

Antropogenic Grassland

This vegetation unit has a **low** biodiversity rating as indicated in Table 16 below. The **low** conservation value is attributed to the low grassland species diversity in the unit and the large area of disturbed grassland remaining. The **low** functional rating is attributed to the lack of ecological services provided by the disturbed grassland.

TABLE 16: BIODIVERSITY RATING FOR THE *DISTURBED GRASSLAND UNIT*

	Size of vegetation unit	Species diversity	Condition
Conservation status	1 - Large	1 - Low	1 - Disturbed
	Use	Ecological service	Aesthetic value
Functional status	1 - None	3 - Undetermined	1 - Low
	Conservation status	Functional status	Biodiversity
Biodiversity Rating	3 - Low	5 - Low	Low

Drainage Areas and Wetlands

This vegetation unit has a **high** biodiversity rating as indicated in Table 17 below. The **high** conservation value is attributed to the high grassland species diversity in the unit and the small area of wetlands remaining. The **high** functional rating is attributed to the obvious ecological services and the high aesthetic value of the wetlands and seepage areas.

TABLE 17: BIODIVERSITY RATING FOR THE *DRAINAGE AREAS AND WETLANDS*

	Size of vegetation unit	Species diversity	Condition
Conservation status	5 – Small	5 – High	3 – Moderately Disturbed
	Use	Ecological service	Aesthetic value
Functional status	1 – none	5 – Obvious	5 - High
	Conservation status	Functional status	Biodiversity
Biodiversity Rating	13 – High	11 - High	High

