Eskom Holdings Limited
Transmission Division

PROPOSED FOSKOR-MERENSKY 275 kV±131 KM LINE AND ASSOCIATED SUBSTATION WORKS

DEA Reference Number: DEA REFERENCE: 12/12/20/2411

DRAFT SOCIAL IMPACT ASSESSMENT REPORT
June 2012

Prepared by:

Dr. Neville Bews & Associates
Social Impact Assessors
PO Box 145412
Bracken Gardens
1452

Submitted to:

NSOVO Environmental Consulting
1056 Crescentwood Estate
8th Road,
Noordwyk
1687

Table of Content

List of Bar Charts

List of Figures

List of Tables

List of Acronyms

A1	Alternative 1 (Green Route)
A2	Alternative 2 (Blue Route)
A3	Alternative 3 (Pink Route)
A4	Alternative 4 (Yellow Route)
AIDS	Acquired immunodeficiency syndrome
DC47	Greater Sekhukhune District Municipality
DC33	Mopani District Municipality
DC35	Capricorn District Municipality
DEAT	Department of Environmental Affairs and Tourism (National)
EIA	Environmental Impact Assessment
EMFs	Electromagnetic fields
ESKOM	Eskom Holdings SOC Limited
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IRR	Issues Response Report
kV	Kilovolt
LIM475	Greater Tubatse Local Municipality
LIM474	Fetakgomo Local Municipality
LIM355	Lepele-Nkumpi Local Municipality
LIM334	Ba-Phalaborwa Local Municipality
LIM335	Maruleng Local Municipality
MW	Megawatt
MR	Main Route
NBA	Dr. Neville Bews & Associates
NGO	Non-Governmental Organisation
PA	Per Annum (Yearly)
PPP	Public Participation Process
RAP	Resettlement Action Plan
SIA	Social Impact Assessment
SMME	Small Medium and Micro Enterprises
Stats SA	Statistics South Africa
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
WHO	World Health Organisation

Details and Experience of Independent Consultant

Consultant:	Dr Neville Bews & Associates
Contact person:	Neville Bews
Physical address:	84 Hennie Alberts Street, Brackenhurst Alberton
Postal address:	P O Box 145412, Bracken Gardens, Alberton, 1452
Telephone:	+27 11 867-0462
Mobile:	+27 82 557-3489
Fax:	+27 86 621-8345
Email:	bewsco@netactive.co.za
Website:	www.socialassessment.co.za

Qualifications:

University of South Africa: B.A. (Honours) – 1984

Henley Management College, United Kingdom: The Henley Post-Graduate Certificate in Management – 1997

Rand Afrikaans University: M.A. (cum laude) – 1999

Rand Afrikaans University: D. Litt. et Phil. – 2000

Experience:

Over 30 years in the Human Resources (HR) field and 11 years in Social Impact Assessments.

Neville Bews has consulted extensively in the field of Social Impact Assessments. Some of the projects completed by Neville include the Gautrain Rapid Rail Link SIA, Australian – South African sports development programme impact, Kumba Resources Sishen South Project SIA, The United Nations Office on Drugs and Crime Evaluation of a Centre for Violence Against Women, SIAs at Leeuwpan Coal Mine Delmas, Glen Douglas Dolomite Mine Henely-on-Klip, Grootegeluk Open Cast Coal Mine, SANRAL – Social Impact Assessment of tolling the Gauteng Highway System, SANRAL – Social Impact Assessment of the N2 Wild Coast Toll Highway, University of Johannesburg – Research into research outputs of the University, the Social Impact Assessment for Waterfall Wedge housing and business development in Midrand Gauteng, the social impact assessment for the Environmental Management Plan for Sedibeng District Municipality. Exxaro Ltd. – Social and Labour Plan for the Belfast Project, Golder Associates Africa (Pty) Ltd – SIA for the Transnet New Multi-Product Pipeline (Commercial Farmers); Golder Associates Africa (Pty) Ltd – SIA for the Proposed Vale Moatize Power Plant Project in Mozambique. Kumba

Resources Ltd. – SIA for the Proposed Dingleton Resettlement Project at Sishen Iron Ore Mine; EcoPartners – SIA for Gold Fields West Wits Project. Exxaro Resources Ltd. – SIA for the Belfast Project. KV3 Engineers – SIA for Eskom Holdings Ltd's Proposed Ubertas 88/11 kV Substation. Cave Klapwijk and Associates SIA for the N3 Toll Road Route Location Initiative – Tugela Plaza to Warden. NEMAI Consulting – SIA for the Mokolo and Crocodile River (West) Water Augmentation Project. Kalahari Survey Solutions – SIA for the Proposed 150 MW Photovoltaic Power Plant and Associated Infrastructure, Potchefstroom. NEMAI Consulting – SIA for Eskom Holdings Limited's Neptune-Poseidon 400 kV Power Line near East London. eThekwini Municipality – SIA for the Proposed Infilling of the Model Yacht Pond at Blue Lagoon, Stiebel Place, Durban. NEMAI Consulting – SIA for the Ncwabeni: Off-Channel Storage Dam, KwaZulu-Natal.

Neville regularly lectures as a guest lecturer in the Department of Sociology at both the Universities of Johannesburg and Pretoria. At the University of Johannesburg he collaborated with Prof. Henk Becker of Utrecht University, the Netherlands, in a joint lecture to present the Social Impact Assessment Masters course via video link between the Netherlands and South Africa. Neville has also presented papers on Social Impact Assessments at both national and international seminars and has published widely at both a national and international level.

Declaration of Consultant's Independence

I, the undersigned,

Neville Frederick Bews

Id No: 5201085107083

do hereby declare as follows:

- I am employed at Dr. Neville Bews & Associates and have been appointed to undertake a Social Impact Assessment in respect of the following Environmental Authorisation application

- **Eskom Holdings' Transmission Division's Proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works DEA REFERENCE: 12/12/20/2411**

- I hereby confirm my independence, as well as that of Dr. Neville Bews & Associates as a specialist;

- Neither I nor Dr. Neville Bews & Associates have any interest, be it business, financial, personal or other, in any proposed activity, other than fair remuneration for work performed;

- I have performed the work relating to the application in an objective manner;

- I have the expertise as required in terms of Sections 17 and 32 of Regulation 543 issued in terms of the National Environmental Management Act 107 of 1998. In this regard refer to the "Details and Experience of the Independent Consultant" above;

- I have complied with the National Environmental Management Act and all applicable legislation.

SIGNED AT ALBERTON ON THIS 17th DAY OF JUNE 2012

Executive Summary

1. Dr. Neville Bews & Associates was sub-contracted by NSOVO Environmental Consulting to undertake a Social Impact Assessment (SIA) for Eskom Transmission Division's proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works.

2. The construction of the proposed power line has become necessary as the existing Eskom network has reached its capacity and will no longer be able to cope with projected future demands.

3. Consequently, Eskom plans to strengthen the existing network by constructing a 2nd Foskor Merensky 275 kV ±131 km power line and associated substation works in order to strengthen the supply network in the area and thus cater for future demand which is driven by mines and rural development in the region.

4. The proposed project stretches over a distance of ±131 km with 4 route alternatives having been identified.

5. These alternatives traverse various farms, including game farms, nature and game reserves, residential and industrial areas all located between Phalaborwa and Steelpoort within the municipal areas of.

    Mopani District Municipality (DC33)
        Ba-Phalaborwa Local Municipality (LIM334)
        Maruleng Local Municipality (LIM335)
    Capricorn District Municipality (DC35)
        Lepele-Nkumpi Local Municipality (LIM355)
    Greater Sekhukhune District Municipality (DC47)
        Fetakgomo Local Municipality (LIM474)
        Greater Tubatse Local Municipality (LIM475).

6. These areas are characterised by high levels of poverty, unemployment and an unequal distribution of income with relatively low service delivery. The prevalence of HIV and AIDS amongst antenatal women in the area is at its highest in Mopani at 24.9% and lowest in Sekhukhune at 20.2% which is somewhat lower than the national average of 30.2%.

7. The project consists of a construction and operational phase, with much of the activity centred on the construction of the line.

8. Construction will commence with the pegging of the footprint followed by setting up of a construction camp, securing the servitude, building of access roads, excavation and preparation of the tower foundation through to the stringing of the transmission cables. During the operational phase of the project Eskom requires access to the line at all times in order to undertake maintenance and repair work which is expected to occur on average twice a year.

9. The following 20 impacts associated with the project were identified and assessed, across each of the 4 alternative routes, in respect of both the construction and operational phases of the project.

    - Access across site
    - Access to servitude across private property
    - Crime and security
    - Disturbance of cultural, spiritual and religious sites
    - Disturbance of sense of place
    - Economic issues
    - Fencing
    - Fire risk
    - Health issues
    - Impact on farming operations
    - Job creation
    - Noise
    - Resettlement
    - Safety hazards associated with people and animals
    - Services and infrastructure
    - SMME opportunities
    - STDs, HIV and AIDS risk
    - Social instability
    - Traffic disruption

10. In respect of these impacts it was found that most related to the construction phase of the project and that many of these impacts could be reduced through appropriate mitigation measures being applied.

11. Amongst the more serious impacts were those relating to the operational phase of the project and associated with health issues and property values.

12. Of concern is that alternatives 1, 2 and 4 all affect a number of properties within the Balule Nature Reserve and the management of the reserve believes that this will negatively impact the vision, mission and objectives of the reserve, thus having a negative effect on the future management of the value of properties in the reserve.

13. In the village of Finale a pylon, associated with Alternative 1, is positioned virtually at the gate of a primary school and the transmission line will pass over a number of dwellings and will affect a number of burial sites. The village of Alverton also has a number of dwellings positioned directly under the transmission line and, at the village of Mashamthane, a law firm has been built directly under the proposed line.

14. Considering the no-go alternative this is likely to have even greater social consequences, particularly if the security of electricity supply is compromised. With the various developments, both industrial and residential, taking place in the country the need to secure a dependable electricity supply is of national importance and consequently the no-go alternative is not a viable option.

15. Considering the social effects of this project and the clear need to strengthen the electricity grid in this region a compromise will need to be negotiated between project proponents and affected parties. Further to this, consideration will need to be given to the technical limitation that a project of this nature faces as well as to the broader environmental threats it poses in respect of such matters as fauna and flora and threats to sensitive natural areas. The nature of the transmission line is such that it is possible to retain a route alternative while making more localised adjustments in an effort to accommodate local conditions. The need for and nature of localised adjustments will only become clearly evident during a corridor walk-down, when the central line and footprint of the transmission line and towers will be pegged and any flaws to the initial route will be identified

1. Introduction

Dr. Neville Bews & Associates have been sub-contracted by NSOVO Environmental Consulting to undertake a Social Impact Assessment (SIA) for Eskom Transmission Division's proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works. The construction of the proposed power line has become necessary as the existing Eskom network has reached its capacity and will no longer be able to cope with projected future demands. Consequently, Eskom plans to strengthen the existing network by constructing a 2nd Foskor Merensky 275 kV ±131 km power line and associated substation works in order to strengthen the supply network in the area and, thus cater for future demand which are being is driven by mines and rural development in the region.

2. Project Description

The activities associated with the proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works will include the following:

- Upgrading the Foskor 275/132 kV transformation by installing a 3rd 250 MVA 275/132 kV;
- Establish a spare 275 kV feeder bay at Merensky MTS to create space for the proposed 2nd Merensky-Foskor 275 kV line;
- Install and equip 1x 275 kV feeder bay for the proposed 2nd Merensky-Foskor 275 kV line at Foskor Substation.
- Construct the 2nd Foskor–Merensky 150 km Kingbird 275 kV line;
- Equip and commission all new infrastructures with all associated primary and secondary plant equipment;
- Upgrade under-rated switchgear at Merensky Substation;
- Install Capacitor Bank at Foskor Substation;
- Extend Foskor Substation to accommodate all the work associated with the new power line;
- Relocation of Acornhoek-Foskor terminal tower to accommodate the new power line;
- Relocation of the existing oil holding dam to accommodate the new power line.

2.1. Project location

The proposed line is located within the Limpopo Province stretching between the towns of Phalaborwa in the northeast and Steelpoort in the southwest. It crosses a number of farms, the majority of which are privately owned game farms as well as tribal authorities and council owned land. The following district and local municipalities are traversed by the project.

- Mopani District Municipality (DC33).
  - Ba-Phalaborwa Local Municipality (LIM334.
  - Maruleng Local Municipality (LIM335)
- Capricorn District Municipality (DC35).
  - Lepele-Nkumpi Local Municipality (LIM355)
- Greater Sekhukhune District Municipality (DC47)
  - Fetakgomo Local Municipality (LIM474);
  - Greater Tubatse Local Municipality (LIM475);

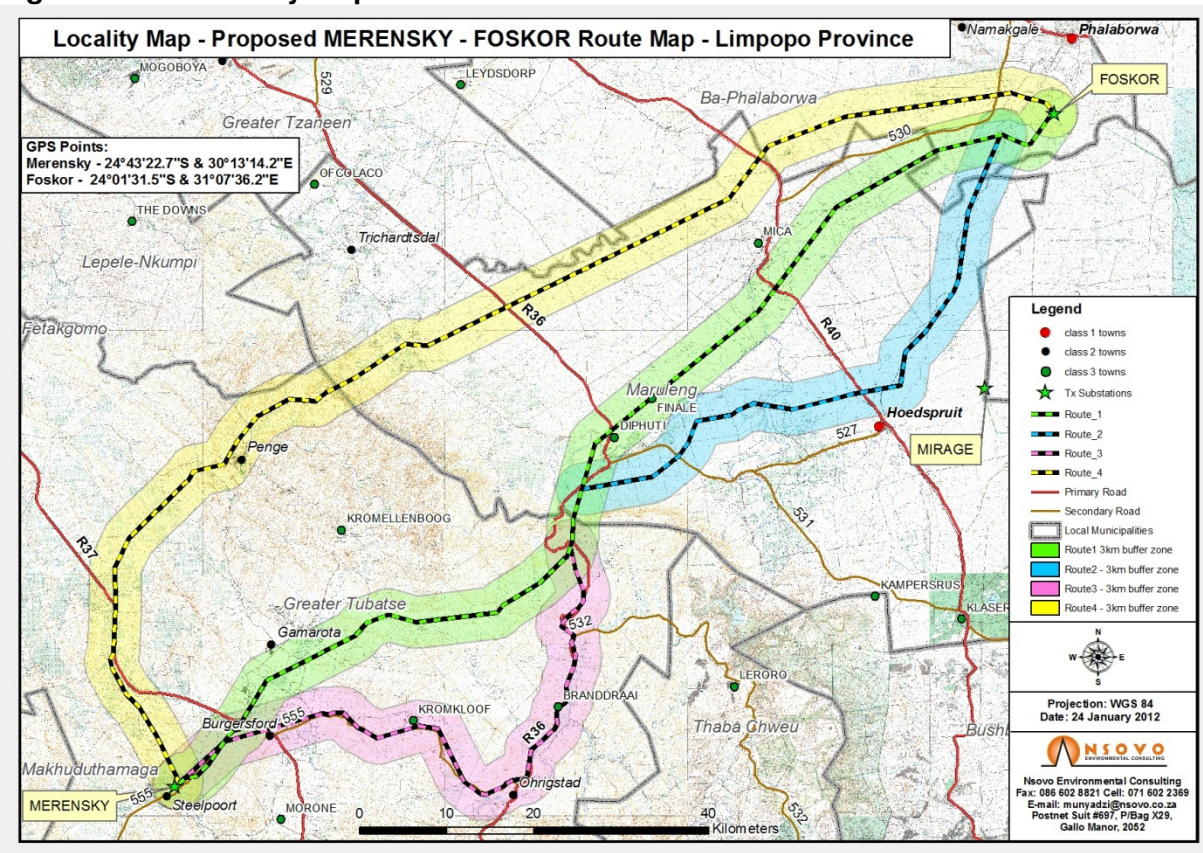
The following towns are also crossed;

- Class 1 towns – Phalaborwa and Hoedspruit
- Class 2 towns – Gamarota, Burgersfort, Orighstad and Steelpoort
- Class 3 towns – Diphuti, Finale, Mica, Kromkloof and Brandraai

The land use description of the general area of the project includes mining; farming, predominantly game farming; residential; commercial and industrial use. The area has a vibrant tourist industry with a number of game reserves, lodges and guesthouses and is renowned for its natural attraction. There are also existing power lines in the area as well as airstrips and airports and an Air Force base. The line will also cross various regional and local roads.

