

PART I REPORT- AGRICULTURE

**ASSESSMENT OF SOCIO-ECONOMIC IMPACTS**

*The Proposed Kronos-Perseus 765kV Transmission Power Line Project,  
Northern Cape and Free State Provinces*



**Prepared for Mokgope Consulting**

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Submitted by

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## INTRODUCTION

ADEC has assessed the socio-economic impacts of the proposed 883km, 765kV power line upgrade between the Juno substation in Western Cape Province and the Perseus substation in the Free State. These impacts form one component of an overall Environmental Impact Assessment (EIA) process for the project. The following report focuses on agricultural impacts within the **Kronos-Perseus Section** of the project.

### Approach and Methodology

This assessment included a review of ESKOM's proposed project and its indicative capital infrastructure programme for the proposed power line development project. The physical ramifications of the proposed upgrade were also reviewed to provide information and basis for understanding the scope and scale of the proposed power line and sub-station upgrades.

ADEC identified the possible "Impact Area" and nodes along and surrounding the proposed power line and upgrades corridor; and assessed existing demographic and economic conditions; and business, tourism, and agro-industrial base within the Impact Area and nodes. In Part I of this Socio-Economic Impact Assessment, ADEC analyzed and forecast the impacts of the proposed projects on agriculture, which is the primary economic activity within the Impact Area. This **Part I Report** presents findings from this **agricultural impact assessment**.

A subsequent Part II Report will present findings on the project's impacts on tourism and other economic activities. Additional analysis of socio-economic impacts relating to health and environment may be required as possible, based on information provided by other members of the consulting team. All of these impacts, along with the Part I impacts on agriculture, are assessed and described for each of the four sections of the power line.

Again, this Part I Report presents findings from assessment of project impacts on the agricultural sector within the *Kronos-Perseus Impact Area*. A subsequent report will present findings from analyses of impacts on industry, tourism, and other activities.

### Limitations and Constraints

Information was requested from ESKOM on the power line project and indicative CAPEX and operating costs. Such information included input on the overall power supply, access, and grid efficiency levels along the route of the new power line. This information would have helped in the determination of the positive impacts of the upgrading of service for economic uses including agriculture, tourism, and urban settlements. However, this information was never provided. . Without information to the contrary, this impact assessment must therefore assume that the

proposed power lines would not promote or improve the supply of power directly within the impact area along the path of the power line corridor.

The agricultural sector was assessed based on regional *average* production and value data for magisterial districts within the Impact Area. The regional impacts of this study depend on the amount of land that would be taken out production based on the perimeter of the power line corridor. The resulting *regional data do not represent impacts on individual farms and properties. This study had no scope for detailed analysis of impacts on individual farms or land holdings.*

Impacts on agriculture are based on averages of the mix of products, output and value derived in part from data supplied by Statistics South Africa, 2007 Agricultural Census. This study assumes that the current mix of products along the power line corridor is equivalent to the mix of products in 2007. However, the assessment of the baseline and impacts for the immediate local (impact) area along and surrounding the proposed power lines was collected directly from a sample of farmers based on personal telephone interviews. It must be noted that the local impact area extends far beyond the land limit of the power line corridor used for the regional analysis.

The local area sample data and information helps compensate for gaps in the regional analysis and thus provides a fair sample-based representation of the current status and performance of the agricultural sector in the study area. The above limitations and constraints are elaborated as caveats in the relevant sections of this Report.

## **Expertise & Staff**

The study was conducted by African Development Economic Consultants (pty) Ltd (ADEC), an economic, development and strategic planning consultancy specializing, in among others, socio-economic impacts, fiscal impacts, market potentials analysis, cost-benefit analysis, project feasibility analysis (financial & economic), public policy analysis, and project implementation strategies.

All background research for this study, including determination of impacts was carried out by Golden Chalunda, Research Associate responsible for economic research and analysis. Golden Chalunda brings over 12 years' consulting experience in, among others, assessment of economic impacts, analysis of property markets, and preparation of strategic inputs for a wide variety of economic development and socio-economic impact assessments. Golden Chalunda has a Masters Degree in Economics from University of East Anglia, Norwich (UK) and Bachelor of Social Science Degree (Economics & Comp. Science) from Chancellor College of the University of Malawi.

The study was managed by Randall Gross, CEO/Director, with over 28 years' experience in strategic economic and development consulting for local, regional and national governments; private companies; and non-profit agencies. Randall Gross has worked closely with local government officials from the U.S., Russia, South Africa and other countries on nearly 600 projects on community revitalization, industrial & economic development, tourism, citizen participation, asset

management, and policy formulation. Randall Gross holds a Masters Degree in Public Policy from Georgetown University (Washington, DC, USA) and a BA Arts & Sciences Degree in political science and urban economics from Northwestern University (Chicago, IL, USA)

## Section 1. PROJECT BACKGROUND

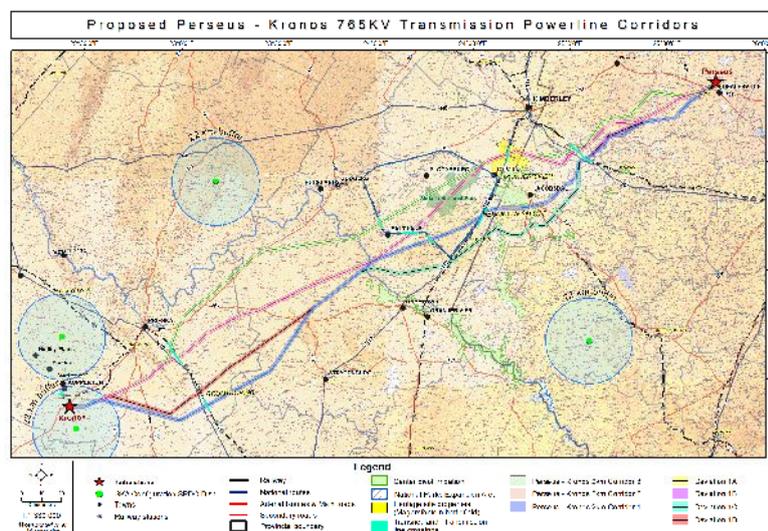
This section presents background information on the proposed project, in terms of its purpose and motivation, geographic location, and physical ramifications. This information provided a basis for understanding the scope and scale of the proposed power line and sub-station upgrades, which in turn informs the analysis of socio-economic impacts.

### Power Line Upgrade Project Scope

Eskom is proposing to construct an 870km<sup>1</sup> 765KV power transmission line between Juno substation near Vredendal in Western Cape to Perseus substation near Boshof in the Free State. This linear new power line and substations upgrade development comprises of core electric power infrastructure, ancillary structures, excavation (i.e. earth removal), road and access route construction, and erection of overhead cableways.

#### Kronos-Perseus Section

Three alternative corridors and deviations are being considered for the power line. According to Eskom<sup>2</sup>, the power line upgrade is divided into four sections that link five existing substations. The power line corridors pass through towns and informal settlement areas, farm portions, and other land uses. This report focuses on the **Kronos-Perseus Section** of the power line from Kronos substation near Copperton to Perseus substation near Boshof in the Free State.



The Kronos – Perseus section would involve the construction of approximately 388km, 765kV power line and substations upgrade extending from Kronos substation near Prieska in the Northern Cape to Perseus substation near Boshof in the Free State Province.

<sup>1</sup> ADEC’s calculation, which compares with Eskom’s indicated 880 km.

<sup>2</sup> Eskom EIA (environmental Impact Assessment) Applications lodged with authorities in the jurisdictions that the Power Line would pass through.

## **Project Motivation & Objectives**

The proposed power line project is driven by ESKOM's goal to supply reliable power in meeting the increasing needs of electricity users during all time periods. In order to achieve this, ESKOM needs to construct, upgrade, and maintain its infrastructure of transmission power lines and substations. ESKOM has called for strengthening of the transmission network in tandem with the growing demand for electricity.

Based on the anticipated growth in demand for electricity in the Western Cape, Northern Cape and Free State Provinces, ESKOM perceives a risk that the demand for electric power will gradually exceed supply. In the event that supply falls short of demand, then the need for load shedding would become inevitable. In order to meet demand and avoid load shedding, ESKOM has identified the need to strengthen the transmission system specifically between the Juno-Helios-Aries-Kronos-Perseus substations through the construction of the proposed 765kV transmission power line and upgrading of the substations.

## **Project Physical Components**

The physical components of ESKOM's power line project include activities central and/or incidental to the proposed power line development under review as part of the EIA (environmental impact assessment) process. These activities constitute the physical components of the project, as summarized below.

### **Electricity Infrastructure**

The project will involve construction of electricity infrastructure between Kronos substation and Perseus substation. This includes expansion of facilities like spillage dams, among others for the transmission line and upgrading of substations.

### **Roads Access Routes**

Another component of the project will be the development of roads or tracks for construction, operation, and maintenance of the proposed power line. Certain existing access routes would also be widened for this purpose.

### **Fuel & Hazardous Material Storage**

The project also involves construction of facilities or infrastructure to store or handle small quantities of dangerous goods (i.e. petrol, diesel and hazardous matter). These storage facilities would be built to handle the temporary needs of the project's construction phase.

## Cableways

The core power transmission line would utilize aerial (above-ground) cableways to transmit electricity. The cableways would interconnect the substations described above.

## Communications Facility

A telecommunication mast would be erected and installed for communication purposes. The exact location of the mast is yet to be determined.

## Removal of Vegetative Cover

Vegetation covering more than five hectares of land would be removed within the transmission corridors to give way for the construction of the proposed power line. Around 75% or more of this vegetative cover is comprised of indigenous plant and fauna. ESKOM has noted that significant portions of the Impact Area comprises of dry land with limited flora and fauna.

## Camps and Associated Project Infrastructure

Camps and associated project infrastructure may be established at locations more than 32 meters of watercourses. The Impact Area is diverse in terms of geology, hydrology, topography, and other physical characteristics that may impact on where project activities are located during and after construction.

## Land Take-Up by Use

The construction of the power line and associated road works would take up roughly 1,083 hectares of land (power structure and roads) along the 880 km corridor. This estimate is based on standard ESKOM servitude requirements (i.e., footprint of 2,126 square metres (or 52.1 metres by 40.8 metres) for a 765kV guyed-V suspension power structure). Eskom ordinarily utilizes three types of power structures i.e. 702 B: 765 kV guyed-V tower (52.1 metres by 40.8 metres), 703 B: 765 kV guyed-V tower (52.6 metres by 36.8 metres), and 701 C: Self-Supporting Suspension tower (14.5 metres by 14.5 metres). The choice of power structures depends on terrain, altitude and course trajectory. The project's total power line and road works land utilisation are summarized below, with **Kronos-Perseus** highlighted (see overleaf).

