HYDRA-PERSEUS 765kV TRANSMISSION LINE

EIA REPORT
SOCIAL IMPACT ASSESSMENT
as part of the
ENVIRONMENTAL IMPACT ASSESMENT

SEPTEMBER 2006

Prepared by:
MasterQ Research
Reg. No.: 2003/002350/07

SOCIAL TEAM:

MasterQ Research
Contact person: Anita Bron
Mobile: 082 780 5801
Telephone: 011 487 3126
Fax: 011 487 3126
Email: masterq@telkomsa.net

Postal address
49 Muller Street
Yeoville
2198

EXECUTIVE SUMMARY

Eskom is proposing the construction of a new 765kV Transmission Power Line between Hydra (De Aar) and Perseus (Dealesville). The line might not enter the Hydra substation, but could go past the west of De Aar to link with the proposed Gamma-Hydra line from Victoria West. A 765 Transmission Power Line will also be built between Perseus and Beta, approximately 12km in length. Perseus substation will have to be expanded by approximately 35ha to the south and 15ha to the west of the existing substation. The route traverses the southern Free State (FS) and Northern Cape (NC).

An Environmental Impact Assessment of the area was conducted by Arcus Gibb (Pty) Ltd, taking into consideration four potential alternative routes for the Transmission power line from Hydra to Perseus, and a study area between Perseus and Beta. The Environmental Impact Assessment included a Social Impact Assessment, which is the focus of this report.

A scoping study was conducted prior to the full EIA, to identify preferred alternatives for the Hydra-Perseus alignments, and to identify sensitive areas. All four Hydra-Perseus alignments went to full EIA, due to the homogeneity of the study area.

The study concluded that only two impacts, i.e. disruption of land use and the maintenance of the servitude are permanent and direct causes of the project. The other impacts were identified as temporary, and the report stated that mitigation well in advance could reduce these impacts. The study concluded that the transmission line which would cause the least economic impact was on the western side of the study area. Further intensive studies prior to making decisions were recommended.

The purpose of this report is to provide a detailed Socio-economic Specialist Report on the study area, which will inform the detailed EIA Report, specifically the identification final alignments for the proposed transmission lines. This specialist assessment and report considers:

- Identification, review and interpretation of existing information on socio-economic resources within the study area;
- Identification of gaps in information and source this information as far as possible;
- Discussion of the significance of any further gaps in information, the reasons for the lack thereof, and the implication it has on the findings, conclusions and recommendations in the Specialist Report;
- Identify any potential fatal flaws associated with the proposed project;
- Identify specific areas of sensitivity and its effect on the final alignment of the line and, conversely, the impacts the line may have on these specific areas, as well as the significance thereof;
- Propose a final alignment for the proposed lines considering sensitive areas and optimum alignment to reduce social impacts and/or the significance thereof;
- Propose mitigation and/or management measures (for inclusion in the EMP) to reduce the significance of impacts, which cannot be avoided;

- Include any other information necessary to provide scientifically correct and defensible findings, recommendations and conclusions in the Specialist Report.

To meet the objectives of the report, a baseline profile of the social, land use and tourism environment in the study area were compiled. The social specialist sourced her information from primary and secondary data gathering methods. The baseline information was used to develop criteria to identify red flag, highly sensitive and sensitive areas. An assessment of these results, together with the results of an assessment of the issues raised by I&AP's, guided the identification of a preferred alignment. The procedure followed was thus:

- data collection;
- baseline description of the study area in terms of social, land use and tourism;
- summary of issues and concerns of Interested and Affected Parties (I&AP's);
- development of assessment criteria;
- impact assessment of issues and concerns raised by I&AP's;
- final identification of a preferred alignment from a socio-economic perspective, taking into account eco-tourism.

The assessment for Hydra-Perseus was done taking into account social, land use and tourism information. The information guided and informed the development of assessment criteria, and the preferred alternative alignment. The results of the final impact assessment overall indicate that the central or eastern alignment is preferred. The main differentiators between alignments are impact on sense of place for the local inhabitants, tourists & hunters, and land use. The central alignment is then preferred. However, care should be taken that the "open horizons" are preserved for future generations, and deviations from this alignment towards the west should be avoided. The western alignment is the least preferred alignment.

The Beta-Perseus study area does not impact significantly on tourism activities, developments or settlements/homesteads – current or planned. In choosing the final alignment, farming activities should be considered. The final alignment should preferably:

- follow farm borders
- follow an existing line
- skirt irrigation areas

The expansion of the Perseus power station will not impact significantly on tourism activities, land use or developments/settlements/homesteads – current or planned.

CONTENTS

ACRONYMS

DM	District Municipality
EIA	Environmental Impact Assessment
FS	Free State Province
GDP	Gross Domestic Product
GGP	Gross Geographic Product
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
LM	Local Municipality
NC	Northern Cape Province
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SSA	Statistics South Africa

1 BACKGROUND

Eskom is proposing the construction of a new 765kV Transmission Power Line between Hydra (De Aar) and Perseus (Dealesville). The line might not enter the Hydra substation, but could go past the west of De Aar to link with the proposed Gamma-Hydra line from Victoria West. A 765 Transmission Power Line will also be built between Perseus and Beta, approximately 12km in length. Perseus substation will have to be expanded by approximately 35ha to the south and 15ha to the west of the existing substation. The route traverses the southern Free State (FS) and Northern Cape (NC).

An Environmental Impact Assessment of the area was conducted by Arcus Gibb (Pty) Ltd, taking into consideration four potential alternative routes for the Transmission power line from Hydra to Perseus, and a study area between Perseus and Beta. All four alignments were taken to full EIA. The Environmental Impact Assessment included a Social Impact Assessment, which is the focus of this report.

The first sub-section below provides an overview of the preliminary findings of the Social Impact Assessment (SIA) conducted during the scoping phase of the EIA. The second sub-section explains the objectives of the study reported in this document, and the final sub-section describes the methodology that has been employed to meet these objectives.

1.1 Findings of the Scoping Phase

In the scoping phase, the standard (social and economic) impacts and issues that were identified as related to the proposed project were[1]:

- Decrease in agricultural production potential;
- Resettlement of farm labourers or any other affected communities;
- Possible displacement of the graves;
- Disruption of current and existing land use and farming practices;
- Disruption of social relations as a result of temporary work camps;
- Spread of HIV/AIDS and other infectious diseases; and
- Employment of local labour.

The study concluded that only two impacts, i.e. disruption of land use and the maintenance of the servitude are permanent and direct causes of the project. The other impacts were identified as temporary, and the report stated that mitigation well in advance could reduce these impacts. The study concluded that the transmission line which would cause the least economic impact was on the western side of the study area. This was also in view of the fact that the major nature reserves, some of which are protected areas, occur on the eastern side of the study area. Further intensive studies prior to making decisions were recommended.

[1] Final ESR_05.05.2006, Appendix 3, prepared by Bembani Sustainability Training (Pty) Ltd

1.2 The Purpose of the EIA Phase Report

The purpose of this report is to provide a detailed Socio-economic Specialist Report on the study area, which will inform the detailed EIA Report, specifically the identification final alignments for the proposed transmission lines. This specialist assessment and report considers:

- Identification, review and interpretation of existing information on socio-economic resources within the study area;
- Identification of gaps in information and source this information as far as possible;
- Discussion of the significance of any further gaps in information, the reasons for the lack thereof, and the implication it has on the findings, conclusions and recommendations in the Specialist Report;
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- Propose mitigation and/or management measures (for inclusion in the EMP) to reduce the significance of impacts, which cannot be avoided;
- Include any other information necessary to provide scientifically correct and defensible findings, recommendations and conclusions in the Specialist Report.

The approach and methodology used to fulfil the purpose of this report are described in more detail the following section.

1.3 Approach and Methodology

To meet the objectives of the report, a baseline profile of the social, land use and tourism environment in the study area were compiled. The social specialist sourced her information from primary and secondary data gathering methods. The sources consulted and data gathered are not exhaustive, but these were the sources that could be accessed and were available within the required timeframes.

Primary data collection involved:

- Field trip by vehicle; and
- Interviews with Interested and Affected Parties (I&AP's) including owners of tourist accommodation.

Secondary methods involved desktop research, in which the following were used:

- Issues and Responses Report[2]
- Specialist maps;

[2] [2] Final ESR_05.05.2006, Appendix 4.10, Issues and Response Report

- Tourism maps and information (internet searches and promotional material);
- Census data (1996 and 2001);
- Integrated Development Plans (IDP) of District Municipalities and Local Municipalities[3];
- Spatial Development Frameworks (SDF) of the District Municipalities and Local Municipalities; and
- Other relevant reports and documents (see section 8 for a detailed list).

The baseline information was used to develop criteria to identify red flag, highly sensitive and sensitive areas. An assessment of these results, together with the results of an assessment of the issues raised by I&AP's, guided the identification of a preferred alignment. The procedure followed was thus:

- data collection;
- baseline description of the study area in terms of social, land use and tourism;
- summary of issues and concerns of Interested and Affected Parties (I&AP's);
- development of assessment criteria;
- impact assessment of issues and concerns raised by I&AP's;
- final identification of a preferred alignment from a socio-economic perspective, taking into account eco-tourism.

Data sources have listed in this section and the section which follows proceeds to describe the study area.

2 DESCRIPTION OF THE STUDY AREA

The study area is located in Southern Free State and Northern Cape. A visual illustration of the study area is presented in the Tourism and Heritage map. The map is further informed by a detailed description in this section of what can be expected in the study area in terms of socio-economic, tourism and land use profiles and practices.

The first sub-section below provides a profile of the socio-economic conditions in Free State and Northern Cape Province, followed by a more detailed profile of the study area, including future developments for areas in the study area.

[3] During data collection, it was noted that not all the municipalities had their most recent, i.e. 2004/2005, IDP's finalised and available. Consequently, it is possible that some of the information reflected in this document might be outdated. A further shortcoming of some IDP's was that the majority used 1996 census data as a reference point. Neither 1996 nor 2001 census data should be regarded as the final say regarding a community. Instead, the combination of these two sets of data should be viewed as indicative of broad trends within an area.

2.1 The Bigger Picture

2.1.1 Free State Province[4]

The Free State Province (FS) covers an area of 129 46 4km2 with a population of 2.8 million, which is 6.4% of the South African population. The Free State is the third largest province in SA, but has the second smallest population and second lowest population density. About three quarters of the Free State population live in urban settlements. The majority of the population is Black African (84%). Sesotho is the dominant mother tongue (57%) followed by Afrikaans (15%)[5]. Two thirds of the population live in poverty and unemployment is high (34%). The incidence of HIV/Aids is highest in the country. Literacy is 3rd highest in the country.

The Southern Free State, in which the study area falls, is mostly used for agricultural purposes, whilst the Northern Free State is focused on the gold mining industry. Mining contributes 22.6% to the Gross Geographic Product (GGP) of approximately R44 billion, manufacturing 14.5%, agriculture 11% and tourism 3%. Almost one third of SA's gold production comes from the Free State, just over three quarters of bentonite is produced in this province, and large deposits of coal exist. Mining is the biggest employment provider in the province (one fifth of the labour force).

The FS is named as the bread basket of SA, producing about 40% of maize, 50% wheat, 80% sorghum, 33% potatoes, 30% groundnuts, 18% red meat, and 15% wool. About 90% of the FS is used for agricultural purposes, with about 2 million ha under cultivation for crop production, and a fifth under irrigation[6].

The full potential of the Southern FS tourism industry has not been explored enough and this also contributes to limited economic growth[7]. District Municipalities and Local Municipalities aim to promote local tourism. Although the entire southern part of Xhariep (situated in the study areas is well known for its tourist attractions, Gariepdam is regarded as the main focus area for the region. Gariepdam has therefore been identified as the main centre for tourism development which will link the potential tourism potential around Zastron (due to own scenery and development of Mohale's dam in Lesotho) to the Van der Kloof Dam near Luckhoff.

2.1.2 Northern Cape[8]

The Northern Cape has the biggest land mass of all the provinces and covers approximately 29.7% of South Africa's land surface. By the year 2000, the total population size of the provinces was estimated to be around 840 000 people, of which the predominant population group was Coloured. According to Census 2001, 10.6% of the total Coloured population group can be found in

[4] Statistics South Africa: Census 2001 in brief

[5] http://www.dteea.fs.gov.za/general.htm, accessed 09/01/2006

[6] http://www.dteea.fs.gov.za/economy.htm, accessed 09/01/2006

[7] Relevant IDP's

[8] Small Enterprises & Human Development, Northern Cape, www.sehd.org.za/ncape.html

the Northern Cape. Some of the minor cultural groups like the San, Khoi and Nama communities are also found in scattered settlements throughout the province. The predominant language spoken in the province is Afrikaans (68.0%), followed by Setswana (20.8%) and IsiXhosa (6.2%).

The Northern Cape's main city is Kimberley, which grew rapidly during the 19th century due to the diamond rush to the area. Apart from the mining industry, the Northern Cape is mostly an agricultural area for the sheep, wine and dried fruit industries. The Kalahari Gemsbok Park is also located in the Northern Cape, and, together with the Botswana National Park, forms one of the world's largest conservation areas.

Despite the fact that the Northern Cape is by far the largest province in South Africa, it has the smallest economy of all the provinces contributing 1.8% to South Africa's Gross Geographic Product (GGP). The unemployment rate stands at 26%, which is slightly below the national average. However, the total amount of households under the poverty line (earning R800 or less per month) is estimated at around 38%, which is much higher than the national average.

Mining and agriculture are the main sectors that contribute to the province's economy. The mining industry mostly revolves around the production of ores, minerals and precious stones. The Northern Cape produces approximately 37% of South Africa's diamonds, 44% of its zinc, 70% of its silver, 84% of its iron ore, 93% of its lead and 99% of its manganese. Although the Northern Cape is much drier than any of the other provinces, it has a fertile agricultural sector that produces export quality table grapes, fruit and meat.

Three other industries that seem promising are tourism, fishing and mariculture. Approximately 3.1% of all tourists to South Africa visit the Northern Cape. The main tourist attractions in the area are the Kgalagadi Transfrontier Park as well as the Augrabies Falls National Park. The Northern Cape Provincial Government identified the tourism sector as a focus area for development and employment creation.

2.2 Profile of the Study Area

As far as the proposed Hydra-Perseus and Beta-Perseus Transmission Power Line is concerned, a number of District Municipalities (DM), Local Municipalities (LM) and towns and/or cities might be affected. These are listed in Table 2.1-1. Only the towns highlighted in yellow will be discussed in detail in the land use and tourism sections, as these are in close vicinity of the proposed alignments. The other areas have been discussed in sufficient detail in the Scoping Report[9].

[9] Final ESR_05.05.2006, Appendix 3, prepared by Bembani Sustainability Training (Pty) Ltd

Table 2.1-1: Municipal Areas and Towns in the study area

Hydra-Perseus 765kV Power Line			
District Municipality	**Local Municipality**	**Town**	**Potentially affected by (alternative)**
NORTHERN CAPE			
Pixley ka Seme	Thembelihle	Hopetown Strydenburg	- -
	Emthanjeni	*De Aar* Britstown Hanover	All alternatives - -
	Renosterberg	Phillipstown Petrusville	- -
FREE STATE			
Xhariep	Letsemeng	*Petrusburg,* *Bolakanang* *Koffiefontein,* *Dithlake,* *Diamantshoogte* *Luckoff,* *Relebohile,* *Teisesville*	Eastern alternatives
		Jacobsdal, *Ratang,* *Sandershoogte* *Oppermansgronde*	Western alternatives
	Kopanong	Fauresmith, Phillipolis, Springfontein, Bethule, Trompsburg, Edenburg and Reddersburg	- - - - -
Beta-Perseus 765kV Power Line			
Free State			
District Municipality	**Local Municipality**	**Town**	**Potentially affected by (alternative)**
Lejweleputswa	Tokologo	*Dealesville* Hertzogville Boshof	Perseus development and where Beta-Perseus enters the Perseus power station

2.2.1 Socio-economic Profile at a glance

Table 2.2-2 reflects the key population statistics of the study area. This is followed by a general description of the economic conditions in the study area, after which detailed descriptions of the population characteristics of the District and Local Municipalities in the study area follow.