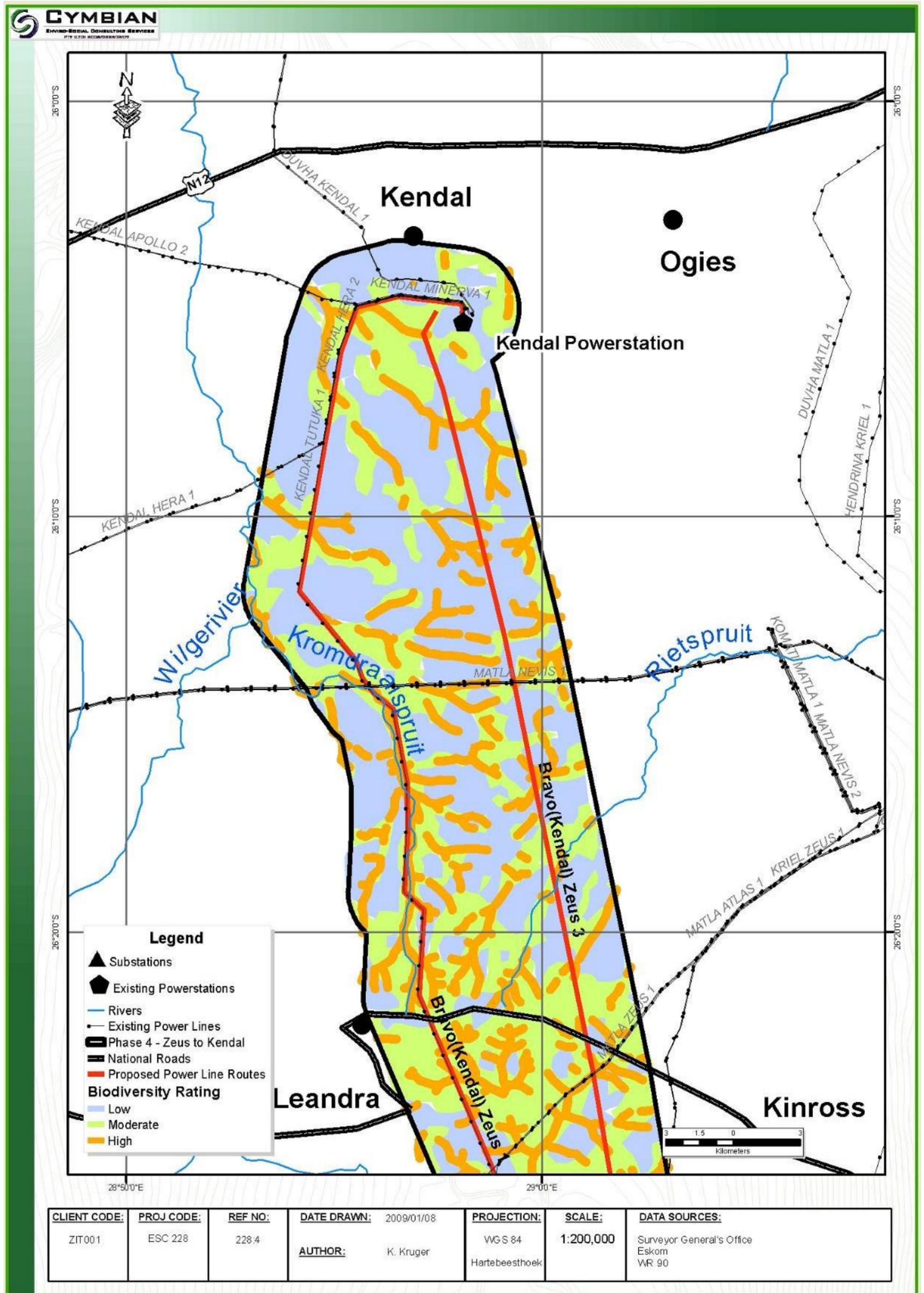


FIGURE 44: BIODIVERSITY RATING MAP OF THE NORTHERN PART OF THE SITE

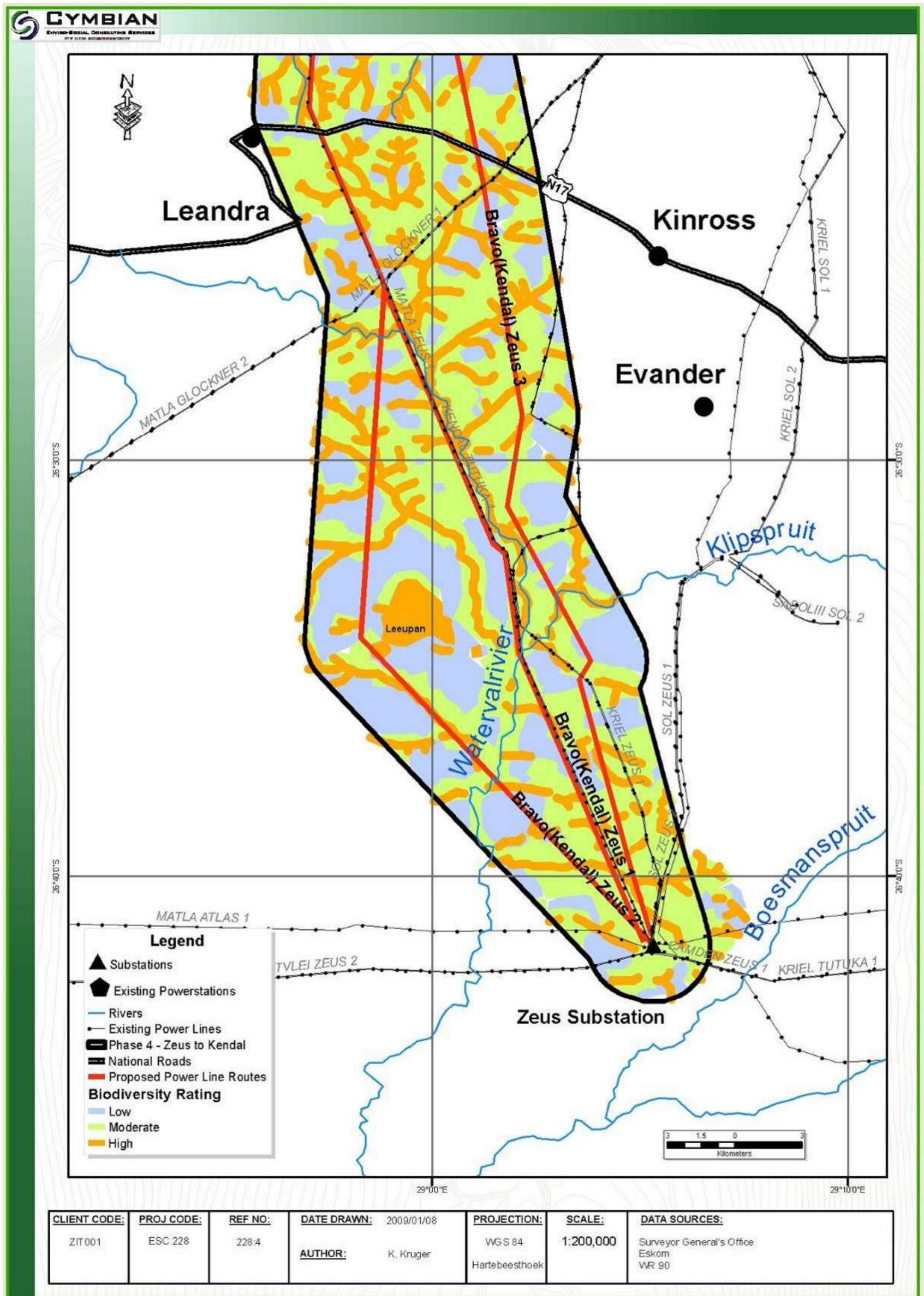


FIGURE 45: BIODIVERSITY RATING MAP OF THE SOUTHERN PART OF THE SITE

7.1.12 Visual Character

Landscape Character

The site and the surrounding area can be described as an agricultural landscape with intermittent mining and power generation activities. All the power line alternatives are located on rolling slopes with very little screening from topography or vegetation. Refer to Figure 12 for the topography of the site.

The major rivers in the south of the site are the Klipspruit and the Waterval River, with several smaller tributaries. In the northern section the Wilge River is the main watercourse that drains northwards. Alternative 1 follows the Waterval River as well as the Kromdraaispruit, Alternative 2 crosses the Waterval River before joining the same alignment as Alternative 1, also following the Kromdraaispruit. Alternative 3 does not traverse along any major water courses but does cross over the Rietspruit and the Klipspruit.

The landscape surrounding the proposed power lines can be described as open grassland with numerous cultivated fields. The natural vegetation does not provide any substantial screening of the power lines. There are several existing power lines throughout the site, and in deed the intention of the project is to connect the existing power lines with the new power station. Figure 46 below provides a view of some of the existing power lines on site.



FIGURE 46: VIEW OF THE EXISTING POWER LINE ON SITE

The study area is relatively devoid of any other infrastructure, with the exception of several farm houses, fences and roads. In a few isolated areas the power lines traverse close to areas used for mining, urban settlements and power generation.

Viewshed

It should be noted that the viewshed for each of the alternatives, which is plotted on Figure 47, Figure 48 and Figure 49, is an approximation that may vary in some locations. Potential views to the proposed upgrade are likely to be blocked in some localised situations by buildings, vegetation or local landform features at specific locations within the viewshed. Similarly, glimpses of the proposed upgrade may be available from some