Table 1. POWER LINE & ROAD LAND USE, WESTERN CAPE, NORTHERN CAPE & FREE STATE, 2013

Section	Locality (Province)	Land Take-Up (Hectares)		TOTAL	Share
		Power Structure	Roads		
Helios – Juno	W. Cape & N. Cape	59.7	112.0	171.7	15.9%
Aries – Helios	N. Cape	74.6	140.0	214.6	19.8%
Aries – Kronos	Northern Cape Province	76.7	144.0	220.7	20.4%

Kronos - Perseus	N. Cape & Free State	165.2	310.4	475.6	43.9%
<b>TOTAL</b>		<b>376.2</b>	<b>706.4</b>	<b>1,082.6</b>	<b>100%</b>
Share		34.8%	65.2%		

Note: Based on Eskom typical land utilisation standards as per relevant governing legislation.

Sources: Eskom and African Development Economic Consultants (pty) Ltd.

Road construction would constitute the bulk of land use (65.2% of the total), whilst power structures would utilize around 35% of the total land area. The amount of land used would be directly proportional to the relative distances of the four sections or corridors of the proposed power line. Power structures are interspaced at a distance of 500 metres (i.e. 500 metres from one structure to the next). The Kronos-Perseus Section would account for more than 40% of the total land area (the highest proportion of the four sections of the power line), whilst the smallest portion would be comprised by the Aries-Juno Section. This land utilization estimate forms a basis for determining project impacts on agriculture, in terms of the change in production, value of agricultural produce, and employment.

## Section 2. EXISTING AGRICULTURAL CONDITIONS

This section presents information on the existing agricultural conditions within the region through which the proposed power line will pass. The 10 magisterial districts through which the power line would pass are distributed over three provinces (Vredendal and Vanrynsdorp in Western Cape; Calvinia, Kenhardt, Prieska, Hopetown, Herbert and Kimberly in Northern Cape; and Jacobsdal and Boshof in Free State). Agricultural production and value has been calculated for the individual magisterial districts through which the power line would pass. Similarly, agricultural employment within the Impact Area provinces has been analyzed. The **Kronos-Perseus Section** of the power line passes through six magisterial districts: Prieska, Hopetown, Herbert, and Kimberly in Northern Cape Province; and Jacobsdal and Boshof in the Free State. The use of magisterial districts is necessitated on the basis of the jurisdictions used in the census of commercial agriculture by Statistics South Africa. Existing agricultural conditions in the Kronos-Perseus Section are presented below.

### Agricultural Land Use and Output

The magisterial districts through which the Kronos-Perseus Section of the proposed power line would pass have a total of approximately 94,110 hectares in agricultural production (crops only). The region covered by this section produces roughly 766,400 tons of agricultural output per annum. Prieska, Herbert, and Boshof produce the most output, together contributing 83% to this section's production volume in tons. The land use and production characteristics of the magisterial districts that comprise the section's Impact Area are presented below whilst a summary of production in the overall region is provided in the Appendix.

#### Prieska Magisterial District

Prieska has roughly 19,000ha of land producing about 180,000 tons of agricultural products. Cultivated land accounts for about 16% of the total in the broader Impact Area region, while production represents 18% of total regional output.

The main products in this area field crops and winter cereals, which account for almost all cultivated land in commercial production. The major products generated by Prieska are field crops and winter cereals. This magisterial district also produces some vegetables and deciduous fruit and grapes. Overall, more than 84% of Prieska's production is in field crops and winter cereals. Current cultivated land area and production are shown overleaf.

**Table 2. CULTIVATED LAND & PRODUCTION, PRIESKA  
MAGISTERIAL DISTRICT, NORTHERN CAPE, 2013**

Crop	Land Area		Production	
	Hectares	Share 1/	Tons	Share 2/
Field Crops	9,380	49.7%	94,986	52.7%
Winter Cereals	8,744	46.3%	56,700	31.5%
Horticulture / Vegetables	657	3.5%	25,639	14.2%
Deciduous Fruit & Viticulture	108	0.6%	2,759	1.5%
<b>TOTAL</b>	<b>18,889</b>	<b>100.0%</b>	<b>180,084</b>	<b>100.0%</b>
<i>Share of land &amp; production.../2</i>	<i>15.9%</i>		<i>18.0%</i>	

Notes: 1/, share in magisterial district.  
2/, share of magisterial district in region.

Sources: Statistics SA, National Dept. of Agriculture (NDA) and African Development Economic Consultants (ADEC).

### Hopetown Magisterial District

Hopetown has around 600 hectares of cultivated land and produces about 25,000 tons of agricultural products. Cultivated land accounts for less than 1% of total farmland in the region, while production represents 5% of the total production in the region. As indicated below, Hopetown mainly produces vegetables, along with a minimal output in oil seeds.

**Table 3. CULTIVATED LAND & PRODUCTION, HOPETOWN  
MAGISTERIAL DISTRICT, NORTHERN CAPE, 2013**

Product	Land Area		Production	
	Hectares	Share 1/	Tons	Share 2/
Oil seeds	20	3.2%	27	0.1%
Horticulture / Vegetables	602	96.8%	25,304	99.9%
<b>TOTAL</b>	<b>622</b>	<b>100.0%</b>	<b>25,331</b>	<b>100.0%</b>
<i>Share of land &amp; production 2/</i>	<i>0.5%</i>		<i>5.0%</i>	

Notes: 1/ and 2/, *ibid.*  
Sources: Statistics SA, NDA and ADEC.

### Herbert Magisterial District

Herbert has 30,000ha of cultivated land, which accounts for more than one quarter of all farmland in the region. Similarly, Herbert Magisterial District's 250,000 tons of output represents almost 25% of the region's total agricultural output. The area's cultivated land area and output are summarized below.

**Table 4. CULTIVATED LAND & PRODUCTION, HERBERT  
MAGISTERIAL DISTRICT, NORTHERN CAPE, 2013**

Product	Land Area		Production	
	Hectares	Share 1/	Tons	Share 2/
Field Crops	16,715	55.1%	127,449	51.6%
Winter Cereals	12,483	41.1%	74,852	30.3%
Horticulture / Vegetables	1,043	3.4%	43,026	17.4%
Deciduous Fruit & Viticulture	97	0.3%	1,599	0.6%
<b>TOTAL</b>	<b>30,338</b>	<b>100.0%</b>	<b>246,925</b>	<b>100.0%</b>
<i>Share of land &amp; production 2/</i>		25.6%		24.7%

Notes: 1/ and 2/, *ibid.*

Sources: Statistics SA, NDA and ADEC.

The major products from this area are field crops (52%), followed by winter cereals (30%) and vegetables (17%). There is also some limited production of deciduous fruit and grapes (1%) produced in the area. Herbert is mainly a producer of field crops, winter cereals, and vegetables. At nearly 130,000 tons, Herbert is by far the region's largest producer of field crops.

### Kimberly Magisterial District

Kimberly is one of the largest urbanized areas within the region, but this magisterial district also has around 9,000ha in cultivation and produces nearly 50,000 tons of agricultural output. Kimberley's cultivated land represents about 8% of the total in the region, and its production accounts for 5% of total output. The district's land area and output are summarized below.

**Table 5. CULTIVATED LAND & PRODUCTION, KIMBERLY  
MAGISTERIAL DISTRICT, NORTHERN CAPE, 2013**

Product	Land Area Land		Production	
	Hectares	Share 1/	Tons	Share 2/
Field Crops	4,336	58.6%	29,089	58.6%
Winter Cereals	4,526	37.8%	18,756	37.8%
Deciduous Fruit & Viticulture	111	3.6%	1,774	3.6%
<b>TOTAL</b>	<b>8,973</b>	<b>100.0%</b>	<b>49,619</b>	<b>100.0%</b>
<i>Share of land &amp; production 2/</i>		7.6%		5.0%

Notes: 1/ and 2/, *ibid.*

Sources: Statistics SA, NDA and ADEC.

Kimberly mainly produces field crops and winter cereals, which also account for the largest share of land in production. Deciduous fruit and grapes are grown at a relatively small scale.

## Jacobsdal Magisterial District

Jacobsdal has around 7,000ha of land under cultivation, and produces close to 54,000 tons of agricultural output. Cultivated land accounts for 6% of the region's total, and Jacobsdal produces 5% of the region's output. Jacobsdal's products, land, and production volumes are summarized below.

**Table 6. CULTIVATED LAND & PRODUCTION, JACOBSDAL  
MAGISTERIAL DISTRICT, FREE STATE, 2013**

Product	Land Area		Production	
	Hectares	Share 1/	Tons	Share 2/
Field Crops	3,966	54.9%	20,875	38.9%
Winter Cereals	1,574	21.8%	6,320	11.8%
Oil seeds	381	5.3%	974	1.8%
Fodder Crops	815	11.3%	12,314	22.9%
Horticulture / Vegetables	491	6.8%	13,193	24.6%
<b>TOTAL</b>	<b>7,227</b>	<b>100.0%</b>	<b>53,675</b>	<b>100.0%</b>
<i>Share of land &amp; production 2/</i>	<i>6.1%</i>		<i>5.4%</i>	

Notes: 1/ and 2/, *ibid.*  
Sources: Statistics SA, NDA and ADEC.

The magisterial district's primary agricultural products are field crops, vegetables, and fodder crops. Winter cereals also comprise a significant portion of the area's output. Some oil seeds are also produced. In general, the district is characterized by a higher level of diversity in agricultural production than must the rest of the region.

## Boshof Magisterial District

Boshof magisterial district has nearly 30,000ha of cultivated land, producing roughly 210,000 tons of agricultural output per year. The key products in Boshof are indicated below.

**Table 7. CULTIVATED LAND & PRODUCTION, BOSHOF  
MAGISTERIAL DISTRICT, FREE STATE, 2013**

Product	Land Area		Production	
	Hectares	Share 1/	Tons	Share 2/
Field Crops	18,427	65.7%	61,112	29.0%
Winter Cereals	3,032	10.8%	6,977	3.3%
Oil seeds	2,939	10.5%	4,713	2.2%
Fodder Crops	612	2.2%	1,769	0.8%
Horticulture / Vegetables	3,058	10.9%	136,152	64.6%
<b>TOTAL</b>	<b>28,068</b>	<b>100.0%</b>	<b>210,723</b>	<b>100.0%</b>
<i>Share of land &amp; production 2/</i>	<i>23.7%</i>		<i>21.0%</i>	

Notes: 1/ and 2/, *ibid.*  
Sources: Statistics SA, NDA and ADEC.