There are four route alternatives and a no-go option that will be considered. These route alternatives are illustrated in the location map provided in Figure 1 and are described below.

Figure 1: Locality map



2.2. Route alternatives

The following four route alternatives are considered for the project.

- Alternative 1 (Green Route)

This route loops out of the existing Foskor substation in a south-westerly direction. It continues along the R530 towards Mica crossing the R40 continuing in the same direction within the Phuza Moya Game Farm. The line intersects the villages of Finale and Diphutin eventually crossing the R36 towards the Orchards. It crosses the R36 again on two more occasions before entering a lightning prone mountainous area which it exits while descending in a south westerly direction towards the low lying Burgersfort villages. After that it crosses the R37 continuing into the town of Burgersfort and then along the secondary road 555 to Steelpoort, which it crosses before eventually entering the substation.

- Alternative 2 (Blue Route)

This route loops out of the existing Foskor substation in Phalaborwa in a south-westerly direction for approximately 5 km. It then curves in a westerly direction for another 5 km and then bends southward towards the town of Hoedspruit following the existing 132 kV line. Just before Hoedspruit the route crosses the R40 and curves westwards where it is situated

between the existing 275 kV line and secondary road 527 on the eastern side of Finale and Diphuti villages. The route then crosses the secondary road 531 and heads for the lightning prone mountainous region which it eventually exits following the exact path of alternative 1 described above.

- Alternative 3 (Pink Route)

This route leaves the Foskor substation following that of alternative 1 until it exits the mountainous areas where it descends in a southerly direction towards Orighstad progressing along a river and bending westwards along the secondary road 555. It passes Kromkloof, re-joining alternative 1 at Burgersfort until it enters the Merensky substation in Steelpoort.

- Alternative 4 (Yellow Route)

This route loops out of the existing Foskor substation in a northerly direction bending north-westerly before progressing along the secondary road 530 and eventually crossing the R40 some 15 km north of Mica. As it continues the route traverses villages and farmlands until crossing the R36 and entering the mountainous areas where it approaches Penge. After Penge it progresses towards the R37 curving southwards and eventually crossing the R37. The route finally enters the Merensky substation on the western side.

- No-Go Alternative

The final alternative concerns the project not proceeding. This would result in the current state remaining and future electricity supply in the area being compromised which would have both regional and national consequences.

2.3. Technical alternatives

As the capacity of the cable exceeds 132 kV the option of placing the cable underground is not viable for a number of reasons.

- Due to electrical loss and heat control underground cables are up to 4 times the diameter and 10 times the weight of overhead lines;
- The three phases of low and medium voltage cables, up to 132 kV, can be placed in the same trench, while the phases for higher voltage cables must be spaced apart, typically in a flat formation;
- Maintenance of underground cables is technically difficult, time consuming and expensive;
- The cost of underground cabling is 3 to 10 times more than that of overhead lines;
- The lifespan of underground lines is about half that of overhead lines.

2.4. Construction process

It is estimated that construction will take 18 months to complete and will entail the following processes:

- Corridor walk-down:

To identify the exact coordinates on which the pylons will be situated and to identify any sensitive areas and create the necessary conservation buffer zones. The central line and footprint of the transmission line and towers will be pegged by a team of surveyors. This process requires that access to properties be negotiated with the relevant property owners and will result in the first basic track being laid along the route. Through this process any flaws to the initial route will be identified which may result in route relocation.

- Construction Camps

The establishment of construction camps through negotiations with landowners. These sites are to be established in accordance with Eskom Transmission's '*Generic Environmental Management Plan – Line Construction*' and are likely to take a similar form to that illustrated below in Figure 2.

Figure 2: Examples of typical Eskom construction camps

- Vegetation clearance

The requirements for a 275 kV line is a 47 meter wide servitude which is cleared of any tall trees along the entire length and maintained in this condition throughout the operation of the line.

- Pylon footings

Excavation for tower and anchor foundations are made by drilling-rig, and foundations are filled with concrete to form a concrete plinth on which to fix the towers. The size of the foundations varies depending on variables such as type of tower and soil conditions. This work is usually undertaken by teams of between 10 and 15 people operating equipment such as a drilling rig and generator. Where the safety of people and/or animals may be at risk it is required that the contractors fence off the construction site during construction. The anchor holes are covered with a safety plate. Typical drilling equipment and excavation activities are illustrated in Figure 3 below.

Figure 3: Excavations for pylons

Drilling equipment

Drilling activity

Foundation steelwork

Foundation steelwork is undertaken by a separate team who position and secure the premade foundation structures in the foundation holes as illustrated above in Figure 3. A third team will fill the foundation with 'Ready-Mix' concrete delivered by truck containing 6 m^2

of concrete or, where access is a problem for delivery, concrete is mixed on site by hand or using a mini mixer. Concrete is left to cure for 28 days.

- Steelwork structures

The assembly of the steel structures commences approximately 1 month after the foundation has been poured. Steel is delivered to the site by truck or, if access is difficult, by helicopter and the pylon is assembled on site. Access roads are clearly marked to facilitate access to and between towers. Once assembly is completed the erection team will take over using a 70-ton mobile crane to raise the pylon or, if access is difficult, a helicopter may be used. This procedure is illustrated below in Figure 4.

Figure 4: Pylon assembly

Steel delivered for assembly

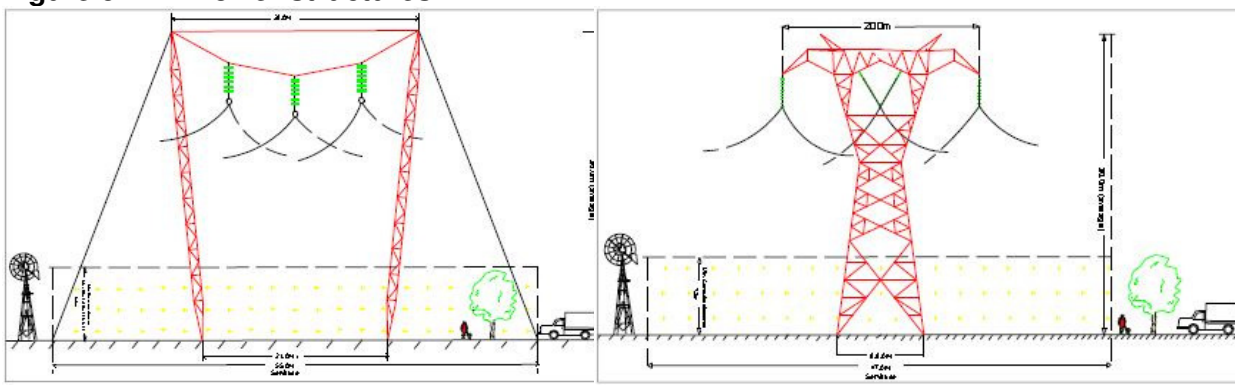
Assembled pylon

Raising the pylon

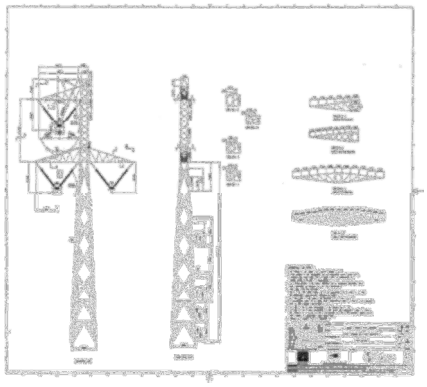
Two tower design alternatives have been proposed for this project, the cross-rope suspension type and the self-supporting type. The choice of tower alternative will largely depend on topographical conditions. Where the line crosses mountainous terrains and when

it changes direction at an angle, the preferred choice is self-supporting towers. In areas where space is a limiting factor, narrow base towers may be utilised. The various tower designs are illustrated below in Figure 5.

Figure 5: Tower structures



Cross-rope suspension tower **Self-supporting tower**



Narrow based tower

- Stringing

The final stage of the construction process, illustrated below in Figure 6, is stringing the transmission line. The first phase of this process is the delivery of cable and equipment to site by truck. Following this two cable drums, carrying about 2.5 km of cable are placed roughly 5 km apart and a winch is positioned between these two cable drums. A pilot tractor is then driven along the route to lay the pilot cable by means of hoisting the cable onto the pylons through a pulley system. In mountainous areas as is the case with this project, the pilot cables may be flown in by helicopter or shot across valleys. The line is generally strung in sections usually from bend to bend. In the final steps in the process the correct tension is created by a small team using survey equipment. Conductors are then clamped at the towers and any excess cable is cut off.

Figure 6: Stringing transmission cable

Cable drums

Stringing pilot cable with pilot tractor

Using pulleys to hoist cable

- Site reinstatement and rehabilitation

After each of the construction stages described above site reinstatement and rehabilitation will take place as follows;

- Removal of excess building material, and waste;
- Repairing any damaged caused as part of the construction activities;
- Rehabilitating the area affected by temporary access roads;
- Reinstating existing roads and
- Replacing topsoil and planting indigenous grasses if necessary.

- Inaccessible sites

In areas where it is difficult to reach and/or in sensitive areas it may be necessary to excavate by hand and/or use a helicopter to deliver material and/or to raise towers and/or string cables. Due to expense, this approach is not the preferred approach and will only be used if required.

- Other infrastructure

Feeder bays will be erected in the existing footprint of the Foskor and Merensky Substations in Phalaborwa as well as at Steelpoort. Underrated switchgear at Merensky Substation will be upgraded. A capacitor bank is to be installed at Foskor Substation and Foskor Substation is to be extended. The Acornhoek-Foskor terminal tower will be relocated as will the existing oil holding dam in both cases to accommodate the new power line. The existing Foskor and Merensky substations are illustrated in Figure 7 below, together with an example of an oil holding dam.

Figure 7: View of substations and associated infrastructure

View of Foskor Substation

View of Merensky Substation

Busbar for the proposed 275kV line

Example of an oil holding dam

2.5. Operation and maintenance

During the operational phase of the project general farming activities, such as the grazing of animals and the cultivation of crops, may continue within the servitude. However, the servitude will need to be kept clear of any vegetation, structures or activities that that may interfere with the line. Eskom will also require access to the transmission lines in order to undertake maintenance and perform any necessary repair work. Such activities are unlikely to occur more than twice a year. During operation it is likely that the line will emit electromagnetic fields of varying intensity, this would depend on a range of factors, such as

carrying capacity of the line, proximity of people and animals along the route, humidity levels.

3. Terms of Reference

The terms of reference of the study are to:

- Conduct a review of available data, including Statistics SA data, various reports generated for the Proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works and documentation compiled during the public participation process;
- Identify potential social impacts during both the construction and operational phases of the proposed project;
- Recommend appropriate optimisation measures to maximise positive impacts and mitigation measures to avoid or minimise the severity of the identified negative social impacts.

Issues excluded from this study and dealt with in other specialist reports are:

- The macro economic impacts associated with the project;
- The potential impacts of the project on property values;
- It was assumed that the data provided by Nsovo Environmental Consulting was a correct reflection of the EIA process to this point.

The methodological approach employed during the study will now be described.

4. Methodology

Both a quantitative and qualitative methodological approach was applied throughout the study, in a research technique referred to as triangulation. A recognised impact assessment technique was applied in assessing the impacts and is described below in greater detail.

4.1. Data collection methods

Data was gathered through:

- A scan and analysis of the Draft Scoping Report prepared for the project by Nsovo Environmental Consulting
- Statistics South Africa, Census 2001; Community Survey 2007; Mid-year population estimates; Quarterly Labour Force Survey 2012.

- A comprehensive scan of the Public Participation containing the issues and responses.
- A review of maps and aerial photographs of the routes.
- Interviews and discussions with the Public Participation Consultant.
- Interviews and discussions with the Environmental Impact Assessment Consultants.
- A literature review of various documents such as the relevant municipal Integrated Development Plans (IDPs) and other specialist reports and documents.
- A broader literature scan.

4.2. Assessment technique

The assessment criteria used in evaluating the impacts of the various route alternatives of the Proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works are as follows.

Status
The project could have a positive, negative or neutral impact on the environment.

Extent
- **Local** - extend to the site and its immediate surroundings.
- **Regional** - impact on the region but within the province.
- **National** - impact on an interprovincial scale.
- **International** - impact outside of South Africa.

Magnitude
Degree to which impact may cause irreplaceable loss of resources.
- **Low** - natural and social functions and processes are not affected or minimally affected.
- **Medium** - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- **High** - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Duration
- **Short term** - 0-5 years.
- **Medium term** - 5-11 years.
- **Long term** - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- **Permanent** - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability
- **Almost certain** - the event is expected to occur in most circumstances.
- **Likely** - the event will probably occur in most circumstances.
- **Moderate** - the event should occur at some time.
- **Unlikely** - the event could occur at some time.
- Rare/Remote - the event may occur only in exceptional circumstances.

Significance
Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-
0 – Impact will not affect the environment. No mitigation necessary.
1 – No impact after mitigation.
2 – Residual impact after mitigation.
3 – Impact cannot be mitigated.

Attention will now turned towards the limitations of the study.

4.3. Study limitations and assumptions

The most recent data at municipal ward level, that is available from Statistics South Africa, dates back to that gathered during Census 2001, which makes it rather out-dated. The situation is not much better at the local and district levels as the most recent data available from Stats SA was gathered during Community Survey, 2007, some 5 years ago. Consequently there are certain limitations attached to the data available from Statistics South Africa that will be reflected in this study.

An effort was made to gather data from a wide range of sources, however, much of the data in this report was made available by the Environmental Impact Assessment (EIA) consultants, Nsovo Environmental Consulting, and relies on the accuracy of the data made available. As is the nature of social research, the results of this study cannot be generalised and applied to the entire population across the whole area and is restricted to the specific study area. A demographic description of the study area will now be provided.

5. Demographic Description of the Area

The proposed project is located within the Limpopo Province and traverses the following district and local municipalities:

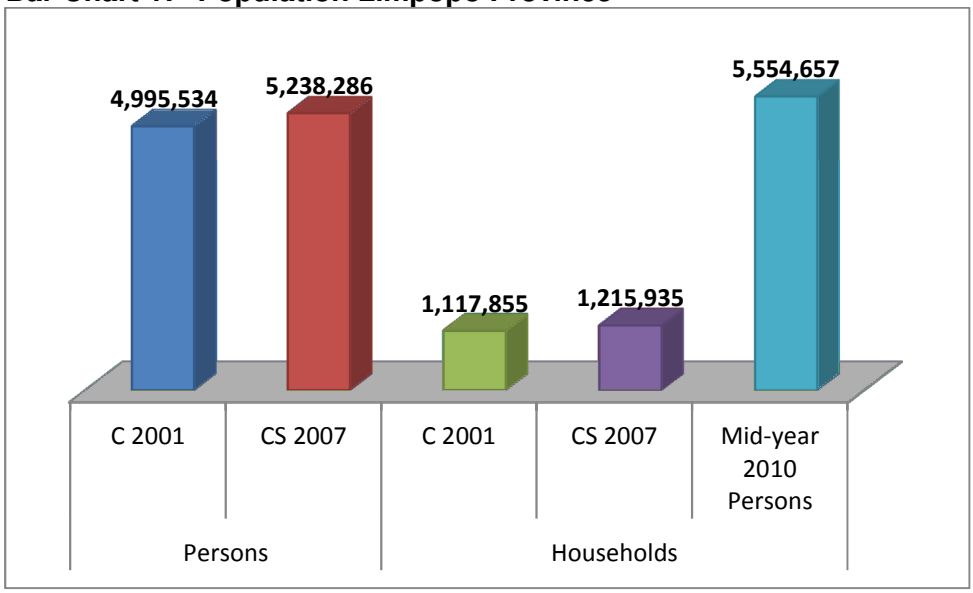
- Mopani District Municipality (DC33).
    - Ba-Phalaborwa Local Municipality (LIM334.
    - Maruleng Local Municipality (LIM335)
- Capricorn District Municipality (DC35).
    - Lepele-Nkumpi Local Municipality (LIM355)
- Greater Sekhukhune District Municipality (DC47)
    - Fetakgomo Local Municipality (LIM474);
    - Greater Tubatse Local Municipality (LIM475);

A demographic description of the region at the provincial, district and local municipal levels is provided below.