isolated high-elevation locations outside the plotted viewshed. The figures illustrate the visibility of each of the alternatives. The coloured areas indicate areas that are visible with the red areas having very high visibility and the blue having lower visibility. It should be noted that Alternative 3 is more visible than Alternative 1 and 2 due to the fact that it is located along the higher altitudes and is not aligned along drainage lines like the other two alternatives.

Notable features of the viewshed are summarised by the following points:

- The viewshed extends approximately 50 km to the northwest of the proposed upgrade;
- In a easterly direction the viewshed is generally limited by a ridgelines approximately 40 km from the site at Bethal;
- To the west the viewshed extends approximately 70 km with isolated views on high outcrops; and
- Potential views from the south are blocked by the flowing ridges located south from the proposed site, and the viewshed extends about 5 km.

Impact Assessment

The visual simulations prepared by Cymbian illustrate the extent to which the upgrade will be visible from key observation points (static and dynamic views). The vertical form/dimensions of the buildings/structures would be hidden by their location among existing buildings and within a well vegetated area. The visual contrast is increased by the “shape” and scale of the buildings/structures, which generally will not be viewed along the skyline.

Static Views

The upgrade would potentially be visible from the surrounding farmland and several towns in the region as listed in Table 18. The potential number of viewers from this area could vary as the farmlands are quite sparsely populated while the towns have denser populations. The views would vary greatly depending on site specific conditions like the orientation of the homes as well as the location of other buildings, fences, vegetation and localized landforms. All these elements have the potential to block views to the proposed upgrade. It should be noted that a viewing distance of more than 5 km reduces the visibility as atmospheric

effects reduce the contrast between the power lines and the surrounding landscape. In addition several existing power lines traverse the site, reducing the impact of an additional line.