Boshof's cultivated land accounts for nearly 24% of the total agricultural land in the broader Impact Area region. In terms of production, this magisterial district accounts for just over one-fifth of the total output generated by the region.

Unlike most of the region, Boshof has a specialization in horticulture, with vegetables accounting for nearly two-thirds of total production in the district. In terms of land use however, horticulture constitutes only 10% of the cultivated land in the magisterial district. By contrast, field crops use about two-thirds of cultivated land but account for only 29% of output. Boshof generally has a somewhat diversified agricultural base, producing vegetables and field crops, but also with significant output (though smaller share) in winter cereals, oil seeds, and fodder crops.

### Value of Agricultural Product

The six magisterial districts in this section produce agricultural output with a total value of about R4.2 billion per annum. The cash value of this output is generated primarily by field crops, followed by vegetables, deciduous fruit & viticulture, winter cereals and (to a lesser extent), oil seeds. Some nominal cash value is also generated by other crops. Much of the section's value is generated by farms in Herbert, which accounts for 32.2% of the total value of agricultural output from this section, followed by Boshof at 29% and Prieska at 20%. The value of crops in each of the section's magisterial districts is highlighted below.

#### Prieska Magisterial District

Prieska magisterial district produces R850 million in agricultural output per annum. This amount represents a fifth of the total value of agricultural product in the broader impact region.

**Table 8. VALUE OF CROP PRODUCTION, PRIESKA  
MAGISTERIAL DISTRICT, N. CAPE, 2014**

Crop	Value	Share 1/
Field Crops	R 422,100,000	49.7%
Winter Cereals	R 393,480,000	46.3%
Horticulture / Vegetables	R 29,565,000	3.5%
Deciduous Fruit & Viticulture	R 4,860,000	0.6%
<b>TOTAL</b>	<b>R 850,005,000</b>	<b>100.0%</b>
<i>Share of land &amp; production 2/</i>	20.1%	

Notes: 1/ and 2/, *ibid.*

Sources: Statistics SA, NDA and ADEC.

Field crops and winter cereals generate the highest overall value to the district, followed by winter cereals. Deciduous fruits and grapes do not generate significant value.

## Hopetown Magisterial District

Hopetown produces crops valued at less than R27 million, equivalent to less than 1% (or 0.7%) of the impact region's total output value.

**Table 9. VALUE OF CROP PRODUCTION, HOPETOWN  
MAGISTERIAL DISTRICT, N. CAPE, 2014**

Crop	Value	Share 1/
Oil seeds	R 900,000	3.2%
Horticulture / Vegetables	R 27,090,000	96.8%
<b>TOTAL</b>	<b>R 27,990,000</b>	<b>100.0%</b>
<i>Share of land &amp; production /2</i>	0.7%	

Notes: /1 and /2, *ibid.*  
Sources: Statistics SA, NDA and ADEC.

Only two groups of agricultural products are cultivated in the district, with vegetables and horticultural crops as the primary generator of agricultural value. Oil seeds accounts for only 3.2% of the agricultural value in the district.

## Herbert Magisterial District

The value of output in Herbert Magisterial District totals R1.4 billion. This amount represents about one third of the total value of the region's output.

**Table 10. VALUE OF CROP PRODUCTION, HERBERT  
MAGISTERIAL DISTRICT, N. CAPE, 2014**

Crop	Value	Share 1/
Field Crops	R 752,175,000	55.1%
Winter Cereals	R 561,735,000	41.1%
Horticulture / Vegetables	R 46,935,000	3.4%
Deciduous Fruit & Viticulture	R 4,365,000	0.3%
<b>TOTAL</b>	<b>R 1,365,210,000</b>	<b>100.0%</b>
<i>Share of land &amp; production/2</i>	32.2%	

Notes: /1 and/2, *ibid.*  
Sources: Statistics SA, NDA and ADEC.

Field crops, winter crops, and horticultural products generate the highest overall value. Deciduous fruits and viticulture only generates about 3.7% of the value of output in this area.

## Kimberly Magisterial District

Kimberly produces R404 million worth of agricultural products. This amount represents only 9.5% of the total value of output in the region.

**Table 11. VALUE OF CROP PRODUCTION, KIMBERLY  
MAGISTERIAL DISTRICT, N. CAPE, 2014**

<b>Crop</b>	<b>Value</b>	<b>Share 1/</b>
Field Crops	R 195,120,000	48.3%
Winter Cereals	R 203,670,000	50.4%
Deciduous Fruit & Viticulture	R 4,995,000	1.2%
<b>TOTAL</b>	<b>R 403,785,000</b>	<b>100.0%</b>
<i>Share of land &amp; production.../2</i>	9.5%	

Notes: 1/ and 2/, *ibid.*

Sources: Statistics SA, NDA and ADEC.

Winter cereals and field crops generate almost all of the agricultural value in the district. Deciduous fruit contributes less than 2% of the value of agricultural output.

### Jacobsdal Magisterial District

Jacobsdal only produces around R325 million worth of agricultural product, or less than 10% (or 7.7%) of the region's agricultural value.

**Table 12. VALUE OF CROP PRODUCTION, JACOBSDAL  
MAGISTERIAL DISTRICT, FREE STATE, 2014**

<b>Crop</b>	<b>Value</b>	<b>Share 1/</b>
Field Crops	R 178,470,000	54.9%
Winter Cereals	R 70,830,000	21.8%
Oil seeds	R 17,145,000	5.3%
Fodder Crops	R 36,675,000	11.3%
Horticulture / Vegetables	R 22,095,000	6.8%
<b>TOTAL</b>	<b>R 325,215,000</b>	<b>100.0%</b>
<i>Share of land &amp; production./2</i>	7.7%	

Notes: 1/ and 2/, *ibid.*

Sources: Statistics SA, NDA and ADEC.

Field crops generate over half of the district's agricultural value while winter cereals account for around one fifth (i.e. 21.8%). Fodder crops and, to a lesser extent, horticulture and oil seeds are also important in the district.

### Boshof Magisterial District

Boshof Magisterial District produces around R1.3 Billion in agricultural output per annum. This amount is the second highest in the region, accounting for about a third of the total value of regional output.

**Table 13. VALUE OF CROP PRODUCTION, BOSHOF  
MAGISTERIAL DISTRICT, FREE STATE, 2014**

<b>Crop</b>	<b>Value</b>	<b>Share 1/</b>
Field Crops	R 829,215,000	65.7%
Winter Cereals	R 136,440,000	10.8%
Oil seeds	R 132,255,000	10.5%
Fodder Crops	R 27,540,000	2.2%
Horticulture / Vegetables	R 137,610,000	10.9%
<b>TOTAL</b>	<b>R 1,263,060,000</b>	<b>100.0%</b>
<i>Share of land &amp; production.../2</i>	29.8%	

Notes: 1/ and 2/, *ibid*.

Sources: Statistics SA, NDA and ADEC.

Areas such as the Boshof Magisterial District, illustrate why the Free State is known as the “Bread Basket” of South Africa. Field crops (e.g., sorghum, maize, wheat, sunflower, etc.) generate nearly R1 Billion or more than 60% of the agricultural value in this area. Ranking a distant second is horticulture, which generates around 10% of value. Other products, including winter cereals, oil seeds, and fodder crops, though significant, constitute a small share of the overall value of agricultural product. Boshof, located just outside of Kimberley, is also an important centre for livestock production, with major sheep, cattle and growing game farming activities in addition to refurbished salt and mining operations. Thus, the area has a diverse and growing economic base. Note that details of livestock farming follow later in the section on Local Area Economic Uses.

This analysis suggests that the region’s cultivated agricultural output and overall value is highly-concentrated in one product category – field crops, produced in two specific areas: Boshof Magisterial District of the Free State and Herbert in the Northern Cape. Thus, *disturbance or interference in field crop production in this area is more likely to have detrimental impacts on agricultural output, value, income and employment than in other areas within this section and throughout the power line corridor.* These impacts are tested further in Section 3 of this report.

## Employment Base

Employment and other economic trends were analyzed as they relate to the agricultural sector of the broader regional economy. The analysis focuses on the three provinces through which the proposed power line corridors would extend – Western Cape, Northern Cape, and Free State - and compares trends within this region to those nationwide. (The Kronos-Perseus Section crosses into both the Northern Cape and Free State). This analysis demonstrates that employment fell between 2008 and 2013 within the region, mirroring trends throughout South Africa that have seen the nation buffeted by the global recession, changing technologies, and foreign competition.

## Agricultural Employment

Western Cape has 126,000 formal agricultural jobs, accounting for about 17% of the nation's total formal agricultural employment of 739,000. The Free State, with a reputation as the nation's "Bread Basket," has nearly 90,000 agricultural workers or 12% of the total. Meanwhile, the Northern Cape has about 46,000 agricultural workers, or 6% of South Africa's total.

Nationwide, agricultural employment fell by nearly 120,000 between 2008 and 2012. However, just in recent months, this downward trend appears to have finally reversed, with an increase of 79,000 jobs or 3% during the first quarter of 2013. Agricultural employment growth in the Western Cape has followed the national trend closely, with an increase of 3.1% to date in 2013. However, the Free State has rebounded more quickly, with 1<sup>st</sup>-quarter growth of 9.2%. In contrast, the Northern Cape has remained in negative growth, with the loss of 3,000 agricultural jobs so far in 2013.

**Table 14. AGRICULTURE EMPLOYMENT TRENDS, WESTERN CAPE, NORTHERN CAPE & SOUTH AFRICA ('000), 2008 – 2012**

Province	2008	2012	2013 1/	Change 2008-2012		
				Number	Per Cent	Per Year
Western Cape	148	120	126	-28	-18.9%	-4.7%
<b>N. Cape</b>	<b>50</b>	<b>49</b>	<b>46</b>	<b>-1</b>	<b>-2.0%</b>	<b>-0.5%</b>
<b>Free State</b>	<b>80</b>	<b>65</b>	<b>89</b>	<b>-15</b>	<b>-18.8%</b>	<b>-4.7%</b>
Sub-Total	278	234	261	-44	-15.8%	-4.0%
<b>RSA</b>	<b>780</b>	<b>660</b>	<b>739</b>	<b>-120</b>	<b>-15.4%</b>	<b>-3.8%</b>

Note: 1/ First Quarter 2013 (January to March)

Source: Statistics South Africa and African Development Economic Consultants (pty) Ltd.