5.1. Provincial description

Limpopo Province covers a geographical area of approximately 125 754 km^2 which accounts for some 10.2% of the land mass of South Africa. During Census 2001 the population was calculated at 4 995 534 people distributed within 1 117 855 households and by 2007 it was estimated to have increased to 5 238 286 people distributed within 1 215 935 households (Statistics South Africa, 2007, p. 13). According to Stats SA in July, 2011 the population of Limpopo Province was estimated at 5 554 657 people accounting for 10.98% of the entire population of the country (Statistics South Africa, 2011, p. 3). This data is graphically illustrated by means of Bar Chart 1 below.

Bar Chart 1: Population Limpopo Province



Data source: (Statistics South Africa, 2007; 2011)

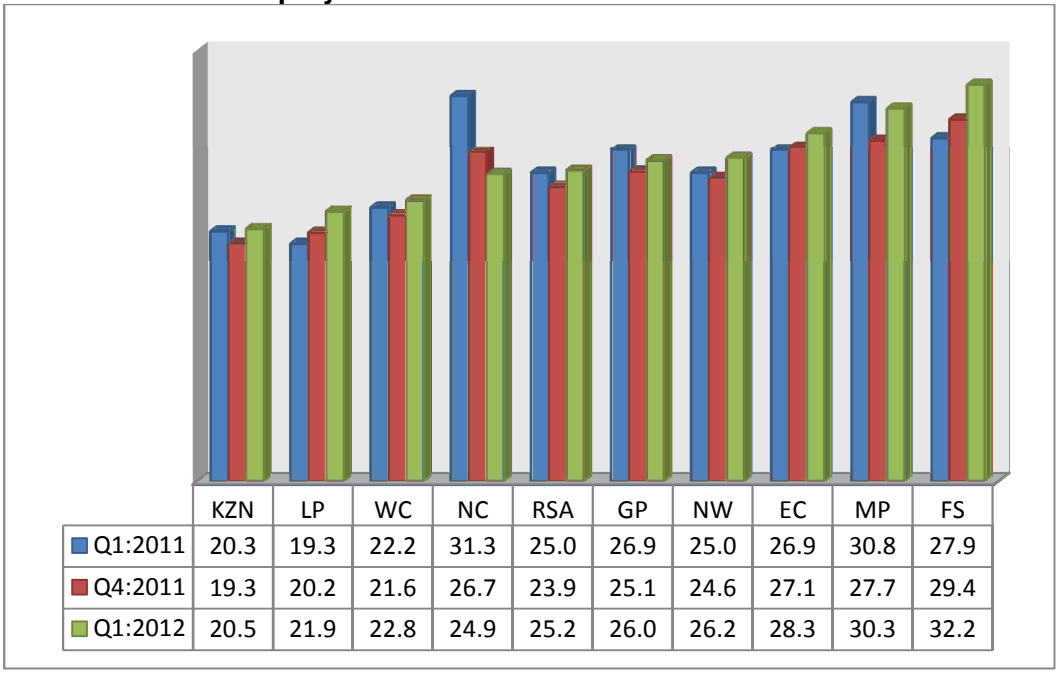
The province has a population density of 41.6/km^2, and incorporates the following 5 districts:

- Capricorn;
- Mopani;
- Vhembe;
- Waterberg;
- Sekhukhune.

A comparison of the unemployment figures for Limpopo Province indicates that the level of unemployment in the province increased year-on-year from 19.3% in the 1st Quarter of 2011 to 21.9% in the 1st Quarter of 2012. When compared to that of the rest of South Africa,

Limpopo has the second lowest level of unemployment in the country with only KwaZulu-Natal having a lower level at 20.5% (Statistics South Africa, 2012, p. xvi). This data is presented below in Bar Chart 2.

Bar Chart 2: Unemployment in South Africa Q1:2011-Q1:2012



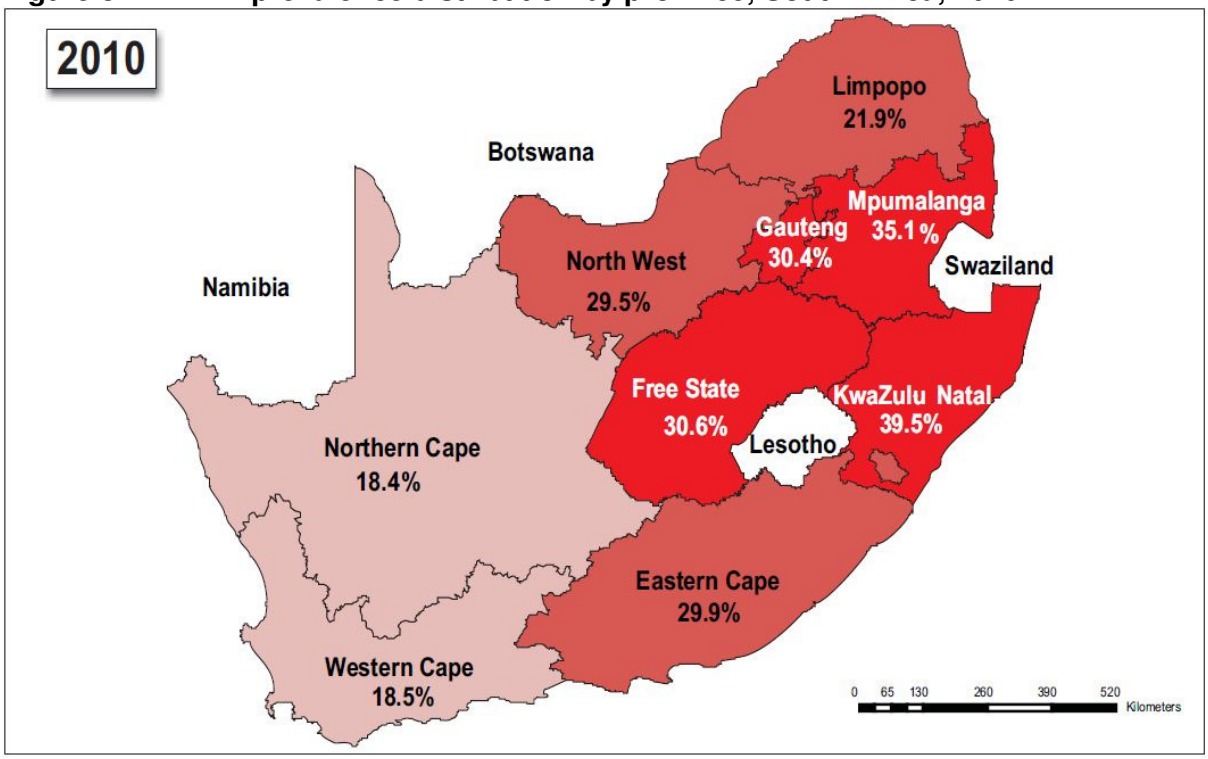
	KZN	LP	WC	NC	RSA	GP	NW	EC	MP	FS
Q1:2011	20.3	19.3	22.2	31.3	25.0	26.9	25.0	26.9	30.8	27.9
Q4:2011	19.3	20.2	21.6	26.7	23.9	25.1	24.6	27.1	27.7	29.4
Q1:2012	20.5	21.9	22.8	24.9	25.2	26.0	26.2	28.3	30.3	32.2

Data source: (Statistics South Africa, 2007)

It is, however, important to note that when considering the unemployment levels discussed above, Statistics South Africa's official definition of unemployment is used. This definition includes amongst the unemployed, those persons between 15 – 64 years who, "[*a]ctively looked for work or tried to start a business in the four weeks preceding the survey interview*" (Statistics South Africa, 2012, p. xxi). This, being the narrow definition of unemployment excludes those discouraged work seekers who may no longer have been actively looking for work but who remained unemployed and disillusioned.

In recent research undertaken by the National Department of Health (2011, pp. 34-35) it is indicated that Limpopo Province has an HIV prevalence rate amongst antenatal women of 21.9% compared to a national prevalence rate of 30.2% in 2010. The HIV prevalence rate amongst antenatal women is compared below in Figure 8 across all provinces.

Figure 8: HIV prevalence distribution by province, South Africa, 2010



(National Department of Health, 2011, p. 40)

Limpopo Province is largely a rural area and, in 2004, was identified as the poorest province in South Africa with 77% of its population living in poverty, just above the Eastern Cape which has 72% of its population living in poverty (Schwabe, 2004). The province has a typical developing economy reliant on the export of primary products and the import of services and manufactured goods. The drivers of the economy are agriculture, with a heavy emphasis on game farming; mining, particularly the platinum metals, chromium, iron ore and coal and tourism, due largely to the high number of game reserves and farms in the area.

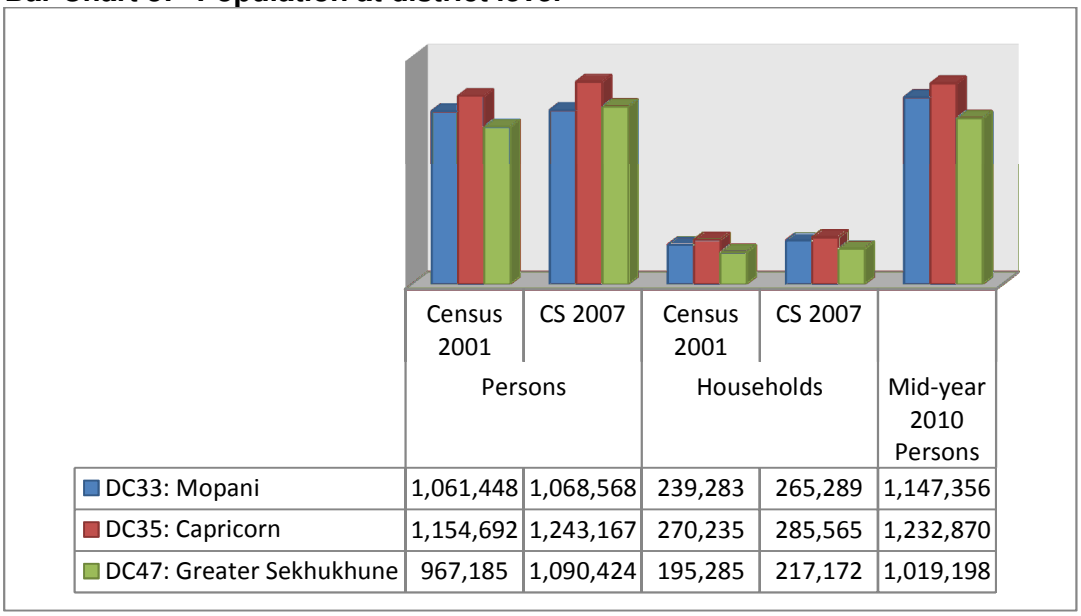
5.2. Municipal description

The demographics of the 3 district and 5 local municipalities through which the transmission line passes, will now be discussed and compared. This comparison is undertaken, on the basis of data gathered during the Community Survey, 2007 and is the most recent data available from Statistics South Africa at a municipal level. In respect of HIV prevalence rate amongst antenatal women the only data available is at the national, provincial and district levels and consequently, the local municipalities cannot be included in this comparison.

Of the three districts that are traversed by the power line, at 21 709 km^2 Capricorn covers the largest geographical area and, with a population of 1 243 167 people living within 285 565 households in 2007, projected at 1 232 870 people in 2010, Capricorn has a

population density of 56.8/km^2. Mopani covers the 2nd largest area at 20 011 km^2 and, with a population of 1 068 568 people living in 265 289 households in 2007 and a projected population of 1 147 356 in 2010, the district's population density is 57.3/km^2. Greater Sekhukhune, which covers a geographical area of 13 528 km and has a population of 1 090 424 people living in 217 175 households in 2007 projected to be 1 019 198 people in 2010, it is the most densely populated district, with a population density of 75.3/km^2. The population distribution across all three district municipalities is illustrated in Bar Chart 3 below.

Bar Chart 3: Population at district level

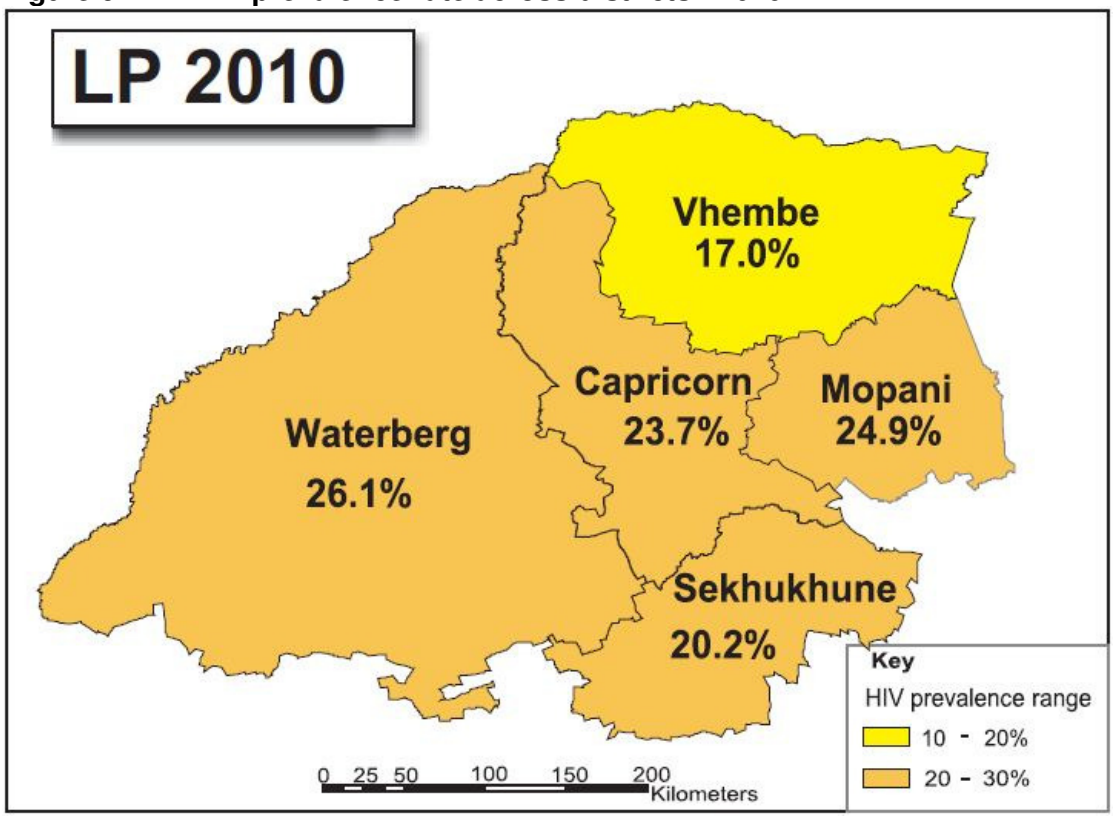


	Persons		Households		
	Census 2001	CS 2007	Census 2001	CS 2007	Mid-year 2010 Persons
DC33: Mopani	1,061,448	1,068,568	239,283	265,289	1,147,356
DC35: Capricorn	1,154,692	1,243,167	270,235	285,565	1,232,870
DC47: Greater Sekhukhune	967,185	1,090,424	195,285	217,172	1,019,198

Data source: (Statistics South Africa, 2007; 2011)

In respect of HIV prevalence amongst antenatal women, at 24.9%, the Mopani district has the highest rate compared to Capricorn at 23.7% and Greater Sekhukhune at 20.2%. The HIV prevalence rate amongst antenatal women across all district municipalities within Limpopo Province is illustrated below in Figure 9.