TABLE 18: STATIC VIEWS

Town	Alt 1 Distance (km)	Alt 2 Distance (km)	Alt 3 Distance (km)
Kendal	0	0	0
Leandra	2	2	10
Kinross	15	15	10
Evander	7.5	10	7.5
Devon	15	15	20
Secunda	15	20	15
Greylingstad	25	20	25
Delmas	20	20	30

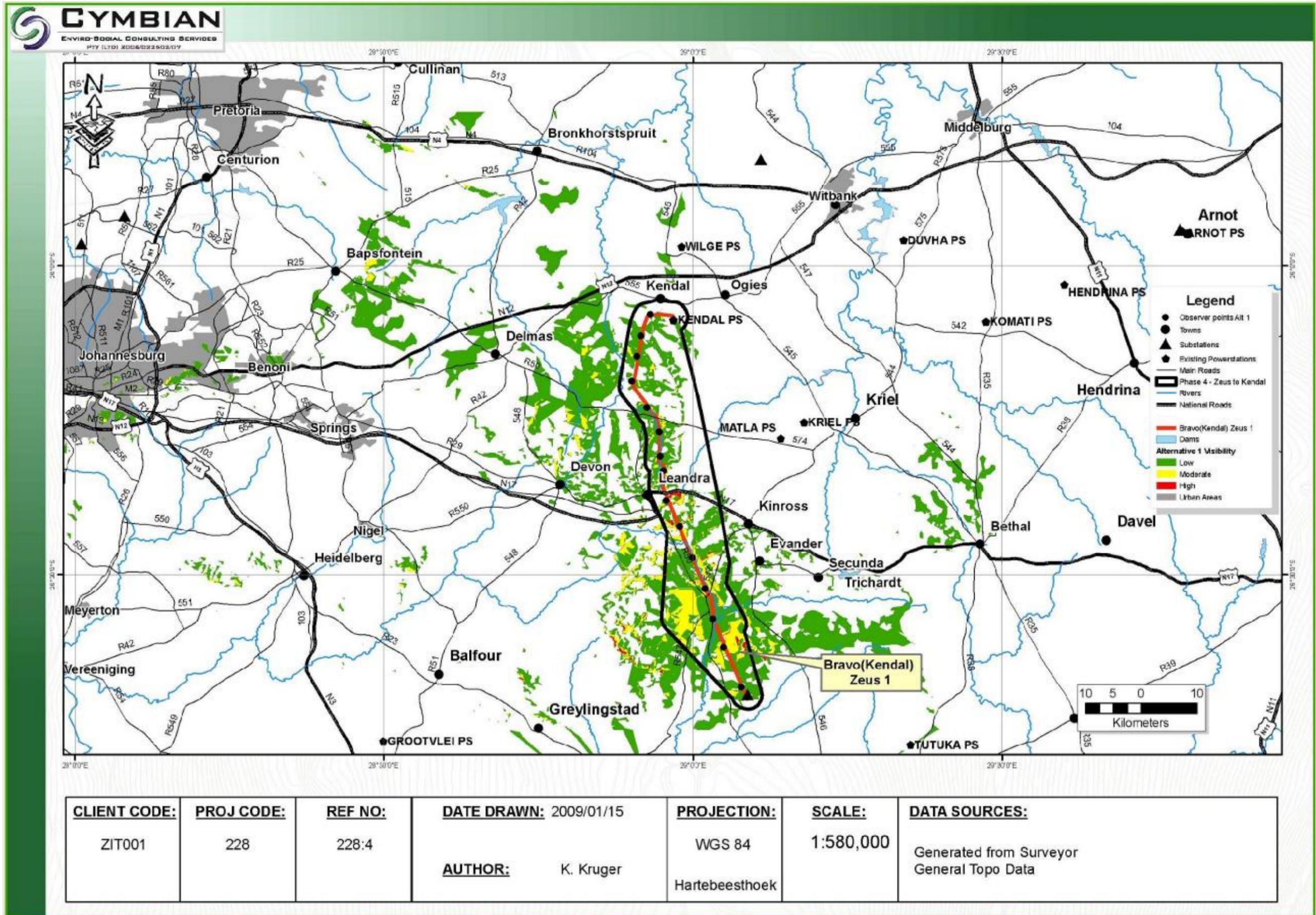


FIGURE 47: VIEWSHED FROM THE ALTERNATIVE 1 ALIGNMENT

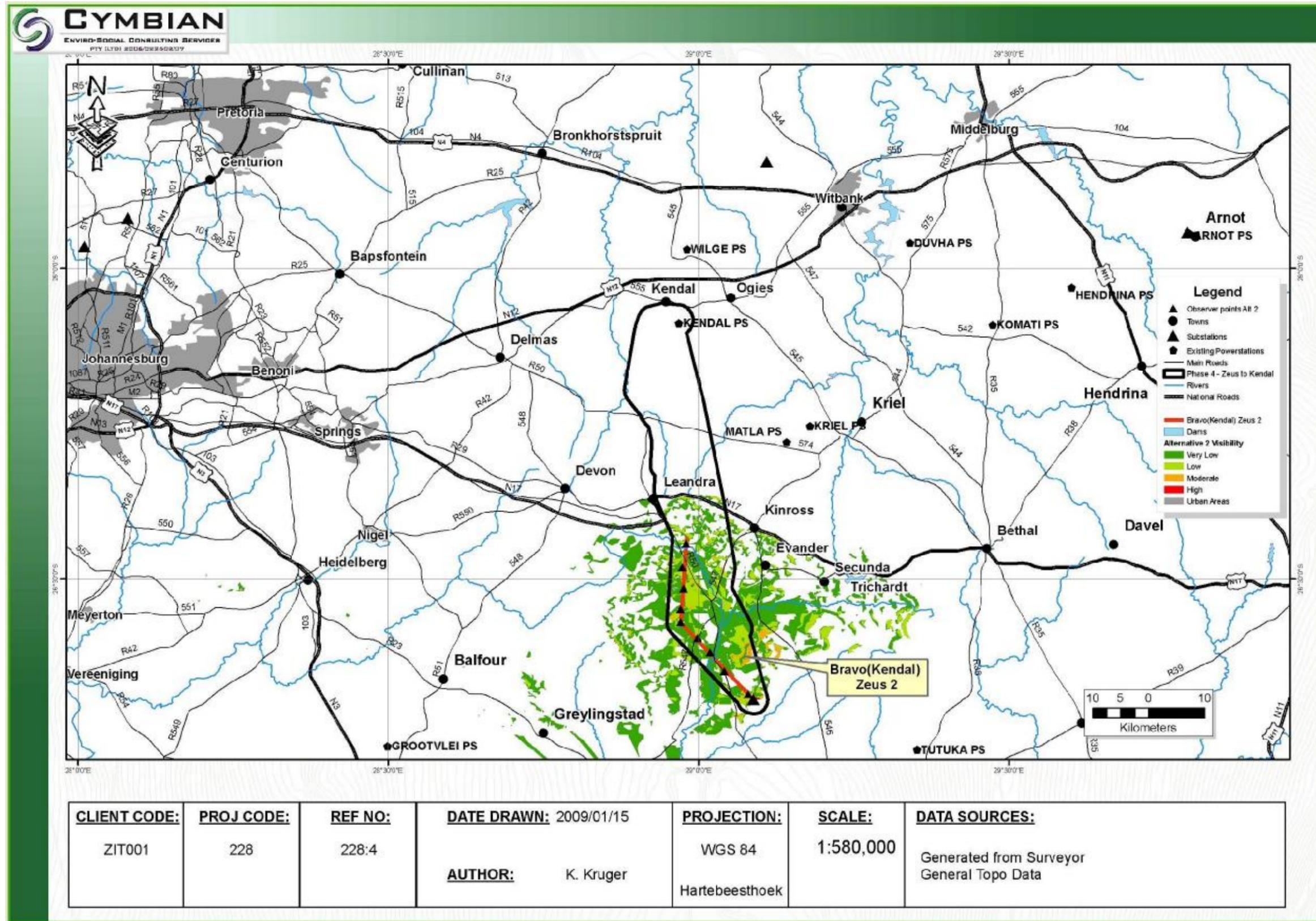


FIGURE 48: VIEWSHED FROM THE ALTERNATIVE 2 ALIGNMENT

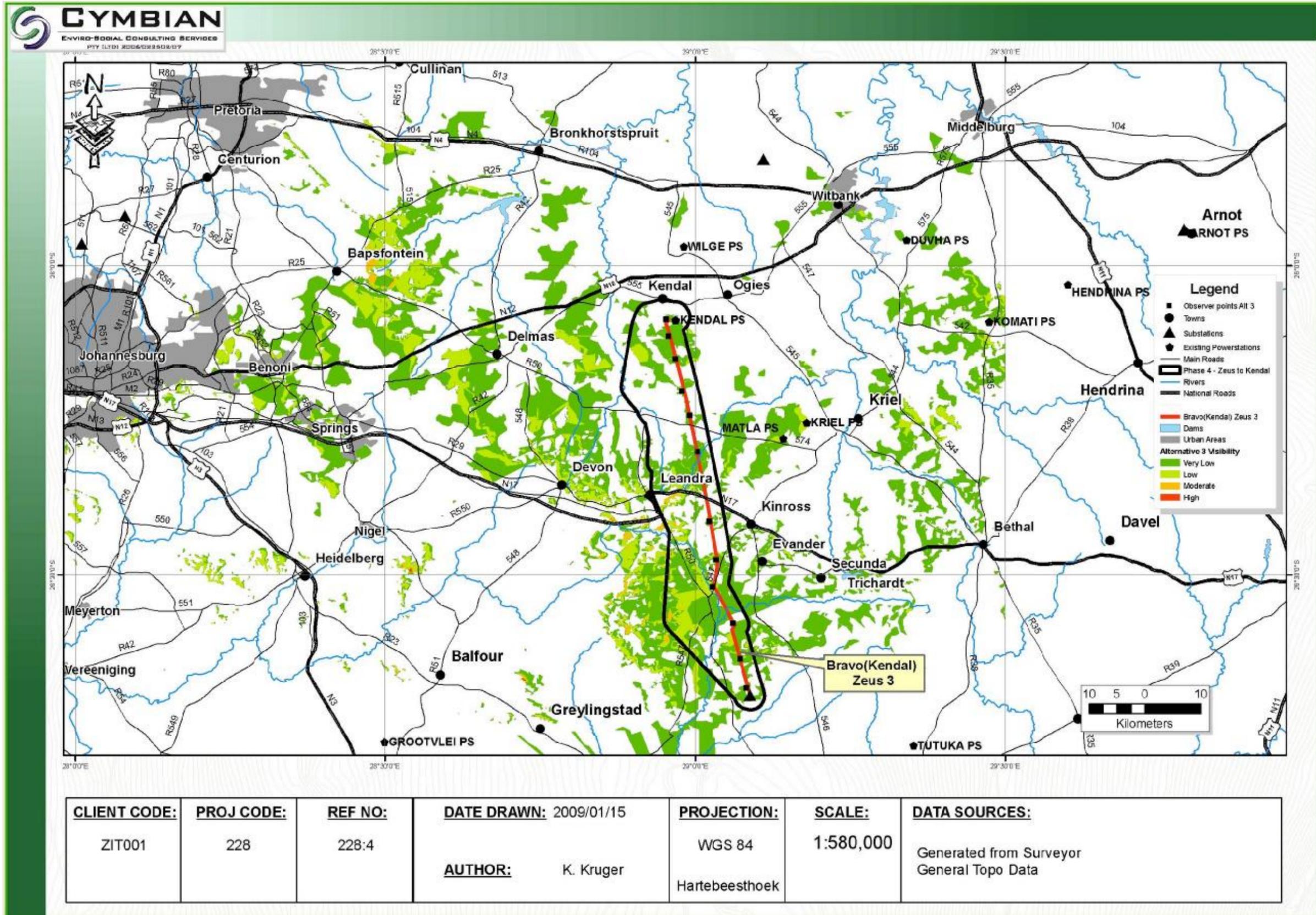


FIGURE 49: VIEWSHED FROM THE ALTERNATIVE 3 ALIGNMENT

Dynamic Views

The power lines will be visible to a moderate number of viewers, mainly those travelling along the highways and other main routes in the area. The level of visibility of the power lines reduces as a result of a view distance of more than 5 km and the resulting atmospheric effects that reduce the contrast between the power lines and the surrounding landscape. Please refer to Table 19 for a summary of the dynamic impacts of all three alternatives on the main roads in the study site. The power line upgrade would also be visible from several farm roads which are located around the proposed site.

As the table below illustrates, the power lines will be visible from a number of roads in the area, and exposures to the view will range from 40 seconds to 17 minutes. The R50 and the R547 runs through the study area and the power lines will be most visible along these roads. Although the lines will also be visible for long periods along the N12 and N17 highways, these are from further away and hence the impact will not be as high.