Overall, the three provinces together lost 44,000 agricultural jobs between 2008 and 2012, accounting for nearly 16% of its total farming employment base. Agricultural employment within the broader region has fallen between 2008 and 2012 in tandem with national economic indicators, partly as a result of global recession. Other factors, including foreign competition and changing technologies that have improved productivity, impact on employment levels. During the first quarter of 2013, agricultural employment once again began to increase within Western Cape and Free State, although Northern Cape's agricultural employment has lagged in its rebound since the recession. Employment in the local area along and surrounding the path of the proposed path of the power line corridor is indicated below.

## Local Area Economic Uses

This sub-section profiles the economic uses in the immediate local area where the proposed power line would pass. This further narrows the region-wide

analysis which focused mainly on agriculture farming (field crops). The local baseline establishes the three main activities, namely: irrigation farming, livestock grazing and game hunting. A caveat is noted that background data and information was collected directly from farmers and stakeholders in the area.

The main economic uses in the local area along and/or surrounding the Kronos-Perseus section of the power line are irrigation farming, livestock grazing and game hunting. These uses are located in the area stretching roughly from Kalkfontein / Koffiefontein / West Kimberly (on the western side of the study area) to Boshof, to the east. There are between 120 and 160 farms located mainly in the two magisterial districts of Jacobsdal and Douglas.

### **Irrigation Farming**

Irrigation farming both at individual farm and scheme levels is served by extensive irrigation systems. These systems depend on centre pivots that cover vast areas of land ranging from 2 ha to 100 ha. The centre pivots have a radius of 50 to 700m. An estimated 300 irrigation systems are installed in the area.

In terms of scale, the local area can be compared with the big irrigation farms in Haartswater and large irrigation systems in Douglas. Centre pivot systems are expensive, with installation costs in the region of R200,000 to R300,000 per hectare. This capital investment increases the value of land (see later section on indicative land values).

Centre pivots are designed to operate in environments free of power lines. These systems, therefore, cannot operate under or near electrical power lines. There are areas within irrigated farms that should not be crossed by power lines and/or power line support structures. In addition, irrigation farming relies on aerial spraying which cannot take place if there are power lines crossing farm land or within close range of the farms. Irrigation farming is undoubtedly very sensitive to the proposed power lines.

**Farm Size.** Farm size varies considerably for the simple reason that some of the farms comprise of all three uses indicated above. Information collected on a sample of farms suggests that a typical farm allocates between 9,000 ha for wheat as main crop and 11,000 ha for lucerne and maize. One farm in the area allocates a small area of dry land for the production of sunflower seeds, generating gross income of R10 to R12 million per annum. The sunflower seeds are used in other parts of South Africa, and also exported overseas, mainly to France and Brazil.

### **Irrigation Schemes**

The local region is characterized by irrigation schemes, including Orange River Canal, Modder River Irrigation Scheme and Kalkfontein Irrigation Scheme. The Orange River Canal serves three major towns in the region.

**Water Users Associations.** Water user associations are important entities in the farming industry and cater for a large user base. For example, Kalkfontein Water Users Association (KWUA) is made up of about 120 to 130 farmers spread on both

sides of Riet River, including Jacobsdal. The irrigation systems in the region are a backbone of the agriculture support infrastructure. These are described below based on information provided by farmers and representatives of water users' and farmer associations.

1. **Orange River Canal.** Orange River Canal serves primarily agricultural production and agro-processing/value added activities. The canal provides direct employment for the majority of people in the area, including Jacobsdal, Douglas and Boshof. These three towns have a significant population base. There is also indirect employment at major agro-based operations/activities in the wider region, for example silos and water boards, among others. Area sources suggest that a good part of the Free State benefits from this irrigation scheme.
2. **Kalkfontein Dam.** Kalkfontein Dam is an important feature in the region. The dam is 4,500 ha in extent and is located some 20 km south-east of Koffiefontein. The dam (built in 1938 and renovated in 1977) supplies water to Koffiefontein and Jacobsdal for the irrigation of roughly 7,000 ha of land.
3. **Kalkfontein Nature Reserve.** Kalkfontein Dam Nature Reserve is situated in the south-western part of the Free State, some 35 km north of Fauresmith on the Petrusberg/Fauresmith road (S136). This reserve is home to yellowish (i.e. small and large mouth varieties) which attract angling activity in the area.
4. **Orange River Irrigation Scheme.** The Orange River scheme supports around 17,000 ha of agricultural land. The output production value is R40,000 to R50,000 per ha per season. Turnover is estimate at around R1.2 billion per annum.
5. **Kalkfontein Irrigation Scheme.** Kalkfontein Irrigation Scheme serves about 11,500 hectares of land located along both sides of Riet River. The scheme is valued at around R2.3 billion, and generates income of the order of R22 billion per annum.
6. **Jacobsdal Irrigation Farming.** Besides Kalkfontein Irrigation Scheme, there is an additional 8,500 ha of organized irrigation farm land situated 5 km from Jacobsdal.

Irrigation farming in the area is carried out by individual farmers and also by large scale irrigation schemes. There is no farming of note outside irrigation-based practices. Other uses, such as livestock grazing and game farming benefit directly from water supplied by irrigation systems.

## **Livestock Farming**

Livestock farming is substantial in the area, in general and in Jacobsdal, in particular. A typical farm averages +/- 2,000 ha used for irrigation farming and livestock grazing. This size of land allows farmers to meet land carrying capacity requirements of 13 ha per cow and cow to sheep ration of 1:6. The majority of farmers keep both cattle and sheep.

Livestock grazing is secondary to irrigation farming in terms of effort and returns, but is an integral part of the farming enterprise. Farm employees work in both irrigation farming and livestock grazing. A typical farm with a herd of 250 cattle makes turnover of between R1 million and R6 million per annum (i.e. 70 calves are sold on average from a herd of 100 cattle).

**Livestock Herd Size.** Farmers keep a herd of around 250 cattle and some sheep. Carrying capacity standards require 13 ha per cattle, and 6 sheep per cow, although some farms keep more sheep in relation to cattle. Some farms keep wild animals on game farms that are operated alongside irrigation farming and livestock grazing activities.

### Game Farming

Game farming is an integral part of the agriculture industry in the area spanning from Kimberly West to Jacobsdal. Game farms offer game hunting experience and are run and maintained as part an enterprise comprising irrigation farming and livestock grazing activities. Detailed information on game farming, including the scope, size, employment and turnover is provided in the Tourism Report. Suffice to note that game farming takes more land relative to the other farming activities.

**Typical Farm.** The character of a typical farm in the area is provided below for land use, hectarage, and output values (revenue/gross turnover). The first is a mixed-use old-generation farm while the second is an exclusive game hunting enterprise.

**Sample 1 Farm.** Sample 1 farm is a fourth generation family-owned enterprise based in Groofontein, with over 20 years of operation under the current owner. This is a 3,600 ha farm used for irrigation farming of multiple crops on rotation (i.e. maize, nuts, maize, wheat lucerne, potatoes and sunflower). Livestock grazing and game hunting are also carried out. The farm's activities and performance indicators are summarized in the Table below.

<b>Farming Activity</b>	<b>Ha</b>	<b>Tons/units</b>	<b>Value</b>
Irrigation Farming 1/	292	4,181	R 8,222,000
Livestock Grazing	1,300	140	R 210,000
Game Hunting	2,000	150	R 100,000
<b>TOTAL</b>	<b>3,592</b>	<b>N/a</b>	<b>R 8,532,000</b>

Note: 1/, multiple rotation crops.

Sources: Area farmers and African Development Economic Consultants (pty) Ltd.

This farm allocates the bulk of its land for game farming/hunting and livestock grazing. The game farm has around 150 wild animals, mostly small game, for example springbok. The farm has a herd of 100 cattle and 40 sheep raised on some 1,000 ha of grazing land. About 130 ha are used for commercial irrigation farming of maize and wheat (at rate of 1¾ to 2 seasons per year). The farm provides employment for six permanent people. Total employment is seven if the owner is included. Irrigation farm workers also look after livestock.

As demonstrated above, this typical farm generates more income from irrigation farming than livestock. About half the land (i.e. 56%) is allocated for game hunting while a third of the land (i.e. 36%) is used for livestock grazing, for a combined land allocation of 92%. It is important to note that while the farm only allocates 8% of its land for irrigation farming, this accounts for 96% of its revenue base.

**Sample 2 Farm.** Sample 2 farm exclusively a game-hunting enterprise situated in the Kimberly / Modder River area. This farm has been in business for the past 17 years, and has over 20 species of 2,500 animals, including eland, buffalos, giraffe and plain game. The farm provides employment for 10 people, and includes a none-core livestock farm of a herd of 100 cattle and 50 sheep.

The farm caters for a niche market of 30 to 40 international (foreign) hunting tourists and another 8 to 10 local (South Africa) groups per annum. The hunting season is short and extends over six months in a year (i.e. April - October). The gross income from game hunting is R2.5 million per annum.

**Animal Breeding.** This farm also breeds rare and endangered animals, an activity that goes back 11 years. Animal breeding is a lucrative venture that generates gross income of roughly R3.5 million per annum. These animals command good market prices, for example R700,000 to R 1 million for roan antelope and R300,000 for sable.

**Game farm size.** A typical game farm would be in the region of 6,000 to 8,000 ha of land. As indicated earlier, game farming is mostly operated alongside irrigation farming and livestock grazing. It is important to note that the overall farm size should account for all these three agricultural farming activities.

This sample game farm stretches from Free State (to the west) to Northern Cape (to the east), and covers 8 to 9 km/8,000 ha. The farm has a guest lodge which also acts as a base for game hunting operations. For noting, this farm is situated directly under power line Alternative 3, while the lodge is only 200 to 300m away. Details on this farm are included in the Tourism Socio-economic Impacts Report.

## Employment

Farming and game hunting provides employment opportunities to an estimated 5,600 people. About 80% of the employees are casual workers. The estimated employment base of the area is summarized on the following page.

**Table 16. ESTIMATED EMPLOYMENT, WEST  
KIMBERLY - BOSHOF REGION, FREE  
STATE & NORTHERN CAPE, 2015**

Area/Region	Number	Share
Jacobsdal	160	2.8%
Region (W. Kimberly to Boshof)	1,120	19.9%
Plus casual workers	4,500	80.1%
<b>TOTAL</b>	<b>5,620</b>	<b>100%</b>

Note: Jacobsdal is included in regional employment.

Sources: Area farmers and ADEC.

A typical enterprise employs on average 8 people to work primarily on an irrigation farm. These same people are also engaged in livestock grazing. Game hunting requires additional people as the roles and duties are distinctively different from agriculture and livestock farming. The current average of 8 employees per farm is less than what was required in the past, as farming is now more mechanized. In the past, these farms employed much more permanent workers. Still, farming employs a substantial number of seasonal workers or casual staff every year during peak season.

