considered low and therefore the visibility is expansive and that the landscape has difficulty in visually absorbing the visual change. However, the area is already visually modified by farming activity, roads and power lines and the high weight design of the tower structures is less visible in the landscape. Therefore the significance of the impact is regarded as medium to low.</p>
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Table 7.31: Assessment of Impacts on the Visual Environment during operation

Theme	AESTHETICS			
Nature of impact	Visual impacts			
Legal requirements	National Heritage Resources Act No 25, of 1999			
Stage	Operation			
	Green	Yellow	Blue	Blue/Green
Preferred route				
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Long term	Long term	Long term	Long term
Intensity	High	High	Medium to low	Medium to low
Probability of occurrence	Highly probable	Highly probable	Highly probable	Highly probable

Status of the impact	Negative	Negative	Negative	Negative
Accumulative impact	Medium	Medium	Medium	Medium
Confidence	Medium	Medium	Medium	Medium
Level of significance	High	Medium to high	Medium to low	Medium to low
Mitigation measures	None	None	None	None
Level of significance after mitigation	Potentially high	Potentially medium to high	Potentially medium to low	Potentially medium to low
EMP requirements	None			
Discussion:	<p>The area generally to the north of Utrecht to Wakkerstroom exhibits a high scenic rural value on which tourism in the area is based. Although the visual extent is limited by the surrounding topography and the fact that the VAC is regarded as moderate to high, which allows for a degree of natural screening or blending, the significance of the impact is considered to be high due to the high scenic and aesthetic value.</p>	<p>The northern route (Corridor 2) traverses an area of relatively high diversity and visual interest. This corridor is more transacted by infrastructure such as road and farming activities such as timer production than Corridor 1. The VAC of the area is considered moderate to high which allows for visual screening and blending with the landscape. The topography assists in limiting the extent of visibility. However, the northern section of the route cuts across an area of high visual sensitivity and thus the significance of the impact is regarded as medium to high.</p>	<p>The visual impact of the transmission line is medium as it is within a relatively flat and open landscape that does not lend itself to natural screening or blending but that it traverses an area of the country that is not regarded as having a high scenic value. The VAC of the area is considered low and therefore the visibility is expansive and that the landscape has difficulty in visually absorbing the visual change. However, the area is already visually modified by farming activity, roads and power lines and the high weight design of the tower structures is less visible in the landscape. Therefore the significance of the impact is regarded as medium to low.</p>	<p>The visual impact of the transmission line is medium as it is within a relatively flat and open landscape that does not lend itself to natural screening or blending but that it traverses an area of the country that is not regarded as having a high scenic value. The VAC of the area is considered low and therefore the visibility is expansive and that the landscape has difficulty in visually absorbing the visual change. However, the area is already visually modified by farming activity, roads and power lines and the high weight design of the tower structures is less visible in the landscape. Therefore the significance of the impact is regarded as medium to low.</p>

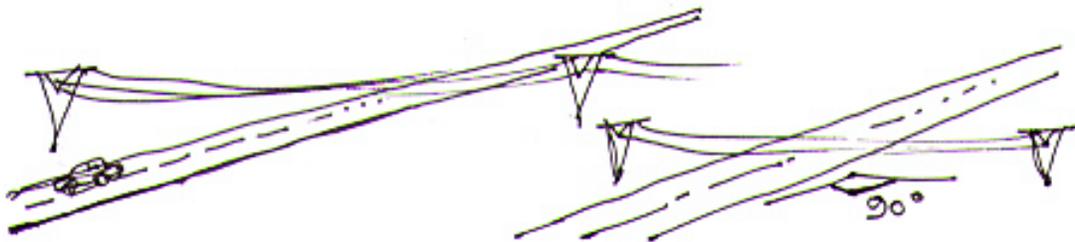
7.10.2 Recommended General Mitigation / Management Measures

Route alignment

The route through should be aligned the lower lying landforms and off the ridge lines. This is to maximise the backdrop screening effect of the topography that will reduce presenting the transmission line in silhouette. It is recommended that the Blue Corridor be selected as it avoids the more mountainous areas to the east.



Plan the route so that the route crosses existing main roads as close to 90° as possible as this will reduce the time that the line is in the viewshed of the passing motorist/viewer.



Align the routes as west as possible to avoid most of the tourist access roads and areas.

Avoid aligning the route along the top of ridges. Should it be necessary to cross a ridge it is preferable to cross directly over rather than at an angle. This will limit the extent that the transmission line will be visible. Attempt to cross over at a depression such as a neck or saddle in the ridge. This will limit the visual effect of any pylon standing proud above the ridgeline.



Align the route, where possible, away from any main road where the two are parallel in relative pristine areas to where distance will mitigate the impact or to where the topography will form a screening backdrop.

Avoid a route that will dominate any tourism facility, lodge or farmsteads' view.



Position the towers on a midslope of a landform that rises to a plateau and koppie so that the plateau or koppie will form a background to the line.



Avoid aligning the route through forestry areas where the line will require that a servitude will need to be cleared. Rather align it to the edge of the plantation where the cut line will not be as visually obvious.

It is important to note that significant mitigation measures were implemented during the scoping phase of this study. Proposed corridors have been altered to avoid areas of high scenic quality and have been aligned taking into consideration many of the proposed mitigation measures discussed in this section.