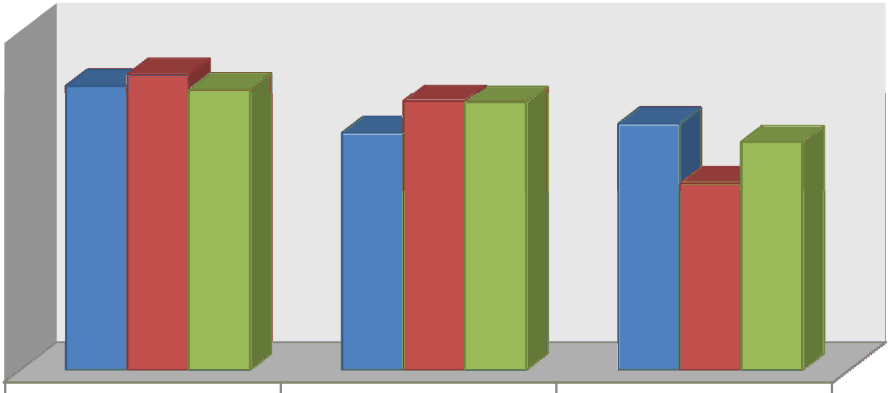
Figure 9: HIV prevalence rate across districts - 2010



(National Department of Health, 2011, p. 73)

The National Department of Health study indicates that over a three year period, between 2008 and 2010, the HIV prevalence rate amongst antenatal women across the three district municipalities fluctuated as is illustrated in below in Bar Chart 4.

Bar Chart 4: HIV prevalence trends amongst antenatal women by district

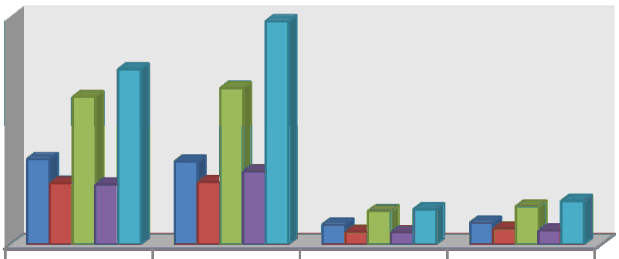


	Mopani	Capricorn	Sekhukhune
2008	25.2%	21.0%	21.8%
2009	26.2%	23.8%	16.6%
2010	24.9%	23.7%	20.2%

(National Department of Health, 2011, p. 70)

At the local municipal level the Greater Tubatse Local Municipality has the largest population followed by Lepele-Nkumpi while the Fetakgomo Local Municipality has the smallest population. The populations, across all local municipalities, in respect of persons and households are illustrated in Bar Chart 5 below.

Bar Chart 5: Populations across local municipalities 2001 & 2007

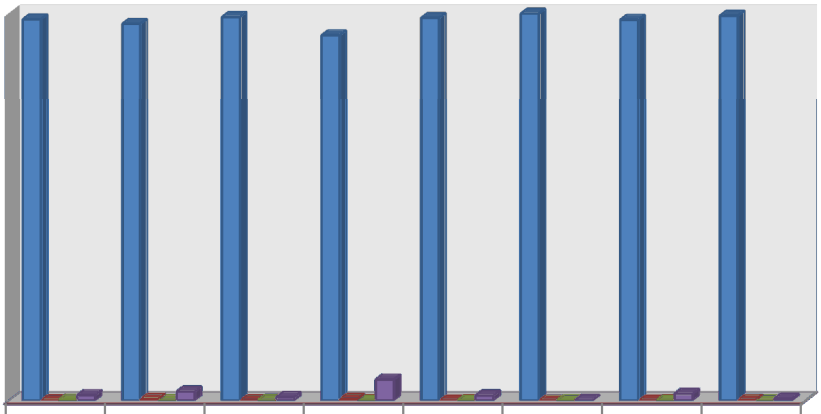


	Persons		Households	
	Census 2001	CS 2007	Census 2001	CS 2007
LIM334: Ba-Phalaborwa	131,091	127,308	30,807	33,792
LIM335: Maruleng	94,383	95,779	19,668	24,589
LIM355: Lepele-Nkumpi	227,970	241,414	51,245	58,483
LIM474: Fetakgomo	92,083	112,232	18,789	21,851
LIM475: Greater Tubatse	270,123	343,468	53,850	66,611

Data source: (Statistics South Africa, 2007)

In an effort to remain consistent, the rest of the social indicators, based on Community Survey 2007, will now be compared as percentages across both the district and local municipal levels. Most people across the area are black people, ranging between 94.3% in Ba-Phalaborwa and 99.3% in Greater Tubatse with the second largest population group being white people at 5.3% in Ba-Phalaborwa. The distribution of population groups across the area is illustrated below in Bar Chart 6.

Bar Chart 6: Population group

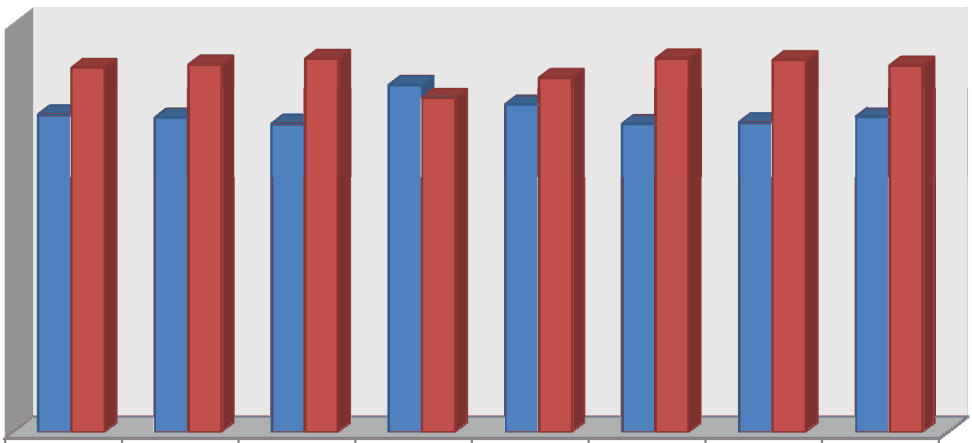


	DC33	DC35	DC47	LIM334	LIM335	LIM355	LIM474	LIM475
Black	98.4%	97.2%	99.0%	94.3%	98.7%	99.8%	98.3%	99.3%
Coloured	0.1%	0.4%	0.1%	0.4%	0.0%	0.0%	0.0%	0.2%
Indian or Asian	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
White	1.3%	2.3%	0.8%	5.3%	1.3%	0.1%	1.7%	0.5%

Data source: (Statistics South Africa, 2007)

There is a higher ratio of females to males across the region with the exception of the Ba-Phalaborwa Local Municipality where males outnumber females. The distribution of gender is illustrated below in Bar Chart 7.

Bar Chart 7: Gender

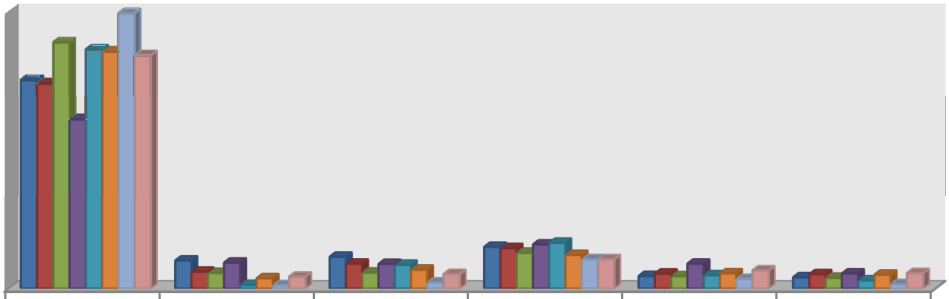


	DC33	DC35	DC47	LIM334	LIM335	LIM355	LIM474	LIM475
Male	46.5%	46.1%	45.2%	51.0%	48.0%	45.2%	45.4%	46.2%
Female	53.5%	53.9%	54.8%	49.0%	52.0%	54.8%	54.6%	53.8%

Data source: (Statistics South Africa, 2007)

A large percentage of the population, ranging between 79.4% in Fetakgomo and 48.8% in Ba-Phalaborwa, have no income. The income levels of those with an income of under R6 401 pm are illustrated in Bar Chart 8 below.

Bar Chart 8: Monthly income amongst those aged 15 to 65 years

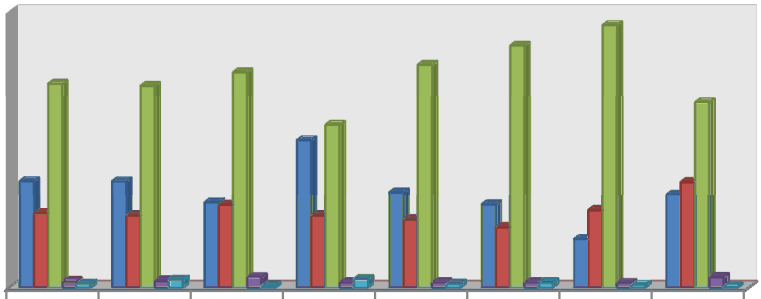


	No income	R 1 - R 400	R 401 - R 800	R 801 - R 1 600	R 1 601 - R 3 200	R 3201 - R 6 400
DC33	60.4%	8.0%	9.1%	11.9%	3.6%	3.2%
DC35	59.3%	4.8%	7.1%	11.6%	4.3%	4.1%
DC47	71.1%	4.5%	4.6%	10.2%	3.5%	3.1%
LIM334	48.8%	7.4%	7.0%	12.6%	7.1%	4.3%
LIM335	69.1%	1.1%	6.8%	13.1%	3.8%	2.3%
LIM355	68.4%	2.9%	5.4%	9.6%	4.4%	4.0%
LIM474	79.4%	1.0%	1.8%	8.4%	2.8%	1.3%
LIM475	67.4%	3.4%	4.1%	8.4%	5.2%	4.4%

Data source: (Statistics South Africa, 2007)

With regard to employment status unemployment is highest within Greater Tubatse at 26.6% and lowest in Lepele-Nkumpi at 15.2%. The highest number of employed people, at 37.3%, are found in Ba-Phalaborwa with the greatest number of people who are not economically active being found in Lepele-Nkumpi at 66.5%. The labour status across the region is illustrated in Bar Chart 9 below.

Bar Chart 9: Labour status

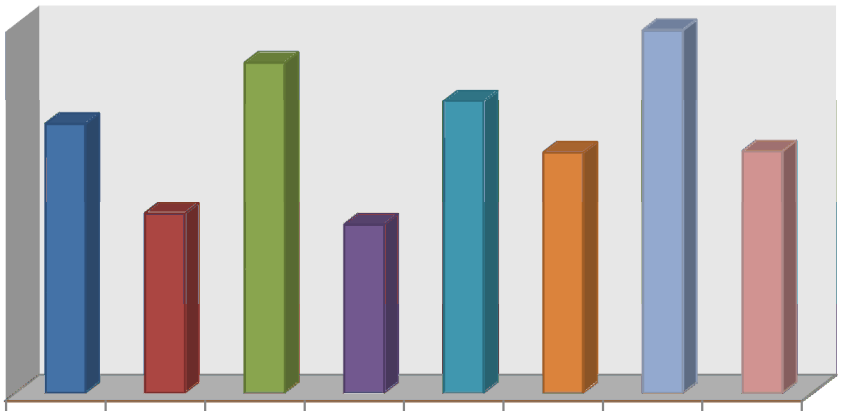


	DC33	DC35	DC47	LIM334	LIM335	LIM355	LIM474	LIM475
Employed	26.9%	26.9%	21.3%	37.3%	24.0%	20.8%	12.2%	23.4%
Unemployed	18.6%	18.0%	20.7%	18.0%	17.1%	15.2%	19.4%	26.6%
Not economically active	51.8%	51.3%	54.7%	41.2%	56.5%	61.3%	66.5%	46.9%
Unspecified	1.6%	1.8%	2.7%	1.4%	1.3%	1.4%	1.2%	2.7%
Institutions	1.1%	2.1%	0.6%	2.2%	1.1%	1.4%	0.8%	0.4%

Data source: (Statistics South Africa, 2007)

Amongst those who are 20 years and older, 29.5% in Fatkgomo have no education while in Ba-Phalaborwa 13.7% of this group have no education. Bar Chart 10 below illustrated the percentage of those who are 20 years and over and who have no education across both district and local municipalities.

Bar Chart 10: Distribution of no education amongst those 20 years and older



	DC33	DC35	DC47	LIM334	LIM335	LIM355	LIM474	LIM475
No schooling	21.9%	14.6%	26.9%	13.7%	23.8%	19.6%	29.5%	19.7%

Data source: (Statistics South Africa, 2007)

A numerical description of the demographics across the region is provided in Table 1 below. Apart from what has been discussed above, this description illustrates the distribution of the working population across industries as well as the educational institutions attended by those between 5 and 24 years of age. A full demographic description is attached in appendix 1.

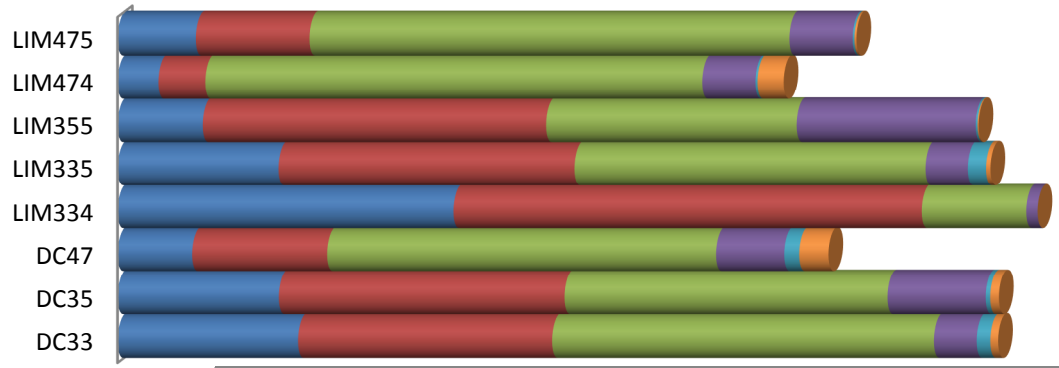
Table 1: Personal demographic data district and local municipal levels