### Indicative Area Land Values

Current land values range from R2,000 to R20,000 per ha, with land for irrigation farming and game hunting being the most valuable. The land values in the local area are summarized below.

**Table 17. INDICATIVE LOCAL  
LAND VALUES, 2015**

Land Use Type	Rand Per Ha
Irrigation farming	R 20,000
Game hunting	R 15,000
Livestock grazing	R 2,000

Sources: Area operators and ADEC.

As noted earlier, land values increase substantially with capital investment, especially the land used for irrigation farming. The Table below shows a sample of a farm with relatively high land values is shown overleaf.

**Table 18. INDICATIVE LOCAL LAND VALUES, 2015**

<b>Land Use Type</b>	<b>Rand Per Ha</b>
Irrigation farming	R200,000 - R300,000
Game hunting	R16,000 - R20,000
Livestock grazing	R4,000 - R5,000

Sources: Area operators and ADEC.

Land values in the area depend of the amount of resources invested in the land. Irrigation systems are a key factor in the value of land used for crop farming. As indicated earlier, centre pivot systems cost between R200,000 and R300,000 per ha. On the other hand, the value of land for game hunting depends, in part, on the value of animal stock and allied investment in lodging and equipment. Not much is invested in grazing land, although local sources suggest that livestock farming is carried out in conjunction with irrigation and game farming..

### **Planned and Proposed Expansion Plans**

There are some immediate plans to expand irrigation farming and game hunting operations among a sample of farms contacted for this study. One farm plans to prepare additional 70 hectares of land under irrigation, at a cost of R250,000 per hectare or R17.5 million in total. This farm plans to introduce small animals for its game hunting side of the business. A second farm plans to prepare additional 2,000 ha of land for game farming, for a total investment of R40 million (or R20,000 per ha). This farm will introduce a modest number of small game (wild animals) as part of this expansion project. On the other hand, one established game hunting farm has no plans to expand, citing satisfaction with current level of operation. The owner is of the view that the farm had reached optimum scale and there was need to change this in the foreseeable future.

### **Potentially Uncultivated Land**

Existing farmers in the area have identified tracks of arable land earmarked for farming in the future. There are water rights for this land but none is under cultivation at present. This land could also generate benefits from the other two uses, i.e. livestock grazing and game farming. This potentially arable land is sensitive to the proposed power lines.

### **Local Area Employment**

Employment in the immediate local area along the path of the proposed power line is estimated at around 5,600, of which 1,100 are permanent employees and around 4,500 casual workers. The 120 to 130 farms in the area employ on average 8 full-time workers per farm. The current level of employment reflects downsizing efforts from relatively high levels in the past, attributed to, among others, mechanization and the quest for manageable employer/employee relations.

Generally speaking, game hunting employs more people than irrigation farming and livestock grazing activities.

## **Summary**

Agriculture is the primary economic activity throughout much of the Impact Area for the proposed power line. Within the Kronos-Perseus magisterial districts through which the power corridor would extend, there is about 94,100 hectares of land in cultivation. A large share of this land is engaged in the cultivation of field crops, as well as vegetables, winter cereals and oil seeds. The value of agricultural product within the region is highly concentrated in field crops, which in turn are highly concentrated within one magisterial district - Boshof. This section of the power line lies within the nation's "breadbasket," with substantial grain production. Within the Kronos-Perseus Section, much of this production is concentrated in Boshof.

Local economic uses include game farming/hunting and livestock grazing. Agriculture, especially crop farming rely on extensive irrigation systems. The value of agricultural farming and game hunting in the area is estimated at over R1 billion per annum. The value of agricultural land is clearly tied to the cost of irrigation and other infrastructure improvements that have added value to that land. Farmers note that the central pivot irrigation systems do not physically allow for interference from power lines. Thus, construction of power lines through irrigated land would, by necessity, undermine farming operations within an impact area.

### Section 3. AGRICULTURAL IMPACTS

The impacts of the proposed power line project on agriculture throughout this section of the Impact Area are presented herein. The impacts were determined based on the amount of land that would be taken out of production as a result of the project, and the resulting loss in agricultural output, value, employment, and income overall and within each of the four sections of the proposed power line corridor. The land taken out of production is the minimum based on the perimeter of one alternative determined by Eskom servitude requirements (see Land Take-up by Use section of Section 1: Project Background).

#### Summary of Regional Impacts

The Kronos-Perseus section would extend some 388km from Kronos substation near Prieska in Northern Cape to Perseus substation near Boshof in the Free State. As noted earlier, this corridor would pass through six magisterial districts, namely Prieska, Hopetown, Herbert, and Kimberly in Northern Cape Province; and Jacobsdal and Boshof in the Free State. The impacts on agricultural output and employment are presented below.

#### Agricultural Output & Value

A total of roughly 476 hectares of land would be taken out of production in this section, resulting in the loss of 383 hectares of cultivated land (from land used for construction of towers), assumed to be equally distributed among the six magisterial districts (i.e. 64 hectares per district). **This is a simplifying assumption to aid the analysis.**

The total impact in monetary value would be just over R17.4 million, based on current (2014) per hectare agricultural production value of between R40,000 and R50,000 per ha per annum. This loss in value is assumed to be equally distributed among the magisterial districts, for purposes of this analysis. These impacts are summarized below for hectareage and output value.

**Table 19. AGRICULTURAL IMPACTS, KRONOS-PERSEUS, 2014**

Item	Impact Value
Hectares (total)	476
Hectares (cultivated)	386
Rand Value 1/	R 17,374,835

Note: 1/, based on current (2014) per hectare values.

Sources: NDA, Statistics SA and ADEC.

Based on earlier analysis of existing agricultural conditions of Section 2, it is expected that Boshof would experience the greatest impacts of loss in agricultural output. The impacts in the rest of the districts are also expected to vary accordingly in line with their relative shares of the regional agricultural base.

## Employment & Earnings

The equivalent of one full-time job would be lost, yielding an impact of R24,300 in lost earnings per annum. This is based on estimated monthly earnings of R3,000, which is above the minimum wage of around R2,600. Whilst relatively nominal, the impact would be primarily borne by casual and unskilled workers.

**Table 20. AG. EMPLOYMENT IMPACTS, KRONOS-PERSEUS, 2014**

Category	Number	Earnings 1/
Skilled	0.13	R 4,584
Unskilled	0.22	R 8,043
Casual & seasonal	0.32	R 11,688
<b>TOTAL</b>	<b>0.7</b>	<b>R 24,316</b>

Note: 1/, based on current monthly earnings of R3,000 per month.

Sources: NDA, Statistics SA & ADEC.

The Kronos-Perseus section is the longest of the four corridors, at 388km, and would experience significant impacts that are expected to be largely concentrated in one magisterial district - Boshof.

## Local Area Impacts

As mentioned earlier, the area's agriculture base is heavily dependent on centre pivot irrigation systems and area-wide water irrigation schemes. Centre pivots cannot operate under power lines. These systems cost around R200,000 to R300,000 per ha, not to mention the larger water irrigation schemes. The loss of these systems would place a severe financial burden on farmers. The disruption of water supply will translate into direct loss of productivity, output and employment. Over and above direct agricultural uses, these impacts would also extend to domestic, industrial and commercial water users.

## Irrigation Farming

According to local area operators, typical power line servitude is around 300m across (i.e. 150m on each side). The servitude is not gated but the land cannot be used for irrigation farming if the power line runs across the farms. Of course, game hunting is out of the question as power lines and game hunters do not mix. The only use for this land would be livestock grazing.

There is an optimum scale at which a centre pivot is constructed / installed to cover the maximum possible area. A power line passing through a farm served by such a system would cause the serviced area to be “dissected” leading to the “forced use” of two smaller pivots, but which would only cover half, or at best, two-thirds of the original service area. In one instance, one of the proposed power line alternatives would pass right over a farm/residential property while another (power line alternative) would be within 2 km. This particular farmer feels that the proposed power lines would shut down his business enterprise. Other farmers located in the direct path of the proposed power lines face this predicament.

### **Water Irrigation Schemes**

In addition to centre pivots, the local area has water irrigation schemes that serve both individual-farm and scheme-based agricultural activities. The disruption of these schemes will translate into loss of productivity, output and employment. Kalkfontein irrigation scheme will be severely affected as it lies in the path of the proposed power line corridor. Likewise, disruption of the operations of this scheme will lead to direct loss of production and employment for scheme-based agricultural uses and downstream impacts on other water users (see below).

**Other Water Use Impacts.** A number of households, industrial and commercial businesses, abattoirs and others rely on water supplied by Kalkfontein irrigation scheme. Likewise, disruption of the operations of this scheme will lead to direct loss of production and employment for scheme-based agricultural uses and negative impacts for domestic, industrial and commercial water users.

### **Planned and Proposed Projects**

The power lines will affect planned and proposed expansion plans in the local area generally. One farm has plans to prepare 21 ha of land valued at R10 million (land only). The second development noted in the area involves the preparation of 70 ha for irrigation farming and a further 2,000 ha for a game farm. These immediate expansion plans will be stopped instantly.

The use of land under preparation would be negatively impacted, including the value of equipment and loss of production in perpetuity. The problem that farmers face is that they cannot replace land impacted by power lines. The land could be used for livestock grazing. For example, sample one farmer realises turnover of around R8 million per annum from 292 ha of land cultivated under irrigation versus about R210,000 turnover from livestock held on roughly 1,300 ha of land.

### **Game Farming versus Livestock Farming**

Overall, game farming is more lucrative than livestock farming, based on national trends. Location, altitude, and vegetation are important factors. According to Wildlife South Africa, buffalo mixed farming generates the highest return on capital, followed by eco-tourism. Game hunting performs marginally better than livestock.

Comparative analysis of return on capital for game and livestock farming is summarized below (reproduced in the Tourism and Urban Settlement Report).

**Table 21. PROFITABILITY OF GAME AND STOCK FARMING, 2007  
(1,000 LSU CAPACITY, MARGINAL LAND USE AREAS)**

Category	RETURN ON CAPITAL				
	Grassland	Lowveld	Highveld	Kalahari	Karoo
Hunting	6.0%	3.0%	5.7%	9.0%	8.3%
Cattle	4.8%	0.9%	1.9%	N/a	N/a
Sheep	N/a	N/a	N/a	7.0%	7.2%
Eco-tourism	N/a	10.9%	13.0%	N/a	N/a
Buffalo - Mixed Farming	19.5%	21.4%	N/a	N/a	N/a

Source: Wildlife Ranching South Africa.