7.10.3 Environmental Management Actions

The visual impact during construction will be moderately significant and little can be done about reducing the effect since the works cannot be screened.

The mitigation measures for the Transmission power line during operation will need to focus on effective rehabilitation of the construction corridor and work sites. These specifications must be explicit and detailed and included in the contract

documentation (Environmental Management Plan) so that the tasks can be costed and monitored for compliance and result.

The galvanising of the pylon should be allowed to weather to a matt grey finish rather than be painted silver, as is often the case. This allows the structures to blend in with the existing environmental colours more readily than the silver which is highly reflective especially early morning and late afternoon. Should it be necessary to paint, it is recommended that a neutral matt finish be used.

Sculpturing or shaping the cut and fill slopes of access roads to angles and forms that are reflected in the adjacent landscape can reduce the visual impact. By blending the edges with the existing landforms the visual impression made, is that the project component has followed a natural route provided by the landscape, rather than been 'engineered' through the landscape.

For access/service roads and servitudes avoid straight edges and corridors. These lines should complement the landscape through which they pass (Litton, 1980).

Special attention should be focussed on the width of servitude actually required for the construction and operational phases. There is a tendency to make these servitudes wider than necessary and access roads built to a higher engineering specification than required for a single lane 4x4 maintenance vehicle track.

Vegetation stripping of servitude corridors should be done in a manner where the edges are organic (non-geometric) or curvilinear rather than straight or sharp edged as viewers tend to form positive visual impressions such as "gentleness" and "delicacy" and tend to object to negative visual impressions such as "rough", "rugged" or "violent" (Ribe, 1989). When disturbances in the landscape are viewed from a distance, those with irregular lines, rather than straight lines appear to blend in with the natural configuration and lines in the landscape (Schaefer, 1967).

It is essential that all cut and fill slopes, as well as all areas disturbed by construction activity, are suitably topsoiled and vegetated as soon as is possible after final shaping. The progressive rehabilitation measures will allow the maximum growth period before the completion of the project.

All areas affected by the construction works will need to be rehabilitated and re-vegetated. This includes the areas beyond the works area such as temporary access roads, construction campsites, workers campsites, borrow pits, laydown areas, etc.

The special conditions of contract must include for the stripping and stockpiling of topsoil from the construction areas for later re-use. Topsoil is considered to be at

leas the top 300 mm of the natural soil surface and includes grass, roots and organic matter. The areas to be cleared of topsoil should be all areas that will be covered by structures, roads and construction camps. The presence of degraded and disused roads and areas left over after development that are not rehabilitated, could present a high perceptual visual impact. These areas should be topsoiled and re-vegetated.

All existing large trees that fall outside the earthworks area must be retained. These will assist in softening the forms of the structures and obscure views to them.

Dust generated by construction activity and the haulage of materials and equipment will need to be suppressed by regular wetting.

The importance of suppressing the visual aspects of dust cannot be over-stressed since the visibility will generate the impression of a polluting industry.

7.11 HERITAGE RESOURCES

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

In general, resources in the former category are afforded specific definitions and special protection, such as structures older than sixty years, rock art and ancestral graves. Mitigatory measures to avoid site alteration depend largely on heritage value and significance, but a permit from Amafa aKwaZulu-Natali, the provincial heritage management organisation, is usually required before such sites are altered in any way. The locations of all recorded archaeological sites within the study area as held by the Natal Museum's Data Recording Centre are plotted on **Figure 2** in **Appendix H**.

Cultural landscapes are less clearly defined; hence their levels of protection and management are more open to interpretation. Examples are places to which oral traditions are attached or that are associated with living heritage; historical settlements and townscapes; and landscapes and natural features. Such resources may receive special protection through declaration as Heritage or Provincial Landmarks, Heritage Conservancies or Sensitive Sites. The American National Parks Services criteria for the identification and management of cultural landscapes (**Appendix H**) were used in this study. Identification and formal declaration of these resources is, however, not far advanced, either provincially or nationally. Accordingly, it is important to ensure that current development and land use does not permanently compromise the character-defining qualities of these significant, yet less tangible, heritage resources.

Table 7.32 and **Table 7.33** summarise the impacts of the three transmission line routes, in terms of discrete heritage sites and cultural landscapes.

Table 7.32: Assessment of Discrete Heritage sites

Nature of impact	Discrete Heritage Sites			
Legal requirements	National Heritage Resources Management Act, No.25 of 1999; KwaZulu-Natal Heritage Act, No.10 of 1997			
Stage	Construction, Operation and Decommissioning			
	Yellow	Green	Blue	Blue/Green
Preferred route (1=most preferred, 3=least preferred)	1	3	2	
Extent of impact	Local	Local	Local	Local
Duration of impact	Short Term	Short Term	Short Term	Short Term
Intensity	Low	Low	Low	Low
Probability of occurrence	Medium	Medium	Medium	Medium
Status of the impact	Negative	Negative	Negative	Negative
Accumulative impact	Low if mitigated	Low if mitigated	Low if mitigated	Low if mitigated
Confidence	High	High	High	High
Level of significance	Moderate	Moderate	Moderate	Moderate
Mitigation measures	Physical ground survey and site identification	Physical ground survey and site identification	Physical ground survey and site identification	Physical ground survey and site identification
Level of significance after mitigation	Medium	Medium	Medium	Medium
EMP requirements	As per proposed site management mitigation recommendations			