Table 2.2-2: Study area at a glance[10]

		NORTHERN CAPE			FREE STATE		
		PIXLEY KA SEME DM			XHARIEP DM		LEJWELE-PUTSWA DM
Sample size	Population Size:	164 529			135 225		656 964
	Total number of households:	41 893			39 305		196 759
	Adult population size:	93 183			76 800		390 185
		Thembelihle LM	**Emthanjeni LM**	**Renosterberg LM**	**Letsemeng LM**	**Kopanong LM**	**Tokologo LM**
Population Demographics	Population size	13 979	35 540	9 062	42 975	55 936	32 448
	Total number of households	3 486	8 833	2 471	12 094	17 633	8 974
	Adult population size	7 931	20 304	5 191	24 025	32 231	18 490
Socio-demographics	Predominant age group	10-14 (11.6%)	10-14 (11.4%)	10-14 (11.7%)	5-9 (11.7%)	15-19 (11.3%)	10-14 (11.4%)
	Predominant education (grouped)	Some primary (27.0%)	Some secondary (26.9%)	No schooling (25.9%)	Some primary (26.2%)	Some secondary (27.7%)	No schooling (31.2%)

[10] Demographic profiles obtained from the Municipal Demarcations Board, http://www.demarcation.org.za, accessed on 24 and 26 July 2006 (Census 2001)

Socio-demographics		Thembelihle LM	Emthanjeni LM	Renosterberg LM	Letsemeng LM	Kopanong LM	Tokologo LM
	Predominant educational institution	School (56.4%)	School (62.7%)	School (60.4%)	School (54.8%)	School (64.4%)	School (58.5%)
	Predominant gender	Female (50.8%)	Female (52.0%)	Female (51.3%)	Female (51.1%)	Female (52.0%)	Female (51.0%)
	Predominant head of household gender	Male (75.1%)	Male (62.0%)	Male (69.7%)	Male (70.9%)	Male (60.2%)	Male (68.3%)
	Predominant household size (persons per household)	2 (20.3%)	2 (19.6%)	2 (24.2%)	2 (19.6%)	2 (22.3%)	2 (21.2%)
	Predominant language	Afrikaans (94.6%)	Afrikaans (73.2%)	Afrikaans (74.8%)	Afrikaans (65.7%)	Sesotho (40.1%)	Setswana (59.4%)
	Predominant population group	Coloured (73.3%)	Coloured (58.1%)	Coloured (62.1%)	Black African (65.0%)	Black African (72.5%)	Black African (84.2%)
	Predominant household income interval	R9601-R19200 (26.5%)	R4801-R9600 (20.9%)	R4801-R9600 (25.8%)	R4801-R9600 (25.0%)	R4801-R9600 (26.3%)	R4801-R9600 (26.3%)
	Predominant industry	Agriculture (11.1%)	Community services (7.0%)	Agriculture (9.3%)	Agriculture (10.9%)	Agriculture (8.9%)	Agriculture (14.5%)

		Thembelihle LM	Emthanjeni LM	Renosterberg LM	Letsemeng LM	Kopanong LM	Tokologo LM
Socio-economics	Predominant occupation	Elementary (55.1%)	Elementary (38.3%)	Elementary (52.3%)	Elementary (54.6%)	Elementary (55.2%)	Elementary (54.6%)
	Predominant personal income interval	No income (62.5%)	No income (65.7%)	No income (67.0%)	No income (63.3%)	No income (65.0%)	No income (63.1%)
	Work status	Paid employee (21.6%)	Paid employee (19.3%)	Paid employee (18.3%	Paid employee (23.6%)	Paid employee (19.6%)	Paid employee (25.0%)
	Predominant employment status	Not economically active (46.7%)	Not economically active (43.5%)	Not economically active (35.1%)	Employed (41.6%)	Not economically active (44.1%)	Employed (43.4%)
	Predominant tenure status	Occupied rent free (38.0%)	Owned, fully paid (37.6%)	Owned, fully paid (55.9%)	Occupied rent free (37.8%)	Owned, fully paid (49.2%)	Owned, fully paid (44.8%)
Infrastructure	Predominant energy for cooking	Electricity (51.4%)	Electricity (68.8%)	Electricity (45.8%)	Electricity (47.0%)	Electricity (42.1%)	Electricity (42.2%)
	Predominant energy for lighting	Electricity (47.8%)	Electricity (83.9%)	Electricity (72.2%)	Electricity (71.4%)	Electricity (81.5%)	Electricity (73.1%)
	Predominant mode of transport	On foot (34.2%)	On foot (35.5%)	On foot (36.8%)	On foot (39.4%)	On foot (46.4%)	On foot (49.6%)
	Predominant method of refuse removal	Removed once a week (60.3%)	Removed once a week (86.3%)	Removed once a week (72.9%)	Removed once a week (62.3%)	Removed once a week (69.6%)	Removed once a week (46.4%)

		Thembelihle LM	Emthanjeni LM	Renosterberg LM	Letsemeng LM	Kopanong LM	Tokologo LM
Infrastructure	Predominant sanitation method	Flush toilet (47.4%)	Flush toilet (60.6%)	Flush toilet (37.8%)	Flush toilet (60.4%)	Flush toilet (71.5%)	Bucket latrine (46.2%)
	Predominant communication infrastructure	Public telephone (32.3%)	Public telephone (29.5%)	Public telephone (31.0%)	Public telephone (36.0%)	Public telephone (32.8%)	Public telephone (27.4%)
	Predominant water access	Pipe water (yard) (23.2%)	Pipe water (dwelling) (21.1%)	Pipe water (dwelling) (21.9%)	Pipe water (yard) 22.4%)	Pipe water (yard) (30.2%)	Pipe water (yard) 30.2%)

Economic information sourced from the IDP's are reflected below.

In the Xhariep DM, Kopanong Local Municipality makes the largest contribution to the total GGP of the district municipality (42.4%), followed by Letsemeng Local Municipality (29.8%) and Mohokare Local Municipality (27.8%). Income from the agricultural sector make the largest contribution to the GGP (Stats SA, 1996) followed by general government (16.2%) and the finance sector (15.6%). Very little diversification takes place, and this places the area at economic risk in light of the decline in the agricultural sector during recent years. Assuming that the GGP has not increased drastically over the period 1996 to 2001, the GGP per capita is calculated at R4 858, which is the second lowest amongst all the district municipalities in the Free State. Unemployment in the region has increased by almost 36.0% over the period 1996 to 2001. The highest increase was experienced in Kopanong, where unemployment increased by 32.0% for the same period. It is also alarming to note that the population of Xhariep has increased by a mere 10.9% since 1996, but that unemployment increased by 14.0% for the same period. This implies that the population of the district is worst off since 1996.

The Lejweleputswa DM, which is also located in the Free State Province, has the highest GGP contribution in the province. This contribution is mostly achieved through the mining industry, which contributes 36.0% of the total GGP in this region. Unfortunately, fluctuations in the gold price place the economy of Lejweleputswa DM in a vulnerable position. Of the 5 LMs within the jurisdiction of the Lejweleputswa DM, the Tokologo LM makes the smallest contribution to the GGP at 1.4%, largely through its agricultural sector. The district is mostly dependant on the mining sector with little or no diversification, which places the area economically at risk. The environmental sensitivity of mining development further adds to this risk.

The Northern Cape GGP accounted for 2.1% of South Africa's GDP. The province's economy is dominated by the primary sector despite a slight decreased contribution and a move towards a more service orientated economy. For the most part the processing of raw materials takes place outside the province. If they were to take place within the Northern Cape, it would lead to more job creation and a higher contribution to the GGP.

Detailed descriptions of the socio-economic characteristics of the District and Local Municipalities in the study area follows, starting with the District Municipality (DM) Pixley ka Seme and its Local Municipalities (LM's), followed by Xhariep DM and Lejweleputswa DM and their relevant LM's.

2.2.2 Pixley Ka Seme District Municipality

The total population of this DM stands at 164 529 people in 41 893 separate households with an average household size of approximately 3.9 persons per household. Almost half of all the residents have some school training, of which a quarter (24.3%) has some primary school education or some secondary school education (23.7%). Slightly more than half (51.4%) of the residents are female, whilst two thirds of households (65.9%) are headed by a male. A fifth of the households (20.1%) consist of two people, followed by households of three (17.0%) and four (16.2%) people. Afrikaans is the predominant language spoken by three quarters (77.6%) of all the people.

The predominant population group is Coloured (62.4%), followed by Black African (26.9%).

Only 15% of all the **households** in this area do not have an income, although close on two thirds (64.0%) reported having no **personal** income. Despite this, close on half (46.9%) has a household income of between R4 801 and R19 200, which places the majority of households above the poverty line. The area has an employment rate of 36.1%, of which half (47.7%) would describe their occupation as elementary. Most of the people (7.6%) work in the agricultural industry.

The municipal infrastructure seems to be well established, with just over half (55.5%) using electricity for cooking, and three quarters (75.4%) using it for lighting. Refuse is removed once a week and half of the households (46.0%) have a flush toilet. Two fifths all the residents (40.2%) have paid for their property in full, followed by nearly a third (29.6%) of people who occupy their property rent-free.

(a) Thembelihle Local Municipality

The Thembelihle LM falls within the jurisdiction of the Pixley ka Seme DM and includes the towns Hopetown and Strydenburg. The total population in this area stands at 13 979 people in 3 486 separate households, with an average household size of approximately 4 persons per household. Most of the people (27.0%) reported having some primary school education followed by almost a quarter (24.0%) having had no schooling. Half of the population is female (50.8%), while most of the households are headed by a male (75.1%). Households consist of mainly two people (20.3%), followed closely by three (16.9%) and four (16.1%) people in a household. By far the majority of people (94.6%) speak Afrikaans as a home language. The predominant population group is Coloured (73.3%), followed by White (13.9%).

Half (52.2%) of all households have an income of between R4 801 and R19 200 per month. Despite this two thirds (62.5%) reported having no personal income. Under half of the employable population (40.5%) is employed, of which every one in ten is employed in the agricultural sector.

The area seems to be lacking a well established municipal infrastructure in some regards, which is reflected in the fact that half the households use electricity for cooking (51.4%) and lighting purposes (47.8%). Most (60.3%) refuse is removed once a week and almost half the households (47.4%) have a flush toilet. One third (29.0%) has no access to sanitation services. Four in ten households (38.0%) occupy their property rent-free, or have paid for their property in full (37.1%).

(b) Emthanjeni Local Municipality

The Emthanjeni LM also falls under the Pixley ka Seme DM and includes the towns of Britstown, De Aar and Hanover. The total population consists of 35 540 people in 8 833 separate households, with an average household size of approximately 4 persons per household. Most has at least some secondary school education (26.9%), or no schooling (22.7%). More than half of the residents are female (52.0%) and two thirds of all households are headed by a male (62.0%). Most of the households (19.6%) consist of two people,

followed by households of three (17.1%) and four (16.2%). Afrikaans is again the predominant home language (73.2%) followed by isiXhosa (24.9%). The predominant population group is Coloured (58.1%) followed by Black African (29.3%).

Close on half (40.9%) of all the households have incomes of between R4 801 and R19 200, although the majority (65.7%) again reported having no personal income. Only one third (33.3%) of the people are employed, of which the majority (7.0%) is in the community services sector.

The area is well supplied with electricity services with the majority using this infrastructure for both cooking (68.8%) and lighting (83.9%). By far the majority's refuse is removed once a week (86.3%) and two thirds of households (60.6%) have a flush toilet. Most of the people own their property (37.6%) whilst a quarter (24.3%) rents their property.

(c) Renosterberg Local Municipality

The Renosterberg LM is the final municipality potentially affected by the proposed Hydra-Perseus transmission line that still falls under the jurisdiction of the Pixley ka Seme DM. Renosterberg LM is home to Phillipstown, and Petrusville. The total population in this area is 9 062 in 2 471 separate households, with approximately 4 people per household. A quarter (25.9%) of all the people reported to have had no schooling, closely followed by both some primary and some secondary schooling (24.0% each). As is the case with the other municipalities, more than half of all the residents are female (51.3%) while most households are headed by a male (69.7%). A quarter of all the households (24.2%) consist of two people, followed by households of four (16.2%) and three (16.1%). The predominant population group is Coloured (62.1%), followed by Black African (27.2%). Afrikaans is spoken by three quarters of all the residents (74.8%), followed by isiXhosa (22.9%).

Most of the households (43.1%) have an income of between R4 801 and R19 200 per month despite the fact that more than two thirds (67.0%) reported having no personal income. Only a third (33.2%) of all the residents are employed, again mainly in the agricultural sector (9.3%).

Although only 45.8% make use of electricity for cooking, three quarters (72.2%) make use of electricity for lighting. Most households' refuse is removed once a week (72.9%). A third (37.8%) of households has a flush toilet, closely followed by households who still make use of a bucket latrine (31.3%). Half has paid for their property in full (55.9%) followed by 14% who rents their property.

2.2.3 Xhariep District Municipality

The Xhariep DM is located in the Free State Province and has a total population of 135 225 people residing in 39 305 separate households, with an average household size of approximately 3.4 persons per household. The Xhariep DM has three separate local municipalities, of which two (the Letsemeng LM and Kopanong LMs) are potentially affected by the proposed Hydra-Perseus transmission line. A quarter of its residents (26.9%) have some primary school education or secondary school education (25.3%).

There is an almost equal split between males and females, with females dominating slightly at 50.8%. Two thirds of all the households (63.8%) are headed by a male. Most of the households consist of at least two people (21.0%), followed by household sizes of three (17.1%) and four (15.8%). Three quarters of the population is Black African (74.6%) followed by Coloured (16.2%). There is an equal split between Afrikaans and Sesotho (both at 37.1%) as predominant home language.

Despite the fact that almost two thirds (64.7%) of the residents have no personal income, only 19.5% of all households have no income. For most of the households (45.1%) the average monthly income is between R1 and R9 600. Just little over a third (37.2%) of all the people are employed, again mostly in the agricultural sector (10.0%).

There is an almost equal split between people who use electricity and paraffin for cooking (39.4% for electricity and 36.7% for paraffin). However, by far the majority (76.3%) makes use of electricity for lighting. Two thirds of households' refuse is removed once a week (65.2%) and have access to a flush toilet (63.9%). Two in ten (43.0%) owns the property in which they stay and have paid for it in full, whist a third (30.6%) occupies their property rent-free.

(a) Letsemeng Local Municipality

The Letsemeng LM is home to Luckhoff, Koffiefontein, Oppermans and Jacobsdal and has a population of 42 975 people residing in 12 094 households, with an average household size of approximately 3.5 persons per household. More than half of the people (54.8%) have attended school, followed by 40.5% who have had no schooling. There is slightly more females (51.1%) than males in the area, but most households are headed by a male (70.9%). Again most of the households consist of two people (19.6%), followed by households of three (17.7%) and four (17.5%). A significant number of households (16.6%) only consist of one person – probably because of employment away from home, in the mining sector. The predominant population group is Black African (65.0%) followed by Coloured (25.3%). Most of the households speak Afrikaans as home language (65.7%) followed by Sesotho (12.6%).

Only 15% of the households reported having no income, even though the majority reported having no personal income. Almost half (42.7%) have a household income of between R1 and R9 600. Most of the residents (41.6%) are employed, again in the agricultural industry (10.9%).

More people make use of electricity for cooking (47.0%) than paraffin (31.2%). The majority uses electricity for lighting (71.4%). Two thirds of households' (62.3%) refuse is removed once a week, whilst the remainder (34.4%) have their own refuse dump. The majority (60.4%) makes use of a flush toilet, a fifth (20.4%) having no access to sanitation services. A third (33.3%) has paid for their property in full, whilst 37.8% occupy their property rent-free.

(b) Kopanong Local Municipality

Kopanong LM includes the towns of Fauresmith, Phillipolis, Springfontein, Bethule, Trompsburg, Edenburg and Reddersburg. The area has a total population of 55 936 people who reside in 17 633 separate households, with an average household size of approximately 3.2 persons per household. Most of these households (22.3%) consist of two people, followed by singe households (20.9%) and households of three (17.2%) and four (14.6%) people. Females are slightly in the majority (52.0%), although most households are male-headed (60.2%). Black Africans are in the majority (72.5%), followed by the Coloured population (17.8%). Sesotho is largely spoken in the area (40.1%), followed by Afrikaans (34.2%).

A quarter (26.3%) of all the households has an income of between R4 801 and R9 600 despite the fact that almost two thirds (65.0%) of individuals has no income. Slightly more than a third (34.7%) of the residents are employed, again mostly in the agricultural sector (8.9%).

There is an almost equal split between people who make use of electricity (42.1%) and paraffin (37.2%) for cooking. By far the majority use electricity for lighting (81.5%). More than two thirds of households (69.6%) have their refuse removed once a week and have a flush toilet (71.5%). Only 12% have no access to sanitation services. Almost a half (49.2%) has paid for their property in full, followed by a quarter (24.2%) who occupies their property rent-free.

2.2.4 Lejweleputswa District Municipality

The Lejweleputswa DM is also located in the Free State province and consists of 5 separate local municipalities, of which only one (the Tokologo LM) might be affected by the proposed Hydra-Perseus transmission line. The area has a total population of 656 964 people residing in 196 759 households, with an average household size of approximately 3.3 persons per household. Most of these households consist of a single person (22.6%), followed by household sizes of two people (19.0%), three people (16.5%) and four people (15.4%). Females dominate slightly at 51.2%, whilst most households are headed by a male (63.4%). The predominant population group is Black African (89.3%), followed by White (8.6%). Almost two thirds (61.5%) speak Sesotho, followed by isiXhosa (15.1%).

Almost a fifth of the households have an income of between R9 601 and R19 200 even though the majority (69.2%) reported having no personal income. Slightly more than a third (34.0%) is employed, of which 5.5% in the mining industry.

There is an almost equal split between people who make use of electricity (48.9%) and paraffin (40.5%) for cooking. The majority (71.7%) uses electricity for lighting, followed by 19.8% who make use of candles. More than two thirds' (68.5%) refuse are removed once a week. The majority (48.8%) use a flush toilet, followed by 28.1% who still make use of a bucket latrine. Only 9.6% reported having no access to sanitation services. Most of the residents (39.2%) have paid for their property in full, followed by 24.2% who occupy their property rent-free.

(a) Tokologo Local Municipality

The towns of Hertzogville, Boshof and Dealesville are all located within the jurisdiction of the Tokologo LM. The area has a total population of 32 448 people in 8 974 households of which most consist of two persons (average households size about four). A fairly large proportion of households (18.1%) consist of a single person. Most of the people (31.2%) have had no schooling, followed by a quarter (26.9%) that has had some primary school education. As is the case with the other municipalities, most of the residents are female (51.0%) whilst most households are headed by a male (68.3%). The predominant population group is Black African (84.2%) followed by White (9.1%). Most of the people (59.4%) speak Setswana, followed by Afrikaans (19.2%).

More than a third of the households (44.6%) have an income of between R4 801 and R19 200, although almost two thirds (63.1%) have no personal income. Close on half (43.4%) of all the residents are employed, mostly in the agricultural sector (14.5%).

Less than half (42.2%) makes use of electricity for cooking, despite the fact that three quarters (73.1%) have access to electricity for lighting. Almost a half (46.4%) has their refuse removed once a week, closely followed by 39.1% of households who have their own refuse dump. The majority (46.2%) has a bucket latrine, followed by 11.3% which makes use of a ventilated pit latrine. The majority (44.8%) owns the property in which they stay, whilst a fairly large proportion (34.4%) lives in their property rent-free.

2.3 Spatial Development in the Study area

This section discusses the current zoning and planned development activities of the towns which will most likely be affected by the proposed lines.

Table 2.3-1: Registered Erven[11]

COMPONENT	TOTAL number of registered erven/farms
Petrusburg	1922
Jacobsdal	182 6
Koffiefontein	2439
Luckhoff	1425
Oppermansgronde	505
Farmland	2062
TOTAL LETSEMENG	**10179**
De Aar	**10 060**
Dealesville	**Not available**

[11] Source: Municipal Manager, September 2003

Table 2.3-2 lists the shortage of erven. An increase of 8685 people within the Letsemeng area occurred from 1996 to 2001. Towns that experienced a drastic increase in population are Jacobsdal and Koffiefontein. A shortage of 2410 houses is currently experienced together with a shortage of 450 erven in the predominantly black/coloured areas, mainly in Dithlake/Diamantshoogte (Koffiefontein). Dealesville municipality is in the process of acquiring agricultural land for housing development. In 2002, Tokologo Municipality estimated that the number of informal houses were 695, and the backlog was 1 500. De Aar is the town with the highest backlog of 2 000.