The study area for the proposed power lines falls largely within the Karoo region. The applicable farming categories are hunting, sheep and cattle. The analysis shows that game hunting generates a higher return than sheep and cattle. These uses are prevalent in sections of the power line corridor. Ultimately, the choices that farmers make between game, crop and livestock farming are, in part, determined by profitability considerations. The proposed power lines would negatively impact on buffalo-mixed farming, which is assumed to include crops. While livestock farming would not be affected as much, the impacts on game hunting would be more pronounced. The impacts on game hunting were analysed and are presented in the separate Tourism and Urban Settlement Report.

### Impact on Land Values

The introduction of power lines in the local area will not only disrupt farming and tourism activities, but will devalue the current land values. In quantitative terms, the proposed power lines would reduce land values from R15,000 per ha for irrigation farming and R20,000 per ha to around R2,000 per ha. The value of R2,000 per ha is for land used for livestock grazing. In other words, both irrigation farming and game hunting activities will cease to exist. The land can only be used for grazing (see Tables 17 and 18 for area land values). Lower-end land values are reproduced in the Table below.

**Table 21. INDICATIVE LOCAL  
LAND VALUES, 2015**

Land Use Type	Rand Per Ha
Irrigation farming	R 20,000
Game hunting	R 15,000
Livestock grazing	R 2,000

Sources: Area operators and ADEC.

The above land values would be for a lower end farm. Comparable land values for a properly prepared farm would be R4,000 to R5,000 per ha for land

used for cattle grazing, R16,000 to R20,000 per ha for game hunting, and between R200,000 and R300,000 per ha for land used for irrigation farming. As mentioned earlier, the value of the land is significantly affected by the level of investment. The biggest asset for a game farm is game (wild animals) while centre pivots and other water irrigation systems play a critical role in irrigation farming. The value of these investments and business "good will" will all be lost.

**Shadow pricing.** Stakeholders advocate using shadow pricing to determine the real economic and/or financial impact of the power lines. This would reinforce the above indicated negative impacts on land values. Assuming the higher end value of R15,000 to R20,000 per ha for land currently used for irrigation farming or game hunting as a base, the question to ask is "*how much would a prospective investor be willing to pay for that land if the power lines are introduced in the area?*" This concept is also included in the Tourism Socio-economic Impacts Report.

It is important to note that land is attached to mixed-use business enterprises as going concerns, with installed infrastructure and assets. Stakeholders are convinced that no one would be willing to buy these affected farms (i.e. irrigation and game hunting farms). As indicated above, the land values are expected to reduce significantly to as low as R2,000 per ha as the land then could only be used for livestock grazing. Again, it is hard to imagine that farmers would switch from Irrigation farming and/ or game hunting (i.e. game farming) to livestock farming only as a core business venture.

### Other Negative Impacts

Over and above the direct impacts on field crops, there are a number of other impacts relating to animal theft and the security of Eskom personnel that are expected to maintain and repair the proposed power lines after construction. These other negative impacts are highlighted below.

1. **Animal Breeding.** Stakeholders strongly feel that the proposed power lines will disturb animal breeding programmes in the area. It is difficult to ascertain exactly what this impact would be, but a leading breeder has estimated that roughly 50% of his breeding programme would be affected by the power lines. This is expected to apply generally to other animal breeders in the area.
2. **Animal theft.** The power lines will bring along intrusion into the area's secluded animal breeding programmes. As people access farm properties to service and repair the power lines, interest would be generated leading to likely thieving and poaching activities. It is important to note that currently animal theft is non-existent in the area.
3. **Security.** Stakeholders feel that Eskom personnel would be at risk due to exposure to live ammunition from hunters' firearms. This negative impact is in the interest of Eskom employees who would be compelled to come to the area for duty.

The impacts on animal breeding and bird life are reiterated again in the Tourism and Urban Development Report. It is worth noting that in the past the area

had large livestock farms. Animal theft was a major problem, especially with sheep. Over time, most farmers scaled down livestock and moved into game farming. A plausible assumption to make is that these farmers would not desire to go back to livestock farming.

## Caveats

**There are a number of caveats relating to these impact estimates.** First and foremost, it must be emphasized that these total regional impacts are based on average production and value data for the Impact Area and its component magisterial districts. Thus, this regional data does **not** represent the specific impacts to any individual farmers, producers, or property owners. No data or information was collected from individual farmers, producers or property owners for the purposes of this regional analysis, which lacked scope and budget for more detailed analysis of impacts on individual farms or land holdings. Second, because the impacts are based on averages, they draw from the existing mix of products, output and value assigned based on the survey data collected by Statistics South Africa in its latest Agricultural Census. Thus, the mix of products along the power lines corridor represented in these numbers is assumed to be equivalent to the mix of products in 2007 within each of the specific magisterial districts in the Impact Area. Obviously, there would be variation in the amount of land in production, the types of products, output generated, and value of products throughout the power line corridor that may not equate exactly to these factors in the magisterial districts' overall.

However, data and information was collected for the immediate local area along and surrounding the proposed power lines. This local area extends beyond the land limit of the corridor of one power line assumed in the regional analysis and is therefore not dependent on the amount of land that will be taken out production. This local area hosts roughly 120 to 160 farms engaged in irrigation farming, game hunting and livestock grazing. This area is estimated to produce between R 1 billion and R1.4 billion in value of output / turnover comprising the mix of irrigation farming, game hunting and livestock grazing, based on the value generated by the area's typical farms. In addition, the area's irrigation schemes cover some 37,000 hectares of agricultural land that produce roughly R24 billion in turnover per annum. The local area data and information is a fair representation of the current performance of the agricultural and tourism/eco-tourism base that would be affected by the proposed power lines.

## Summary

The construction of the proposed 765kV power line between the Kronos and Perseus substations would take an estimated **386 hectares** of agricultural land out of cultivation in the region based on data from the 2007 Census of Agriculture. This translates to loss of R17.4 million per annum in crop value. Most of this impact would occur in Boshof. The reduction in production would result in the loss of the equivalent of less than **one agricultural job**. The loss of one job would be around R36,000 per year in employee earnings. These impacts would vary across the area, owing to variation in the amount of land taken out of production, productivity, value, and other variables across the affected magisterial districts. It is expected that the impacts on **field crops** would be concentrated primarily in Boshof, whilst impacts on

those farming **winter cereals** would likely be felt in areas of Prieska and Herbert. Boshof would also incur some impacts on **horticulture**.

However, when these impacts are considered in the local area context, the results are grave as the power lines would affect the very survival of not only irrigation farming but also game hunting and livestock grazing. The impacts on these three land uses will disrupt the mixed-use viability of farming enterprises along and surrounding the path of the proposed power line corridor. For each farm that is taken out of business, the loss in the value of output is estimated at around R8.5 million, plus 8 jobs worth R288,000 in employee earnings per annum.

## Section 4. IMPACTS MITIGATION MEASURES

The power lines will negatively impact on existing lucrative irrigation farming and game hunting activities along and surrounding the proposed path of the power lines. The high land values for irrigation farming and game hunting would be reduced to grazing land values, while all investment and infrastructure installed on the farms would become less useful. The immediate consequences are a reduction in existing farming and game hunting enterprises, and a likely stoppage of all planned and proposed farming development in the area.

The principal mitigation measure is a detour of the path of the power lines to avoid existing irrigation farming and game hunting areas. This calls for relocating the power lines to an existing Eskom power line corridor or a new corridor that would lie, as far as a possible, to the south of the study area. These deviations are presented below in order of preference.

1. **Deviation 1.** Eskom could relocate the power lines to the south of Jacobsdal. This would follow an existing corridor where Eskom already has existing power lines. In geographic terms, this would take the power lines to Oppermans, roughly halfway between Jacobsdal and Kalkfontein (See map in Appendix). This is the best option for the farmers around Jacobsdal area, as the power lines would be as far away as possible from existing and potential farming areas.
2. **Deviation 2.** Eskom could construct the power lines to the south of Kimberly in order to keep them out of existing and potential game farming areas (See map in Appendix). As indicated in this report, game hunting enterprises can only thrive in an environment that is not “polluted” by power lines and support infrastructure.

### Motivation for Mitigation

The motivation for these mitigation measures arise from two factors. Firstly, an existing fully functional power line corridor is routed along a path that would conveniently avoid the impacted areas and meet Eskom’s engineering needs. Secondly, these mitigation measures are grounded in the best economic and environmentally friendly use of the land. The existing farming and game hunting activities would continue to preserve the rich agricultural and tourism character of the area.

### Existing power line corridors

The rationale for the use of existing power lines corridors is based on the fact that negative impacts can be minimized in the impact area. The future cost of the proposed power lines can be ascertained from the lessons learnt from experience with similar projects near the study area and elsewhere in South Africa. These lessons relate to land degradation and negative impacts on the environment. In other words, the local and surrounding areas where these power lines pass through

have already been impacted. So extending the proposed power lines into these corridors will not generate new or incremental socio-economic and environmental impacts. The addition of new power lines will have limited at-place impacts but would help avert all socio-economic and environmental impacts that are the subject of this study.

### **Cost of “Moving” Power Lines**

The cost of removing the power lines is prohibitive. While Eskom provides the option to “move” power lines out of farm properties, the farmers cannot meet the cost, not to mention the engineering and geophysical implications. The proposed power lines are large super structures, very expensive, and visible up to a distance of +/- 40km. Once installed, the power lines are expected to stay in the area for many years. This is one of the reasons for recommending re-routing of the power lines to avoid existing and potential farming and game hunting areas.

### **Compensation by Eskom**

Information from local sources suggests that Eskom provides compensation for the construction of infrastructure on farm properties. Consideration should be given to accommodate costs associated with ground support structures and loss of production. Stakeholders note that power lines can “sterilize” up to 4km corridor of land (or 2km on either side) along the path of the power lines.

### **Employment Impacts**

A typical irrigation farms employs 8 people, on average. It is common practice for people employed on an irrigation farm to also look after livestock (i.e. livestock grazing). This compares with a game farm which employs about 2 to 3 workers to look after wild animals, plus additional 10 to 15 deployed in lodging, domestic work and patrols. Game hunting activities also employ additional hunters and workers in animal skinning and taxidermy industry. The proposed power lines will have serious impacts for irrigation and game farming. The employment impacts will be mostly borne by tourism-oriented game farms, on a per farm basis. These farms employ more people than irrigation farming and/or livestock grazing taken together. It must be noted that local area impacts address farm level employment as opposed to regional employment impacts, which are based on land-take-up by the construction of power lines.