Table 7.33: Assessment of the Cultural Landscape

Nature of impact	Cultural Landscapes			
Legal requirements	National Heritage Resources Management Act, No.25 of 1999; KwaZulu-Natal Heritage Act, No.10 of 1997			
Stage	Operation			
	Yellow	Green	Blue	Blue/Green
Preferred route (1=most preferred, 3=least preferred)	1	3	2	
Extent of impact	Regional	Regional	Regional	
Duration of impact	Long term	Long term	Long term	
Intensity	Medium	High	Medium	
Probability of occurrence	High	High	High	
Status of the impact	Negative	Negative	Negative	
Accumulative Impact	Medium	High	Medium	
Confidence	High	High	High	
Level of significance	Low	High	Moderate	
Mitigation measures	Wherever possible line route should be parallel and in proximity to existing servitudes	"No go" option	Route the line wherever possible along valleys rather than ridges or skylines	
Level of significance after mitigation	Moderate	None	Moderate	
EMP requirements	NONE APPLICABLE			

7.12 CONSTRUCTION IMPACTS

The construction impacts assessed below are:

- Sanitation and water supply requirements at construction camps (**Table 7.34**);
- Waste and rubble removal (**Table 7.35**);
- Safety and security problems arising from contact between locals and construction workers (**Table 7.36**);
- Speed limits on roads (**Table 7.37**);
- Damage to road infrastructure (**Table 7.38**); and
- Animal theft/poaching (**Table 7.40**).

Table 7.34: Assessment of the impact of sanitation and water supply requirements at construction camps during construction and decommissioning

B1	SOCIAL			
Theme	Construction camps/ construction villages			
Nature of impact	Sanitation, and water supply			
Legal requirements	Construction Regulations under the Occupational Health and Safety Act, NEMA, NWA			
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	34	2
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction	During construction	During construction	During construction
Intensity	High	High	High	High
Probability of occurrence	High	High	High	High
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				
Confidence	High	High	High	High
Level of significance	High	High	High	High

Mitigation measures	The contractor is responsible for good construction camp and site practices.			
Level of significance after mitigation	Medium	Medium	Medium	Medium
EMP requirements	The contractor should adhere to construction Regulations under the Health and Safety Act. A proper storm water drainage system should be implemented, proper toilets to be provided. The Environmental Control Officer (ECO) should monitor adherence to strategy.			
Discussion	Bad sanitation and water supply practices, both in the construction camp and on site, pose a health risk/spreading of cholera.			

Table 7.35: Assessment of waste and rubble removal during construction and decommissioning

B1	SOCIAL			
Theme	Construction camp			
Nature of impact	waste and rubble removal			
Legal requirements	Construction Regulations under the Occupational Health and Safety Act, NEMA & ECA			
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	3	4
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction	During construction	During construction	During construction
Intensity	High	High	High	High
Probability of occurrence	High	High	High	High
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				
Confidence	High	High	High	High
Level of significance	High	High	High	High
Mitigation measures	The contractor is responsible for good construction camp and site practices in this regard. Negotiate with local municipality in terms of solid waste removal services.			
Level of significance after mitigation	Medium	Medium	Medium	Medium
EMP requirements	The contractor should adhere to construction Regulations under the Health and Safety Act. A solid waste service should be put in place. An Environmental Control Officer (ECO) should monitor adherence to strategy.			
Discussion	Construction sites and construction camps will have to be supplied with appropriate services and infrastructure (water, sanitation, solid waste			

	removal, storm water drainage, etc.). The responsibility of providing such services and establishing infrastructure will fall on local municipalities. Although these services would be paid for by Eskom, the possibility exists that some local authorities would not be able to provide the required services. Especially in the case of small, rural municipalities, their capacity (in terms of human resources, skills, financial management and planning abilities, etc.) is sometimes extremely limited. It is therefore recommended that the proponent enter into negotiation with local authorities to assess their ability to provide the necessary services for construction activities.
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Table 7.36: Assessment of Safety and security problems arising from contact between locals and construction workers

B1	SOCIAL			
Theme	Construction workers			
Nature of impact	Safety and security – problems arising from contact between locals and construction workers			
Legal requirements	Construction Regulations under the Health and Safety Act			
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	4	3
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	Period of construction	Period of construction	Period of construction	Period of construction
Intensity	Medium	Medium	Medium	Medium
Probability of occurrence	Low	Low	Medium	Medium
Status of the impact	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative	On project: neutral Environment: negative
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	Low	Low	Medium	Medium
Mitigation measures	<p>Construction workers should adhere to a contract with the contractor. These rules of conduct should be stipulated in the EMP. This should include the use of sanitation, water and waste as well as informal trading, running shebeens, and interfering in community affairs.</p> <p>Suitable security measures should be established.</p> <p>Workers should wear distinctive clothing / badges during working hours to distinguish them from vagrants.</p> <p>Arrangements should be made with the local Community Policing Forum to monitor / combat possible increase in crime during construction period.</p> <p>An incentive and fine scheme to ensure that rules are adhered to, can be implemented. An ECO monitors transgressions / compliance, and incentives / fines.</p> <p>Location of camps should be determined by the contractor in liaison with the ECO and landowners, or affected parties as well as Eskom. Municipalities should be involved to ensure the minimum impact. Site selection to not only take into account services required, availability of</p>			