Table 2.3-2: Shortages of Erven[12]

AREA	No. of Registered erven	Housing shortage	Shortage of Erven
Petrusburg 303 informal	724	0	0
Bolokanang	1198	500	200
TOTAL	**1922**	**500**	**200**
Jacobsdal	499	0	0
Ratanang	879	400	0
Sandershoogte	448	0	0
TOTAL	**1826**	**400**	**0**
Koffiefontein 225 informal settlements	727	0	0
Dithlake	1447	1050	0
Diamantshoogte	265	50	100
TOTAL	**2439**	**1100**	**100**
Luckhoff	424	0	0
Relebohile	431	350	100
Teisesville	615	10	50
TOTAL	**1470**	**360**	**150**
Oppermansgronde (rural town)	505	50	0
TOTAL	**505**	**50**	**0**

[12] Source: Relevant IDP's

AREA	No. of Registered erven	Housing shortage	Shortage of Erven
TOTAL LETSEMENG	**8162**	**2410**	**450**
Toklogo DM Dealesville Tshwaraganang		**1 500**	
De Aar	**10 060**	**2 000**	

Please refer to the scoping report for a detailed breakdown of informal settlements. Table 2.3-3 discusses future spatial development plans[13]. The Transmission Power Line alternatives will not impact on any of these plans.

Table 2.3-3: Spatial Development Plans[14]

KOFFIEFONTEIN
The suburbs of Dithlake and Diamantshoogte will be extended through the development of new erven southeast from Dithlake towards Koffiefontein, as well as northwest and southeast of Diamantshoogte. The Koffiefontein CBD has also been earmarked for expansion towards the northeast. Although the CBD has started to expand to the northeast, the idea is not to extend the CBD, but rather to consolidate and densify the area. There are no plans to develop a separate CBD in Dithlake. However, the idea is that the existing nodal points in this area be supported and strengthened. The future development framework of Koffiefontein also includes the implementation of small scale farming for emerging farmers.
PETRUSBURG
Petrusburg will be extended towards the east. The area of Bolokanang will most probably be extended in a northern direction towards the N8. There is potential to develop an activity corridor along the A17 main street running through the town of Bolokanang. A proposed One-stop service station is also planned along the N8 at Petrusburg. The CBD can still be densified despite the fact that it is currently well developed. The further development of businesses in this area is encouraged along the main street in a western direction. A drawback in the development of these two towns is the N8 that separates the two towns, causing adverse problems with integration. Despite this, a high level of integration has already taken place. Small scale farming will be implemented for emerging farmers.

[13] Final ESR_05.05.2006, Appendix 3, prepared by Bembani Sustainability Training (Pty) Ltd

[14] Source: relevant IDP's

JACOBSDAL
The future development framework of Jacobsdal includes residential expansion west of the town towards the S574. The areas of Ratanang and Sandershoogte could also expand, but should be in an eastern direction towards Jacobsdal. The most prominent road in the area is the P8/2 between Modderfontein and Koffiefontein, which also unlocks potential for Jacobsdal's economy.
LUCKHOFF
There are large areas in Luckhoff that can still be (re)developed and densified. Due to the current layout of the new residential areas at Relebohile and Teisesville, these areas can still develop further towards the west. The existing canals and dams around Luckhoff limit expansion and therefore an urban fringe is proposed. Small scale farming would be implemented for emerging farmers.
OPPERMANSGRONDE
Oppermansgronde would most probably expand towards the north. Instead of attempting integration, a tourism corridor is proposed that passes by the rural town, which would then link the towns in Letsemeng. The possibilities for smaller municipal camps or commonages in Oppermansgronde should be explored.
DEALESVILLE
Future development will take place north of Perseus away from the power station and proposed lines.

2.4 Land Use[15]

2.4.1 Land use Profile

The area, through which the alternatives go, is characterised as farming area, although physical characteristics do not make it most suitable for farming economically efficient and sustainable. The grazing capacity is 9ha per livestock unit. This can be contributed to the low rainfall the areas receive.

In 1995 the Riet river settlement scheme in Letsemeng LM, comprising of a canal system, was completed. This settlement formed part of the Riet River Scheme and received water from Kalkfontein Dam from 1945 to 1987. The area under irrigation in 1987 was 7857.8 hectares.

The Orange Riet canal in Letsemeng LM was completed in 1987, and the upgrading of the Riet River settlement canals continued to 2001. The scheme is therefore relatively new.

Letsemeng LM encourages small-scale farming, especially in areas where intensive production is possible, such as the irrigation areas. Commonage

[15] Source: relevant IDP's

projects are listed in Table 2.4-1, followed by mining information in Table 2.4-2. Commonage development will ensure food security to rural communities.

Table 2.4-1: Commonage projects in Letsemeng

TOWN	CAMPS	EXTENT (HA)	PARTICULARS
Petrusburg/ Bolokanang	15	2449.35	Emerging Farmers Grazing Grazing Communal
Jacobsdal/Ratanang/ Sandershoogte	8	3221.40	Emerging Farmers P J Wilke Lessee absconded
Koffiefontein/Dithlake/ Diamanthoogte	26	4539.00	Communal Land Arable
Luckhoff/Relebohile/ Teisesville	4	2081.00	Emerging Farmers Grazing

Table 2.4-1: Mining

MINING	
Current: There is a diamond mine situated southeast of Koffiefontein was closed down, but apparently has recently been bought by a mining company. Limited mining activities take place on the land surface at Petrusburg, which includes the mining of gravel, clay and salt. The existing salt pans at Petrusburg also holds potential for further salt mining activities. There are currently extensive prospecting activities for diamonds taking place in Jacobsdal. The introduction of small-scale salt mining for batch salts has proven very successful in the past and should be considered in the Petrusburg area. In Dealesville, salt works on a small scale also exist at some of the numerous salt pans characterizing the area.	Future: The research and development of new and sustainable mining activities should be supported. This can also be achieved through the development of small scale mining operations. Value should be added to mining products, e.g. a tile factory. Local professionals can also be trained (e.g. engineering training).

2.4.2 Economic situation and implications

After mining and tourism, agriculture is the biggest contributor to the economy in the FS. Initiatives and programmes are directed to further unlock our agricultural potential of the FS. For the year ending 30 September 2004 the gross income of Free State farmers amounted to R10 728 million, a decrease of 6.5% compared to the previous year. Free State farmers earn R5 330 million from field crops[16]. The drought situation has also impacted on farmers' financial situation, as well as the irrigation tariffs (Appendix A). The yield for maize, sheep and ostriches yield is discussed in more detail ahead, as well as economic development programmes.

[16] Free State Department of Agriculture, Five year Strategic and Performance Plan, 2005/2010

MAIZE[17]

Maize accounts for approximately 36.0% of the gross value of field crops. The major areas of production are the Free State (36.4%), North West (32.8%), and Mpumalanga (19.8%). An estimated 2 929 500ha of maize was planted during 2004/05, which is an increase of about 3% from the 2003/04 season. The average producer price decreased by 44.4% from R836 per ton in 2003/04 to R465 per ton in 2004/05.

SHEEP

Sheep farming is concentrated in the Eastern Cape (30.1%), Northern Cape (25.3%), Free State (20.4%), and Western Cape (10.8%). The total number of sheep as at the end of August 2005 stood at 25.3 million, which is a reduction of 0.2% compared to 2004. Sheep are mostly kept for wool and mutton production. The production of wool in South Africa increased slightly during 2004/05 to about 46.5 million kg. Wool is an export product, with approximately 90% of the total production being exported. However, the 2004/05 wool season was disappointing with the average market indicator at R25,68 per kilogram – a reduction of 16.8% compared to the previous season.

The average producer price for mutton and lamb stands at R20,08 per kilogram for 2004/05, which is an increase of 8.1% compared to 2003/04. The consumption of mutton decreased by 17.3% from 152 000 tons in 2003/04 to 126 000 tons in 2004/05.

OSTRICHES

South Africa is the major supplier of ostrich products to the rest of the world. Approximately 70% of all ostrich products are produced locally. The local consumption of ostrich meat increased by 70% due to an effective marketing and awareness campaign. The income derived from ostrich leather differs owing to the various skin grades. First grade leather costs approximately R1 000 per skin, whilst third grade leather costs approximately R800 per skin. The average price per kilogram of ostrich meat is R16 and R90 for feathers per bird. It is expected that the amount of ostriches slaughtered in South Africa in the 2005/06 season would drop dramatically due to avain influenza. The income of ostrich farmers would also be quite lower because of the recovery of the Rand.

In the study area, itt is important to note that although the rural areas seemingly has the lowest unemployment rate, the decline in the agricultural sector over recent years has had an adverse effect on the employment potential of the rural areas and today it is expected that high levels of poverty occur[18]. In an attempt to develop rural communities and ensure their economically independence, various economic empowerment projects are executed or planned. These projects are discussed in Table 2.4.2-1.

[17] Information on maize, sheep and ostriches adapted from *Trends in the Agricultural sector (2005)*, a report commissioned by the Department of Agriculture

[18] Letsemeng LM IDP

Table 2.4.1-1: Economic Empowerment Projects

	MUNICIPALITY/TOWN	PROJECT DESCRIPTION	ECONOMICAL IMPACT	STATUS
FARMING	Jacobsdal & Koffiefontein	Xhariep Ostrich Project	Promotion of Ostrich industry by establishing farmers Expansion and creation of secondary uses: ▪ Tannery ▪ Abattoir (meat) ▪ Job creation ▪ Tourism ▪ Practical use of natural resources ▪ Diamond and wine route promotion	Funding Business Plan Feasibility study
	Koffiefontein	Crop (maize) farming		Operational
	Berg van Hoop	Crop (maize) farming		Operational
	Vukani Ma – Afrika	Crop (maize) farming		Operational
	Ebenezer	Crop (maize) farming		Operational
	Sisokola Sonke	Crop (maize) farming		Operational

	MUNICIPALITY/TOWN	PROJECT DESCRIPTION	ECONOMICAL IMPACT	STATUS
	Jacobsdal	Jacobsdal Vineyard Project	Settlement of farmers on irrigated land. Expansion of existing vineyards. Produce to existing wine cellars.	Funding
	Aganang			Operational
	Boitumelong	Vineyards		Not operating well
	Individuals	Stock farming		Operating
	Luckhoff	Diary at Luckhoff amongst emerging farmers	Secondary uses, e.g. cheese fabric, butter	No irrigation in Luckhoff Funding Business plan
	Oppermansgronde	Oppermans Vineyard Project (50ha)	Settlement of Oppermans farmers on irrigated land. Expansion of existing vineyards. Produce to existing wine cellars.	Funding of R20 million

	MUNICIPALITY/TOWN	PROJECT DESCRIPTION	ECONOMICAL IMPACT	STATUS
	Oranje Riet Channel	400ha at Oranje Riet Channel	Settlement of farmers Produce Job creation Skills development	Funding Business Plan Finalisation of process
	Jacobsdal, Koffiefontein, Luckhoff and Petrusburg	Establishment of emerging farmers on 116 000ha	Settlement of farmers Skills development Job creation Produce	Funding Business plan in process
		Vegetable farming	Job creation Secondary uses Poverty upliftment Enhancing livelihood	Unknown
		Cotton farming/plantations	Clark cotton 90 employment opportunities	Unknown
IRRIGATION	Rietrivier	Rietrivier Water Transfer Scheme (also known as Kalfontein Reverse Pumping Scheme)	12 new weirs with pump stations Constructed balancing dam Sufficient water supply which means irrigation possibilities for agricultural sector (crops and vineyards)	Operational

	MUNICIPALITY/TOWN	PROJECT DESCRIPTION	ECONOMICAL IMPACT	STATUS
	Oppermansgronde	Oppermans community irrigation along the S830. Vineyard.	Settlement of farmers Extension of vineyards, crops and livestock Skills development Job creation.	Funding. Kick start.
	Koffiefontein	57ha irrigation rights to be developed at Koffiefontein	Empowerment of people. Economic sustainability	Finalisation of funding
PROCESSING	Luckhoff	Investigate agri-processing possibilities, e.g. RDP maize mill, CSIR investigate agri-processing possibilities	Job creation by investigation Secondary industries Diversify production	Funding Investigation underway
		Lucerne processing plants (pills)	Secondary uses through manufacturing of pills for livestock: ▪ Lab ▪ Processing ▪ Packaging	Funding Business plan
		Potato processing	Job creation Secondary uses, e.g. packaging Enhancing livelihood	Funding Business plan

	MUNICIPALITY/TOWN	PROJECT DESCRIPTION	ECONOMICAL IMPACT	STATUS
	Luckhoff and Jacobsdal	Agri-processing with existing olive plantations	Job creation & Skills development Secondary uses to ensure economic sustainability	Needs to be strengthened
OTHER		Poultry production	Job creation Secondary uses Poverty upliftment Enhancing livelihood	Funding Implementation of project
	Oppermansgronde	Incubator system for breeding of birds	Job creation Skills development Secondary uses	R2.5 million 2-3 years
	Koffiefontein & Jagersfontein	Spoorweg site	Job creation	
	Koffiefontein, Jacobsdal, Petrusburg and Luckhoff	Refencing of commonage and crazing camps	Job creation	R1.2 million 2-4 years
	Koffiefontein	Recycling of dumping site	Job creation	R480 000 1-2 years
	De Aar	Workshop of Recycled Matter (WORM)	Job creation. Aimed at recycling all types of tin and glass containers, transforming it into crafts such as tea trays, picture frames, etc.	

	MUNICIPALITY/TOWN	PROJECT DESCRIPTION	ECONOMICAL IMPACT	STATUS
	De Aar			Expand and diversify the agricultural sector through the diversification of production and the stimulation of emerging farmers.

2.5 Tourist Activities

> "The province of the Free State has always had a magical effect on me... With its flat, dusty landscape as far as the eye can see, the great blue ceiling above, the endless stretches of yellow mealie fields, scrub and bushes, the Free State landscape gladdens my heart no matter what my mood. While I am there I feel that nothing can shut me in that my thoughts can roam as far and wide as the horizons."
> - Nelson Mandela in *Long Walk to Freedom*

This section discusses current and planned tourist activities in the study area, followed by an economic analysis of the tourism industry in South Africa.

2.5.1 Current attractions

Major routes and corridors are listed ahead followed by a table of tourist attractions (table 2.5.-1). Please note that only the towns closer to the alignments are included in the table.

Major routes to regional attractions

- Access route between Jacobsdal and Bloemfontein, via Koffiefontein and Petrusburg.
- Access route between Gariepdam and Wepener, via Bethulie and Smithfield.
- Link road between Trompsburg and Philippolis.
- Access routes to Philippolis from N1 (Gariepdam and Colesberg)
- Agricultural distribution route between Koffiefontein and Luckhoff
- Distribution route between Luckhoff and Philippolis
- The road between Bloemfontein and Kimberley is becoming busier, because of the condition of the N14. Also, R50mn has been spent on the upgrading and development of the Kimberley hole.

All these areas are to be inked together by means of an eco-tourism corridor along the Orange River.

Tourism corridors

Two tourism corridors have been identified.

- The Diamond and Wine Route linking Kimberley with Jacobsdal, Koffiefontein, Fauresmith and Jagersfontein;
- Xhariep route along the Gariepdam, Bethulie, Smithfield, Rouxville and Zastron where it will link up with the Maloti route that runs through the Eastern Cape along the R26 which follows the Lesotho boundary up to QwaQwa;
- Horizon route including Koffiefontein, Jacobsdal, Petrusville and Jagersfontein: this route forms part of the African Dream Routes, which aims to link “Africa’s splendours in a continuous network of Africa tourism routes – from the Cape to Cairo.” This route is sponsored by Engen.

Table 2.5-1: Tourist Attractions[19]

	KOFFIEFONTEIN	PETRUSBURG	JACOBSDAL	OPPER-MANS-GRONDE	LUCKHOFF	DE AAR	RURAL
Festivals	Water Festival – (March)	Potato & Game festival (every 2nod year) April Agricultural show every 2nd Year • Potato and Venison Festival	Kontron & Sport Festival (8-11 Oct 03) Annual Water and Wine Festival	None	Agricultural Show (October)	Major show every January/February - marked as a red letter event	None
Memorials / Historical sites	Historical buildings and Monuments of 2nd World War Kanonkop World War Two Murials – remaining walls of the Second World War Two prisoner of war camp that features murals painting by Fascio, who was an inmate of the camp	Voortrekker Memorial Anglican Church used in the Boer War Petrusburg Monument Paardeberg Anglo-Boer War Museum Poplar Grove Battle site - General De Wet unsuccessfully tried to stop the British advance into Bloemfontein	The cairn of commander Ds Lubbe The Burger Monument Market Square - earlier battle site British Blockhouse Magersfontein Battlefield and Museum Jacobsdal Cemetery – graves dating back to 1859 Dutch Reformed church – built in 1879 Cairn heap of stones – erected in 1899 by Boers departing to war	None	Stone Church Ossewa Tracks Anglo Boer War Gun Powder House		Battle of Driefontein Graves of English soldiers

[19] Source: relevant IDP's and websites

	KOFFIEFONTEIN	PETRUSBURG	JACOBSDAL	OPPER-MANS-GRONDE	LUCKHOFF	DE AAR	RURAL
			departing to war Paardeberg Battlefield – 40 000 British soldiers supported by 100 guns forced a force of 4000 Boers to surrender on 27 February 1900 after 10 days of fighting				
Craft Centres	Victoria Emmanuel Mossoulini Italian crafts	Bolokanang Craft Centre (in process of completion) Local pottery	None	None	None		None
Attraction facilities (e.g. Dams)	Open mine that is 385m deep. Entrance to town old mining equipment De Beers open mine lookout point Bird Park - see exotic and indigenous species Koffiefontein Shalalambi Crocodiles Coffee Pot	Wine Route Stop Emmaus - the centre point of South Africa Blockhouses Potato packing factory Salt pans – plans to build a factory at the salt mine to manufacture secondary products such as bath salts Rondavel built with	Landzicht wine cellars	Donkey Carts Tourism that includes farming activities	Biggest hole Unique weathered rock Gas lamp streetlights from bygone times Rolfontein Nature Reserve Van Der Kloof Dam - mecca for watersport, fishing and enjoying the outdoors.	Second largest railway junction, with 110km of railway and 29 rail tracks	Emmaus (centre of SA) Hunting Oskoppies hiking trails

	KOFFIEFONTEIN	PETRUSBURG	JACOBSDAL	OPPER-MANS-GRONDE	LUCKHOFF	DE AAR	RURAL
	Fountain Open-air Museum Diamond Game Farm Kalkfontein Dam San Rock Artwork Ettiene Le Roux Farm – home of one of South Africa's best novelists.	beer bottles Cultural village at the Service station along the N8 to market indigenous art of the area and that of the Southern Free State Open market selling fresh produce from local farms					
Accommodation	3 Guesthouses	1 Guesthouse	1 Guesthouse	None	1 Guesthouse		Game Lodges: Petrusburg, Jacobsdal, Luckhoff.