TABLE 19: DYNAMIC IMPACT TABLE

Road	Speed limit	Length (km)	Visibility (min)	Distance from power line (km)
N12	120	31.53	15.77	5 – 30
N17	120	27.53	13.77	0 - 45
N3	120	1.29	0.64	50 – 60
N4	120	8.02	4.01	30 – 40
R547	100	25	15	0 – 10
R50	100	35	17.5	0 – 15

Conclusion

Table 20 lists the observation points together with the category of viewer, context of view, relative numbers of viewers and approximate distance of observation point to the proposed site.

TABLE 20: VISUAL IMPACT MATRIX

Potential Observation Point	Category of Potential Receptor	Context of View	Approximate View Distance	Period of View	Visibility Rating
Surrounding Farmland	Static	Above & below	0 – 50 km	Long Term	Medium
Towns	Static	Above & below	0 - 30 km	Long Term	Medium
Gravel Roads	Dynamic	Above & below	0 – 20 km	Medium	Medium
Tar Roads	Dynamic	Level - Above	0 – 40 km	Medium	Medium

It should however be noted that there are a number of existing power lines in the study area as shown in the Figures above. Viewers in the viewshed have become accustomed to these power lines in the landscape and an additional power line will not increase the impact significantly. In terms of the preferred alternative, there is very little to choose between the alternatives from a visual standpoint. But it should be noted that the impact along Alternatives 1 and for sections along Alternative 2 is existing, while the bulk of Alternative 3 will be a new visual impact.

7.2 Cultural Environment

7.2.1 Archaeological and Cultural Historical Features

Focused archaeological research has been conducted in the Gauteng and Mpumalanga Provinces of South Africa for more than four decades. This research consists of surveys and of excavations of Stone Age and Iron Age sites as well as the recording of rock art and historical sites. The Gauteng and Mpumalanga Provinces have a rich heritage comprised of remains dating from the pre-historical and from the historical (or colonial) periods of South Africa. Pre-historical and historical remains in the Gauteng and Mpumalanga Provinces therefore form a record of the heritage of most groups living in South Africa today.

Various types and ranges of heritage resources that qualify as part of South Africa's 'national estate' as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) occur in the Gauteng and Mpumalanga Provinces.

Within a cultural landscape

The project area is located in the midst of a cultural landscape that is marked by heritage remains dating from the pre-historical into the historical (colonial) period. Stone Age sites, Iron Age sites and colonial remains therefore do occur in the Eastern Highveld.

The archaeological and historical significance of this cultural landscape therefore must be described and explained in more detail before the results of the Phase I HIA study is discussed.



FIGURE 50 THE PROJECT AREA ON THE EASTERN HIGHVELD IN THE MPUMALANGA PROVINCE OF SOUTH AFRICA. THE PROJECT AREA STRETCHES FROM THE KENDAL AND MATLA POWER STATIONS IN THE NORTH TO THE ZEUS SUBSTATION IN THE SOUTH (BELOW).

The project area is an undulating piece of land which is characterised by an outstretched grass veldt. This piece of land is dotted with farmstead complexes which are usually associated with Blue Gum avenues or with smaller plantations of these trees.



FIGURE 51: THE PROJECT AREA NEAR THE ZEUS SUBSTATION ON THE EASTERN HIGHVELD IN THE MPUMALANGA PROVINCE

Contextualising the project area

The following brief overview of pre-historical, historical, cultural and economic evidence will help to contextualise the proposed project area.

Stone Age sites

Stone Age sites are marked by stone artefacts that are found scattered on the surface of the earth or as parts of deposits in caves and rock shelters. The Stone Age is divided into the Early Stone Age (covers the period from 2.5 million years ago to 250 000 years ago), the Middle Stone Age (refers to the period from 250 000 years ago to 22 000 years ago) and the Late Stone Age (the period from 22 000 years ago to 200 years ago).

The Later Stone Age is also associated with rock paintings and engravings which were done by the San, Khoi Khoi and in more recent times by Iron Age farmers.

Heritage surveys up to now have recorded few Stone Age sites, rock paintings and engravings in the Eastern Highveld.

Iron Age remains

The Iron Age is associated with the first agro-pastoralists who lived in semi-permanent villages and who practised metal working during the last two millennia. The Iron Age is usually divided into the Early Iron Age (covers the 1st millennium AD) and the Later Iron Age (covers the first 880 years of the 2nd millennium AD).

The Eastern Highveld has not been occupied by Early Iron Age communities but was occupied by Late Iron Age communities such as the Sotho, Swazi and Ndebele who established settlement complexes that are associated with stone walls.