	materials, and the route, but also socio-economic profile of communities.		
Level of significance after mitigation	Low	Low	Low
EMP requirements	<p>The requirements for good camp management practices should be stipulated. The contract with workers should be included as well as how compliance will be monitored.</p> <p>Guidelines for choice of camp location should be included.</p> <p>Camps should avoid informal settlements where social problems already exist.</p>		
<p>Discussion</p> <p>Because of the specialist nature of building a transmission line, specialists in the field will be contracted to do the work. Contract workers will have to live in temporary camps because they are away from their homes.</p> <p>(The term “construction camp” is sometimes used to refer to the yard at the construction site where machinery, tools, etc. are stored overnight. No-one lives in such a construction camp, except perhaps security personnel. In order to avoid misunderstandings, to construction workers’ accommodation is referred to as “construction villages”.)</p> <p>Where contract workers in camps are present, social and environmental problems often occur. Construction camps are often situated in the vicinity of settlements where infrastructure problems and service problems already exist. These problems include informal settlements, lack of sanitation and water, as well as social problems because of high unemployment rates. A camp will add to these problems.</p> <ul style="list-style-type: none"> - disruption of local communities - security of local communities - traffic disruption - increase in sex trade and sexually related diseases <p>Potentially positive impacts are:</p> <ul style="list-style-type: none"> - support of local businesses – i.e. creation of indirect employment opportunities and injection into local economy - creation of employment opportunities (esp. in terms of semi-skilled labour) <p>Settlements where more social problems seem to occur compared to other settlements are Osizweni (Blue corridor) and eMondlo-Madadeni (Blue and Blue-Green) as well as Nquthu (Blue and Blue-Green). Utrecht’s proximity to eMondlo-Madadeni should be considered (Green corridor) as well as the settlements occurring between Vryheid towards Ulundi along the Yellow corridor.</p> <p>The magnitude of these impacts will be directly related to the size of the construction workforce and the construction schedule. E.g. will there be a large number of construction teams working concurrently on various parts of the line, or will a small number of teams be moved along the line as construction proceeds? The required skills breakdown of the construction workforce will also determine the extent to which it will be possible to use local labour.</p> <p>It is therefore considered imperative that such information be obtained before any commitments with regard to mitigating these impacts are incorporated in the EMP (which is a legally binding document; once an organisation undertakes to implement the EMP, it cannot at a later stage object that certain items in the Plan are not feasible.)</p> <p>A further crucial item of information to be obtained from Eskom is whether workers will be housed in construction camps/ construction villages, or whether they will be housed in EXISTING accommodation in nearby towns. The latter is Eskom’s preferred strategy with regard to the construction of power STATIONS –it is considered less likely to lead to social problems than construction villages. It may be the same for power LINES, although this would have to be confirmed².</p>			

² Jan Perold, external reviewer

Table 7.37: Assessment of speed limits on roads during construction and decommissioning

B1	SOCIAL			
Theme	Construction activities			
Nature of impact	Speed limits on roads			
Legal requirements	National and provincial traffic laws, and local by-laws NWA			
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) i/o Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	1	2	4	3
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction	During construction	During construction	During construction
Intensity	Low	Low	Medium	Medium
Probability of occurrence	Low	Medium	Medium	Medium
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	Low	Medium	Medium	Medium
Mitigation measures	Maintenance and operation traffic will be limited and is not expected to have a significant impact. These vehicles should adhere to traffic regulations and should stick to the maintenance roads.			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	<p>Construction traffic to abide by the traffic laws.</p> <p>The presence of construction vehicle roads signs must be placed on public roads during construction to warn passing motorists of the dangers of construction traffic.</p> <p>Drivers must have applicable licenses.</p> <p>Movements of heavy vehicles must be planned.</p> <p>Damage caused must be repaired before decommissioning.</p> <p>Access roads through wetlands areas should be carefully assessed and maintained.</p> <p>Eroded areas should be avoided.</p>			
<u>Discussion</u>				

Table 7.38: Assessment of potential damage to road infrastructure during construction and decommissioning

B1	SOCIAL			
Theme	Construction			
Nature of impact	Damage to road infrastructure			
Legal requirements	Road Traffic Act, provincial traffic ordinances and local by-laws. NWA			
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) (to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact))	4	3	1	2
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction	During construction	During construction	During construction
Intensity	Medium	Medium	Medium	Medium
Probability of occurrence	Medium	Medium	Medium	Medium
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact	In cases where roads are already being damaged by high volumes of heavy-vehicle traffic (e.g. trucks), additional impacts could be experienced.			
Confidence	Medium	Medium	Medium	Medium
Level of significance	Medium	Medium	Medium	Medium
Mitigation measures	The contractor should be aware of the effect of road damage along the line, and how negative effects can be avoided and/or prevented.			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Damage caused must be repaired before decommissioning. Access roads through wetlands areas should be carefully assessed and maintained. Eroded areas should be avoided. An ECO to inspect adherence to requirements.			
<u>Discussion</u>	It is possible that the movement of heavy vehicles during construction could lead to road damage. In the case of national/ provincial roads, the responsibility of maintaining roads falls on national/ provincial authorities. In the case of local roads, however, maintenance is the responsibility of local authorities – i.e. municipalities. As mentioned earlier, some smaller, rural municipalities have extremely limited capacity, and may not implement necessary road maintenance activities.			