### **Best use of land**

Ultimately, this study finds that the area along and surrounding the proposed path of the power line is valuable and best suited for the current economic uses, i.e. irrigation farming, game hunting and livestock grazing. The findings from this study suggest that the proposed power lines will lead to dislocation of existing lucrative irrigation farming and game hunting enterprises, and also destroy green fields for future development.

The viability of existing and future farming activities critically depends on the absence of power lines. This study has analyzed and narrated the impacts of power

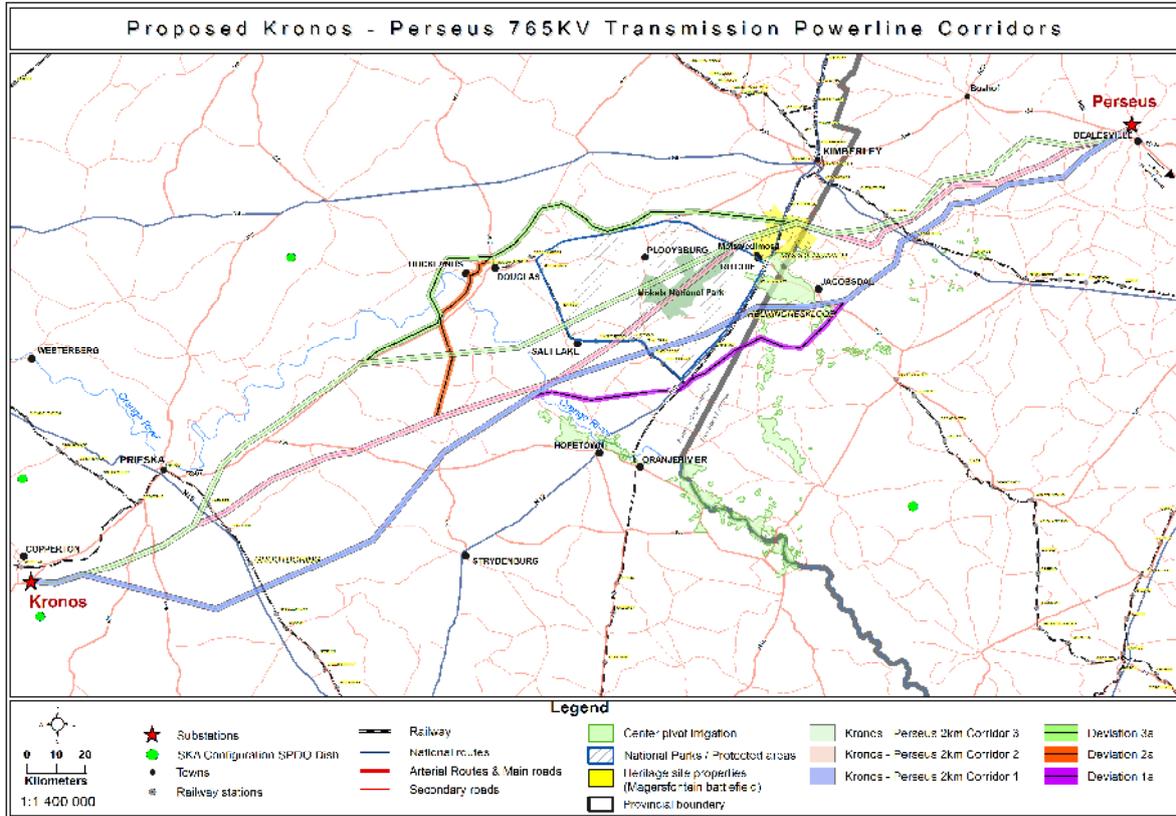
lines on the study area's irrigation farming economy, and recommends that this be preserved to sustain agriculture.

### **Mitigation Measures**

Based on the above motivation factors, this study recommends mitigation measures for portions of the power lines that would negatively impact mainly the irrigation farming economy. The proposed power lines should be re-routed and/or constructed in existing "brownfield" corridors. Perhaps, it is important to point out that the existing corridors are in operational condition. Specific impacts of the proposed power lines and corresponding mitigation measures were prepared based on the results of this socio-economic impacts study. These impacts and mitigation measures are elaborated in Appendix Table 3 of this report. Mitigation measures for tourism impacts appear separately in the Tourism and Urban Settlement Report.

**APPENDIX**

**Locality Map: Kronos-Perseus Section**



Source: Mokgope Consulting cc

Table 1. SUMMARY AGRICULTURAL PRODUCTS AND LAND AREA, MAGISTERIAL DISTRICTS IN IMPACT AREA, 2013

Product	Vredendal		Vanrynsdorp		Calvinia		Kenhardt		Prieska		Hopetown		Herbert		Kimberly		Jacobsdal		Boshof		TOTAL	
	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Ha	Share	Hectares	Share
Field Crops	178	1.5%	-	0.0%	180	2.9%	42	2.0%	9,380	49.7%	-	0.0%	16,715	55.1%	4,336	58.6%	3,966	54.9%	18,427	65.7%	53,224	44.8%
Winter Cereals	4,279	35.4%	2,708	64.4%	5,954	96.9%	20	0.9%	8,744	46.3%	-	0.0%	12,483	41.1%	4,526	37.8%	1,574	21.8%	3,032	10.8%	43,320	36.5%
Oil seeds	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	20	3.2%	-	0.0%	-	0.0%	381	5.3%	2,939	10.5%	3,340	2.8%
Fodder Crops	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	0.0%	0.0%	-	0.0%	-	0.0%	815	11.3%	612	2.2%	1,427	1.2%
Vegetables	1,010	8.3%	176	4.2%	-	0.0%	-	0.0%	657	3.5%	602	96.8%	1,043	3.4%	-	0.0%	491	6.8%	3,058	10.9%	7,037	5.9%
Citrus Fruit	132	1.1%	5	0.1%	-	0.0%	-	0.0%	-	0.0%	0.0%	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	137	0.1%
Decid's Frt & V'cture	6,503	53.7%	1,315	31.3%	8	0.1%	2,051	97.1%	108	0.6%	0.0%	0.0%	97	0.3%	111	3.6%	-	0.0%	-	0.0%	10,193	8.6%
<b>TOTAL</b>	<b>12,102</b>	<b>100%</b>	<b>4,204</b>	<b>100%</b>	<b>6,142</b>	<b>100%</b>	<b>2,113</b>	<b>100%</b>	<b>18,889</b>	<b>100%</b>	<b>622</b>	<b>100%</b>	<b>30,338</b>	<b>100%</b>	<b>8,973</b>	<b>100%</b>	<b>7,227</b>	<b>100%</b>	<b>28,068</b>	<b>100%</b>	<b>118,678</b>	<b>100%</b>
Share of Total	10.2%		3.5%		5.2%		1.8%		15.9%		0.5%		25.6%		7.6%		6.1%		23.7%		100.0%	

Note: Land area in hectares for magisterial districts.

Sources: Statistics South Africa, National Department of Agriculture, and African Development Economic Consultants (pty) Ltd.

Table 2. SUMMARY AGRICULTURAL OUTPUT, MAGISTERIAL DISTRICTS IN IMPACT AREA, 2013

Product	Vredendal		Vanrynsdorp		Calvinia		Kenhardt		Prieska		Hopetown		Herbert		Kimberly		Jacobsdal		Boshof		TOTAL	
	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share	Tons	Share
Field Crops	576	0.4%	-	0.0%	321	4.2%	309	0.7%	94,986	52.7%	-	0.0%	127,449	51.6%	29,089	58.6%	20,875	38.9%	61,112	29.0%	334,718	33.4%
Winter Cereals	9,228	5.9%	2,851	10.5%	7,155	94.1%	132	0.3%	56,700	31.5%	-	0.0%	74,852	30.3%	18,756	37.8%	6,320	11.8%	6,977	3.3%	182,970	18.3%
Oil seeds	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	27	0.1%	-	0.0%	-	0.0%	974	1.8%	4,713	2.2%	5,714	0.6%
Fodder Crops	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	12,314	22.9%	1,769	0.8%	14,082	1.4%
Vegetables	36,245	23.4%	3,563	13.1%	-	0.0%	-	0.0%	25,639	14.2%	25,304	99.9%	43,026	17.4%	-	0.0%	13,193	24.6%	136,152	64.6%	283,121	28.3%
Citrus Fruit	4,488	2.9%	65	0.2%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	4,553	0.5%
Decid's Frt & V'cture	104,576	67.4%	20,676	76.1%	124	1.6%	44,552	99.0%	2,759	1.5%	-	0.0%	1,599	0.6%	1,774	3.6%	-	0.0%	-	0.0%	176,060	17.6%
<b>TOTAL</b>	<b>155,114</b>	<b>100%</b>	<b>27,155</b>	<b>100%</b>	<b>7,601</b>	<b>100%</b>	<b>44,993</b>	<b>100%</b>	<b>180,084</b>	<b>100%</b>	<b>25,331</b>	<b>100%</b>	<b>246,925</b>	<b>100%</b>	<b>49,619</b>	<b>100%</b>	<b>53,675</b>	<b>100%</b>	<b>210,723</b>	<b>100%</b>	<b>1,001,219</b>	<b>100%</b>
Share of Region	15.5%		2.7%		0.8%		4.5%		18.0%		2.5%		24.7%		5.0%		5.4%		21.0%		100.0%	

Note: Total output in tons for magisterial districts

Sources: Statistics South Africa, National Department of Agriculture, and African Development Economic Consultants (pty) Ltd.