Population Group	DC33		DC35		DC47		LIM334		LIM335		LIM355		LIM474		LIM475	
Black	1,051,288	98.4%	1,208,633	97.2%	1,079,322	99.0%	120,018	94.3%	94,578	98.7%	241,035	99.8%	110,280	98.3%	341,082	99.3%
Coloured	916	0.1%	5,496	0.4%	618	0.1%	493	0.4%	0	0.0%	61	0.0%	0	0.0%	605	0.2%
Indian or Asian	2,001	0.2%	956	0.1%	1,257	0.1%	3	0.0%	3	0.0%	72	0.0%	0	0.0%	144	0.0%
White	14,364	1.3%	28,086	2.3%	9,227	0.8%	6,793	5.3%	1,209	1.3%	249	0.1%	1,952	1.7%	1,630	0.5%
Gender																
Male	496,957	46.5%	572,714	46.1%	492,830	45.2%	64,867	51.0%	45,964	48.0%	109,030	45.2%	50,938	45.4%	158,655	46.2%
Female	571,612	53.5%	670,457	53.9%	597,594	54.8%	62,440	49.0%	49,826	52.0%	132,387	54.8%	61,294	54.6%	184,806	53.8%
Income - 15-65 years																
No income	368,673	60.4%	410,704	59.3%	406,659	71.1%	40,031	48.8%	39,203	69.1%	90,418	68.4%	47,201	79.4%	130,467	67.4%
R1 - R400	48,950	8.0%	33,329	4.8%	25,539	4.5%	6,080	7.4%	601	1.1%	3,878	2.9%	570	1.0%	6,541	3.4%
R401 - R800	55,534	9.1%	49,273	7.1%	26,106	4.6%	5,774	7.0%	3,861	6.8%	7,138	5.4%	1,041	1.8%	8,026	4.1%
R801 - R1 600	72,786	11.9%	80,061	11.6%	58,533	10.2%	10,334	12.6%	7,433	13.1%	12,706	9.6%	4,992	8.4%	16,248	8.4%
Industry																
Agriculture; hunting; forestry; fishing	21,736	3.4%	13,801	2.0%	8,269	1.4%	838	1.0%	838	1.0%	1,293	1.0%	60	0.1%	1,844	1.0%
Mining and quarrying	5,836	0.9%	1,795	0.3%	13,037	2.2%	4,878	5.9%	4,878	5.9%	1,002	0.8%	2,361	4.0%	10,295	5.3%
Manufacturing	17,143	2.7%	21,547	3.1%	8,420	1.4%	2,362	2.9%	2,362	2.9%	3,489	2.6%	128	0.2%	2,958	1.5%
Electricity; gas and water supply	1,844	0.3%	2,749	0.4%	941	0.2%	701	0.9%	701	0.9%	380	0.3%	0	0.0%	118	0.1%
Construction	8,400	1.3%	11,471	1.7%	7,039	1.2%	1,666	2.0%	1,666	2.0%	2,440	1.8%	326	0.5%	1,922	1.0%
Wholesale and retail trade	24,563	3.9%	26,769	3.9%	15,929	2.7%	3,920	4.8%	3,920	4.8%	3,609	2.7%	591	1.0%	4,948	2.6%
Transport; storage and communication	5,189	0.8%	5,908	0.9%	4,307	0.7%	1,668	2.0%	1,668	2.0%	826	0.6%	83	0.1%	1,551	0.8%
Financial	11,047	1.8%	17,491	2.5%	6,708	1.1%	1,832	2.2%	1,832	2.2%	1,598	1.2%	0	0.0%	2,625	1.4%
Community	21,736	3.4%	13,801	2.0%	8,269	1.4%	838	1.0%	838	1.0%	1,293	1.0%	60	0.1%	1,844	1.0%
Institution attended 5-24 Years																
Pre-school	14,379	2.8%	19,423	3.3%	18,118	3.5%	1,718	3.2%	1,361	2.9%	3,173	2.8%	1,704	3.1%	4,741	2.9%
Primary school	190,034	36.9%	228,309	38.5%	199,069	38.2%	19,957	36.7%	18,770	39.6%	42,257	36.9%	22,241	40.0%	62,875	38.6%
Secondary school	196,781	38.2%	212,337	35.9%	194,542	37.4%	17,488	32.2%	17,818	37.6%	44,929	39.3%	23,572	42.4%	56,232	34.5%
College	3,060	0.6%	7,544	1.3%	2,829	0.5%	1,079	2.0%	236	0.5%	731	0.6%	72	0.1%	1,056	0.6%
University/University of technology	2,316	0.4%	8,350	1.4%	1,472	0.3%	306	0.6%	118	0.2%	713	0.6%	0	0.0%	262	0.2%
Employment																
Employed	169,667	26.9%	185,897	26.9%	127,695	21.3%	30,572	37.3%	13,630	24.0%	27,478	20.8%	7,235	12.2%	45,322	23.4%
Unemployed	117,315	18.6%	124,901	18.0%	124,228	20.7%	14,804	18.0%	9,687	17.1%	20,025	15.2%	11,506	19.4%	51,552	26.6%
Not economically active	326,736	51.8%	354,854	51.3%	327,552	54.7%	33,797	41.2%	32,084	56.5%	81,065	61.3%	39,511	66.5%	90,697	46.9%

Data source: (Statistics South Africa, 2007)

Attention will now be turned towards the household level service delivery indicators across the district and local municipalities. In this respect Ba-Phalaborwa has the highest percentage of households enjoying water piped inside their dwellings at 36.3% as well as to a point inside their yard at 50.5%. Fetakgomo has the highest percentage of households having a water access point outside their yard at 53.6% followed by Greater Tubatse at 51.8%. The distribution of water across the district and local municipalities is illustrated in Bar Chart 11 below.

Bar Chart 11: Access to water

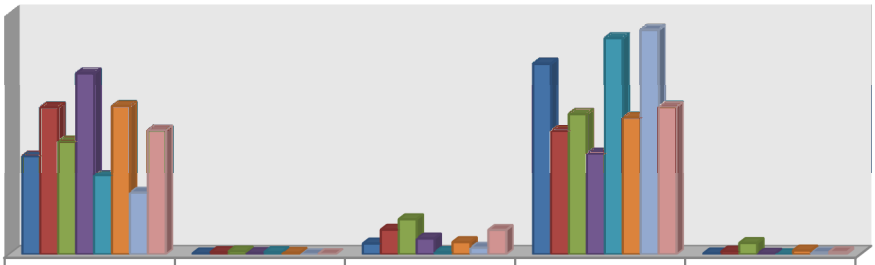


	DC33	DC35	DC47	LIM334	LIM335	LIM355	LIM474	LIM475
Piped inside dwelling	19.5%	17.4%	8.0%	36.3%	17.4%	9.2%	4.4%	8.4%
Piped inside yard	27.4%	30.8%	14.6%	50.5%	31.9%	37.1%	5.1%	12.3%
Piped outside yard	41.2%	34.9%	42.0%	11.3%	37.9%	27.0%	53.6%	51.8%
Borehole	4.6%	10.6%	7.4%	1.2%	4.6%	19.3%	5.7%	6.8%
Spring	1.5%	0.5%	1.6%	0.0%	2.0%	0.2%	0.2%	0.2%
Dam/pool	0.8%	0.9%	3.2%	0.0%	0.5%	0.1%	2.8%	0.2%

Data source: (Statistics South Africa, 2007)

Ba –Phalaborwa Local Municipality also has the highest percentage of household that use electricity for cooking at 60.2% while Fetakgomo has the lowest percentage at 20.1% and at 74.5% has the highest number of households using wood for cooking. The distribution of energy used for cooking is illustrated below in Bar Chart 12.

Bar Chart 12: Energy used for cooking

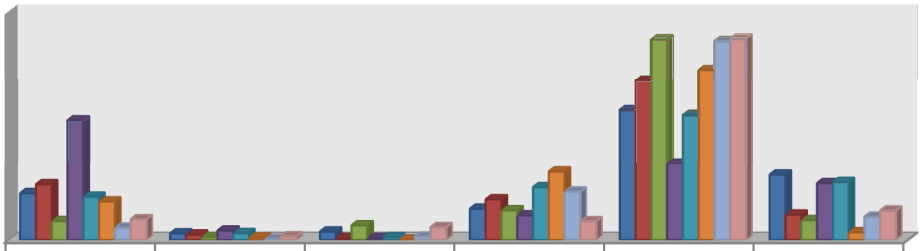


	Electricity	Gas	Paraffin	Wood	Coal
DC33	32.5%	0.3%	3.5%	63.4%	0.3%
DC35	48.6%	0.7%	8.0%	40.8%	0.9%
DC47	37.4%	0.9%	11.4%	46.5%	3.7%
LIM334	60.2%	0.4%	5.2%	33.4%	0.2%
LIM335	25.8%	0.7%	0.7%	71.8%	0.0%
LIM355	49.0%	0.5%	4.0%	45.2%	1.2%
LIM474	20.1%	0.0%	2.1%	74.5%	0.6%
LIM475	41.0%	0.1%	7.9%	48.8%	0.7%

Data source: (Statistics South Africa, 2007)

The highest percentage of households having flush toilets connected to the sewerage system at 41.6% is found in Ba-Phalaborwa, whereas only 4.3% of households in Fetakgomo have toilets connected to the sewerage system. The distribution of toilet facilities across the region is illustrated in Bar Chart 13 below.

Bar Chart 13: Toilet facilities



	Flush toilet - sewerage	Flush toilet - septic tank	Dry toilet facility	Pit toilet - ventilation	Pit toilet no ventilation	None
DC33	16.1%	2.3%	2.9%	10.8%	45.2%	22.5%
DC35	19.2%	1.9%	0.6%	14.0%	55.5%	8.7%
DC47	6.5%	1.0%	5.1%	10.2%	70.2%	6.8%
LIM334	41.6%	3.2%	0.6%	8.5%	26.5%	19.6%
LIM335	14.9%	2.4%	1.0%	18.2%	43.3%	20.0%
LIM355	13.3%	0.9%	0.1%	23.6%	59.5%	2.6%
LIM474	4.3%	0.4%	1.1%	16.7%	69.6%	8.0%
LIM475	7.2%	1.3%	4.4%	6.5%	70.5%	10.1%

Data source: (Statistics South Africa, 2007)

A more comprehensive description of the service delivery indicators is provided in Table 2 below. Apart from what is discussed above, refuse removal, tenure status and type of main dwelling are also indicated in Table 2. An analysis of the household indicators suggests that residence of Ba-Phalaborwa Local Municipality enjoy the highest level of service delivery across the area. Conversely, those who reside in Fetakgomo Local Municipality probable receive the lowest level of service delivery.

This is confirmed through a study undertaken in 2009 by the North-West University. The focus of this study was " *...to shed more light on delivery at a local level by using data from the 2001 Census and the 2007 Community Survey. The analysis involves the construction of a service delivery index for each municipality and analysis of variance to explain the changes in service delivery over the period 2001 to 2007"* (Krugell, Otto, & van der Merwe, 2009, p. 1).

The service delivery index constructed for the study was based on the percentage of households that;

- Have piped water delivered into the dwelling;
- Use electricity for cooking, heating and lighting;
- Have a flush toilet connected to the sewerage system;
- Have their refuse regularly moved by the authorities;
- Live in brick housing structures.

Bar Chart 14 below illustrates the level of service delivery across the relevant municipalities under discussion here, with the scores ranging between 0 and +2 on the positive side and on the negative side 0 to -2.

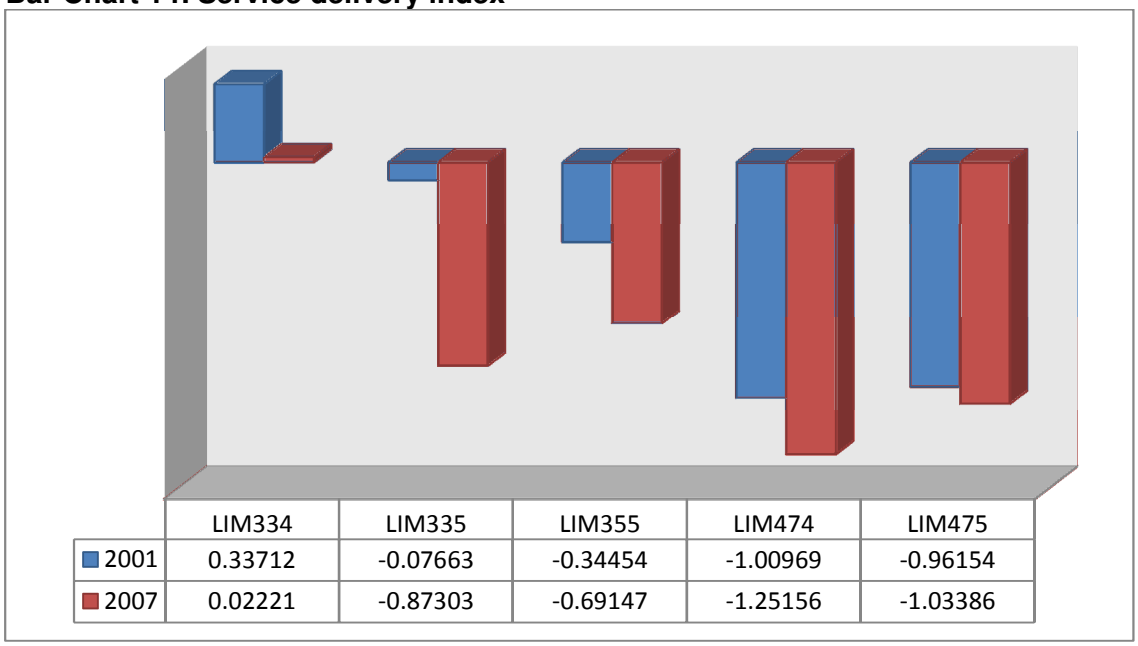
Of all 5 local municipalities impacted by the project only Ba-Phalaborwa had an above average performance rating and by 2007, Ba-Phalaborwa's performance rating had fallen somewhat. By 2007 Ba-Phalaborwa was placed marginally above average when compared against all local municipalities across South Africa. Between 2001 and 2007 the performance of all 5 local municipalities being discussed here deteriorated and Fetakgomo Local Municipality was rated as having the weakest service delivery index. What is important to note is that the researchers point out that "[p]*ositive index values indicate better aggregate service delivery above the national average* (Krugell, Otto, & van der Merwe, 2009, p. 6).

Table 2: Household indicators district and local municipal levels

Access to water	DC33		DC35		DC47		LIM334		LIM335		LIM355		LIM474		LIM475	
Piped water inside the dwelling	51,673	19.5%	49,699	17.4%	17,476	8.0%	12,251	36.3%	4,271	17.4%	5,375	9.2%	963	4.4%	5,624	8.4%
Piped water inside the yard	72,754	27.4%	88,064	30.8%	31,642	14.6%	17,081	50.5%	7,856	31.9%	21,676	37.1%	1,106	5.1%	8,173	12.3%
Piped water outside the yard	109,341	41.2%	99,565	34.9%	91,177	42.0%	3,812	11.3%	9,319	37.9%	15,817	27.0%	11,722	53.6%	34,509	51.8%
Energy for cooking																
Electricity	86,240	32.5%	149,006	48.6%	81,181	37.4%	20,315	60.2%	7,219	25.8%	31,306	49.0%	6,731	20.1%	27,010	41.0%
Gas	761	0.3%	4,107	0.7%	1,973	0.9%	319	0.4%	8	0.7%	646	0.5%	62	0.0%	339	0.1%
Paraffin	9,306	3.5%	33,969	8.0%	24,829	11.4%	2,684	5.2%	539	0.7%	4,543	4.0%	903	2.1%	7,828	7.9%
Wood	168,125	63.4%	97,368	40.8%	100,973	46.5%	10,413	33.4%	16,823	71.8%	21,922	45.2%	14,076	74.5%	31,141	48.8%
Refuse disposal																
Removed at least once a week	40,100	15.1%	62,185	21.8%	13,995	6.4%	13,816	40.9%	1,959	8.0%	7,389	12.6%	1,328	6.1%	4,707	7.1%
Removed less often	4,663	1.8%	1,940	0.7%	2,059	0.9%	131	0.4%	414	1.7%	457	0.8%	165	0.8%	743	1.1%
Communal refuse dump	4,656	1.8%	4,592	1.6%	2,821	1.3%	114	0.3%	0	0.0%	179	0.3%	188	0.9%	924	1.4%
Own refuse dump	158,190	59.6%	194,350	68.1%	170,137	78.3%	15,100	44.7%	19,806	80.5%	47,828	81.8%	19,112	87.5%	51,234	76.9%
No rubbish disposal	57,556	21.7%	21,518	7.5%	27,896	12.8%	4,631	13.7%	2,410	9.8%	2,629	4.5%	1,058	4.8%	8,940	13.4%
Tenure status																
Owned and fully paid off	168,376	63.5%	214,272	75.0%	164,088	75.6%	17,157	50.8%	6,967	28.3%	51,414	87.9%	20,817	95.3%	52,558	78.9%
Owned but not yet paid off	9,509	3.6%	16,932	5.9%	3,494	1.6%	2,453	7.3%	1,129	4.6%	1,198	2.0%	0	0.0%	557	0.8%
Rented	20,399	7.7%	25,280	8.9%	14,280	6.6%	3,334	9.9%	2,830	11.5%	3,487	6.0%	697	3.2%	5,930	8.9%
Occupied rent-free	66,336	25.0%	28,772	10.1%	34,277	15.8%	10,732	31.8%	13,605	55.3%	2,384	4.1%	172	0.8%	7,361	11.1%
Toilet facilities																
Flush toilet connected to sewerage	42,746	16.1%	54,776	19.2%	14,117	6.5%	14,056	41.6%	3,659	14.9%	7,750	13.3%	930	4.3%	4,771	7.2%
Flush toilet (with septic tank)	5,989	2.3%	5,344	1.9%	2,236	1.0%	1,090	3.2%	584	2.4%	504	0.9%	80	0.4%	856	1.3%
Dry toilet facility	7,692	2.9%	1,771	0.6%	10,972	5.1%	208	0.6%	246	1.0%	50	0.1%	250	1.1%	2,942	4.4%
Pit toilet with ventilation (VIP)	28,521	10.8%	39,931	14.0%	22,192	10.2%	2,868	8.5%	4,473	18.2%	13,803	23.6%	3,643	16.7%	4,305	6.5%
Pit toilet without ventilation	119,934	45.2%	158,565	55.5%	152,505	70.2%	8,958	26.5%	10,656	43.3%	34,770	59.5%	15,201	69.6%	46,983	70.5%
Type of main dwelling																
House or brick structure	218,974	82.5%	237,667	83.2%	164,441	75.7%	29,780	88.1%	21,503	87.4%	53,504	91.5%	19,674	90.0%	48,560	72.9%
Traditional dwelling	28,271	10.7%	7,215	2.5%	24,010	11.1%	1,183	3.5%	766	3.1%	368	0.6%	1,100	5.0%	7,568	11.4%
Flat in block of flats	205	0.1%	4,735	1.7%	273	0.1%	0	0.0%	0	0.0%	0	0.0%	69	0.3%	45	0.1%
Town/cluster/semi-detached house	1,147	0.4%	1,424	0.5%	558	0.3%	218	0.6%	134	0.5%	66	0.1%	0	0.0%	50	0.1%
House/flat/room in back yard	1,561	0.6%	3,818	1.3%	7,444	3.4%	116	0.3%	0	0.0%	256	0.4%	159	0.7%	1,133	1.7%
Informal dwelling/shack in back yard	2,398	0.9%	7,684	2.7%	3,557	1.6%	302	0.9%	373	1.5%	140	0.2%	60	0.3%	2,001	3.0%
Informal dwelling/shack not in back yard	5,534	2.1%	12,104	4.2%	10,701	4.9%	58	0.2%	419	1.7%	1,372	2.3%	594	2.7%	5,512	8.3%

Data source: (Statistics South Africa, 2007)

Bar Chart 14: Service delivery index



	LIM334	LIM335	LIM355	LIM474	LIM475
2001	0.33712	-0.07663	-0.34454	-1.00969	-0.96154
2007	0.02221	-0.87303	-0.69147	-1.25156	-1.03386

Source: (Krugell, Otto, & van der Merwe, 2009)

The social impact of the proposed Foskor Merensky 275 kV ±131 km Line and Associated Substation Works were identified and assessed against the demographic background described above.