Table 7.39: Assessment of noise and dust pollution during construction

B1	SOCIAL			
Theme	Construction			
Nature of impact	Noise and dust pollution			
Legal requirements	NEMA and Environment Conservation Act			
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred, 4=least preferred) (to Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact))	1	2	3	4
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction	During construction	During construction	During construction
Intensity	Low	Low	Low	low
Probability of occurrence	High	High	High	High
Status of the impact	Project – negative Environment – neutral	Project – negative Environment – neutral	Project – negative Environment – neutral	Project – negative Environment – neutral
Accumulative Impact				
Confidence	Medium	Medium	Medium	Medium
Level of significance	Low	Medium	Medium	Medium
Mitigation measures	Establish what time of year less dust will be distributed, and attempt to construct in this time.			
Level of significance after mitigation	Low	Low	Low	Low
EMP requirements	Construction not to be done after working hours should settlements/dwellings be close to the site. Construction camps should have rules about noise after hours.			
<u>Discussion</u>	The severity of these impacts will depend on the proximity of surrounding towns/ settlements.			

Table 7.40: Assessment of potential animal theft/poaching during construction and decommissioning

B2	SOCIAL			
Theme	Agriculture			
Nature of impact	Animal theft/poaching			
Legal requirements				
Stage	Construction and decommissioning			
	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Preferred route (1=most preferred,	4	1	3	2

4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)				
Extent of impact	Regional	Regional	Regional	Regional
Duration of impact	During construction	During construction	During construction	During construction
Intensity	High	High	High	High
Probability of occurrence	High	High	High	High
Status of the impact	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative	Project – negative Environment – negative
Accumulative Impact				
Confidence	High	High	High	High
Level of significance	Medium	High	High	High
Mitigation measures	EMP requirements to be clearly set out prior to construction. Liaise with local Community Policing Forums regarding mutually acceptable strategies for minimising risk of poaching.			
Level of significance after mitigation	Low	Medium	Medium	Medium
EMP requirements	Farm gates to remain closed unless otherwise agreed with land owner. Existing gates should preferably be used. Security control of gates should be agreed on with owner. Landowners should be aware of movement plans through the fenced areas. Responsibilities must be clearly set out.			
<p><u>Discussion</u> Neglect to close gates can lead to animal poaching/loss of stock. Even in cases where construction workers are not responsible for poaching, local farmers may well blame these construction workers for (actual or perceived) increases in poaching.</p>				

8. IDENTIFICATION OF RECOMMENDED CORRIDOR

8.1 EVALUATION OF ALTERNATIVE CORRIDORS IN TERMS OF ECOLOGICAL ASPECTS

The green corridor has the least vegetatively disturbed areas and the yellow corridor the most transformed land due to afforestation and agricultural practice. The blue corridor also has a great deal of agricultural transformed land.

A summary of the assessments of the ecological aspects is provided in the **Table 8.1.**

Table 8.1: Summary of assessment of ecological aspects

Aspects	Green Alternative		Yellow Alternative		Blue Alternative		Blue/Green Alternative	
	Before mitigation	After mitigation	Before mitigation	After mitigation	Before mitigation	After mitigation	Before mitigation	After mitigation
Ecological integrity of grassland	High negative	Medium Negative	Medium negative	Low Negative	Medium negative	Low Negative	Medium negative	Low negative
Ecological integrity of forests and bushveld	High negative	Medium Negative	High negative	Medium Negative	Medium negative	Low Negative	Medium negative	Low negative
Mammals	High negative	Medium Negative	High negative	Medium Negative	High negative	Medium Negative	Medium negative	Low negative
Other animals (invertebrates, fish, amphibian and reptiles)	Medium negative	Low Negative	Medium negative	Low Negative	Low negative	Low Negative	Low negative	Low negative
Wetlands	Very High negative	High Negative	Medium negative	N/A	High negative	Low Negative	High negative	Low negative
Fire	Very High negative	Medium Negative	Very High negative	Medium Negative	High negative	Medium Negative	High negative	Low Negative
Conservation areas	High negative	Medium Negative	High negative	Medium Negative	High negative	Medium Negative	Medium negative	Low Negative
Summary	22	14	21	10	17	10	15	7

Rating: Negligible = 0, Low = 1, Medium = 2, High = 3

Based on Table 8.1, the blue/green corridor is recommended for the Majuba-Umfolozi 765kV Transmission power line in terms of impacts on ecology in the study area.

8.2 EVALUATION OF THE ALTERNATIVE CORRIDORS IN TERMS OF AVI-FAUNAL ASPECTS

In order to arrive at a preferred corridor in terms of avi-faunal impacts, the following factors were taken into account:

- Red Data diversity in the study area.
- Red Data density in the study area.
- The distance of each corridor in each quarter degree square that comprises the study area.

Several methods were used, incorporating the factors stated above to determine which corridor is the preferred one from a bird interaction perspective. The first method was to score each corridor in the following manner:

- A Red Data sensitivity score was calculated for each square that was bisected by a corridor. This was done by multiplying the conservation status of each power line sensitive Red Data species recorded in that square with the reporting rate for that species. The Red Data sensitivity score was then calculated by adding up the scores of all the individual Red Data species that were recorded in that square.
- A Red Data line sensitivity score was calculated for each square by multiplying the length of the corridor in a quarter degree square with the Red Data sensitivity score of that square.
- The total Red Data sensitivity score for a corridor was calculated by adding up the Red Data line sensitivity scores of the quarter degree squares for that corridor.