2.5.2 Future plans

The full potential of the region's tourism industry has not been explored enough and this also contributes to limited economic growth[20]. The reasons offered is the lack of marketing strategy for the region's tourism products and services offered as well as the lack of co-ordination of tourism initiatives in the region. The fact that both the District Municipality and the Local Municipalities have the same mandate (promotion of local tourism) was indicated as one of the reasons for duplication and lack of coordination. Concerns were also raised that previous disadvantaged communities have not participated in this sector of the economy.

Although the entire southern part of Xhariep is well known for its tourist attractions, Gariepdam is regarded as the main focus area for the region. Gariepdam has therefore been identified as the main centre for tourism development which will link the potential tourism potential around Zastron (due to own scenery and development of Mohale's dam in Lesotho) to the Van der Kloof Dam near Luckhoff.

According to the DM IDP, a few significant heritage resources occur in the area which can be used as tourist attractions. The IDP states that care should however be taken with developing these areas in order to preserve these cultural and natural heritage for future generations. Various areas along adjacent to the Orange river as well as surrounding regional dams have been identified as well suited for tourism and agricultural development alike.

Phillippolis and Smithfield were identified as tourism nodes. This implies that development focusing on the hospitality and tourism industry should be promoted in these nodes.

As a whole, the Letsemeng LM would like to develop and promote the following potential tourist attractions:

- Eco-tourism together with an irrigation scheme and game farming. This will also include the establishment of a local ostrich farming project with the aim to establish emerging farmers and as a result some secondary industries, e.g. abattoir, tannery, etc. The LM believes that such a project would create job opportunities and be economically sustainable.
- Cultural activities in the form of a cultural festival (LeClufe) to attract tourists to the area and thereby boosting the economy by selling arts and produce from the area.
- Diamond and wine route: The promotion of this route would take tourists through the area of Letsemeng and would also help to sustain the existing facilities for tourists. The route will link to the regional tourist route, which implies that the area will be marketed and exposed as a whole.
- Art and crafts, through the expansion of the existing pottery facility and other skills to serve as a tourist attraction, creating jobs and economic growth.
- Tourism will also be promoted through the establishment of a tourist centre, which the National Department of Environmental Affairs and Tourism will support financially.

The aim of this tourism initiative is to increase the tourism market share and to invest in the local economy of the region. This would be achieved by:

[20] Source: relevant IDP's

- Linking the regional tourism routes;
- Co-ordinating the local tourism development efforts;
- Promoting skills development to international standards;
- Creating information structures;
- Developing support infrastructures, e.g. access roads to attractions;
- Promoting focussed market segmentation based on proper research;
- Encouraging communities to become tourist friendly; and
- Combined marketing of the area as a whole.

The following sites are planned to be developed:

- A house at Sterkfontein that was originally built by a Scottish gentleman of which the original wall paintings are still in tact. This house is currently being restored to serve as a guest house.
- A pre-war hospital is currently being used as a school. The author AP Grové also attended this school.
- From the Rietriver to the Klipriver, Modderriver and Paardeberg, a battle route could be followed (see Appendix C for a detailed description).
- Land was bought between Koffiefontein and Luckoff, and rumour has it that this will be developed for hunting.

2.5.3 Economic situation and implications

Overall tourism figures[21]

According to SA Tourism there has been a 6.9% increase of international arrivals to South Africa during the period April to June 2005. In addition, approximately 8 million domestic trips were also undertaken during the same period.

The Total Foreign Direct Spend (TFDS) have also increased by approximately 19.7%, from R8.6 billion to R10.3 billion. It is estimated that every tourist to South Africa spent on average R408 or more. The increase in TFDS was mostly driven by neighbouring African countries. Despite the fact that arrivals from Botswana declined by 10%, arrivals from countries such as Mozambique and Zimbabwe had increased by 53% and 62% respectively.

Arrivals from the Americas had remained fairly consistent since 2002, at 8%. Despite the fact that arrivals from Europe only accounted for 2.5% of all foreign arrivals, European tourists were the second highest contributor to the TFDS.

The total domestic spent for April to June 2005 was estimated at around R2.93 billion. Most of the domestic trips undertaken were for the purposes of visiting family and friends, followed by religious and business travel.

[21] SATour data

Hunting
The demand from overseas is dependent on the strength of the rand. Hunting as a form of tourism contributes to SA economy, and 70 000 jobs have been created on game farms and directly from professional hunting[22].
The average biltong hunter spends R15 700/year on hunting. This brings the total amount spent on biltong hunting to 3.1 milliard per annum.

Northern Cape Tourism Figures[23]
The formation of the Northern Cape Tourism Authority (NCTA) was largely responsible for the boost in tourism to the province. However, a drawback was the lack of a formalised tourism plan, which is currently being developed by the Development Bank of South Africa (DBSA).

Tourism figures have shown a steady increase of between 11%-17% per year. Approximately 200 new tourist accommodation facilities have been established in the province during the past two years. Each of these facilities employ on average 4 people, resulting in 800 new job opportunities being created in the tourism industry.

The game farm/private nature reserve industry has shown the highest growth by approximately 25%. Each of the attractions in this industry employs on average 10 people, resulting in a total of 2 400 job opportunities. International tourist figures to the province have grown from 3% to 25% over the past decade.

Free State Tourism Figures
Tourism is the second biggest contributor to the economy in the FS. FS tourism figures could not be accessed at the time of writing this report, but one can assume with relative confidence that the visitor numbers to the study area in the FS is low (excluding Xhariep dam). Reasons for this conclusion are

- the number of tourist accommodation in the area (Table 2.5-1);
- difficulty to find and get hold of tourism information centres in the towns;
- results of a survey conducted amongst product owners.

22 wwwhasa.co.za

23 Information adapted from www.sagoodnews.co.za

The survey was conducted amongst some tourist destinations in the area:

Name of Establishment	Nr of beds	Nr of permanent staff	Cost of double room per person sharing
Sterkfontein Wildsplaas – Jacobsdal area. Planned game and hunting.	5 rooms planned		
Nooitgedacht Game Farm – Luckhoff area	20	2	
Petrusburg Country Lodge (also weddings and conferences)	18	5	200-300
Pride Rock Lodge – Van der Kloof (also weddings and conferences)	26	22	150
De Lange Guest House – De Aar (also weddings and conferences)	30	10	260
Dorpshuis Gasteverblyf – De Aar	8	3	250-350
Veenwouden Guesthouse - Jacobsdal	Not shared		
Wolweplaat (camps at Wolweplaat, Roodedam, Bethal annex, Ludiksdal) – Luckoff area.	6	8	350
Telegraaffontein and Potfontein closed their doors - De Aar rural			

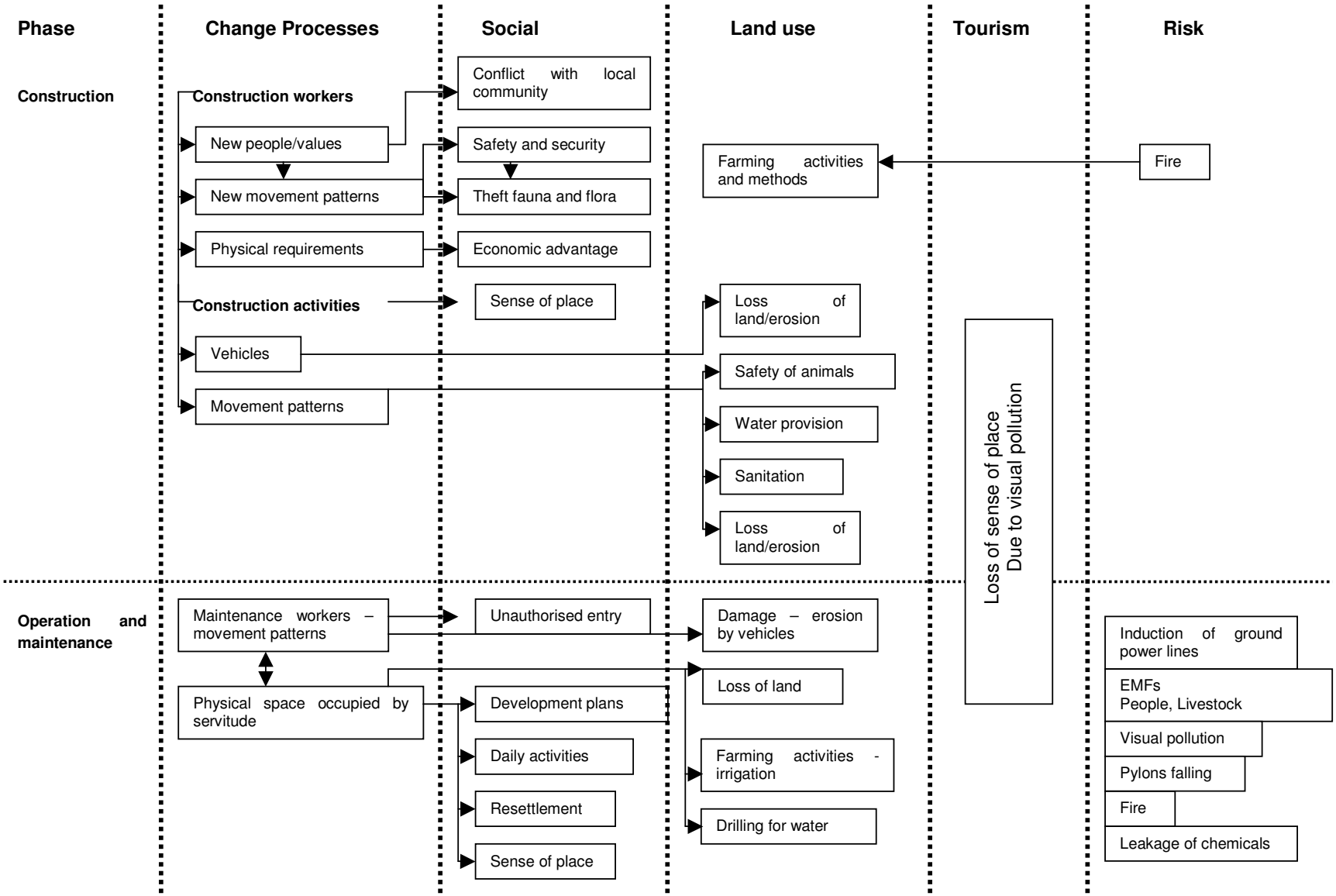
Results of the survey (please refer to Appendix C for a questionnaire): The majority of visitors are business/conference groups and they tend to visit in the week. Visitors mostly pre-book, and come from other provinces – mainly Gauteng. International visitors do come on occasion. Visitors stay on average two nights. Product owners claimed that they were almost fully booked in the time the survey was conducted. According to two owners, visitor numbers have increased since last year the same time. Visitors hear from establishment from the internet and word-of-mouth. Three establishments have been in business for less than 6 years, 2 between 6 and 10 years, and one for 22 years. Three product owners have invested R1-5mn into their establishment in the past 3 years, two have invested R5-10mn, and one R500 000-R1mn. Money was mainly used for renovations, and product owners financed these themselves.

The area has the potential to increase tourism figures.

- The historical value and unique natural beauty of the area could attract visitors. Just over 80 000 tourists visited the battlefields in KwaZulu Natal in 2004, and this gives an indication of what could happen in the study area should it be marketed and developed more intensely.
- Also, foreign tourists visit SA for its scenic beauty, climate, seeing friends / family, wildlife, and cultural diversity. This area has open horizons, some wildlife and has historical value.
- Product owners are investing, and are nearly fully booked.
- Tourism creates jobs, which creates more opportunities, and in turn attracts more tourists.

3 ISSUES AND COMMENTS RAISED BY I&AP'S

The issues and comments raised by I&AP's should be assessed in terms of potential their potential impacts and significance thereof. The flowchart on the next page illustrates the issues and comments raised by I&AP's. This is followed by a more detailed discussion of these issues, taking into account the baseline information of section 2.


Phase
Change Processes
Social
Land use
Tourism
Risk
Construction
Construction workers
New people/values
New movement patterns
Physical requirements
Construction activities
Vehicles
Movement patterns
Conflict with local community
Safety and security
Theft fauna and flora
Economic advantage
Sense of place
Farming activities and methods
Fire
Loss of land/erosion
Safety of animals
Water provision
Sanitation
Loss of land/erosion
Loss of sense of place
Due to visual pollution
Operation and maintenance
Maintenance workers – movement patterns
Physical space occupied by servitude
Unauthorised entry
Development plans
Daily activities
Resettlement
Sense of place
Damage – erosion by vehicles
Loss of land
Farming activities - irrigation
Drilling for water
Induction of ground power lines
EMFs
People, Livestock
Visual pollution
Pylons falling
Fire
Leakage of chemicals

3.1 Social

Social aspects considered are the proximity of the line to human settlements and homesteads, and sense of place experienced by inhabitants.

3.1.1 Proximity to human settlements/homesteads

When considering the effects of the transmission line itself on the social environment, it is clear that many of the negative impacts that may arise from the power line would *decrease* as distance from existing settlements or population centres increases. For instance, if the line were located far away from any towns or villages, this would reduce the probability that:

- People would settle in the servitude before or after construction;
- People would flock into the area during construction in search of jobs;
- Social problems would arise because of contact between locals and construction workers or job seekers;
- The project would interfere with people's daily movement patterns or impact on their safety;
- The number of people who would be exposed to hazards associated with the transmission line; and
- Significant numbers of people would experience negative impacts on their sense of place (please also refer to the tourism section).

The disadvantages of locating the transmission line far from existing settlements/houses would appear to be the fact that:

- It would reduce the probability that construction workers would provide a boost to the informal sector;
- It would increase the distance that would have to be traversed by services infrastructure for construction camps. Hence, it would increase the burden on local authorities that are required to provide that infrastructure;
- It could impact on sense of place, and should be assessed in consideration of the visual impact assessment;
- It reduces accessibility in the event of a hazard.

In light of the above, it would seem preferable to select a route that is as remote as possible from existing settlements. However, in order to obtain a complete view of the social impacts derived from the project, it is also necessary to consider activities and structures that are associated with any transmission line. In particular, it is necessary to take into consideration the need for access roads for construction and maintenance activities. If a transmission line is remote from existing settlements, it is also likely to be far removed from existing road infrastructure. The advantages described above may be neutralised by the need to construct longer access routes. For instance, longer access roads could increase the probability that:

- The construction of these roads would necessitate the relocation of populations;
- Access roads would cut across private property, thereby increasing the number of landowners to be affected by construction and maintenance activities; and
- Access roads and the line itself in the operational phase would interfere with tourism and recreational activities.

If all these factors are considered together, it is clear that the most preferred alternative would be one that is relatively close to existing infrastructure, preferably within existing servitudes, but also skirts existing settlements.

3.1.2 Sense of place - residents

Situating a transmission line close to existing infrastructure could also present an advantage in the sense that it consolidates visual impacts, and therefore reduces the line's impact on sense of place. The study area already has numerous lines traversing it. A 765kV transmission line runs parallel with the green option, and three 400kV power lines run close to each other approximately 10 km east of the 765kV. The question is whether the cumulative impact of erecting a line in close vicinity of these lines would have a more significant impact visually and on sense of place experienced compared to erecting a line in a 'greenfields' area. Also, the term "close vicinity" should be defined to understand what distance makes a more significant impact. According to the visual specialist, the cumulative negative impact of adding another line in close proximity to existing lines is significant, and should be avoided. From a social perspective, the values held by affected parties should be considered when attempting to understand the cumulative impact of existing lines.

The sense of place experienced and what is valued by the communities living in the area should also be considered. It was not possible to do a detailed, scientific assessment of the values that the affected parties attach to their properties, but a study of the Issues and Responses report[24], as well as feedback from farmers, whom were interviewed, gives an indication of the prevailing values:

- The horizons of the area are valued. As one farmer put it: *"If nothing else, we have the big skies."* – hence the horizon tourism route;
- Farmers understand that development is necessary, however, not to the extend that all farmers would accept without qualms a line passing in close vicinity of their homesteads. The reasons are:
- The possible effect of EMF's on livestock;
- The impact on sense of place: *"We live here to appreciate the open spaces"*;
- A line already traverses their land;
- The potential impact on tourism activities.

For some farmers (more to the north), the potential financial compensation outweighs the impact on sense of place. From a sample of 17 farms in the north, 10 are either cattle posts, have "weekend farmers"/have a manager/or leased. Although farmers in the south of the study area also experiences financial strain because of the drought and cost of electricity/irrigation, they still seem to value the lack of a line close to their homesteads over financial benefit[25].

According to Moore (1997 Conference of the Australian Association for Social Research) *"place may be an essential aspect of sustainability, but a strong attachment to place or sense of place may not necessarily be linked to sustainable practices. On the other hand, placelessness may be very strongly linked to unsustainable practices. So, place may be a necessary, but not sufficient condition for sustainability and sustainable practices."* Place recognises social aspects, and is also located at the intersection of biophysical and socioeconomic considerations, a

[24] Final ESR_05.05.2006, Appendix 4.10, Issues and Response Report

[25] Please note that these values have not been verified scientifically, and should therefore be seen as indicative of what could be expected should a survey be conducted.

location shared with sustainability. Moore (1997) concludes that for farmers, having productive agricultural lands and caring for the land is generally an equally important part of farmers' identity. A line will therefore impact on farmers' sense of place, should this be negatively associated with caring for the land, and stop them from having productive land. Creating a sense of placelessness should therefore be avoided, but there is not enough evidence available to support the argument that the construction of a line next to an existing line would result in a more intense sense of placelessness compared to constructing a line in greenfields area.

Because of the lack of scientific evidence from a social perspective, the social specialist uses the results of the visual impact assessment to

According to the visual assessment, the western line is the preferred route.

3.2 Land use

Experience has shown that it is possible to cultivate land around pylons, but it does complicate the process, and land for cultivation is lost. This is because the use of implements, equipment and centre pivots around/underneath pylons proof problematic. Although the 765kV line can cross centre pivot irrigation without affecting the operations system, it is preferred that centre pivots be avoided. Centre pivots are chosen based on fertility of soil and availability of water, and this should also be taken into account, especially in light of the drought proneness of the area, and the resultant economic impact on the agriculture sector.