6. Social Impacts

In general, the transmission line will traverse a number of ecologically sensitive areas, such as the Balule Nature Reserve incorporating the Olifants West Game Reserve, Klaserie Nature Reserve and Gwala Gwala Nature Reserve amongst a number of others all of which are dependent on nature conservation and associated tourism. It also passes through various residential areas, amongst which are the villages of Finale, Diphuti, Makgwareng, Lebogang, Monareng and Ga Sepaka, and at times is located in close proximity to people engaging in their daily activities. Some of the commercial and industrial enterprises affected are Burgersfort Brick Yard, Ferrochrome Bricks and Paving and Johnson Crane Hire amongst others. With this in mind and based on the project description, the social baseline study and an analysis of the focus group meetings and various submissions, the following 20 social impacts have been identified and are assessed.

- Access across site
- Access to servitude across private property
- Crime and security

- Disturbance of cultural, spiritual and religious sites
- Disturbance of sense of place
- Economic issues
- Fencing
- Fire risk
- Health issues
- Impact on farming operations
- Job creation
- Noise
- Resettlement
- Safety hazards associated with people and animals
- Services and infrastructure
- SMME opportunities
- STDs, HIV and AIDS risk
- Social instability
- Traffic disruption

These impacts will now be described in greater detail, optimisation or mitigation measures will be suggested and each impact will be assessed in respect of either the construction or operational phases of the project or both, depending on relevance.

6.1. Access across site

Description of impact: During both construction and operation it is likely that the transmission line will result in restriction of access across sections of the servitude.

This impact will essentially be associated with the construction phase of the project and in this sense is likely to be temporary in nature. The intensity of this impact will depend largely on the construction activity being undertaken at the time. For instance during excavation and foundation work, access will be more confined than during the tower assembly and stringing process, as this is likely to stretch across sections exceeding 1 km. Access across the site during the construction of access roads may also be more restrictive as will entrance into the vicinity of construction camps.

In areas where there is a higher population such as in the residential and commercial and industrial areas access across the site is likely to be more disruptive to a higher number of people engaging in their daily activities than it is in less populated rural areas.

Disruption of access across the site is not entirely restricted to the construction phase of the project as disruption is likely to occur during the operational phase particularly when maintenance and repair work is being carried out. This is, however, only likely to occur on sporadic occasions and for a relatively short period at a time.

Mitigation objective: To limit disruption of access across the selected servitude route.

Mitigation measures:

- Provide strategically distributed crossing points to secure existing routes currently used by both farmers and local communities;
- Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of any disruptions;
- Ensure that service nodes such as schools, clinics, water sources, places of worship, etc. remain easily and safely accessible at all times;

The impact on access across the site is assessed and presented in Table 3 below.

Table 3: Access across site

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Low	Long term	Likely	2
A2	Negative	Local	Low	Long term	Likely	2
A3	Negative	Local	Low	Long term	Likely	2
A4	Negative	Local	Low	Long term	Likely	2

6.2. Access to servitude across private property

Description of impact: During both the construction and operational phases of the project Eskom will require access to the servitude which, at times, will need to be gained through privately owned property.

Although, largely associated with the construction phase, access to the transmission line will also be required for repair and maintenance work. During construction the required access will be over the short term and although more intense this will last for approximately 18 months over the length of the project. As with the previous impact the intensity of this impact will depend on the construction activity being undertaken at the time.

During the operational phase required access across private property will last over the life span of the transmission line. It will, however, be more sporadic in nature probably only occurring two to three times a year on average.

Mitigation objective: To manage access to private property across the selected servitude route.

Mitigation measures:

- Negotiate with landowners to ensure agreement concerning any access to private property;
- Consult with property owners, prior to any access, to ensure that they are timeously informed of the duration and nature of the required access;
- Ensure that all staff as well as the staff of contractors can be clearly identified at all times;
- Ensure that all staff and the staff of contractors are enlightened with regard to the appropriate protocol when entering and working on private property and that they adhere to this protocol at all times;
- On properties on which wild animals roam freely, ensure that the appropriate safety precautions are taken to safeguard employees from any potential injury that may be caused by encounters with wild animals.

The impact on access to servitude across private property is assessed and presented in Table 4 below.

Table 4: Access to servitude across private property

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Low	Long term	Almost certain	1
A2	Negative	Local	Low	Long term	Almost certain	1
A3	Negative	Local	Low	Long term	Almost certain	1
A4	Negative	Local	Low	Long term	Almost certain	1

6.3. Crime and security

Description of impact: The increased risk of criminal activity due to an influx of workers and activities during construction and operation.

A possibility exists that, during the construction phase of the project, an opportunistic criminal element may take advantage of increased activities in some areas around the construction site. During construction workers will be accommodated in construction camps with these construction camps being situated on land obtained, on a temporary basis, by means of agreement with landowners.

During operation the only activity that will be associated with the project will be maintenance and repair work which will be sporadic in nature only occurring on average two to three times a year.

There is, however, great concern that has been raised by various I&APs about the threat the construction and operation of the line will pose to game in the area. In this regard in a letter to the environmental consultant, with reference to Alternative 2, it is pointed out that;

> "*The route traverses prime white and black rhino habitat which will present a security threat to our endangered rhino during the construction and maintenance phases of the project. In the light of current rhino poaching statistics I am sure you will appreciate our concerns.*"

And with regard to Alternatives 1, 3 and 4:

> "*The route passes through an area of prime Black Rhino Habitat, home to a number of these endangered animals*" (Ferguson, 2012, p. 5).

It is also indicated in an objection to Alternative 1, that:

> "*The construction phase of the project will bring potential management problems into the reserve. These include illegal bush-meat and poaching as well as other security concerns, as well as the associated fire-threats from cooking fires, access control, etc."* (Spencer, 2012, p. 3)

Current threats associated with rhino poaching and with no apparent medium to long term solution to the problem result in the risks remaining high during the operational phase of the project.

Mitigation objective: To reduce the risk of criminal activity associated with the project.

Mitigation measures:

- Where appropriate establish liaison structures with local police and communities to monitor changes during the construction phase;
- Where necessary, particularly where there is a threat to wild life due to poaching, additional security should be provided;
- Workers should be provided with identity cards and should wear identifiable clothing at all times;
- Keep landowners well informed of movements in and around their properties;
- Liaise with landowners prior to entering their property.

The impact of crime and security is assessed and presented in Table 5 below.

Table 5: Crime and security

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	High	Short term	Almost certain	2
A2	Negative	Local	High	Short term	Almost certain	2
A3	Negative	Local	High	Short term	Almost certain	2
A4	Negative	Local	High	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	High	Medium term	Almost certain	2
A2	Negative	Local	High	Medium term	Almost certain	2
A3	Negative	Local	High	Medium term	Almost certain	2
A4	Negative	Local	High	Medium term	Almost certain	2

6.4. Disturbance of cultural, spiritual and religious sites

Description of impact: The likelihood of the project having a physical impact on areas of cultural, spiritual or religious significance.

During a site visit undertake by Nsovo it was pointed out by Mr. Kgohloane, a ward committee member, that there are a number of grave sites on the properties occupied by some residents of the village of Finale. Mr Delport of Foskor Mine also raised the issue of heritage sites in the area. This impact is only mentioned here as it is the subject of a separate specialist heritage study and, as such, is assessed in accordance with that study. It must, however, be noted that there remains the possibility that a culturally sensitive site may be discovered during construction and it is important to have an archaeologist on stand-by, over the construction period, to address any such eventualities.

6.5. Disturbance of sense of place

Description of impact: The effect that the project may have on the vista, atmosphere and lifestyle of the region through which it passes.

With regard to Alternative 1 Craig Spencer (2012, p. 2) points out that;

> "*It is our belief that the market values of the properties within the OWNR will be adversely affected by the proposed Route 1. Although there is already a similar line through the reserve, we firmly believe that an additional over-head power-line will impact negatively on the intrinsic values of the properties and reduce their appeal."*

Karin Kamponga of Olifants River Game Reserve Share Block Ltd. (2012, p. 4), points out that in respect of Alternative 2:

> "*5. There will be visual unsightliness of the lines, as well as of any construction area.*
> *6. There will be audible disturbance due to machinery and general vocality* (sic) *of labourers.*"

Ismail Mia of Oxford Trading Company (2012, p. 1) writes that with regard to Alternative 1;

> "*There is already an existing line traversing through our property and having another line adjacent to this line with a servitude width of 47m would be a visual nightmare, in this very lovely and scenic part of the country. The visual impact of such a line will ultimately have a negative impact of the value of the land, as well as the natural habitat of the area, as indicated in the objection submitted by the Warden of Olifants West Nature Reserve."*

It is also indicated by Craig Ferguson of Balule Nature Reserve (2012, p. 5) that Alternative 2 will have a negative effect on the experiences of guests and landowners in the area who "…*will be forced to travel to their big five destination with the powerlines visible for 30km. This will definitely impact negatively on the market prices of the properties and on the guests wildlife experience.*" And that alternatives 1 and 3 " …*pass within 500m of an established lodge on the Olifants River that caters to international and local tourists.*"

It is clear that the construction of the transmission line through what is largely a rural area is likely to change the rural atmosphere and lifestyle of the region and consequently, will have a negative effect on the sense of place for some residents. It is quite feasible that this will also negatively impact the tourist potential of some game farms and nature reserves through which the line will pass

Mitigation objective: To limit the negative impact that the project may have on the environment and to retain the sense of place as best as possible.

Mitigation measures:

- Consult with affected communities in an effort to identify and address issues relating to the visual impact and sense of place;
- Reinstate the natural environment as swiftly as possible;
- Where feasible, follow the recommendations of the visual impact specialist.

The disturbance of sense of place is assessed and presented in Table 6 below.

Table 6: Disturbance of sense of place

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	High	Short term	Almost certain	2
A2	Negative	Local	High	Short term	Almost certain	2
A3	Negative	Local	High	Short term	Almost certain	2
A4	Negative	Local	High	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	High	Medium term	Almost certain	2
A2	Negative	Local	High	Medium term	Almost certain	2
A3	Negative	Local	High	Medium term	Almost certain	2
A4	Negative	Local	High	Medium term	Almost certain	2

6.6. Economic issues

Description of impact: The macro-economic effects of the project.

The economic effects of the project are addressed here at macro-economic level from a social perspective. The construction of the proposed transmission line has become necessary as part of Eskom's undertaking to upgrade the country's existing electricity infrastructure. Eskom has indicated that the Foskor-Merensky load centre is driven by mines and rural development and that the proposed project is necessary to:

- Help strengthen the supply network between Foskor and Merensky Substations;
- Improve the security of electricity supply thus benefit users in the region and country as a whole;
- Improve the economic status of the country.

Although the project may carry with it certain negative economic consequences, mainly at a micro level such as the effect on property values, this is not addressed in here as it falls outside the scope of proficiency of this report.

Optimisation objective: To enhance the Macro-economic benefit of the project.

Optimisation measures:

- Ensure that the project is run in a responsible manner and that the environment is adequately protected from negative impacts;
- Put adequate monitoring systems in place throughout the duration of the project;
- Ensure that the value of the project is balanced against costs related to both the negative environmental and social impacts in the region;
- Apply the mitigation measures suggested in the economic report.

The economic issues related to the project are assessed and presented in Table 7 below.

Table 7: Economic

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Operational Phase						
A1	Positive	National	Medium	Long term	Almost certain	2
A2	Positive	National	Medium	Long term	Almost certain	2
A3	Positive	National	Medium	Long term	Almost certain	2
A4	Positive	National	Medium	Long term	Almost certain	2

6.7. Fencing

Description of impact: The repair of existing fencing damaged during construction and/or maintenance operations and the provision of adequate fencing around construction sites.

Damage that may occur to fencing is of specific concern to game farmers as they need to ensure that their farms are secured at all times to prevent any loss of game. In addition to this the required fence structures must conform to particular standards resulting in repairs being expensive to undertake. For the safety of both people and animals it is also important to ensure that construction sites are properly fenced off, during the construction phase

Mitigation objective: To reinstate any damage to existing fencing and to secure the construction site.

Mitigation measures:

During construction;

- Fence the construction site to prevent access;
- Inspect fencing on a weekly basis and ensure it is properly maintained by the contactor until completion of construction;
- Adequately and promptly repair damaged caused to fencing by contractors to an acceptable standard.

During the operation;

- Adequately and promptly repair damaged caused to fencing during maintenance and repair work to an acceptable standard.

The impact of fencing is assessed and presented in Table 8 below.

Table 8: Fencing

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	1
A2	Negative	Local	Medium	Short term	Almost certain	1
A3	Negative	Local	Medium	Short term	Almost certain	1
A4	Negative	Local	Medium	Short term	Almost certain	1
Operational Phase						
A1	Negative	Local	Low	Long term	Almost certain	1
A2	Negative	Local	Low	Long term	Almost certain	1
A3	Negative	Local	Low	Long term	Almost certain	1
A4	Negative	Local	Low	Long term	Almost certain	1

6.8. Fire risk

Description of impact: Increase in fire risk as a result of construction and maintenance activities.

There may be some increase in the risk of veld fires as a result of construction activities. This is as a result of workers smoking and cooking food within the vicinity of the construction sites. Although the risk may be somewhat less during operation it would still exist to some degree during maintenance and repair activities.

This risk has been raised by various I&APs.

Craig Ferguson (2012, p. 5) points that;

> "*We will not allow contractors camps to be constructed within the Reserve as they present a security and fire risk.*"

Karin Kampinga (2012, p. 4) claims that;

"*There will be an increase in the risk of runaway fires – mostly accidental with regards to cooking fires and cigarettes – this would lead to damage to land and flora and injury to humans and flora and be potentially devastating to the conserved region as a whole should it get out of hand.*"

Craig Spencer (2012, p. 3) points out that;

"*The OWNR supports the "adaptive-interference model" regarding the management of the ecology and ecological processes necessary to maintain the ecological integrity of our region. The proposed Route 1has the potential to create a barrier for one of the critical ecological drivers (processes) of the Arid Savanna – fire. This could be a double-edged sword and requires further investigation. Whereas ESKOM will require a wide fuel-free buffer to protect their infrastructure, the potential to compound our fire-management strategy (in line with the adaptive-interference model) needs further investigation to understand the management requirements. Our annual phytomass surveys indicate that should favourable climatic conditions persist, the likelihood of ecologically appropriate basal fires is increasing.*"

Mitigation objective: To reduce fires risks that may be created through the project.