In summary it was concluded that the blue-green corridor is the preferred one in terms of avi-fauna issues, as it will have the least impact on birds.

8.3 EVALUATION OF ALTERNATIVE CORRIDORS IN TERMS OF SOCIAL ASPECTS

Based on the impact assessment tables, a preferred route was identified. The social specialist assessed social, mining, land-use and tourism impacts separately. Each of these was ranked from 'most preferred' (highest rank 1) to 'least preferred' (rank 4). The range depended on the number of alternatives being considered. The same weight should not be given to CONSTRUCTION-related impacts as to OPERATIONAL impacts. Construction impacts are temporary, whereas operational impacts are long-term or permanent. MAINTENANCE is intermittent.

Table 8.2: Summary of preferred corridor in terms of social, land use and tourism issues

A1.SOCIAL				
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Resettlement	1	2	4	3
Potential impact on developments	1	2	4	3
Loss of sense of place	1	2	4	3
Injury/damage	1	2	4	3
TOTAL	4	8	16	12
Maintenance workers - operation				
Fire risk – effect on communities	4	3	2	1
Impact on roads	4	3	1	2
Dust and noise pollution	1	2	3	4
Animal theft/poaching	4	1	3	2
TOTAL	13	9	9	9
PREFERRED (1=most preferred, 4=least preferred)	1	2	4	3
B1. SOCIAL				
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Construction workers				
Speed limits on roads	1	2	4	3
Social problems	1	2	4	3
Fire risk – effect on communities	4	2	3	1
Littering, waste and rubble removal	1	2	3	4
Sanitation, and water supply – health risk	1	2	3	4
Damage to roads	4	3	1	2

Dust and noise pollution	1	2	3	4
PREFERRED (1=most preferred, 4=least preferred)	13	15	20	21
A2/B2 LANDUSE				
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
A2. General – maintenance				
Fire risk – effect land use	4	3	1	2
Loss of land	4	3	1	2
B2. Construction/decommissioning				
Disruption of agricultural activities	4	3	1	2
Animal theft	4	1	3	2
PREFERRED (1=most preferred, 4=least preferred)	16	10	6	8

TOURISM A3				
Preferred route (1=most preferred, 4=least preferred) ito Significance of impact (1=positive/ no significant negative impact, 4=severe negative impact)	Yellow corridor	Green corridor	Blue corridor	Blue-Green corridor
Loss of sense of place	3	4	1	2
ADVENTURE ACTIVITIES				
Paragliding	4	3	1	2
TOTAL	7	7	2	4

The following alternatives are preferred:

Social: Yellow

Tourism: Blue-Green

Land use: Blue

8.4 EVALUATION OF THE ALTERNATIVE CORRIDORS IN TERMS OF VISUAL IMPACTS

Table 8.3, rates each criterion from high, medium to low according to the specific characteristics of that criterion. **Table 8.4** to **Table 8.6** list the visual criteria rating and the visual impact for each corridor.

Table 8.3: Visual Assessment Criteria Ratings

Criteria	High	Medium	Low
1. Visibility	Very visible from many places beyond 1000 metre zone	Visible from within the 1000 metre zone but partially obscured by intervening objects.	Only partly visible within the 1000 metre zone and beyond due to screening by intervening objects.
2. Genius Loci	A particularly definite place with an almost tangible dominant ambience or theme.	A place which projects a loosely defined theme or ambience.	A place having little or no ambience with which it can be associated.
3. Visual Quality	A very attractive setting with great variation and interest but no clutter.	A setting which has some aesthetic and visual merit.	A setting which has little aesthetic value.
4. Visible Social Structures	Housing and/or other structures as a dominant visual element.	Housing and/or other structures as a partial visual element.	Housing and/or other structures as a minor visual element.
5. Surrounding Landscape Compatibility	Ideally suits or matches the proposed development.	Can accommodate the proposed development without appearing totally out of place.	Cannot accommodate proposed development without it appearing totally out of place visually.
6. Character	The site or surrounding area exhibits a definite character.	The site or surrounding area exhibits some character.	The site or surrounding area exhibits little or no character.
7. Scale	A landscape which has horizontal and vertical elements in high contrast to the human scale.	A landscape with some horizontal and vertical elements in some contrast to the human scale.	Where vertical variation is limited and most elements are related to the human and horizontal scale.
8. Visual Absorption Capacity (VAC)	The ability of the landscape to easily accept visually a particular development because of its diverse landform, vegetation and texture.	The ability of the landscape to less easily accepts visually a particular development because of a less diverse landform, texture and vegetation.	The ability of the landscape not to visually accept a proposed development because of a uniform texture, flat slope and limited vegetation cover.
9. View Distance	If uninterrupted view distances to the site	If uninterrupted view distances are < 5 km	If uninterrupted view distances are >500 m

Criteria	High	Medium	Low
	are > than 5 km.	but > 1 km.	and < 1000 m.
10. Critical Views	Views of the project are to be seen by many people passing on main roads and from prominent areas i.e. towns / urban areas / settlements, game farms, guest farms / lodges, hiking routes.	Some views of the project from surrounding towns / urban areas / settlements, main roads and game farms / lodges.	Limited views to the project from towns / urban areas / settlements, main roads and game farms / lodges.