The highest point of a centre pivot when not controlled can be 6/7 meters high. The clearance distance for a 765kV line is 14-15 meters and can extend to 20m. It should also be taken into account that a centre pivot with a radius of 220m (440 lengths in total) gives optimal irrigation in terms of cost effectiveness and the correct amount of water. The shorter the radius, the less cost effective the irrigation, and a longer radius will not give enough water to drench the area sufficiently.

Center pivot irrigation is a method of crop irrigation in which equipment rotates around a pivot. A circular area centered on the pivot is irrigated, often creating a circular pattern in crops when viewed from above.
Originally, most center pivots were water powered. These were replaced by hydraulic systems (T-L) and electric motor driven systems (Lindsay, Reinke, Valley). Most systems today are driven by an electric motor mounted at each tower.
Center pivot equipment can also be configured to move in a straight line, where the water is pulled from a central ditch. In this scenario, the system is called a linear move irrigation system.

If these factors are considered, it is more feasible to, where the line does cross areas with centre pivots; the line should preferable follow boundary lines of farms or land. Also, lines should not be erected parallel to centre pivots.

Pylons and lines on grazing land pose fewer problems, as cattle move around these and less land is lost. During the construction and operational phase it has happened that construction/maintenance teams leave gates open, don't follow access roads, and cut through fences. The effect could be: less land available for cultivation and grazing, cross breeding of cattle, erosion. Although pylons do not take up a lot of space, it should also be remembered that for this area, 9ha carries one livestock unit.

For small emerging farmers the loss of land could have a significant negative impact. Vanclay (2004) states that "From a sustainable agriculture point of view, we should be concerned about protecting (zoning) our productive farmlands, to protect them from conversion to non-farm use."

This is closely linked to the social issue of the level of poverty evident in the Free State communities. Poverty is experienced especially by those living in peri-urban and rural areas. The Xhariep IDP states that "It is therefore crucial if not pivotal that the Department of Agriculture address and stimulates job creation and poverty alleviation through rendering of efficient services in the agro-processing and production fields. Agriculture is often the dominant and sometimes-exclusive economic sector, and opportunities for resource mobilization are limited. The characteristics mean that people living in rural areas face a set of factors that pose major challenges to development." According to the Strategic Plan (2003/2006) of the Free State Province Department of Agriculture, the following strategic goals and objectives are identified.

1) Agro-processing and production, job creation and poverty alleviation;
2) Agricultural economic and market development;
3) Optimisation of plant and livestock health, production and product safety;
4) Service delivery innovations;
5) Natural resource and infrastructure utilization and management;
6) Research and experimental facilities;
7) Information management, including IT and related technology
8) Formal and non-formal training programs.

The most preferred alternative would be one that crosses grazing land, preferably within existing servitudes. The indication is that for grazing land, and existing corridor should be followed, but for irrigated land, a new corridor in order to minimize irrigation problems. The best grazing land should be avoided.

In selecting a final route, a detailed map of irrigation in the Xhariep DM can be accessed at the Luckoff Corporation.

3.3 Tourism

The tourism assessment takes place within the context of "sense of place." The concept of sense of place is applicable to tourist areas. People go on holiday for various and different reasons, e.g. to escape, to be entertained, to enjoy nature, to socialise, etc. In choosing a destination the image of the place is being considered, e.g. its authenticity, its offering, its status (The wide open horizons of this area is viewed as its main attraction). Research on the psychological experience of sense of place suggests that people rapidly discount a landscape as soon as the first scar occurs, rather like a stain ruining a favourite garment.[26] Thereafter, any additional impacts on the landscape have a correspondingly smaller effect. Hence, the aesthetic impact of placing a transmission line in a landscape that already bears the marks of development would be less than that of placing it in a relatively unspoilt environment. In discussing the diverse research showing that people overwhelmingly prefer `nature' scenes to urban and built environments, Zadik (1985) explains *"people*

26 Petrich, C.H. (1993). Science and the inherently subjective: The evolution of aesthetic assessment since NEPA. In Hildebrand, S.G. & Cannon, J.B. (Eds.). Environmental Analysis: The NEPA Experience (pp. 249-273)

seem to respond to environments as natural if the areas are predominantly vegetation and do not contain human artifacts such as roads or buildings."[27]
The above is strengthened by the results of a study to determine the value of interior plants to the hotel/tourism industry, Evans and Malone (1992) conducted a study at Opryland. The 12 acres of indoor space has approximately 18,000 plants valued at over $1 million. The annual, horticultural budget is approximately $1.2 million. The study attributes several positive impacts to the "greatscapes" -- the unusually high occupancy rate of 85%, numerous awards and continued expansion. Most importantly, the higher rate ($30/night) for those rooms overlooking the gardens and the high occupancy rate of those rooms translate into $7 million in additional room revenue annually. Steven Kaplan (1992) attributes the restorative value of participation with nature, particularly wilderness experiences, to the ability to fulfill several criteria: Being away, Extent, Fascination, and Compatibility which is established by an environment that is conducive to meeting your personal goals; that is, in a compatible environment, what you want to do and are inclined to attempt are needed and feasible.

It would therefore be preferable to select a route that runs parallel to existing roads, railways or power lines, and away from conservation areas/lodges/tourism destinations and their buffer zones.

In the Hydra-Perseus context, however, an existing line already runs through game reserves. The question is whether the same guidelines should be followed in these cases. Should a second line run parallel to of these existing lines in the game reserves? The impact assessment for a pipeline in Arizona maintains that a the visual impact would be concentrated and therefore less, should two projects be adjacent to each other and run in existing development corridors, instead of both projects being in view, but in different locations. The impact assessment further concludes that definition and protection of land uses through the Sonoran Desert Conservation Plan, when implemented, could contribute to keeping cumulative visual impacts of development within designated areas.

It would therefore seem preferable to either select a route which is not visible from the current line traversing tourism destinations or to keep the new line in a development corridor, next to the existing line despite the fact that the existing line runs through game reserves.

In terms of cultural sites, the likelihood of finding unknown cultural sites is reduced when following existing infrastructure.

3.4 Risk Assessment

Only safety risks in terms of electrocution and EMF's are discussed in this section.

3.4.1 Electrocution

Transmission lines could pose a safety risk in terms of electrocution. Induced charges can build up on fence wires mounted on wood posts near power lines[28]. This phenomenon is generally restricted to higher voltage lines (200 kV or greater).
The magnitude of the buildup depends on a variety of factors:

27 HortTechnology April/June 1992 2(2) Diane Relf, Professor, Horticulture, Virginia Polytechnic Institute and State University

[28]This section informed by http://www.greatriverenergy.com/community/power_line_safety.html

- The size of the power line;
- The length of fence paralleling the line;
- The distance between the line and the fence;
- The amount of moisture in the fence posts and the ground; and
- The presence of grounding devices such as metal fence posts or weeds growing next to the fence.

For example, a farmer in Luckoff with a 765kV line on his farm observes the following:

- Lightning strikes his house, borehole pump and the two pivots on his farm, instead of the highest point which is the transmission line;
- The magnetic field surrounding the power line interferes with the electrical fence on the farm to such an extent that people and animals have had electrical shocks without touching the fence
- Touching a pylon causes electric shocks

Irrigation is compatible with transmission lines as long as certain basic precautions are taken:

- Prevent a solid water stream or irrigation pipes from hitting the wires. The distance of the 765kV Transmission Power Line from irrigation systems makes this an unlikely event.
- Irrigation system should be well grounded.
- Long lengths of pipe should not be installed parallel and adjacent to transmission lines. They should be laid out at right angles to power lines, if possible, to reduce induced charges.
- Even a small amount of exposure to electrical current is dangerous. It takes less than 15 milli-amperes to produce a painful shock. This is only a fraction of the electrical current needed to power a 60-watt light bulb, which draws about 500 mill amperes. More than 20 milliamperes of current can be deadly, especially to small children.

3.4.2 EMF's

Although the current research on the effect of EMF's on people and livestock indicates that these are not harmful, the perception is strong that these are harmful, and farmers have mentioned that they have observed changes in livestock behaviour after a line had been installed.

The following trends have been observed by a farmer in the Luckhoff area after a transmission power line was commissioned in close proximity to his farm (the detailed list of statistics are not presented here, but only summarised):

According to the farmer, the power line has interfered with his horse breeding in terms of a rapid decline in births during the past 7 years. To determine the effect the power line had on the horses, the farmer kept some horses in the camp close to the power line whilst keeping another group of horses in the field well away from the power line. Both groups of horses had the same feeds. He found that the horses in the camp were more likely to abort than those in the open field. He ascribed this trend to the power line.

Following an existing line could pose a cumulative safety risk – what effects one line could affect the other, which could result in both lines being disabled, intensifying the impact on those affected.

4 DEVELOP ASSESSMENT CRITERIA

The investigation and assessment of the study area as well as issues and comments from I&AP's informed the identification of red flag, highly sensitive and sensitive areas. To identify these areas, a set of criteria was developed. These criteria encompass the potential impacts of the 765kV transmission lines on the social environment, on land use, and on tourism in the context of this study area. Please note that these criteria were developed for a 765kV transmission power line specifically, and are not applicable to all types of power lines. Also, these criteria were developed with the information available to the social specialist to date, and therefore could change/be adapted in future.

Table 4-1: Assessment criteria

POTENTIAL RED FLAG AREAS (going through potential red flag areas should only be considered if the route in its totality is the most sustainable option taking into account economic, social and environmental impacts, if the route can be re-aligned to bypass these areas, and if impacts can be mitigated satisfactorily to medium-low significance)		
Impact category	**Criteria**	**Comments**
Social	Areas currently occupied by human settlements	These could necessitate the relocation of populations (number of people to be expropriated plays a role in level of significance)
	Areas earmarked for future development	Power lines would interfere with development plans of high importance (e.g. a rapid rail link)
Land use	Areas occupied by open cast mining activities or surface infrastructure of underground mines Areas of high agricultural potential	Necessity of mining around power lines would have significant cost and safety implications These areas should be avoided from a sustainability perspective
Tourism	Conservation areas/ lodges/ tourism destinations (especially eco-tourism)	Power lines would impact negatively on visual experience, sense of place and attractiveness of tourism venue. Hunting activities are probably slightly less prone to such effects than ecotourism ("wilderness" experiences). Because hunting is closely related to tourism activities and its economic benefits, for the purposes of this study this sporting activity is assessed under the tourism umbrella.

HIGHLY SENSITIVE AREAS **(Although the line could go through these areas, alternatives should be given preference. Negative impacts should be mitigated to have impacts of moderate-low significance)**		
Impact category	**Criteria**	**Comments**
Social	Areas in close proximity of current human settlements	Transmission lines could pose a safety risk in terms of fire, electrocution or pylons collapsing. Furthermore, future encroachment of settlements on servitude would be likely.
	Areas earmarked for future development	Power lines would interfere with development plans.
Land use	Areas occupied by cultivated land	Power lines would interfere with irrigation and ploughing. Where an existing line goes through irrigated land, a second line should be avoided to lessen impact on farming activities.
	Areas in close proximity of underground mining	Ground slumps could cause pylons to collapse. Underground fires could occur.
Tourism	Buffer zones around conservation areas/ lodges/ tourist destinations	Tourists/visitors tend to approach destinations through these buffer zones. Negative visual impact of power lines could detract from the experience of the destination. Where a power line already exists, the line should either run parallel to the existing line, or be invisible from the existing line

SENSITIVE AREAS **(these areas should preferably be avoided, but the level of desirability is dependent on other specialist input, and these areas are preferred over highly undesirable and red zone areas)**		
Impact category	**Criteria**	**Comments**
Social	Areas far removed from existing settlements	Reduces the probability that construction workers would provide a boost to the informal sector. Also increased the distance that would have to be traversed by services infrastructure for construction camps. This, in turn, would increase the burden on local authorities that are required to provide that infrastructure.

	"Greenfields" areas (areas not currently occupied by any infrastructure)	Situating a power line close to existing infrastructure is preferable, as this would consolidate visual impacts and thereby reduce the line's impact on sense of place
Land use	Areas far removed from existing road infrastructure	Would necessitate the construction of lengthy access roads for construction and maintenance activities. These roads could impact on land use, daily movement patterns, safety, sense of place, etc.
	Areas occupied by livestock farming	Temporary loss of grazing land would occur during construction activities.
Tourism	Areas with potential for future development as tourist destinations/ recreational areas	Negative visual impact of power lines could reduce the potential of area to be developed as tourist destination/ recreational area

What follows is an assessed of the area in terms of these criteria. The Beta-Perseus study area does not affect any sensitive areas, and neither does the Perseus extension.

POTENTIAL RED FLAG AREAS **(going through these areas should only be considered if the route in its totality is the most sustainable option taking into account economic, social and environmental impacts, if the route can be re-aligned to bypass these areas, and/or if impacts can be mitigated satisfactorily to low-moderate significance)**		
Impact category	**Criteria**	**Comments**
Social	Areas currently occupied by human settlements	Expropriation does not appear to be necessary where any of the Hydra-Perseus alignments and the Beta-Perseus, Perseus expansion are planned
	Areas earmarked for future development (e.g. of residential units)	No areas earmarked for urgent development are affected
Land use	Areas occupied by open cast mining activities or surface infrastructure of underground mines Areas of high agricultural potential	None of the alternatives seem to cross mining activities/future mining activities No areas of high agricultural potential occur, although the eastern and central alignments cross areas with higher agricultural potential
Tourism	Conservation areas/ lodges/ tourism destinations (especially eco-tourism)	The existing, eastern and central alignments cross a private game reserve with hunting activities (Luckoff), but an existing line crosses the reserve The existing and central alignments cross a

		game farm at Koffiefontein, together with an existing line The Battlefield in the south crossed by the western and central alignment The western alignment crosses battlefield routes

HIGHLY SENSITIVE AREAS **(Although the line could go through these areas, alternatives should be given preference. Negative impacts should be mitigated to have impacts of low-moderate significance)**		
Impact category	**Criteria**	**Comments**
Social	Areas in close proximity of current human settlements	Western line close to Nonzwakang, De Aar, encroachment possible Close to Odendaalsrus
	Areas earmarked for future development (e.g. of residential units)	None of the alternatives interfere with future development plans
Land use	Areas occupied by cultivated land	Eastern: 3.23%, western 2.2%, centre 1.99% irrigation – not taking into account the 30 000ha irrigation scheme between Odendaalsrus and Koffiefontein. All alignments cross irrigation at Orange River, although central line at Orange river crossing is a better option. Eastern line: lack of space – farm house and koppies are in the way All alignments cross irrigation at Modderriver
	Areas in close proximity of underground mining	No alternative in close proximity of underground mining identified
Tourism	Buffer zones around conservation areas/ lodges/ tourist destinations	Battle of Poplar Grove flanked by Eastern and Central All lines cross the Horizon route

SENSITIVE AREAS (these areas should preferably be avoided, but the level of desirability is dependent on other specialists' input, and these areas are preferred over highly undesirable and red zone areas)		
Impact category	**Criteria**	**Comments**
Social	Areas far removed from existing settlements	Central alignment worst case but not significantly different from other alternatives
	"Greenfields" areas (areas not currently occupied by any infrastructure)	Mostly central and western alignments
Land use	Areas far removed from existing road infrastructure	Central alignment is worst case but does not appear to be significantly different from other alternatives
	Areas occupied by livestock farming	All alternatives, more so in the south
Tourism	Areas with potential for future development as tourist destinations/ recreational areas	All lines cross the areas earmarked for tourism development

This assessment will be assed in conjunction with the impact assessment in the next session, to determine a preferred alignment.

5 ASSESSMENT OF SOCIAL IMPACTS

The assessment criteria developed in section 4 indicates the following:

Table 5-1: Application of the assessment criteria to the study area

Impact category	EXISTING	EAST	CENTRAL	WEST
Social	Proximity of homesteads to the existing line is already problematic	Proximity to existing line	Removed from settlements	Skirts Odendaalsrus and De Aar
Land use	Irrigation activities	Higher agric value and irrigation	Orange River crossing least impact	Planned irrigation/community development Oppermans
Tourism	2 Game Farms (existing lines go through these) Existing infrastructure	2 Game Farms (existing lines go through these) Flanks a battlefield Existing infrastructure	2 Game Farms (existing lines skirt these) 1 Battlefield Flanks another battlefield Open horizons	1 planned Game Farm 1 Battlefield Open horizons
Risk	Close to existing line Proximity of emergency services (better)	Somewhat removed from existing line Proximity of emergency services (better)	Removed from emergency services	Proximity to emergency services (somewhat better)

The indication is that the eastern and central alignments are preferred. However, this should be further informed by an impact assessment of concerns and issues. A summary of the impact breakdown as illustrated in the flowchart in section 3 are listed ahead, followed by a discussion of the assessment criteria which will be used to assess these impacts.

A1. IMPACTS SPECIFICALLY RELATED TO CONSTRUCTION, DECOMMISSIONING and CONSTRUCTION/MAINTENANCE WORKERS:

- Presence of construction workers pose a safety and security risk to landowners, and can lead to community conflict
- Theft of plants, trees, game and/or livestock by workers have financial implications
- Because construction workers are on site during the day, sanitation and water are needed on site and at the camp
- Construction/maintenance vehicles can cause erosion and lead to loss of land
- Fire hazard to communities (due to construction activities and negligent behaviour of construction/maintenance workers)
- Loss of sense of place (tourists and landowners) could be experienced

A2. IMPACTS SPECIFICALLY RELATED TO OPERATION AND MAINTENANCE:

- Resettlement of populations
- Impact on development plans
- Impact on farming activities
- Impacts arising from effects of the project on tourism
- Impacts arising from effects of the project on surrounding areas' sense of place of farmers
- Potential safety risks

Please note that only impacts for the alternatives are assessed in detail.
The construction EMP measures should be applied to the Beta-Perseus corridor, and the expansion of the Perseus power station.

The following criteria are used to determine significance:

EXTENT

Magnitude of the impact and is classified as:

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

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

Provincial: the impacted area is or could be the size of the whole province.

DURATION

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

Short term: the impact will only last for the period of construction.

Medium term: the impact will be short lived after construction has been finalised.

Long term: the impact will continue for the entire operational lifetime of the project.

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

INTENSITY

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

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

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

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

PROBABILITY

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

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

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

High – the environment will be affected irrespectively; in some cases such impact can be reduced.