Table 3: Mitigation Measures (Socio-Economic - AGRICULTURE)

Impact	Mitigation Measures
<p><b>Disruption of Irrigation Systems:</b></p> <p>The construction of power lines will disrupt the operation of centre pivots for individual farms and large scale water irrigation schemes, leading to total incapacitation of irrigation farming operations. Also, farmers will not be able to carry out aerial spraying vital for checking crop pests and diseases.</p> <p>The construction of power lines will lead to the demise of game farming/hunting industry (see details in Tourism Impact Report – Mitigation Measures). Game hunting is a pillar of mixed-use farming enterprises in the area, so its failure or success bears directly on the performance of irrigation and livestock farming.</p>	<ul style="list-style-type: none"> <li>• Power lines must be constructed away from current farming areas. This would require changing the path of proposed power line corridor.</li> <li>• Aerial spraying would require the power lines to be as far away as possible from farms.</li> <li>• Two deviations are recommended, as below: - <ul style="list-style-type: none"> <li>○ <u>Deviation 1</u> (preferred). Push power line to the south of Jacobsdal, following existing Eskom corridor (i.e. close to Oppermans, roughly halfway between Jacobsdal and Kalkfontein.</li> <li>○ <u>Deviation 2</u> (optional). Construct power lines to south of Kimberly, out of the game farming areas (detailed in Tourism and Urban Development Report).</li> </ul> </li> <li>• Recommended principle mitigation measure is for Eskom to use existing “brownfield” corridors, with no new socio-economic impacts.</li> </ul>
<p><b>Loss of Productive Agricultural Land:</b></p> <p>The construction of the power line route would require use of some land to accommodate the “footprint” of towers (pylons). Whilst the footprint is small on an individual basis, the total number of pylons can result in an overall reduction in agricultural land in the broad area over which the corridors extend. All three alternative power line corridors pass through agricultural land that would be removed from production to accommodate towers.</p> <p><i>Caveat: Stakeholders maintain that Eskom only compensates for part of the structure which goes into the ground, and not the structure’s footprint.</i></p>	<ul style="list-style-type: none"> <li>• The only way to avoid a reduction in productive agricultural land is to reduce the volume of pylons and/or minimize pathways over productive farmland. In some cases, a few hundred metres in another direction can make a significant difference in the ability of a farmer to ensure efficiencies in production.</li> <li>• As a mitigation measure, farmers should be compensated at fair market value (FMV) for productive farmland used to accommodate pylons and other infrastructure. The value of the farmland would be determined based on farm income generated on an average annual basis.</li> <li>• Indicative production crop values per hectare are provided in this Report. (i.e. R40,000 to R50,000 per hectare).</li> </ul>

Impact	Mitigation Measures
<p><b>Loss of Investment Capital and Assets:</b></p> <p>The construction of power lines on farm land will immobilize operation of centre pivots and water irrigation systems, leading to loss heavy capital investment.</p> <p>The construction of power lines near farms will prevent aerial spraying operations for pest and disease control, leading to loss of productivity, output and employment.</p>	<ul style="list-style-type: none"> <li>• The path of the proposed power lines must avoid existing farms.</li> <li>• If the power lines transgress existing farms, then farmers must be compensated for lost investment, currently estimated at R200,000 to R300,000 per hectare, plus operating losses. The compensation for larger water irrigation schemes would be much higher than the investment cost of centre pivots</li> <li>• The path of the proposed power lines must be as far away as possible from currently farmed land.</li> <li>• Compensation would be hard to determine as there is no alternative to aerial spraying at the moment.</li> </ul>
<p><b>Loss of Productive Capacity:</b></p> <p>When farmland is taken out of production, there is a reduction in production capacity and output. The reduction in output results not only from the loss of land but also from a reduction in efficiencies (e.g., farm equipment must maneuver around pylon structures). For the purposes of this impact analysis, productive capacity is tied closely to a reduction in land available for agriculture.</p> <p><i>Caveat: Stakeholders maintain that Eskom does not compensate for loss of productivity, production or value. Eskom may have to re-consider this stance in light of the results of this Socio-economic Impact Study.</i></p>	<ul style="list-style-type: none"> <li>• Loss in productive capacity is an indication of income and value. A reduction in farm income would result in a change in value. As such, mitigation measures are warranted as above (and below) based on farm income and value.</li> </ul>
<p><b>Loss of Agricultural Value:</b></p> <p>As noted above, the loss of productive capacity can result in a loss of farm income, which is used in turn to determine value.</p> <p><i>Caveat: Ibid.</i></p>	<ul style="list-style-type: none"> <li>• Farmers would be compensated for the loss in value, based on the income generated by their land. Fair compensation as a mitigation measure is noted above.</li> </ul>
<p><b>Livestock Theft</b></p> <p>The introduction of power lines will render Eskom service and repair personnel to access farm properties, leading to generation of interest and eventual thieving activities (note: animal theft is non-existent at the moment).</p>	<ul style="list-style-type: none"> <li>• The path of the proposed power lines must avoid existing farms.</li> </ul>

Impact	Mitigation Measures
<p><b>Risk of Death for Eskom Personnel:</b></p> <p>Eskom personnel tasked to maintain and repair power lines face the risk of dying from exposure to live bullets fired by game hunters.</p>	<ul style="list-style-type: none"> <li>The power lines must be constructed as far away as possible from game farms and game hunting areas. This mitigation measure is in the interest of Eskom personnel.</li> </ul>
<p><b>Loss of Employment:</b></p> <p>If a business (i.e., farm) loses revenue generated by land, there is the possibility that overall operations will become less profitable. Businesses will sometimes reduce their overhead charges or operating costs in order to stay afloat. Farms, however, are different from many businesses in that they tend to remain much more dependent on family and household members than on outside hiring of staff. A relatively small proportion of agricultural employment is hired from outside the household. As a result, even a sharp downturn in farm revenue will not necessarily translate into a decrease in farm employment. Nevertheless, serious reductions in output and income can still result in tightening of workers' hours.</p>	<ul style="list-style-type: none"> <li>Compensation for land used to accommodate towers and other infrastructure does not ameliorate the fact that some farms will have less productive capacity and less need for workers. That being said, the employment impacts were still determined to be minimal. Mitigation in the form of a temporary subsidy is recommended where there is a direct layoff resulting from construction of power infrastructure. Such temporary compensation would be provided directly to claimants, equivalent to 3/5<sup>th</sup> annual salary and wages, for a period of up to two years.</li> </ul>
<p><b>Loss of Household Income:</b></p> <p>As noted above, there is a very small possibility of a reduction in employment resulting from the loss of productive capacity. A reduction in employment can also include a loss of hours worked by those who remain employed. Clearly, either a reduction in hours or full-time job loss will result in reduced household income for the worker.</p>	<ul style="list-style-type: none"> <li>As noted above, a subsidy could be provided for agricultural workers who are shown to have been laid off or had their hours reduced as a result of the construction of power lines through an agricultural area. This subsidy could help ameliorate the impact on household income generated by the loss of work hours and/or employment. That being said, compensation should only be provided where workers' claims are shown to be related directly to power infrastructure at a specific farm.</li> </ul>
<p><b>Halt of Planned &amp; Proposed Farm Expansion Projects</b></p> <p>The construction of power lines would bring immediate halt to planned and proposed expansion projects spread in the area along and surrounding the path of the</p>	<ul style="list-style-type: none"> <li>Farmers must be compensated for preparation costs, including investment cost in machinery and equipment. Indicative costs are R10 million for a 21 ha track of land, based on an existing project documented in this Report.</li> </ul>

Impact	Mitigation Measures
proposed power lien corridor.	
<p><b>Land Identified for Future Development of Irrigation Farms</b></p> <p>The corridor of the proposed power lines transgresses identified potential land for earmarked for future development of irrigation farms, including areas with secured water rights.</p>	<ul style="list-style-type: none"> <li>• Land earmarked for future development of irrigation farms must be marked as “hot spots” to be avoided by the proposed power lines.</li> <li>• Land with existing water rights must also be marked as “hot spots” to be avoided by the proposed power lines.</li> </ul>

## **PERSONAL INTERVIEW LIST**

1. Steven M. Squires, Chairman, Riet River Water Users Association, Jacobsdal.
2. Phillipus Nel, Chairman, Riet River Farmers Association, Jacobsdal.
3. Ian Conroy, Farmer (crop, livestock & game), Jacobsdal.
4. Kempen Nel, Chairman, Kalkfontein Water Users Association.
5. Andrew Conroy, Chairman, Jacobsdal Pilots Association, Jacobsdal.
6. Greg Edwards, Entrepreneur, Magersfontein Safaris (game farm), Kimberly West.
7. Christo Meyer, Representative, Farmers' Union, Prieska.
8. Piet Roux, Representative, Farmers' Union, Prieska.
9. A. J. Brand, Land Owner, Loop 10
10. B.J. Voolgraff, Land Owner, Brandvlei.

## REFERENCES

1. <http://www.daff.gov.za/daffweb3>, Census of Commercial Agriculture, 2007, Statistics South Africa, Financial and production statistics, Western Cape Province, Northern Cape Province and Free State.
2. BFBA (2012), Analysis of Agricultural Wages in South Africa.
3. National Department of Agriculture, Forestry and Fisheries, Abstract of Agricultural Statistics, 2012.
4. Statistics South Africa, 2001 and 2011 Census, Demographics (population and households) for Western Cape Province, Northern Cape Province and Free State).
5. Area in Hectares and Square Metres for Magisterial Districts, Powerline Corridor, Northern Cape, Free State and Western Cape Provinces, GIS source, unpublished.
6. <http://www.en.wikipedia.org> (2013), Wikipedia entries for Calvinia, Copperton, Dealesville, Loriesfontein, Kimberly, Prieska, Diemansput, Namaqua National Park, and Grootdoring.
7. Eskom (2012), Application Form for Kronos-Perseus Environmental Authorization, Environmental Impact Assessment for the Proposed Helios-Juno 765 kV Transmission Powerline and Substation Upgrades, Eskom Holdings SOC Limited, 6<sup>th</sup> November, 2012.
8. Mokgope Consulting cc, (2012), Minutes of the Kick-off Meeting for the Proposed Aries-Juno 765 kV Powerline, 11 September, 2012 (unpublished).
9. Eskom, Machinery Regulations, Supports (minimum clearance for inside/outside townships, communication lines, buildings, et al).
10. Asquare Mining Consulting cc., (2012), Social Impact Assessment for the Proposed Perseus-Gamma 2<sup>nd</sup> 765 kV Power Line and Substations Upgrade Project, Northern Cape and Free State Provinces, South Africa.
11. Eskom, Thresholds for Radiation from Powerlines / Substations, Resources & Strategy Division, Corporate Responsibility (SHE), letter dated 28 July, 2006.
12. Switch and Transformer Premises (excerpt), Electrical Machinery Regulations (1988) of Occupational Health & Safety Act (1993).
13. Mokgope Consulting cc., Tower Typologies for 765 kV transmission power lines: 702B and 703B Guyed-V Suspension and 701C, D, E & F Self-Supporting Suspension, (undated).
14. Eskom, Servitude Requirements for a 702B: 765 kV Guyed-V tower and 702B: 765 kV Guyed-V Suspension.
15. Eskom, Guidelines for Different Voltages and Requirements (buildings and separation distance), (undated).
16. Alan Mclver (2009), Kalkfontein Dam Nature Reserve, Fouresmith, Western Free State.
17. Eskom, Socio-economic Requirements, EIA, (undated).
18. <http://www.en.wikipedia.org>, Namaqua National Park.
19. Eskom, Vegetation Clearance Safe Distance with respect to Power Lines, excerpt from OHS Act 85 of 1993.
20. MasterQ Research (2006), Social Impact Assessment, Hydra-Perseus 765 kV Transmission Line, Free State and Northern Cape Provinces, South Africa.