Table 8.4: Site Evaluation: Green Corridor

Characteristics	Visual Criteria Rating	Visual Impact
1. Visibility	Medium	Medium
2. Genius Loci	High	High
3. Visual quality	High	High
4. Social structures	Low	High
5. Surrounding landscape compatibility	Low	High
6. Character	High	High
7. Scale	High	Low
8. VAC	High	Low
9. View Distance	Medium	Medium
10. Critical Views	Medium	High

Table 8.5: Site Evaluation: Yellow Corridor

Characteristics	Visual Criteria Rating	Visual Impact
1. Visibility	Medium	Medium
2. Genius Loci	High	High
3. Visual quality	Medium	Medium
4. Social structures	Medium	High
5. Surrounding landscape compatibility	Low	Medium
6. Character	Medium	Medium
7. Scale	High	Low
8. VAC	Medium	Medium
9. View Distance	Medium	Medium
10. Critical Views	Medium	Medium

Table 8.6: Site Evaluation: Blue Corridor

Characteristics	Visual Criteria Rating	Visual Impact
1. Visibility	High	High
2. Genius Loci	Medium	Low
3. Visual quality	Low	Low
4. Social structures	Medium	Medium
5. Surrounding landscape compatibility	High	Medium
6. Character	Low	Low
7. Scale	Low	Medium
8. VAC	Low	High
9. View Distance	High	High
10. Critical Views	High	Low

Green Corridor

The Transmission power line will exert a negative influence on the visual environment. This is largely due to:

- medium visibility of the transmission line;
- high impact on the scenic visual quality and the sense of place;
- high impact on the surrounding eco-tourism land uses that are incompatible with visual degradation;
- high impact on selected critical views and
- the height of the pylons, especially where it crosses ridges, could be dominant in the landscape.

The overall significance of the visual impact is considered high negative during construction and operation notwithstanding any mitigation as discussed in this report.

Yellow Corridor

The Transmission power line will exert a negative influence on the visual environment. This is largely due to:

- medium visibility of the transmission line;
- high impact on the sense of place and on social structures such as farmsteads and lodges;
- the height of the pylons could be dominant in the landscape.

The overall significance during construction is regarded as medium negative and medium to high during operation.

Blue Corridor

The Transmission power line will exert a negative influence on the visual environment. This is largely due to:

- high visibility of the Transmission power line;
- high visibility of construction and operation activity within large areas of uniform visual pattern and flat topography;
- the low visual absorption capacity of the setting which is attributable to:
 - relatively flat to undulating topography;
 - the low vegetation height (less than one metre);
 - the lack of visual diversity; and
 - a general lack of rising landforms as a backdrop for most of the route; and
- the height of the pylons could be dominant in the landscape.

The significance of the visual impact during construction is regarded as medium due to the construction activities. This is, however, of a short duration until the rehabilitation is complete.

The overall significance of the visual impact of the Transmission power line during operation is regarded as remaining medium to low negative rather than moderate notwithstanding the implementation of the mitigation measures especially the route selection and the already visually disturbed routes by the existing infrastructure, Transmission power line, surrounding land uses and generally low visual scenic quality. Although it is not possible to screen the transmission line, the placement of the route where it is not readily seen in silhouette, will assist in minimising the visual impact. Furthermore the Transmission power line is often viewed from extended distances which diminish considerably the visual intrusion to where it becomes insignificant at distances beyond five kilometres.

In conclusion, it is the visual specialist's opinion that, based on the field observations and the studies herein, the blue corridor, from a visual point of view, is the least sensitive and therefore the most preferred corridor. This is predominantly due to the already visually disturbed area and the opportunity to avoid the more scenic sections of the affected study area.

It is further recommended that, in order to avoid the scenic White Mfolozi River Valley, the blue corridor route cross over just north of Emondlo to the green corridor and continue south to the Umfolozi Substation.

8.5 EVALUATION OF ALTERNATIVE CORRIDORS IN TERMS OF HERITAGE RESOURCES

Any one of the three transmission line routes selected will have a permanent adverse impact on the visual aspects of the cultural landscape, wherever it is placed.

However, this impact will be minimised by routing the line along valleys rather than ridges or skylines and is considered a best-case compromise, given the necessity of the transmission line for network strengthening

8.6 INTEGRATION AND IDENTIFICATION OF RECOMMENDED CORRIDOR

A project team integration meeting took place once the specialists had completed their specialist investigations. At this meeting the outcomes of the specialist studies were considered separately and jointly. Each specialist rated their preferred corridor in terms of the impacts on their specialist areas (**Table 8.7**).