CONFIDENCE

This is the level knowledge/information one had in his/her judgement, and is rated as:

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

Medium – common sense and general knowledge informs the decision.

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

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

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

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

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

Potential impacts listed in A1 and A2 will now be assessed.

	SOCIAL			
Theme	Construction workers/maintenance workers			
Nature of impact	Safety and security			
Legal requirements	*Construction Regulations under the Health and Safety Act*			
Stage	Construction and decommission			
	Western Red	**Central Blue**	**Eastern Yellow**	**Existing Green**
Preferred route (1=most preferred, 4=least preferred)	**1**	**1**	**1**	**1**
Extent of impact	*Regional*	*Regional*	*Regional*	*Regional*
Duration of impact	*Period of construction*	*Period of construction*	*Period of construction*	*Period of construction*
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*Medium*	*Medium*	*Medium*	*Medium*
Status of the impact	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*
Accumulative Impact	*Social problems in communities*			
Confidence	*Medium*	*Medium*	*Medium*	*Medium*
Level of significance	*Medium*	*Medium*	*Medium*	*Medium*
Mitigation measures	*Construction workers should adhere to a contract with the contractor. These rules of conduct should be stipulated in construction management plans. These should include the use of sanitation, water and waste as well as informal trading, running shebeens, and interfering in community affairs.* *Suitable security measures should be established.* *Workers should wear distinctive clothing / badges to distinguish them from vagrants.* *Arrangements should be made with the local Community Policing Forum to monitor / combat possible increase in crime during construction period.*			

	An incentive and fine scheme to ensure that rules are adhered to, can be implemented. An ECO monitors transgressions / compliance, and incentives / fines. *Location of camps should be determined by the contractor in liaison with the ECO and landowners, or affected parties as well as Eskom. Municipalities should be involved to ensure the minimum impact. Site selection to not only take into account services required, availability of materials, and the route, but also socio-economic profile of communities.*			
Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	The requirements for good camp management practices should be stipulated. The contract with workers should be included as well as how compliance will be monitored. Mitigation measures should be included in the requirements. Guidelines for choice of camp location should be included. Camps should avoid informal settlements where social problems already exist.			

Discussion

Because of the specialist nature of building a transmission line, specialists in the field will be contracted to do the work. Contract workers will be accommodated in existing accommodation in towns, and teams will be taken to work everyday. Where contract workers are present, social and environmental problems often occur. Conflict could occur where coloured people are in the majority and construction workers will probably be mostly black.

To summarise, the effects of workers could be

- disruption of local communities
- security of local communities
- traffic disruption
- increase in sex trade and sexually related diseases

Potentially positive impacts are:

- support of local businesses
- use of unskilled labour

All alternatives start at Dealesville and end at De Aar. The Oppermans community will probably have contact with the construction workers, no matter what alignment is finally chosen.

	SOCIAL			
Theme	Construction workers/maintenance workers			
Nature of impact	Animal theft/poaching/loss of livestock			
Legal requirements				
Stage	Construction and decommissioning, operation			
	Western Red	**Central Blue**	**Eastern Yellow**	**Existing Green**
Preferred route (1=most preferred, 4=least preferred)	**1**	**1**	**1**	**1**
Extent of impact	*Regional*	*Regional*	*Regional*	*Regional*
Duration of impact	*During construction*	*During construction*	*During construction*	*During construction*
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*Medium*	*Medium*	*Medium*	*Medium*
Status of the impact	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*
Accumulative Impact				
Confidence	*Medium*	*Medium*	*Medium*	*Medium*
Level of significance	*Medium*	*Medium*	*Medium*	*Medium*
Mitigation measures	*EMP requirements to be clearly set out prior to construction.*			
Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	*Farm gates to remain closed unless otherwise agreed with land owner.* *Existing gates should preferably be used. Security control of gates should be agreed on with owner.* *Landowners should be aware of movement plans through the fenced areas.*			

	Responsibilities must be clearly set out.
Discussion Neglect to close gates can lead to animal poaching/loss of stock. All alternatives start at Dealesville and end at De Aar. The Oppermans community will probably have contact with the construction workers, no matter what alignment is finally chosen. The number of stock and their movements are not known, and could therefore not be taken into account.	

	Land use			
Theme	Construction activities – land use			
Nature of impact	Sanitation, and water supply			
Legal requirements	*Construction Regulations under the Health and Safety Act*			
Stage	Construction and decommissioning			
	Western Red	**Central Blue**	**Eastern Yellow**	**Existing Green**
Preferred route (1=most preferred, 4=least preferred)	**1**	**1**	**1**	**1**
Extent of impact	*Regional*	*Regional*	*Regional*	*Regional*
Duration of impact	*During construction*	*During construction*	*During construction*	*During construction*
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*Medium*	*Medium*	*Medium*	*Medium*
Status of the impact	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*
Accumulative Impact				
Confidence	*Medium*	*Medium*	*Medium*	*Medium*
Level of significance	*Medium*	*Medium*	*Medium*	*Medium*
Mitigation measures	*The contractor is responsible for good construction camp and site practices.*			

Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	*The contractor should adhere to construction Regulations under the Health and Safety Act.* *A proper storm water drainage system should be implemented, proper toilets be provided, and wastewater treated. An Environmental Control Officer (ECO) should monitor adherence to strategy.*			
Discussion Bad sanitation and water supply practices on site, pose a health risk/spreading of measles and pollute ground water. The magnitude of these impacts will be directly related to the size of the construction workforce and the construction schedule. The construction schedule could be that construction teams work concurrently on the line, or one construction team constructs the whole line. This information should be available before any mitigation commitments are incorporated in the EMP.				

	Land use			
Theme	Construction activities			
Nature of impact	Damage to road infrastructure			
Legal requirements				
Stage	Construction and decommissioning, maintenance			
Preferred route (1=most preferred, 4=least preferred)	**Western Red**	**Central Blue**	**Eastern Yellow**	**Existing Green**
Construction	**3**	**3**	**2**	**1**
Maintenance	**1**	**1**	**1**	**1**
Extent of impact	*Regional*	*Regional*	*Regional*	*Regional*
Duration of impact	*During construction*	*During construction*	*During construction*	*During construction*
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*Medium*	*Medium*	*Medium*	*Medium*
Status of the impact	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment -*

				negative
Accumulative Impact				
Confidence	*Medium*	*Medium*	*Medium*	*Medium*
Level of significance	*Medium*	*Medium*	*Medium*	*Medium*
Mitigation measures	*The contractor should be aware of the effect of road damage along the line, and how negative effects can be avoided and/or prevented.*			
Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	*Damage caused must be repaired before decommissioning.* *Access roads through sensitive areas should be carefully assessed and maintained.* *Eroded areas should be avoided.* *An ECO to inspect adherence to requirements.*			
Discussion The existing line already has an existing road infrastructure, and damage would therefore be less likely. It is assumed that the eastern alternative will link up with the existing infrastructure of the existing line.				

	SOCIAL			
Theme	Construction and maintenance workers			
Nature of impact	Fire risk – effect on communities			
Legal requirements	*National Veld and Forest Fire Act of 1998 (Government Gazette: 1998)*			
Stage	Construction and decommission, maintenance			
	Western Red	**Central Blue**	**Eastern Yellow**	**Existing Green**
Preferred route (1=most preferred, 4=least preferred)	**1**	**1**	**1**	**1**
Extent of impact	*Regional*	*Regional*	*Regional*	*Regional*

Duration of impact	*During construction*			
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*Low*	*Low*	*Low*	*Low*
Status of the impact	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*	*Project - negative* *Environment - negative*
Accumulative Impact				
Confidence	*Medium*	*Medium*	*Medium*	*Medium*
Level of significance	*High*	*High*	*High*	*High*
Mitigation measures	*In conjunction with land owners and municipalities, Eskom should develop a fire prevention, safety and fire fighting strategy. This strategy should be agreed upon by all parties involved.* *The strategy should stipulate fire prevention, emergency, and fire fighting procedures that should be followed by Eskom and land owners/municipalities. The strategy should be area specific, and not generic.* *Where residential areas are in close proximity, special precautions should be taken.* *An Environmental Control Officer (ECO) should monitor adherence to the strategy.*			
Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	*An emergency procedure and fire fighting procedure should be in place.* ▪ *The procedure should have the local fire brigade and emergency numbers available.* ▪ *It should stipulate the equipment available for use, and where these are stored.* ▪ *It should take into account fire fighting procedures followed and preferred by farmers and municipalities.* ▪ *The strategy should not be generic, but should take into account the unique characteristics of the land along the area. Vegetation type, land use, location, seasonal weather conditions and proximity of dwellings should be taken into account.* *An Environmental Control Officer (ECO) should monitor adherence to strategy.*			

Discussion

Fires do not only pose a safety risk (loss of human life), but the economical impact (loss of game, livestock, dwelling) as well as the impact on nature (erosion, composition change of grass) can be significant. This assessment looks at the potential social and economical impact. From a social perspective, the areas with higher population densities will be impacted on to a greater extent. Because of the close proximity of all the alignments to each other, the similarity in ecology, and the dependence on unknown factors such as wind direction, no differentiation between alignments are made in this regard.

	SOCIAL			
Theme	Sense of place - inhabitants			
Nature of impact	Loss of sense of place			
Legal requirements				
Stage	Construction and decommissioning, Operation			
	Western Red	**Central Blue**	**Eastern Yellow**	**Existing Green**
Preferred route (1=most preferred, 4=least preferred)	**1**	**2**	**3**	**4**
Discussion The order of preference is based on the visual impact assessment. Please refer to the visual impact assessment for a detailed analysis.				

	SOCIAL			
Theme	Sense of Place			
Nature of impact	Resettlement of households, household structures and infra structure			
Legal requirements	*Extension of Security of Tenure Act (Act 62 of 1997) (ESTA).*			
Stage	For operation			
	Western	**Central**	**Eastern**	**Existing**

	Red	Blue	Yellow	Green
Preferred route (1=most preferred, 4=least preferred)	1	1	1	1
Extent of impact	*Local*	*Local*	*Local*	*Local*
Duration of impact	*Permanent*	*Permanent*	*Permanent*	*Permanent*
Intensity	*Low*	*Low*	*Low*	*Low*
Probability of occurrence	*Low*	*Low*	*Low*	*Low*
Status of the impact	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*
Accumulative Impact	*Where settlements are more dense*			
Confidence	*High*	*High*	*High*	*High*
Level of significance				
Mitigation measures	*The line should be redirected to skirt settlements and future developments to discourage encroachment on the servitude.* *Mitigation should be affected in the planning phase.* *Compensation for loss of land, property and sense of place should be negotiated.*			
Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	*Mitigation should be effected in the design phase.* *Assessment should be done by an independent assessor.* *Identify tenure rights of present residents according to prevailing law as stipulated in the Extension of Security of Tenure Act (Act 62 of 1997) (ESTA).*			

Discussion

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

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

None of the corridors go through human settlements. The red corridor could encroach on the De Aar community, as settlement is developing towards the east. Should the red corridor be chosen, it is preferable that it links up with the other options when it reaches De Aar.

	TOURISM			
Theme	Sense of place			
Nature of impact	Loss of sense of place			
Legal requirements				
Stage	Construction, decommission, operation			
Preferred route (1=most preferred, 4=least preferred)	**Western Red**	**Central Blue**	**Eastern Yellow**	**Existing Green**
Construction	**2**	**1**	**3**	**4**
Operation	**4**	**3**	**1**	**2**
Extent of impact	*Regional*	*Regional*	*Regional*	*Regional*
Duration of impact	*Permanent*	*Permanent*	*Permanent*	*Permanent*
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*High*	*High*	*Medium*	*Medium*
Status of the impact	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment:*

				negative
Accumulative Impact				
Confidence	*Medium*	*Medium*	*Medium*	*Medium*
Level of significance	*High*	*High*	*Medium*	*Medium*
Mitigation measures	*The line should skirt areas that add to the experience of tourists. Where lines go over these areas, pylons should be place outside the boundaries of these areas.* *Where possible industrial areas should be considered to put the line through.* *Access points and the use of private and public roads should be negotiated with the land owner/municipality to lessen the impact on tourism in the area.* *Determination of construction camp sites should take into account tourism.*			
Level of significance after mitigation	*Medium*	*Medium*	*Low*	*Low*
EMP requirements	*Clear measures should be in place to ensure that construction and maintenance is responsibly done, not causing a more intense impact on tourism than necessary.* *An Environmental Control Officer (ECO) should monitor adherence to construction measures in place.*			

<u>Discussion</u>

To construct the transmission line with tourism value will have to be accessed. In some instances, fences might have to be cut, gates put in and access roads be made. Should these not be properly planned and managed, the negative impact on tourism will increase, especially where tourism activities already occur, e.g. game reserves. Lack of responsible behaviour (fast driving, not using access road) could impact on tourism. Areas of specific concern are the game reserves crossed by the eastern alignments.

The eastern alignments are preferred during operation, because they do go through already visually polluted areas. The eastern line is preferred over the existing line, because it will be easier to skirt game reserves and still impact less on the “open horizons.”

	LAND USE			
Theme	Agriculture			
Nature of impact	Loss of land – limitation of land-use			
Legal requirements				
Stage	Construction and Decommissioning (these are assumed to have similar impacts)			
	Western	**Central**	**Eastern**	**Existing**

	Red	Blue	Yellow	Green
Preferred route (1=most preferred, 4=least preferred)	**4**	**3**	**2**	**1**
Extent of impact	*Local*	*Local*	*Local*	*Local*
Duration of impact	*During construction*	*During construction*	*During construction*	*During construction*
Intensity	*Medium*	*Medium*	*Medium*	*Medium*
Probability of occurrence	*High*	*High*	*High*	*High*
Status of the impact	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	
Accumulative Impact	*May be exacerbated in a pristine area where an existing line does not occur and existing infrastructure can't be used*			
Confidence	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Level of significance	*Medium*	*Medium*	*Medium*	*Medium*
Mitigation measures	*Mitigation measures should be negotiated with the land owner to ensure that construction is done in an acceptable manner*			
Level of significance after mitigation	*Low*	*Low*	*Low*	*Low*
EMP requirements	*Mitigation should be affected in the planning phase.* *Where possible existing infrastructure should be used, and kept in its present condition to minimise loss of land.* *Access points and the use of private roads should be negotiated with the land owner.* *All erosion and other environmental damage should be rehabilitated before decommissioning.* *Clear measures should be in place to ensure that construction is responsibly done, not causing more loss of land and income in the short and long term because of construction and management.* *Farm gates should remain in the state they were found in (open or closed) unless otherwise permitted by the farmer. Where possible, existing gates and roads should be used* *Responsibilities and conditions should be clearly set out.* *Compensation for loss of land should be negotiated.*			

	An Environmental Control Officer (ECO) should monitor adherence to construction measures in place.

Discussion

During construction, more land compared to the operational phase is taken up to erect the power lines, resulting in a temporary loss of land. This land becomes available to the farmer after construction. To construct the transmission line, private properties will have to be accessed. In some instances, fences might have to be cut, gates put in and access roads be made. Loss of land can occur when this process is not managed properly. For example, where land is not rehabilitated after construction, erosion could occur.

Loss of land during construction will have an economic impact on farming. Construction will have less of an impact on grazing land as opposed to cultivated land. Animals can be moved to alternative grazing land, not so cultivated land where the farmer could have to lose part of his cultivated land to accommodate the construction of the line.

The existing line already has an existing road infrastructure for maintenance. It is assumed that the eastern alternative will link up with the existing infrastructure of the existing line.

	LAND USE			
Theme	Agriculture			
Nature of impact	Loss of land			
Legal requirements				
Stage	Operation			
	Western Red	**Central Blue**	**Eastern Yellow**	**Existing Green**
Preferred route (1=most preferred, 4=least preferred)	**2**	**1**	**3**	**4**
Extent of impact	*Local*	*Local*	*Local*	*Local*
Duration of impact	*Permanent*	*Permanent*	*Permanent*	*Permanent*
Intensity irrigation	*Medium*	*Medium*	*Medium-High*	*High*
Intensity grazing	*Low*	*Low*	*Medium*	*Medium*
Probability of occurrence	*High*	*High*	*High*	*High*
Status of the impact	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*	*On project: neutral* *Environment: negative*
Accumulative Impact				
Confidence	*High*	*High*	*High*	*High*
Level of significance irrigation	*Medium*	*Medium*	*High*	*High*
Level of significance grazing	*Medium*	*Medium*	*Low*	*Low*
Mitigation measures	*Mitigation measures should be negotiated with the land owner to ensure that the least possible impact on agricultural activities*			
Level of significance after mitigation	*Medium*	*Medium*	*Medium - irrigation*	*Medium - irrigation*

EMP requirements	*Mitigation should be affected in the planning phase.* *Where possible existing infrastructure should be used, and kept in its present condition to minimise loss of land.* *Access points and the use of private roads should be negotiated with the land owner.* *Clear measures should be in place to ensure that maintenance is responsibly done, not causing more loss of land and income in the short and long term because of bad operation.* *Farm gates should remain in the state they were found in (open or closed) unless otherwise permitted by the farmer. Where possible, existing gates and roads should be used* *Responsibilities and conditions should be clearly set out.* *Compensation for loss of land should be negotiated.* *An Environmental Control Officer (ECO) should monitor adherence to operations measures in place.*

Discussion

A servitude of 80m will be needed to accommodate the 765kV Transmission power line. In the servitude, dwellings are not allowed, and crops higher than 4m. With regards to grazing, cattle are allowed to graze in the servitude. Land can be cultivated in the servitude, but ploughing is more time intensive as ploughing has to go around the pylons. Also, cultivation is not done on the land in the pylon. The use of centre pivots is also complicated and although centre pivots can be used under a 765kV line, centre pivots should preferably be avoided. Following an existing line where centre pivots occur, could complicate the irrigation activities.

Loss of land can also occur when proper maintenance is not done, for example when access roads are not used.

6 RANKING OF ALTERNATIVE ALIGNMENTS

A summary of the impact assessment completed in section 5, is listed in the table ahead. The ranking for "loss of sense of place for inhabitants" are not included in the totals, as the ranking of this variable is reflected in the visual impact assessment and should not be duplicated. The results indicate that the existing alignment is preferred for construction, and the central or eastern alignment for operation. The preferred alignment for operation is given preference because most construction and decommissioning impacts are temporary, and operation impacts permanent.