Mitigation measures:

- Strategically placed emergency access points along servitude at times when access is restricted to ensure that landowners and emergency services are able to respond to any outbreak of a fire.
- Ensure that both construction and maintenance personnel are made aware of the risks and dangers of veld fires and that, at all times, they behave in a manner to reduce the risk of fire.
- Ensure close co-operation between landowners and construction and maintenance teams to ensure an effective fire management strategy.

The impact of fire risk is assessed and presented in Table 9 below.

Table 9: Fire risk

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Medium	Long term	Almost certain	2
A2	Negative	Local	Medium	Long term	Almost certain	2
A3	Negative	Local	Medium	Long term	Almost certain	2
A4	Negative	Local	Medium	Long term	Almost certain	2

6.9. Health issues

Description of impact: The affect that the project is likely to have in respect of the health of communities living and working within the vicinity of the transmission lines.

Health issues have been identified at two levels. Karin Kampinga (2012, p. 3) claims that;

> "*There may be an increased risk of malaria in the area due to increased number of potential carriers on the reserve during the construction phase and during periods of maintenance, which will have a negative impact on its appeal to owners and visitors (affect land value) issues have been identified at two levels.*"

Health related issues are also related to electromagnetic fields (EMFs) associated with the operational phase of the project. It is important to note, that although the effects of EMFs are addressed at the social level the scientific assessment of such health issues is beyond the scope of the specialisation of this study. Accordingly, at the social level, health issues are addressed in terms of public perceptions amongst the affected communities rather than on a scientific basis. The issue of health risks associated with electromagnetic fields (EMFs) on communities living within close proximity of transmission lines and electrical substations as well as on animals is, and remains, a controversial and well documented issue (Wartenberg, 1993; UK Childhood Cancer Study Investigators, 1999; UK Childhood Cancer Study Investigators, 2000; Draper, Vincent, Kroll, & Swanson, 2005; Wood, 2006; Copes & Barn, 2008; Electric Power Research Institute, 2009; Huss A. , Spoerri, Egger, & Röösli, 2008; Blank, 2009; Electric Power Research Institute, 2009). This controversy has led to a high degree of concern amongst many residents in respect of five issues in particular.

- The risk of childhood leukaemia;
- The risk of breast cancer particularly amongst women, but should not be restricted to women only;

- A link between Alzheimer's Disease and EMFs;
- The effect of EMFs on animals, particularly the rate and quality of production amongst dairy cattle and poultry but not restricted to only dairy herds and poultry;
- The devaluation of property within close proximity of power lines and electrical substations.

Although it is difficult to establish the real dangers of exposure to EMFs, what is clear is that many people at least perceive this as a risk to health and that in turn this may also cause secondary health risks brought about through high stress levels.

Mitigation objective: To manage health risks related to the project.

Mitigation measures:

- Undertake an independent health assessment in respect of the dangers that may be associated with electromagnetic fields;
- Follow mitigation measures recommended in the appropriate specialist report/s;
- Put in place a monitoring system to monitor health risks throughout the life of the project;
- Ensure that there is broad based representation, capable of serving both community and company interests in respect of the monitoring facility referred to above.

The impact of health issues is assessed and presented in Table 10 below.

Table 10: Health issues

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Low	Short term	Almost certain	1
A2	Negative	Local	Low	Short term	Almost certain	1
A3	Negative	Local	Low	Short term	Almost certain	1
A4	Negative	Local	Low	Short term	Almost certain	1
Operational Phase						
A1	Negative	Local	Medium	Long term	Almost certain	2
A2	Negative	Local	Medium	Long term	Almost certain	2
A3	Negative	Local	Medium	Long term	Almost certain	2
A4	Negative	Local	Medium	Long term	Almost certain	2

6.10. Impact on farming operations

Description of impact: Routine farming operations are likely to be disrupted during both the construction and operational phases of the project.

During construction certain farming activities may be disrupted for a short while as construction teams access farming areas. During the operational phase the effect on farming activities is likely to be less significant as normal farming activities, such as grazing and cultivation may continue within the servitude. There are, however, certain restrictions such as the growing of vegetation or building of structures, which could interfere with the safe operation of the power line.

At a meeting for communities in the Steelpoort–Burgersfort area held in the Boardroom of the Greater Tubatse Local Municipality on the 2nd February, 2012, Mr Pretorius indicated that his farm is a nature reserve with wild animals which attracts tourists. He pointed out that extra power line servitude will reduce grazing for his animals and that he is planning new residential development.

Mitigation objective: To limit disruptions to farming operations caused by the construction and maintenance of the power line.

Mitigation measures:

- Liaise with farmers and farmer associations with the aim of finding solutions to possible restrictions placed on the movement of farm equipment and animals within and between farms during construction and maintenance;
- If, and where feasible, coordinate construction activities with farming activities, to minimise disruptions in respect of both sets of activities;
- Where technically feasible, adjust the route to minimise any long-term disruptions to farming operations.

The impact on farming operations across the site is assessed and presented in Table 11 below.

Table 11: Impact on farming operations

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	High	Short term	Almost certain	2
A2	Negative	Local	High	Short term	Almost certain	2
A3	Negative	Local	High	Short term	Almost certain	2
A4	Negative	Local	High	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Medium	Medium term	Almost certain	2
A2	Negative	Local	Medium	Medium term	Almost certain	2
A3	Negative	Local	Medium	Medium term	Almost certain	2
A4	Negative	Local	Medium	Medium term	Almost certain	2

6.11. Job creation

Description of impact: The power line will result in the creation of jobs during construction and operation.

Job opportunities will be limited as the construction process is put out to tender and contractors are appointed to construct the transmission line. These contractors employ skilled workers and although they are encouraged to employ local people for semi and unskilled work such jobs are limited and temporary in nature.

Optimisation objective: To increase the benefit of job creation.

Optimisation measures:

- Use local labour as far as possible;
- Create opportunities for the employment of women;
- Where possible use labour-intensive methods of construction;
- Go beyond the minimum wage rate and invest in local staff.

The impact on job creation is assessed and presented in Table 12 below.

Table 12: Job creation

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Positive	Local	Low	Short term	Almost certain	1
A2	Positive	Local	Low	Short term	Almost certain	1
A3	Positive	Local	Low	Short term	Almost certain	1
A4	Positive	Local	Low	Short term	Almost certain	1
Operational Phase						
A1	Positive	Local	Low	Long term	Almost certain	1
A2	Positive	Local	Low	Long term	Almost certain	1
A3	Positive	Local	Low	Long term	Almost certain	1
A4	Positive	Local	Low	Long term	Almost certain	1

6.12. Noise

Description of impact: The power line possibly could result in an increase in noise.

The project is situated in a rural area, well known for tourism and game farming. Consequently, the issue of noise reduction during both construction and operation is important as heightened noise levels will have a negative effect on tourist experiences.

The construction process is likely to result in an increase in noise levels due to the use of heavy machinery and, a helicopter if used during construction, inspection and maintenance activities. Increased noise can have psycho-social effects which could manifest in irritation, mental health disturbances, noise induced stress and sleep disturbances and has been found to lead to depression (Öhrström, 1991). Although difficult to measure at the social level these effects are likely to be most severe where the relative quiet of a rural area is disrupted by noise associated with the construction and operation of the transmission line.

The typical noise emitted by transmission line is the corona noise heard as a crackling or hissing sound. The intensity of this noise varies depending on voltage levels and weather conditions. With high voltages and in high humidity and extremely wet weather this noise could peak at between 50 to 60 dBA placing it at no higher level than that of a normal conversation at about 1 meter (Aspen Environmental Group, 2012). Other noise can be that cased by dirty or damaged insulators or aeolian noise as a result of wind blowing across the line.

The international tendency for evaluating the impact caused by intruding noise is to specify an average ambient noise level of 55 dBA and 45 dBA during the day and night respectively, as the maximum average ambient noise levels to which residential premises in urban areas

should be exposed (Berglund, Lindvall, & Schwela, 1999). It is unlikely that any constant noise emanating from the transmission line will exceed the World Health Organisation's recommended noise limits. It is, however, the irritation factor caused through a prolonged crackling or hissing sound, particularly during wet weather, which is of concern. During construction there may also be occasions when the noise level approaches what could be considered to be an unacceptable level.

Mitigation measures:

- Restrict construction activities and vehicle movement to daylight hours;
- Maintained all vehicles and construction machinery to a standard that prevents the noise levels causing any unnecessary and avoidable nuisance to the workforce and local communities;
- Keep the transmission line in a condition that minimises any unnecessary noise emanating from the line during operation.

The impact of noise is assessed and presented in Table 13 below.

Table 13: Noise

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Medium	Long term	Almost certain	1
A2	Negative	Local	Medium	Long term	Almost certain	1
A3	Negative	Local	Medium	Long term	Almost certain	1
A4	Negative	Local	Medium	Long term	Almost certain	1

6.13. Resettlement

Description of impact: The resettlement of households as a result of the construction of the power line.

Alternative 1 passes between the villages of Finale and Diphuti with one of the pylons at the gate of the primary school in Finale illustrated in Figure 10 below. Graves are also apparent in the ground of residential dwellings as illustrated in Figure 11 below. The route also passes through the villages of Makgwareng, Lebogang, Morareng and Ga Sepaka and in Alverton some families are affected by the line. In Mashamthane Village, regardless of earlier discussions with Eskom, the offices of a law firm have been built on the servitude.

Figure 10: School in the village of Finale

Figure 11: Graves in residential area of Diphuti

There is clear evidence that in some areas there may well be a need to relocate dwellings, graves and businesses, however, the exact extent of this will only be established when pegging the central line and footprint of the transmission line. Consequently, the developers may need to commission independent experts to undertake a land audit and to facilitate the development of a resettlement action plan (RAP). In accordance with such a plan alternative housing and/or compensation would also need to be provided to the affected parties prior to the actual relocation activities.

It is important that the resettlement complies with recognised acceptable relocation practices. In this regard international experience has shown that, unless the best practice benchmarks are achieved, resettlement exposes affected people to a range of risks which include:

- landlessness
- homelessness
- joblessness
- economic and social marginalisation
- increased morbidity and mortality
- food insecurity
- loss of access to common property resources

- social and cultural disarticulation/disruption

It is pointed out that poorer households are particularly vulnerable and need to be protected (Cernea, 1997). Accordingly, if the need for resettlement does arise it must be conducted in terms of international best practice and accompanied by a comprehensive resettlement action plan. This goes further than merely fulfilling the legislative requirements of compensation.

Mitigation objective: To reduce the disruptive effects that resettlement could have on the lives of people.

Mitigation measures:

- Resettlement needs to be undertaken in accordance with a recognised protocol.

According to the World Bank's Revised Policy on Involuntary Resettlement (OP/BP 4.12) (2006), best practices must ensure that:

- Involuntary resettlement should be avoided, or minimised where unavoidable.
- Where resettlement is unavoidable, resettlement plans and activities should be seen and executed as development programmes.
- Resettled persons should be provided with sufficient investment resources and opportunities to share in project benefits.
- Displaced persons should be meaningfully consulted, and should participate in the planning and implementation of resettlement programmes.
- Displaced persons should be compensated, prior to the move, for their losses at full replacement cost.
- Resettled persons should be assisted with the move and provided with support during the transition period.
- Resettled persons should be assisted with their efforts to improve, or at least restore, their former living standards, income earning capacity and production levels – whichever is higher.

As resettlement will need to be completed prior to construction it will only be assessed in respect of the construction phase of the project and, as such, is assessed and presented in Table 14 below.

Table 14: Resettlement

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2

6.14. Safety hazards associated with people and animals

Description of impact: During construction and operation the safety of people and animals may be at risk.

During construction, repairs and maintenance of the line heavy equipment will be used that will increases the risks to the safety of people and animals in the vicinity of these activities. Apart from this the line transverses area where there are wild animals roaming freely which will pose specific safety hazards for construction, maintenance and repair teams. In this vein the following comments are made;

Craig Ferguson (2012, p. 5) indicates in regards to Alternative 2 and with reference to Eskom that;

> "*Your construction workers will be working over a distance of 30km in a big five environment with dangerous animals that will present a risk to your staff. We cannot afford to provide armed guards for all the crews and cannot allow armed outsiders onto the Reserve.*"

Karin Kampinga (2012, p. 4) also highlights the dangers in warning that;

> *"There will be an increased risk to the safety of Eskom personnel by lion, leopard, elephant and buffalo."*

Mitigation objective: To reduce the risk of safety hazards associated with the project.

Mitigation measures:

- Liaise closely with game farmers and/or game wardens to ensure the safety of all construction and maintenance personnel;
- Ensure all equipment is maintained to the required standards;
- Ensure that the appropriate safety procedures are in place and that they are followed at all times during both construction and maintenance;
- Fence off all construction sites to prevent people and animals straying onto the site;

- Liaise with land owners prior to entering their property to ensure an understanding between contractors and property owners;

The impact of safety hazards is assessed and presented in Table 15 below.

Table 15: Safety hazards associated with people and animals

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	High	Short term	Almost certain	2
A2	Negative	Local	High	Short term	Almost certain	2
A3	Negative	Local	High	Short term	Almost certain	2
A4	Negative	Local	High	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	High	Medium term	Almost certain	2
A2	Negative	Local	High	Medium term	Almost certain	2
A3	Negative	Local	High	Medium term	Almost certain	2
A4	Negative	Local	High	Medium term	Almost certain	2

6.15. Services and infrastructure

Description of impact: Interfering with and/or disrupting service infrastructure and provision in the vicinity of the servitude.

There is some risk that construction activities could result in damage to or disruption of existing services such as electrical transmission lines, roads, water and sewerage facilities. The following airports are noted along the

- Phalaborwa Airport, outside Phalaborwa;
- Burgersfort Airport, located in Greater Tubatse;
- East Gate Airport outside Hoedspruit;
- Hoedspruit Air force Base Airport in Hoedspruit along the R41;
- Private air strips within the farms

In respect of Alternative 2 it is indicated that;

> "*The line crosses directly across the end of an airstrip (24 09 46S; 31 01 27 E) on Olifants River Game Reserve near the railway line. This could increase the danger to aircraft landing and taking off from this strip*" (Ferguson, 2012, p. 5)

Existing power lines in the study area, including a 275 kV power line. This line runs parallel to Alternative 1 between Foskor and Merensky for a distance of 129 km with a 47 m wide servitude. Other Eskom lines in the area include:

- A 275 kV overhead power line;
- A 132 kV Eskom overhead power lines; and

- The existing 11/22 kV distribution line.

Road infrastructure in the vicinity of the project includes the following regional roads, R36, R37, R40, R71 as well as the following local roads, R527, R530, R531, R532, R536, R 555.

On 20th December, 2011, an issue regarding a possible conflict with regard to land zoning in the Mareuleng Local Municipality was raised by Khensani Sithoile of the municipality.

Mitigation objective: To reduce any negative affect the power line may have on existing infrastructure.

Mitigation measures:

- Liaise with all relevant services providers such as the district and local municipalities, South African National Roads Agency Limited (SANRAL), the water authorities in the area and airports authorities to ensure that any disruption to existing infrastructure is limited.
- Liaise with property owners to ensure that existing infrastructure is recorded and any damage repaired or compensated for;
- Liaise with the owners of private airstrips to find solutions to any conflict with the power line route.

The impact on service and infrastructure across the site is assessed and presented in Table 16 below.

Table 16: Services and infrastructure

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Low	Medium term	Likely	1
A2	Negative	Local	Low	Medium term	Likely	1
A3	Negative	Local	Low	Medium term	Likely	1
A4	Negative	Local	Low	Medium term	Likely	1

6.16. SMME opportunities

Description of impact: Opportunities for Small Medium and Micro Enterprise (SMMEs) will possibly occur during both the construction and operational phases of the project.