Table 8.7: Preferred corridor

Specialist area	Corridor 1 (Green)	Corridor 2 (Yellow)	Corridor 3 (Blue)	Corridor 4 (Blue to Green)
Social	2	1	4	3
Landuse	3	4	1 (1)	2 (1)
Tourism	3	3	2	1
Visual	4	3	2	1
Ecology	3	4	2 (2)	1 (2)
Wetlands	3	4	1 (3)	1 (3)
Avi-fauna	4	3	1	2 (3)
Heritage Resources	3	4	1	2
Total	25	26	14	13

Notes:

- (1) Corridor 3 and 4 are very close to each other in terms of level of preference. The potential impact on Leopard Rock was the deciding factor. The potential impact on the Petronet pipeline as summarised below must be taken into account for these options.
- (2) The potential impact on the sensitive Zulu Rock area in the south west of the study area makes Corridor 4 preferable to Corridor 3.
- (3) The impact on wetlands is not affected by the difference in Corridor 3 and 4.
- (4) The avi-fauna specialist study identified the Blood River vlei as a "no-go" area in terms of the potential impact of the Transmission power line on birds. The recommended corridor therefore carefully avoids this sensitive area.

The outcome of the integration exercise is that the preferred, and therefore recommended corridor, is the fourth option, i.e. the blue/green corridor which comprises the blue corridor until north of the eMondlo complex at which point the route should traverse in an easterly direction until joining with the green corridor from where it continues southwards to the Umfolozi Substation (**Figure 1.1**). This corridor does, however, run parallel to the Petronet pipeline (**Figure A.3 in Appendix A**, for authorities only) and the recommendation assumes the proviso that the Petronet requirements for overhead cables, as summarised in **Chapter 6.6.2** and detailed in **Appendix B** are honoured. The motivation for the preferences for each aspect of the environment are explained in **Chapters 5, 6 and 7** and in **Appendices D to H**.

9. CONCLUSION AND RECOMMENDATIONS

A recommended corridor (Figure 1.1) within the blue-green corridor that is technically feasible and avoids all significant environmental issues has been identified.

The following particular aspects should receive attention in the implementation of the Transmission power line:

- The final route of the Transmission power line should:
 - Be within the recommended corridor;
 - Be aligned through the lower lying landforms and off the ridge lines;
 - Cross existing main roads as close to 90° as possible ;
 - Avoid alignment along the top of ridges; as well as
 - Position the towers on a midslope of a landform that rises to a plateau and koppie so that the plateau or koppie will form a background to the line.
- Vegetation, avi-faunal and heritage resources specialists should undertake a site inspection of each tower position and any new access roads to ensure that no endangered vegetation, sensitive avi-faunal habitat or heritage resources are compromised and advise on mitigation prior to construction.
- No towers or access roads should be placed in wetlands. If this is unavoidable, then a licence from DWAF must be obtained prior to construction.
- An avi-faunal specialist must identify the sections of the line that require demarcation for anti-collision devices once the route has been finalised. The following areas should be marked:
 - The entire section running through the EGBR;
 - All sections of line crossing a wetland or within 500 metres of a wetland;
 - All river crossings;
 - All sections of line crossing a centre pivot or within 500 metres of it; and
 - Sections of grassland identified as being particularly sensitive for cranes, bustards and korhaans.
- The galvanising of pylons should be allowed to weather to a matt grey finish rather than be painted.
- Self-supporting strain towers must be protected with bird guards.
- The location of construction camps should be carefully considered. Newcastle, Utrecht, and Vryheid are better locations compared to eMondlo, Osizweni, and Nquthu.
- In addition to the standard process followed by Eskom for the resettlement of houses an interpreter, who is also preferably a sociologist, should accompany the negotiator when negotiation with the Nkosi/affected parties takes place. The impact should be softened by enhancing positive impacts. The sociologist should assess whether the mitigation is concluded satisfactory, to the benefit of the affected parties. The sociologist should be in contact with the affected parties after resettlement had taken place to gauge the well-being of the affected parties.

- Petronet requirements for pipeline crossings must be honoured; and
- Specific mitigation requirements included in the Construction EMP (**Appendix I**) must be adhered to.

The EIA team believes that the EIA for the proposed Majuba-Umfolozi 876kV Transmission power line fulfils the process requirements of current legislation. Issues and associated impacts have been investigated by a team of qualified specialists who have reported on their findings without reservation. Extensive efforts have been made to identify and involve all potentially affected parties in the Public Participation Process. The public has been afforded numerous opportunities to participate in the EIA and all concerns raised have been addressed.

The recommendations set out in the Key Findings of the EIA section above are therefore presented for project implementation and the EIR will be presented to the relevant authorities for decision making on this basis.

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Appendix A

LAYOUT OF MAJUBA AND UMFOLOZI SUBSTATIONS

- Figure A.1 – New bay at the Majuba Power Station
- Figure A.2 – New bay at the Ulundi Substation
- Figure A.3 – Petronet pipeline
- Petronet Requirements Letter

Appendix B

STAKEHOLDER DATABASE

- **Figure B.1: Public Participation map showing landowner participation and farmer's organisations**
- **Figure B.2: Traditional authorities**
- **Stakeholder Database**

Appendix C

ISSUES AND RESPONSES REPORT

Appendix D

**SOCIAL, TOURISM AND LANDUSE
SPECIALIST REPORT**

Appendix E

VISUAL IMPACT ASSESSMENT

Appendix F

**HERITAGE RESOURCES
SPECIALIST STUDY**

Appendix G

ECOLOGICAL SPECIALIST STUDY

Appendix H

AVI-FAUNA SPECIALIST STUDY

Appendix I

FRAMEWORK ENVIRONMENTAL MANAGEMENT PLAN FOR CONSTRUCTION