To inform the final decision as to whether the central or eastern alignment should be selected, the loss of sense of place for inhabitants is considered, as per the visual impact assessment, and the assessment in section 4 and table 5-1. The central alignment is then preferred. However, care should be taken that the "open horizons" are preserved for future generations, and deviations from this alignment towards the west should be avoided.

Preferred route (1=most preferred, 4=least preferred)	**Western Red**	**Central Blue**	**Eastern Yellow**	**Existing Green**
Construction and decommissioning				
Construction workers Safety and security	**1**	**1**	**1**	**1**
Construction workers Animal theft/poaching	**1**	**1**	**1**	**1**
Construction activities Sanitation, and water supply	**1**	**1**	**1**	**1**
Construction activities Damage to road infrastructure	**3**	**3**	**2**	**1**
Construction workers Fire risk – effect on communities	**1**	**1**	**1**	**1**
Construction and decommissioning Tourism/hunting sense of place	**2**	**1**	**3**	**4**
Construction and decommissioning Loss of land/limitation of land use	**4**	**3**	**2**	**1**
Total (Construction and decommissioning)	**13**	**11**	**11**	**10**

Preferred route (1=most preferred, 4=least preferred)	**Western Red**	**Central Blue**	**Eastern Yellow**	**Existing Green**
Maintenance and operation				
Maintenance workers Safety and security	**1**	**1**	**1**	**1**
Maintenance workers Animal theft/poaching	**1**	**1**	**1**	**1**
Maintenance workers Fire risk	**1**	**1**	**1**	**1**
Maintenance Damage to road infrastructure	**1**	**1**	**1**	**1**
Sub-total Maintenance	**4**	**4**	**4**	**4**
Operation Resettlement of households, household structures and infra structure	**1**	**1**	**1**	**1**
Operation Tourism/hunting sense of place	**4**	**3**	**1**	**2**
Operation Loss of land/limitation of land use	**2**	**1**	**3**	**4**
Sub-total Construction	**7**	**5**	**5**	**7**
Total (Maintenance and operation)	**11**	**9**	**9**	**11**
TOTAL (Construction & decommissioning, and Maintenance & operation)	**24**	**20**	**20**	**21**
Construction and Operation Sense of place – inhabitants	***1***	***2***	***3***	***4***
GRAND TOTAL	**25**	**22**	**23**	**25**

7 CONCLUDING REMARKS

7.1 Hydra-Perseus Alignments

The assessment for Hydra-Perseus was done taking into account social, land use and tourism information. The information guided and informed the development of assessment criteria, and the preferred alternative alignment. The results of the final impact assessment overall indicate that the central or eastern alignment is preferred. The main differentiators between alignments are impact on sense of place for the local inhabitants, tourists & hunters, and land use. The central alignment is then preferred. However, care should be taken that the "open horizons" are preserved for future generations, and deviations from this alignment towards the west should be avoided. The western alignment is the least preferred alignment.

7.2 Beta-Perseus

The study area does not impact significantly on tourism activities, developments or settlements/homesteads – current or planned. The EMP requirements discussed in section 5 apply to this alignment. In choosing the final alignment, farming activities should be considered. The final alignment should preferably:

- follow farm borders
- follow an existing line
- skirt irrigation areas

7.3 Perseus expansion

The expansion of the power station will not impact significantly on tourism activities, land use or developments/settlements/homesteads – current or planned. The EMP requirements for construction as discussed in section 5 apply to this project.

8 SOURCES

Personal:

Interested and Effected Parties including farmers, experts, accommodation product owners, and municipal officials

IDP's and/or SDF's

Pixley ka Seme DM	Thembelihle
	Emthanjeni
	Renosterberg
Xhariep DM	Letsemeng LM
	Kopanong LM
Lejweleputswa DM	Tokologo LM

On the web:

- African Dream Frame Set
- California Case Report 94CA00102 CDCNIOSH_files
- DTEEA Free State Government_general
- DTEEA Free State Government_economy
- Greatriverenergy.com/community/power_line_safety.html
- Opposing Overhead Pylons - Indymedia Ireland
- (Hernandez)-A-moratorium-on-power-lines-in-Spain
- Program California Case Report 94CA00102 CDCNIOSH D
- Statistics South Africa: Census 2001 in brief
- SA Goodnews
- SAtour
- Numerous tourism related websites

Reports/articles:

HortTechnology April/June 1992 2(2) Diane Relf, Professor, Horticulture, Virginia Polytechnic Institute and State University

Trends in the Agricultural sector (2005), a report commissioned by the Department of Agriculture

Nat' Academies Press, Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope (2003) NIOSH FACE

Petrich, C.H. (1993). Science and the inherently subjective: The evolution of aesthetic assessment since NEPA. In Hildebrand, S.G & Cannon, J.B (Eds). Environmental Analysis: The NEPA Experience (pp. 294-273)

9 PHOTO GALLERY

1	Perseus power station from the south-west
2	From Perseus view to south-west
3	Traditional houses (3) and power line
4	Beta power station and sheep grazing
5	View from Beta to Perseus
6	Four windmills by homestead
7	Landscape
8	Two lines crossing
9	Modder River
10	Centre pivots and grazing
11	Lines
12	Lines against sunset
13	East of Hydra
15	Hydra power station
16	Nonzwakang / De Aar
17	Center Pivot / Orange River
18	Oppermans
19	Oppermans

1 2 3 4 5

6 7 8 9 10 11


12


13


14


15


16

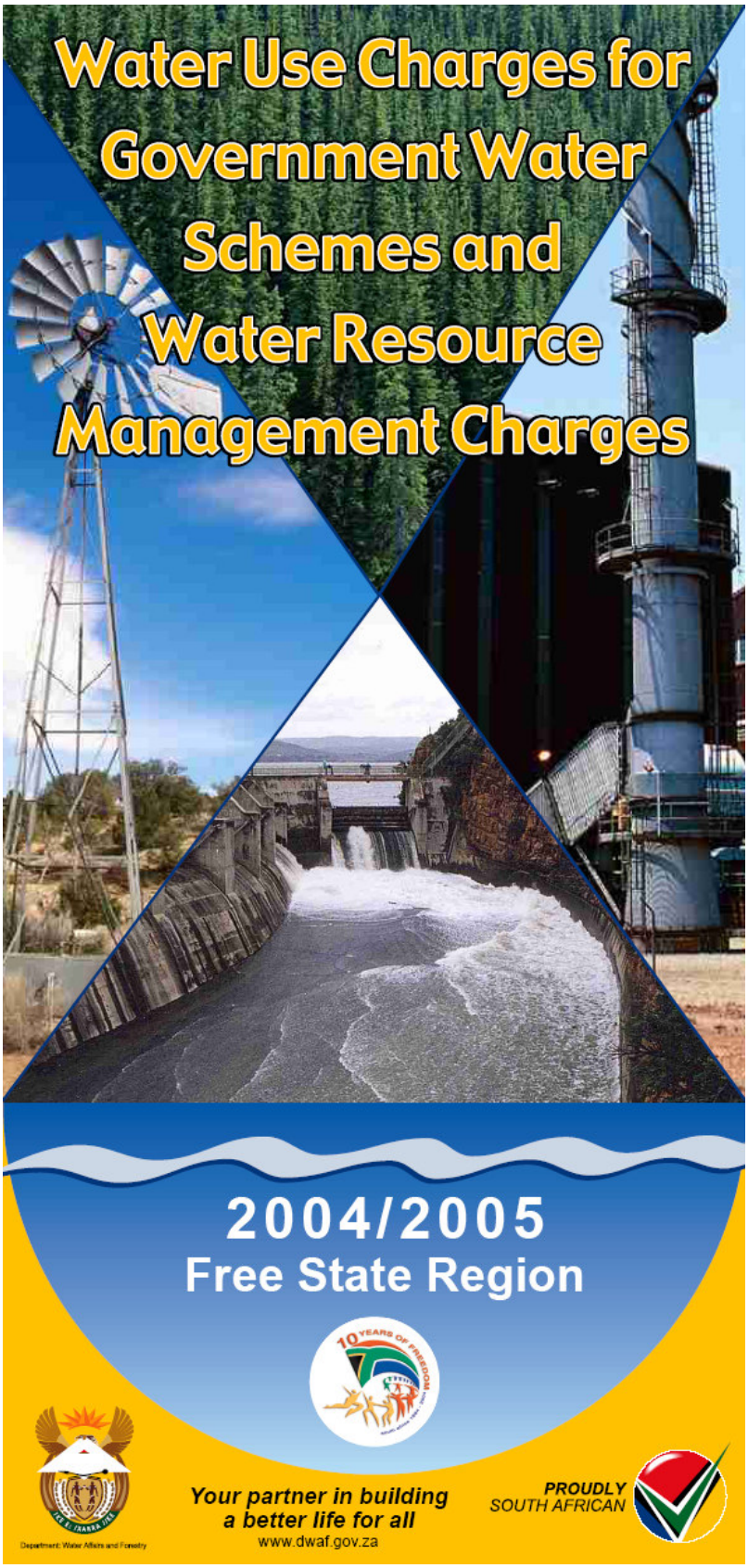

17


18


19


Petrusville

APPENDIX A – IRRIGATION COSTS


Water Use Charges for Government Water Schemes and Water Resource Management Charges
2004/2005
Free State Region
10 YEARS OF FREEDOM
Your partner in building a better life for all
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PROUDLY SOUTH AFRICAN

Preface

Included in this brochure are schedules containing Water Resource Management and Water Consumptive charges that will come into effect from 1 April 2004.

Before announcing these charges a series of consultations were held by the top management of the Department of Water Affairs and Forestry (DWAF), with key national stakeholders including amongst others SALGA, SAAWU, TAU, NAFU, Agri-SA and Forestry SA.

The consultation meetings led to a better understanding of the practical implementation of the Department's Raw Water Pricing Strategy and the drivers necessitating charge increases. The charges set out in these tables have been amended with respect to a number of issues raised at the consultation meetings, but do not represent a consensus position of stakeholders and DWAF. The charges have been determined by DWAF in accordance with the mandate of the National Water Act and the Raw Water Pricing Strategy.

In order to improve the process of further consultations, it was agreed that future discussions on water charge increases will be held well in advance of announcement dates. This will enable stakeholders to properly consult with their members and make meaningful recommendations to the Department.

It was further agreed that DWAF will, during the 2004/5 financial year, initiate a process of reviewing the Raw Water Pricing Strategy. It is intended that the review of this strategy will be completed in time for the 2006/7 charges to be based on the revised strategy. Because of the requirements for public consultation it is not possible to finalise the revision in time to influence the 2005/6 charges which will, therefore, still be calculated under the existing strategy.

Mike Muller
Director-General
DEPARTMENT OF WATER AFFAIRS AND FORESTRY

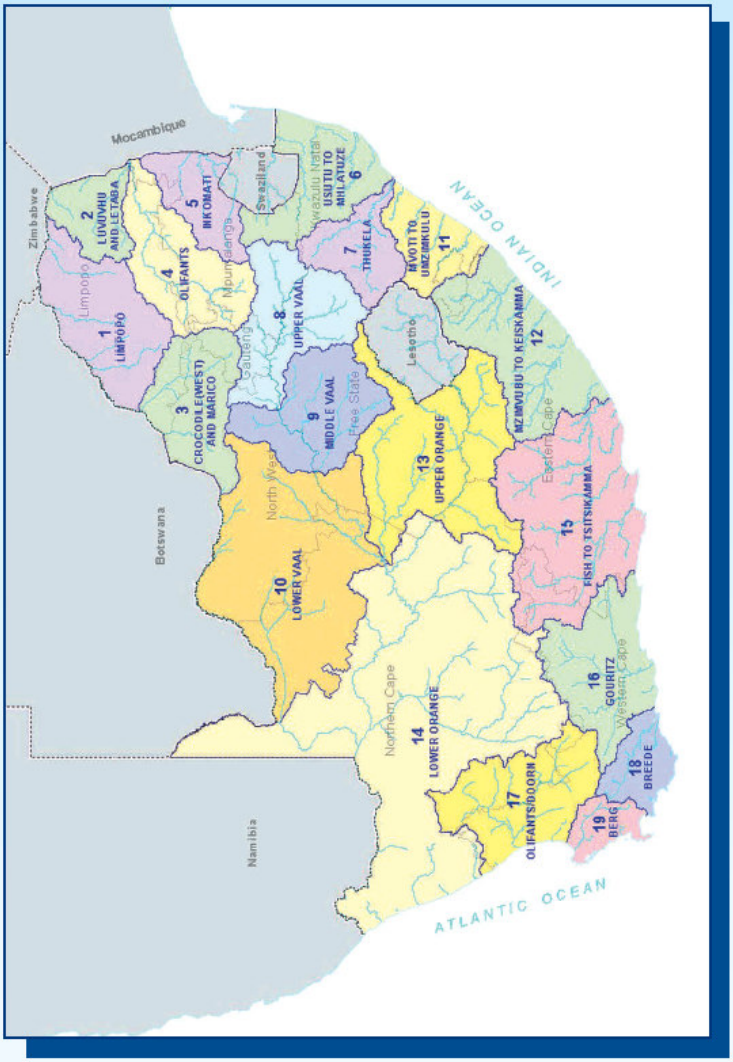
Summary of sectoral Water Resource Management Charges per Water Management Area

WATER MANAGEMENT AREA		SECTORAL UNIT COST IN $^{C}/_{M^3}$		
No	Water Management Area	Domestic/ Industrial	Agriculture: Irrigation and watering livestock	Forestry
1	LIMPOPO	1.23	0.89	0.83
2	LUVUVHU AND LETABA	1.60	1.07	0.98
3	CROCODILE (W) & MARICO	0.85	0.70	0.68
4	OLIFANTS	0.89	0.75	0.70
5	INKOMATI	0.85	0.63	0.57
6	USUTU TO MHLATHUZE	0.42	0.42	0.41
7	THUKELA	0.34	0.34	0.33
8	UPPER VAAL	1.30	0.79	0.79
9	MIDDLE VAAL	0.98	0.80	N/A
10	LOWER VAAL	0.69	0.56	N/A
11	MVOTI TO UMZIMKULU	0.91	0.87	0.84
12	MZIMVUBU TO KEISKAMMA	0.97	0.67	0.56
13	UPPER ORANGE	0.38	0.38	N/A
14	LOWER ORANGE	0.62	0.47	N/A
15	FISH TO TSITSIKAMMA	1.45	0.61	0.38
16	GOURITZ	2.11	0.72	0.56
17	OLIFANTS / DOORN	1.16	0.70	0.64
18	BREEDE	2.64	0.64	0.41
19	BERG	3.25	0.76	0.61
	Average	**1.19**	**0.67**	**0.61**

ALL CHARGES EXCLUDE VAT

$^{C}/_{M^3}$ (cent per cubic metre)

Map of the Water Management Areas and provincial borders



How to convert cents per m^3 to Rand per hectare

The charges listed in the table for irrigation purposes are provided in cents per m^3. Should you wish to convert it to Rand per hectare, please follow the instructions below:

Take the total charge in cent per m^3 and divide it by 100. Take the answer and multiply it with the m^3 quota per hectare to get to the Rand per hectare amount. *For example see next page:*

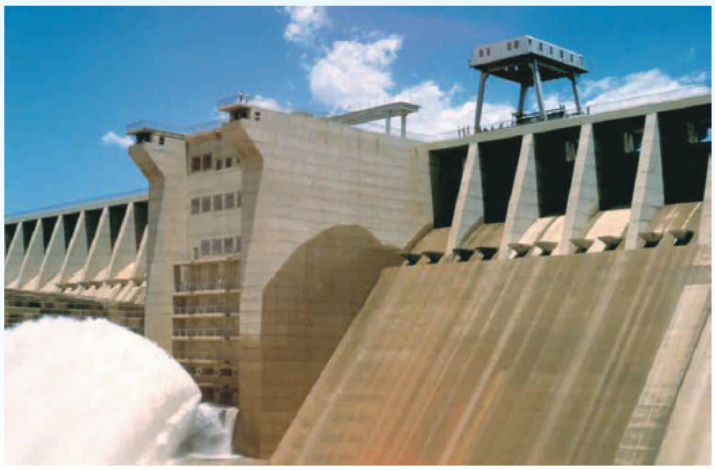
For example:

Total Charge: 3.70 cent per m^3 /100 = R 0.037 per m^3

Total charge R 0.037 per m^3 x 3 000 (m^3 quota of water per hectare) = R111 per hectare

Understanding the abbreviations

WMA	Water Management Area A map of the Water Management Areas is printed in this document for easy identification.
m^3	Cubic metre
Ha	Hectare
B	Bi-annually
A	Annually
TBA	To be adviced
Billing Fre	Billing Frequency



WMA (refer map)	Foot Notes	Government Water Scheme Name	Scheme Management Parameter	Charges For Irrigation Purposes			Charges For Domestic and Industrial use	Charges For The TCTA
				m^3 Quota Per Ha	Charge - Cent Per Cubic Metre	Billing Fre.	Charge - Cent Per Cubic Metre	Charge - Cent Per Cubic Metre
13		CALEDON RIVER (WELBEDACHT DAM, RUSTFONTEIN DAM AND KNELLPOORT DAM	BLOEM WATER [RAW WATER FROM RIVER AND DAMS]				17.29	
13	SERV	CALEDON RIVER (WELBEDACHT DAM, RUSTFONTEIN DAM AND KNELLPOORT DAM	BLOEMFONTEIN MUNICIPALITY [RAW WATER FROM MODDER RIVER]				17.29	
13		KGABANAYANE RIVER (GROOTHOEK DAM)	BLOEM WATER				63.13	
13		LEEU RIVER (ARMENIA DAM)	RAW WATER FROM THE CANAL SYSTEM	6100	0.18	B		
13		LEEU RIVER (ARMENIA DAM)	RAW WATER FROM THE DAM AND RIVER	6100	0.18	B	3.38	
13		MODDER RIVER (KRUGERSDRIFT DAM)	RAW WATER FROM THE DAM AND RIVER				4.90	
13		MODDER RIVER (KRUGERSDRIFT DAM)	ZONE 1: WATER ABSTRACTED FROM THE RIVER (KRUGERSDRIFT DAM UP TO RYANSDALE/KALKBANK)	8130	3.56	B		
13		MODDER RIVER (KRUGERSDRIFT DAM)	ZONE 2: WATER ABSTRACTED FROM THE RIVER (RYANSDALE/KALKBANK UP TO SCHOLTZBURG WEIR)	8640	3.56	B		
13	SERV	ORANGE RIVER (GARIEP DAM, VANDER-KLOOF DAM AND ORANGE-FISH TUNNEL)	HOPETOWN MUNICIPALITY (RAW WATER ABSTRACTED FROM ANY OF THE DAMS AS WELL AS THE ORANGE RIVER)				4.96	
13		ORANGE RIVER (GARIEP DAM, VANDERKLOOF DAM AND ORANGE-FISH TUNNEL)	MIDDLE ORANGE WATER CONTROL AREA (BETWEEN HOPETOWN AND DOUGLAS/MARKSDRIFT)	11000	1.05	B	4.96	
13		ORANGE RIVER (GARIEP DAM, VANDERKLOOF DAM AND ORANGE-FISH TUNNEL)	RAW WATER PUMPED BY THE DEPARTMENT FROM VANDERKLOOF DAM				38.60	
13		ORANGE RIVER (GARIEP DAM, VANDERKLOOF DAM AND ORANGE-FISH TUNNEL)	VANDERKLOOF GOVERNMENT WATER CONTROL AREA (BETWEEN GARIEP DAM AND HOPETOWN)	11000	1.05	B	4.96	
13		ORANGE RIVER (VANDERKLOOF CANALS)	RAW WATER FROM VANDERKLOOF CANALS	11000	6.27	B		