The possibility of a limited number of opportunities for small businesses and entrepreneurs could arise. These opportunities will be both directly and indirectly associated with the project with a number being related to the upgrading of the national grid.

At a meeting held in the boardroom of the Greater Tubatse Local Municipality on 2nd February, 2012, the expectations of some people along all route alternatives were highlighted by Mr. Tsepo Shayi when he asked;

"*What are the benefits that can be derived by small business from this project? We also expect Eskom to plough back to communities in the receiving environment.*"

Mitigation objective: To optimise the benefit that the project may have for SMMEs.

Optimisation measures:

- Establish a local SMME recruitment preference policy;
- Implement a monitoring system to ensure that the local SMME recruitment preference policy is followed.

The impact on SMME opportunities is assessed and presented in Table 17 below.

Table 17: SMME opportunities

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Positive	Local	Medium	Short term	Almost certain	2
A2	Positive	Local	Medium	Short term	Almost certain	2
A3	Positive	Local	Medium	Short term	Almost certain	2
A4	Positive	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Positive	Local	Low	Medium term	Almost certain	1
A2	Positive	Local	Low	Medium term	Almost certain	1
A3	Positive	Local	Low	Medium term	Almost certain	1
A4	Positive	Local	Low	Medium term	Almost certain	1

6.17. STDs, HIV and AIDS

Description of impact: The risk of STDs, HIV and AIDS infections due to an influx of workers and work seekers during construction.

The prevalence of HIV amongst antenatal women in Limpopo is 21.9% which is lower than its neighbouring provinces of Gauteng at 30.4% and Mpumalanga at 35.1% (National Department of Health, 2011). In respect of the districts affected by the project the HIV prevalence rate amongst antenatal women ranges between 24.9% in Mopani and 20.2% in Greater Sekhukune with Capricorn having a rate of 23.7%. It is therefore possible that an influx of contract workers from these areas could pose a risk to the HIV status of the province, particularly when this is considered against the fact that the area has a high level of poverty. Prostitution often follows contract workers due to there being a source of income. However, what is a limiting factor is that the contract workforce will not be that large and some labour will be locally sourced.

The impact of STDs, HIV and AIDS across the site is assessed and presented in Table 18 below.

Table 18: STDs, HIV and AIDS

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Low	Medium term	Almost certain	1
A2	Negative	Local	Low	Medium term	Almost certain	1
A3	Negative	Local	Low	Medium term	Almost certain	1
A4	Negative	Local	Low	Medium term	Almost certain	1

Mitigation objective: To reduce the risk of the spread of STDs, HIV and AIDS.

Mitigation measures:

- The contractor/operator should, in consultation with local HIV/AIDS organisations and government structures, design and implement an STD, HIV and AIDS awareness and prevention campaign for employees. This campaign should use various common practice methodologies in order to ensure social and cultural sensitivity;

- The contractor/operator should make STD, HIV and AIDS awareness and prevention programmes a condition of contract for all suppliers and sub-contractors;
- The contractor/operator should provide an adequate supply of free condoms to all workers;
- Condoms should be located in the bathrooms and other communal areas on the construction site and at the construction camps;
- If feasible, a voluntary counselling and testing programme should be introduced during the construction phase and continued during operations. This should be undertaken in conjunction with the existing VCT programmes within the region.

During the operational phase:

- The operator should, in association with HIV/AIDS organisations and government structures, implement an STD, HIV and AIDS awareness and prevention campaign directed at employees.

6.18. Social instability

Description of impact: The effect that an influx of job seekers and workers may have on existing family networks and social structures.

An increase of workers and job seekers can have a number of negative effects for host communities regarding;

- An increase in prostitution;
- Unplanned and unwanted pregnancies;
- An increase in alcohol and drug related incidents;
- Pressure on local services, including housing, clinics, schools, water supplies;
- An increase in local prices and the cost of living;
- Tension and conflict within the community and an effect on family networks and relationships; and
- Increased competition for available jobs and resources.

It is unlikely that the project will result in a significant increase in job opportunities in the area. As a consequence it is most unlikely that it will lead to a significant influx of workers and job seekers coming into the area. Besides this, during construction workers will be accommodated in construction camps and during the operational phase maintenance and repair personnel will operate across a wide area.

The impact on social instability across the site is assessed and presented in Table 19 below.

Table 19: Social instability

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Low	Medium term	Almost certain	1
A2	Negative	Local	Low	Medium term	Almost certain	1
A3	Negative	Local	Low	Medium term	Almost certain	1
A4	Negative	Local	Low	Medium term	Almost certain	1

Mitigation objective: To reduce the effect that an influx of workers and job seekers may have on existing family networks and social structures.

Mitigation measures:

- Maintain communication channels between the contractor and local community structures in an effort to maximise the employment of local labour;
- Make condoms readily accessible to workers;
- Liaise with the South African Police Services and community structures to ensure that the workforce is controlled;
- Where practical, workers from other area should be provided with adequate on-site temporary accommodation and amenities;
- Dismantle and remove all temporary accommodation on completion of work to prevent the development of informal settlements.

6.19. Traffic disruption

Description of impact: Traffic disruptions and delays during the construction and operational phases of the project.

Moving from east to west the route will either cross or at times be within the vicinity of the following regional and local roads.

- Alternative 1 – R40, R36, R37, Road 555.
- Alternative 2 – R40, R36, R37; Road 527 Road 531, Road 555.
- Alternative 3 – R40, R36, R37, Road 532, Road 555.
- Alternative 4 – Road 530, R40, R36, R37; Road 555.

During construction heavy vehicle traffic will increase with the delivery of material, equipment and construction personnel to site. As the line crosses a number of regional roads there is the likelihood that, during the stringing process some traffic disruption could occur, however, construction techniques are available that will keep these disruptions to a minimal level. Traffic disruptions during the maintenance phase, when considered across the lifespan of the project, will be minimal.

The impact of traffic disruption across the site is assessed and presented in Table 20 below.

Table 20: Traffic disruption

Site	Status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase						
A1	Negative	Local	Medium	Short term	Almost certain	2
A2	Negative	Local	Medium	Short term	Almost certain	2
A3	Negative	Local	Medium	Short term	Almost certain	2
A4	Negative	Local	Low	Short term	Almost certain	2
Operational Phase						
A1	Negative	Local	Low	Medium term	Likely	1
A2	Negative	Local	Low	Medium term	Likely	1
A3	Negative	Local	Low	Medium term	Likely	1
A4	Negative	Local	Low	Medium term	Likely	1

Mitigation objective: To ensure the efficient and effective management of traffic disruptions.

Mitigation measures:

- Carefully schedule construction activities to minimize traffic delays;
- Inform the public of any envisaged disruptions;
- Provide adequate traffic warning signs and traffic control measures that comply with national standards.

6.20. No-go alternative

Description of impact: Not to construct the power line leaving the status quo in place.

If the project did not proceed then;

- All the impacts discussed above would be irrelevant and the status quo would remain in place;
- The national electricity supply grid would be compromised in that it would not be possible to supply any additional electricity through the existing transmission network;

- Eventually there would be insufficient electricity to meet the demand of all Eskom's customers which would lead to the interruption of supply to certain areas resulting in load shedding;
- The dependability and quality of supply would be compromised resulting in serious regional and possibly national economic consequences.

The impact of not proceeding with the project is assessed and presented in Table 21 below.

Table 21: No-go alternative

Status	Extent	Magnitude	Duration	Probability	Significance
Negative	National	High	Long-term	Almost certain	3

Having assessed the impacts identified on a social basis in relation to the project these alternatives will now be compared.

7. Assessment of alternatives

After carefully considering all 4 route alternatives it is clear that, on a social basis, there is no obvious fatal flaw with regard to any of the routes. There are, however, a number of concerns that would require careful consideration and the application of mitigation measures in an attempt to reduce the severity of the social impacts. Of concern is that alternatives 1, 2 and 4 all effect a number of properties within the Balule Nature Reserve and the management of the reserve believes that "[i]*ncreasing the number of lines will definitely have a negative impact on the vision, mission and objectives and consequently the property values and future management of the Reserve…* " (Ferguson, 2012, p. 4).

In the village of Finale a pylon, associated with Alternative 1, is positioned virtually at the gate of a primary school and the transmission line will pass over a number of dwellings and will affect a number of burial sites. The village of Alverton also has a number of dwellings positioned directly under the transmission line and, in the village of Mashamthane, a law firm has been built directly under the proposed line.

Considering the no-go alternative this is likely to have even greater social consequences, particularly if the security of electricity supply is compromised. With the various developments, both industrial and residential, taking place in the country the need to secure a dependable electricity supply is of national importance and consequently the no-go alternative is not a viable option.

8. Conclusion

In general, the generation and supply of electricity are associated with the following 3 somewhat contentious issues;

- Scarcity of suitable sites on which to place new infrastructure;
- Exposure of people and animals to electromagnetic fields (EMFs) and
- Potential decline in property values associated with both EMFs and the visual impact of transmission lines.

All of which are apparent with respect to this project.

Regarding the first of these issues, both the requirement to upgrade existing infrastructure and the availability of suitable sites are in contradiction. This conflict emphasises the need to attempt to balance the national interest of securing a dependable electricity supply network against the interests and welfare of neighbouring communities. Consequently it is important to carefully select a suitable route and in so doing to attempt to find a compromise that would ensure that the sense of place of the area remains intact as far as is practicable and that any health risks to communities along the route are controlled.

The second contentious issue, the exposure of people and animals to electromagnetic fields (EMFs) has, since Wertheimer & Leeper's research in 1979, generated a great deal of public attention. Attention has led to robust public debate on a global scale with little or no consensus seeming to have been emerged (for a more detail discussion see 6.9 Health issues on page 39 above). In 2012, Teepen and van Dijck evaluated the evidence of a causal relationship between EMF and childhood leukaemia. They then suggest that, although evidence points to the potential health impacts being limited, it would be advisable in densely populated areas and close to schools, to reduce exposure from power lines. They also advocate for further research to gain greater insight on the topic.

What has been highlighted at the social level is that all this uncertainly has indeed resulted in concerns, whether real or not, amongst the public about the risks of living in close proximity to electrical power lines and electrical substations, with a growing body of knowledge warning of the dangers of EMFs. These fears need to be noted and addressed in the light of this mounting evidence.

The third contentious issue is associated with the second and, together with any visual impact that may occur, relates to the potential decline in the value of properties associated with the power line. In this regard a number of I&APs, north-east of Hoedspruit and to the east of the R40 between Hoedspruit and Phalaborwa, extending along both sides of the Olifants River for approximately 40 km, have raised their concern. They claim that increasing the number of lines in the area known as Balule Nature Reserve will definitely have a negative impact on the vision, mission and objectives of the nature reserve and consequently, will have a negative effect on the property values as well as on the future management of the reserve.

Considering the social effects of this project and the clear need to strengthen the electricity grid in this region a compromise will need to be negotiated between project proponents and affected parties. Further to this, consideration will need to be given to the technical limitation that a project of this nature faces as well as to the broader environmental threats it poses in respect of such matters as fauna and flora and threats to sensitive natural areas. The nature of the transmission line is such that it is possible to retain a route alternative while making more localised adjustments in an effort to accommodate local conditions. The need for and nature of localised adjustments will only become clearly evident during a corridor walk-down, when the central line and footprint of the transmission line and towers will be pegged and any flaws to the initial route will be identified.

9. Bibliography

Direct Testimony and Exhibits of Professor Martin Blank Department of Physiology and Celluar Biophysics College of Physicians and Surgeond Columbia University Submitted on Behalf of Respondents Alfred T. Ghiorzi and Irene A. Ghiorzi, PUE 2009-00043 (State Corporation Commission 2009).

Aspen Environmental Group. (2012). Transmission Line Noise Fact Sheet . Retrieved June 13, 2012, from ftp://ftp.cpuc.ca.gov/gopher-data/environ/tehachapi_renewables/FS7.pdf

Berglund, B., Lindvall, T., & Schwela, D. H. (1999). WHO Guidelines for Community Noise - A complete, authoritative guide on the effects of noise pollution on health . Retrieved March 01, 2010, from World Health Organisation: http://www.ruidos.org/Noise/WHO_Noise_guidelines_1.html

Cernea, M. (1997). The risks and reconstruction model for resettling displaced populations. World Development. Volume 25, Issue 10, October 1997, 1569-1587.

Copes, R., & Barn, P. (2008). Is living near power lines bad for our health? British Columbian Medical Journal, Vol. 50, No. 9, — BC Centre for Disease Control, 494.

Draper, G., Vincent, T., Kroll, M., & Swanson, J. (2005). Childhood cancer in relation to distance from high voltage power lines in England and Wales: a case-control study. British Medical Journal, 1290-1294.

Electric Power Research Institute. (2009). Health Effects of Exposure to EMF. Palo Alto, California: Electric Power Research Institute (EPRI), Inc.

Ferguson, C. (2012, February 15). Letter from Balule Nature Reserve .

Henshaw, D. L. (2009, August 3). RE: the proposed construction of power lines (2x 400kV + 2x 220 kV) near Kamionki Adverse health effects of exposure to power frequency electric and magnetic fields (EMFs). Retrieved January 6, 2011, from www.kamionki.net: www.kamionki.net/minister_of_environment_%20poland_%203rd_aug_09.pdf

Huss, A., Spoerri, A., Egger, M., & Röösli, M. (2008). Residence Near Power Lines and Mortality From Neurodegenerative Diseases: Longitudinal Study of the Swiss Population. American Journal of Epidemiology Vol. 169, No. 2, 167–175.

Kampinga, K. E. (2012, February 12). Letter form Olifants River Game Reserve Share Block Ltd.

Krugell, W., Otto, H., & van der Merwe, J. (2009, February 17). Local Municipalities and Progress with the Delivery of Basic. Retrieved February 21, 2010, from www.econrsa.org: http://www.econrsa.org/papers/w_papers/wp116.pdf

Mia, I. (2012, February 13). Letter from Oxford Trading Company (Pty) Limited.

National Department of Health. (2011). The National Antenatal Sentinel HIV and Syphilis Prevalence Survey, South Africa, 2010. Pretoria: National Department of Health.

Öhrström, E. (1991). Psycho-social effects of traffic noise exposure . Journal of Sound and Vibration Volume 151, Issue 3, 22 December 1991, 513-517.

Schwabe, C. (2004). Fact Sheet: Poverty in South Africa . Pretoria: Human Sciences Research Council .

Scientific Committee on Emerging and Newly Identified Health Risks. (2009). Health Effects of Exposure to EMF. Brussels: European Commission, Health & Consumer Protection DG, Directorate C: Public Health and Risk Assessment.

Sidaway, H. G. (2009). Environmental and social impacts of electricity utilization: broadening the debate . The Environmentalist 23(3) , 307-314.

Spencer, C. (2012, January 31). Letter from Olifants West Game Reserve.

Statistics South Africa. (2007). Community Survey 2007. Statistic Release P0301. Pretoria: Statistics South Africa.

Statistics South Africa. (2011). Mid-year population estimates 2011. Statistical Resease P0302. Pretoria: Statistics South Africa.

Statistics South Africa. (2012). Quarterly Labour Force Survey, Quarter 1, 2012. Statistical release P0211. Pretoria: Statistics South Africa.

Teepen, J. C., & van Dijck, J. A. (2012). Impact of high electromagnetic field levels on childhood leukaemia incidence. Int. J. Cancer. doi: 10.1002/ijc.27542.

UK Childhood Cancer Study Investigators. (1999). Exposure to power frequency magnetic fields and the risk of childhood cancer. The Lancet, Vol. 354, No. 9194, 1925-31.

UK Childhood Cancer Study Investigators. (2000). Childhood cancer and residential proximity to power lines. British Journal Cancer, 83, No. 11, 1573-80.

Wartenberg, D. G. (1993). Identification and characterization of populations living near high-voltage transmission lines: a pilot study.

Wertheimer, N., & Leeper, E. (1979). Electrical wiring configurations and childhood cancer. American Journal of Epidemiology 109(3), 273-284.

Wood, A. W. (2006). How dangerous are mobile phones, transmission masts, and electricity pylons? Archives Diseases in Childhood (2006) 91, 361-366.