WMA (refer map)	Foot Notes	Government Water Scheme Name	Scheme Management Parameter	Charges For Irrigation Purposes			Charges For Domestic and Industrial use	Charges For The TCTA
				m^3 Quota Per Ha	Charge - Cent Per Cubic Metre	Billing Fre.	Charge - Cent Per Cubic Metre	Charge - Cent Per Cubic Metre
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	AGANANG: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL	11000	1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	COMMERCIAL FARMERS: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL	11000	1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	DRIE EENHEID: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL	11000	1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	ITERELENG: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL	11000	1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	MAHUA TRUST: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL	11000	1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	OPPERMANS: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL		1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	ORANGE-RIET CANAL SYSTEM				32.15	
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	PROEFPLAAS: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL		1.05	B		
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	RIET RIVER SETTLEMENT CANAL SYSTEM				37.90	
13		ORANGE-RIET (RIET RIVER SETTLEMENT) AND ORANGE-RIET CANAL	ZELPHY: IRRIGATION USE SECTOR FROM VANDERKLOOF MAIN CANAL	11000	1.05	B		
9		RHENOSTER RIVER (KOPPIES DAM)	RAW WATER FROM THE CANAL SYSTEM	6100	17.59	B		
13	SERV	RIET RIVER (KALKFONTEIN DAM)	JACOBSDAL MUNICIPALITY (RAW WATER FROM THE KALKFONTEIN CANAL SYSTEM FOR IRRIGATION)	11000	23.32	B		
13	SERV	RIET RIVER (KALKFONTEIN DAM)	KOFFIEFONTEIN MUNICIPALITY (RAW WATER FROM THE KALKFONTEIN CANAL SYSTEM)				23.32	

WMA (refer map)	Foot Notes	Government Water Scheme Name	Scheme Management Parameter	Charges For Irrigation Purposes			Charges For Domestic and Industrial use		Charges For The TCTA
				m^3 Quota Per Ha	Charge - Cent Per Cubic Metre	Billing Fre.	Charge - Cent Per Cubic Metre		Charge - Cent Per Cubic Metre
13		RIET RIVER (KALKFONTEIN DAM)	RAW WATER FROM KALKFONTEIN DAM				3.18		
13		RIET RIVER (KALKFONTEIN DAM)	RAW WATER FROM THE KALKFONTEIN CANAL SYSTEM	11000	0.36	B	23.32		
13		RIET RIVER (KALKFONTEIN DAM)	RESOURCE POOR FARMERS (RAW WATER FROM THE KALKFONTEIN CANAL SYSTEM)	11000	0.36	B			
13		RIET RIVER (KALKFONTEIN DAM)	RIETRIVIER BOERDERY BK (RESOURCE POOR FARMERS) (RAW WATER FROM THE KALKFONTEIN CANAL SYSTEM)		0.36	B			
9		SAND-VET RIVER (ERFENIS AND ALLEMANS-KRAAL DAM)	FROM ANY OF THE DAMS (DIRECTLY)	7200	1.66	B	7.09		
9		SAND-VET RIVER (ERFENIS AND ALLEMANS-KRAAL DAM)	FROM THE CANAL SYSTEM	7200	10.12	B	21.02		
9		SAND-VET RIVER (ERFENIS AND ALLEMANS-KRAAL DAM)	FROM THE RIVER	7200	7.97	B			
9	SERV	SAND-VET RIVER (ERFENIS AND ALLEMANS-KRAAL DAM)	HOOPSTAD MUNICIPALITY (RAW WATER FROM THE RIVER)				21.02		
9	SERV	SAND-VET RIVER (ERFENIS AND ALLEMANS-KRAAL DAM)	THEUNISSEN MUNICIPALITY (RAW WATER FROM THE CANAL SYSTEM)				21.02		
9		SCHOONSPRUIT (ELANDSKUIL AND RIETSPRUIT DAMS)	SCHOONSPRUIT GOVERNMENT WATER SCHEME	7700	7.66	B	32.00		
13		STERKSPRUIT (JOZANASHOEK DAM)	RAW WATER FROM THE DAM	6100	3.55	B	74.14		
9	SERV	VAAL RIVER (SYSTEM) - FREE STATE REGION	ANGLOGOLD VAAL RIVER				28.30		122.40
9		VAAL RIVER (SYSTEM) - FREE STATE REGION	USERS IN THE MIDDLE VAAL WMA				28.30		122.40
13		WITTESPRUIT (EGMONT DAM)	EGMONT IRRIGATION BOARD	6100	0.20	B			
9		WITTESPRUIT (EGMONT DAM)	RAW WATER FROM THE DAM AND RIVER	6100	4.20	B	15.68		

Foot notes and additional comments

	Foot notes
Serv	In case where a zero cent charge is to be applied in respect of volumes smaller or equal to servitude volume, only the charge to be applied per every one m^3 in excess of the servitude arrangement is reflected.

	Additional comments
1.	Charges for domestic and industrial use: to be applied per every one m^3.
2.	Charges for irrigation purposes: to be applied per every one m^3.
3.	Charges for the TCTA: to be applied per every one m^3.
4.	Any of the following changes made to the charges, incorporated in the relevant brochure, will be updated and published on the DWAF-website. These include: a) Additional charges b) Changes to the charges incorporated in the brochure: - Charges that are no longer to be applied (declared as OBSOLETE); - Changes to charges; - Changes to volume variables.
5.	In general, charges reflect the full amount without consideration of subsidies. Invoices reflect the amounts inclusive of subsidies.

For more information, contact your nearest office of the Department of Water Affairs and Forestry

Mpumalanga Regional Office
Mr Johan van Aswegen
Tel: (013) 755-1674-7

Free State Regional Office
Mr Tseliso Ntili
Tel: (051) 430 3134

KwaZulu-Natal Regional Office
Mr JGG Hansmann
Tel: (031) 336 2700

Gauteng Regional Office
Mr Hennie Smit
Tel: (012) 392 1301

Limpopo Regional Office
Prof Ola Busari
Tel: (015) 290 1217

North West Regional Office
Mr Chedwick Lobakeng
Tel: (018) 384 3270-6

Eastern Cape Regional Office
Mr Zolile Keke /
Mr Dewald Coetzee
Tel: (043) 643 4352

Northern Cape Regional Office
Mr LJ Snyders
Tel: (053) 831 4125

Western Cape Regional Office
Mr Rashid Khan
Tel: (021) 950 7100

APPENDIX B – BATTLE ROUTE

NOTES – as provided by Mr Rob Scott via email on 14 August 2006

Hydra Perseus – Power Line Corridors

1. The lines, red and blue (per Arcus Gibb draft route map 28 March 2006), as they run north of the Riet River and south of the Modder River span an area that was the subject of an extensive reconnaissance carried out by the British after their defeat at Magersfontein (11 December 1899).

2. This reconnaissance was carried out east and west of the Magersfontein stronghold (probably in the main by Rimmington's Guides). L March Phillipps, a Rimmington Guide, in letters home (published in "With Rimmington" Arnold First Edition 1901) writes at page 58 :

   > *"After studying the country yard by yard with our glasses, and making a few notes about the lie of the land and the names of the positions of farms, we creep off and get back to camp by mid-day.*
   >
   > *The results of these exciting little prowls, when worthwhile, are sent into the General, and from the mass of evidence thus placed before him he is supposed to be able to define the enemy's position and movements."*

   Phillipps was relating his own experience, which it would seem was relative to the eastern area.

3. In research at the State Archives (Pretoria) earlier this year Etienne De Villiers (Brandvallei and Sterkfontein) and I found a note amongst Lord Robert's papers which illustrates the extent of the reconnaissance carried out to the west. The note, prepared by Hudson Clark (possibly a Rimmington Guide) reports on water points distributed in the country both south of the Riet River and north of the Riet River up to the Modder River. Hudson Clark's note is dated 9 February 1900. The note which is unfortunately a poor copy is attached.

4. Roberts and Kitchener arrived at Enslin / Modder River Station on about 7 February 1900. Roberts's goal was the relief of Kimberley and thereafter the occupation of Bloemfontein. Roberts had already decided on a flank march around Cronje at Magersfontein (by going west) in order to get to Kimberley. He would have settled his strategy and determined his route after his arrival at Enslin / Modder River Station once he had assimilated all available information (including reconnaissance reports). Roberts was to lead up to 50 000 troups in this advance and water was the primary concern.

5. The lines (red and blue) traverse the reconnaissance area described in Hudson Clark's note (they run through and over it). The farms mentioned in the note relative to the country north of the Riet are :

   Middelbosch, Brulfontein, Blaauwbank, Smous Kraal, Blaaubosch Pan, Kuitjes Pan, De Dam, Taaibosch Dam, Kalkwal, Kalklaagte, Welgelegen, Kopjes Kraal, Wagenmaakers Drift, Morgenzon, Hartebeeste Pan, Roode Dam, Brandvallei (spelt Brandvaliet), Kalkfontein, Tweefontein, Stinkfontein (next to Osfontein on Modder River) and Gruisbank.

6. Roberts's advance from the Riet River (below Jacobsdal) at specifically Waterval and De Kiel drifts to the Modder River at Klipkraal Drift, ran, it would appear, in proximity to the red line. In this regard :

6.1 I have been unable to establish the precise routes of the British Forces (different routes were used bearing in mind that 3 divisions, as well as the cavalry division, consisting of up to 50 000 troups, were involved) from research thus far.

6.2 I have studied the map in Breytenbach "*Geskiedenis van die Tweede Vryheidsoorlog 1899 – 1902*" Volume 4, which I regard as the South African Official History of the War. The map at page 202 entitled "*Lord Roberts se Inval in die Vrystaat*" was prepared by the Direkteur-generaal van Opmetings (1977). The map, at the very least, illustrates the proximity of the advance (routes) to the red line. The map however does not accord precisely with the 1 : 50 000 map published by the Chief Director of Surveys and Mapping. Breytenbach himself does not describe the route/s in the text.

6.3 I have not had regard to the British Official History ("Amery") which has, I understand, more detailed maps. I am continuing my research into the lines of the actual march.

6.4 The red and blue lines, and in particular the red line, is in close proximity to De Kiels, and also in very close proximity to / at Bloubanksdrift at which crossings took place, and at which substantial skirmishes with Boer forces under De Wet also took place. Skirmishes also took place between the opposing forces in the advance from the Riet River to the Modder River. General Lubbe shadowed the British advance, to the west of the advance lines, ultimately crossing the Modder River at Klipkraaldrift.

7. I have not conducted a field study of the area traversed by the advance – at most I have found an abundance of sangers (schantze) on the northern half of the farms Brandvallei and Sterkfontein. It is my view that these schantze were established after the Battle of Paardeberg as part of the block house / SAC line along the Modder River (although there are also indications to suggest that the sangers / schantze may have been construed at the time of the battle of Paardeberg). These sangers / schantze are not unlike those found on

Oskoppies / Kitcheners Koppie (central to the Paardeberg battle) which is approximately 4 km south of the site of the laager at Paardeberg. The red line would run in close proximity to Oskoppies and to the second line of defence established by the British, south of Oskoppies towards the end of the battle of Paardeberg.

8. Moving further north the red and blue lines, as they cross the Modder River, do so in close proximity to the site of the battle of Poplar Grove and would appear to span / traverse the area to the west of the site of the battle occupied by the Boer forces (running north / south), in advance of the battle (reference is made to the Loogkop entrenchments).

APPENDIX C - QUESTIONNAIRE

Tourism supply questionnaire

PRODUCT OWNERS QUESTIONNAIRE

INTRODUCTION

(Important: Interviewer, please respect any refusal to answer and move on to another question)

1. CONTACT DETAILS

Name of establishment: ……...

Name of owner:

……

……

Contact Person	
Position	
Telephone	
Fax	
Cellphone	
Email	
Website	

Postal Address

_____

_____

_____

Physical Address:

_____

2. TYPE OF ESTABLISHMENT (multi-mention, read out)

Ask 1st: What type of establishment are you primarily? (tick one appropriate primary box)

Ask 2nd: Do you have another type of offering? (tick one appropriate secondary box if applicable)

Type of establishment		Primary	Secondary
Accommodation	Guest house	1	1
	Hotel	2	2
	B&B	3	3
	Country Lodge	4	4
	Self catering unit	5	5
	Camping & caravanning	6	6
	Holiday or Adventure Resort	7	7
	Game or hunting lodge	8	8
Adventure activities (please specify)		9	9
Sporting Activities		10	10
Arts & crafts (please specify)		11	11
Health & beauty		12	12
Nursery & flowers		13	13
Restaurant, pub & tea gardens		14	14
Venues & conferences (with accommodation)		15	15
Venues and Conferences (without accommodation)		16	16
Other: (please specify)			

3. **GUEST PROFILE: who are your main visitors? (read out, tick one appropriate primary visitor box and tick one appropriate secondary visitor box)**

	Primary visitor	Secondary visitor
Day visitors (during the week)	1	1
Day visitors (on the weekend)	2	2
Week day visitors (overnight)	3	3
Weekend visitors (overnight)	4	4

4. **GUEST PROFILE: How would you best describe your primary and secondary visitors? (read out, tick one appropriate primary visitor box and tick one appropriate secondary visitor box)**

	Primary visitor	Secondary visitor
Tour Group/s	1	1
Businesses/Conference groups	2	2
Individuals or young couples	3	3
Families	4	4
Special interest groups e.g. birders, church groups	5	5
Party or wedding groups	6	6
Hunters		
Other (specify)		

5. **GUEST PROFILE: What percentage of your visitors are booked and what percentage are walk ins/casuals? (read out) (% split)**

Advanced Booking	
Walk ins	
Total	**100%**

6. **GUEST PROFILE: Where do the majority of your visitors come from? (single mention, read out)**

Gauteng	1
Free State	
Northern cape	

Other provinces		3
Foreign	Specify continent please:	4

7. NUMBER OF DAY VISITORS (if applicable): Approximately how many day visitors visited your establishment…? (read out)

	Specify
On your busiest weekend day last week (Saturday/Sunday)	
On your busiest week day last week	

8. NUMBER OF OVERNIGHT VISITORS (if applicable): Approximately how many overnight visitors visited your establishment…? (read out)

	Specify
On your busiest weekend night last week (Saturday/Sunday)	
On your busiest week day night last week	

9. LENGTH OF STAY (if applicable). For those who stay overnight in the week, what is the average length of days they stay?

10. And for those staying overnight on the weekend, what is the average length of days they stay?

	Specify nr of days
QUESTION 12: Ave. week stay	
QUESTION 13: Ave. weekend stay	

11. VISITOR ACCESS: How do people know about your establishment? (multi mention, do not read out)

	Yes	No
Via a Travel Agent or Tour operator	1	2
Via the local tourism map/brochure	1	2
Coincidentally – they just drive past	1	2
Through friends and colleagues / word of mouth	1	2
Through your own marketing	1	2
Through other marketing	1	2

Through a tourism expo or show	1	2
Via the web	1	2
Other (specify)		

12. Do you encourage your visitors to tour other facilities or attractions in the project area?

Yes	1	**(Specify which attractions)**
No	2	

13. CAPACITY: How many…(read out)

Beds do you have (if accommodation/conferences)	
Seats do you have (if restaurant)	
People can you accommodate (if other)	
Seats for conferences (excluding beds)	

14. PRICE: Please answer where applicable (read out, multi mention)

Hunting	What would it cost to shoot a springbok?	
Restaurant (open to public)	What would a standard meal cost?	
Accommodation (catered)	What would a mid-range double room cost per person sharing?	
Accommodation (self catering)	What would a mid-range double room cost per person sharing?	
Conferencing	What is the cost for a day conference per person?	
	What is the cost of an overnight conference per person?	
Caravan/campsite	What is the cost of a caravan or camping site per person?	
Activity	What is the cost of entry to your attraction- per adult	
	- per child	

15. YEARS IN OPERATION: How many years has your establishment been in operation?

No. of Years	

16. VISITATION TREND:

Has there been any increase in the number, compared to last year this time?

Yes	1
No	2
Don't know	3

17. EMPLOYMENT: How many permanent staff members do you currently employ?

And how many casual staff members?

Permanent staff numbers	Casual staff numbers

18. TRAINING: Do you run training and skills programmes for:

Your staff?

Local people in the area?

	Yes	**No**	**(If no)** Why not	**(If yes)** Please specify
Staff	1	2		
Local people	1	2		

(Please explain that the next 3 questions relate to financials, this information will be treated as confidential and not be used for tax purposes. It will be used to assess trends in the area and in support of investment and destination marketing)

19. CAPITAL SPEND: What is the total capital investment that has been made into your establishment in the past 3 years? If possible specify purpose and amounts.

Purpose of spend	Amount of spend

20. FINANCING: How has this capital investments been financed? (read out, multiple mention)

	Yes	No
Own finance	1	1
Loans	2	2
Bringing in new partners	3	3
Other (specify)		

21. REVENUE: What is your average annual gross income? (read out, single mention)

Under R250 000	1
R250 000- R500,000	2
R500,000 – R1,000,000	3
R1 000,000 – R5,000,000	4
R5,000,000 – R10,000,000	5
R10,000,000+	6

Thank you for taking the time to talk to me. This information is essential for the ongoing successful marketing strategy for the project area. You will be provided with feedback from your participation in this and future detailed surveys.

APPENDIX D - MAP