The historical period

Towns closest to the project area include Ogies and Delmas in the north, Leandra in the central part and Evander and Secunda in the south. A brief historical background to this region is provided below.

Ogies serves as an important link in the running railway line running between Pretoria and Maputo which was built in 1896. It is also linked via Broodsnyersplaas, 35 km south of Middelburg to join the railway line between Ermelo and Piet Retief to Richards Bay. This railway line carries some of the longest and heaviest trains in the world. The town of Ogies developed around the railway station which was built on the farm Ogiesfontein in 1928.

Delmas was laid out in 1907 on the farm Witklip ('white stone') which was divided into 192 residential stands, 48 smallholdings of 4 ha each and a commonage of 138ha. The farm belonged to Frank Dumat who originated from France where he grandfather had a small farm. He named the town

Delmas which is derived from 'mas' which means a small farm in a southern dialect of French. In 1909 the government added another 5 500 ha to Frank Dumat's original rural settlement.

The town of Leandra's name is derived from two townships, Leslie and Eendrag, which are incorporated in this mining village.

Evander, south of Kinross, was established in 1955 by the Union Corporation as a residential township for the employees of the Winkelkaak, Leslie and Bracken mines. The name Evander is a composite of Evelyn and Anderson, the names of the widow of the managing director of the company when prospecting began in the area.

Secunda developed around Sasol 1 and Sasol 2 in the 1970's. Sasol was born during the oil crisis of 1973 when OPEC virtually quadrupled the price of crude oil overnight. Construction started in 1976 and the first oil was delivered on 1 March 1980. Following the overthrow of the Shah of Iran in 1979, South Africa's major source of crude oil at the time, the government announced the construction of a second plant at Secunda to double output. Sasol 3 delivered its first oil from coal in May 1982. The total costs of the two plants came to R 5,8 billion, mostly financed by levies on motorists.

Sasol 2 and 3 use about 35 million tons of coal a year to produce mostly liquid fuels. The coal is produced by four mines collectively known as Secunda Colliers which is the world's largest underground mining complex and by a new open-cast mine at Syferfontein.

A coal mining heritage

Coal mining on the Eastern Highveld is now older than one century and has become the most important coal mining region in South Africa. Whilst millions of tons of high-grade coal are exported annually more than 80% of the country's electricity is generated on low-grade coal in Eskom's power stations such as Duvha, Matla and Arnot situated near coalmines on the Eastern Highveld.

The earliest use of coal (charcoal) in South Africa was during the Iron Age (300-1880AD) when metal workers used charcoal, iron and copper ores and fluxes (quartzite stone and bone) to smelt iron and copper in clay furnaces.

Colonists are said to have discovered coal in the French Hoek Valley near Stellenbosch in the Cape Province in 1699. The first reported discovery of coal in the interior of South Africa was in the mid-1830 when coal was mined in Kwa Zulu/Natal.

The first exploitation for coal was probably in Kwa Zulu/Natal as documentary evidence refers to a wagon load of coal brought to Pietermaritzburg to be sold in 1842. In 1860 the coal trade started in Dundee when a certain Pieter Smith charged ten shillings for a load of coal dug by the buyer from a coal outcrop in a stream. In 1864 a coal mine was opened in Molteno. The explorer, Thomas Baines mentioned that farmers worked coal deposits in the neighbourhood of Bethal (Transvaal) in 1868.

Until the discovery of diamonds in 1867 and gold on the Witwatersrand in 1886, coal mining only satisfied a very small domestic demand.

With the discovery of gold in the Southern Transvaal and the development of the gold mining industry around Johannesburg came the exploitation of the Boksburg-Spring coal fields, which is now largely worked out. By 1899, at least four colliers were operating in the Middelburg-Witbank district, also supplying the gold mining industry. At this time coal mining also has started in Vereeniging. The Natal Collieries importance was boosted by the need to find an alternative for imported Welsh anthracite used by the Natal Government Railways.

By 1920 the output of all operating colliers in South Africa attained an annual figure of 9,5million tonnes. Total reserves were estimated to be 23 billion tonnes in Witbank-Springs, Natal and Vereeniging. Total reserves today are calculated to be 121 billion tonnes. The largest consumers of coal are Sasol, Iscor and Eskom.

A vernacular stone architectural heritage

A unique stone architectural heritage was established in the Eastern Highveld from the second half of the 19th century well into the early 20th century. During this time period stone was used to build farmsteads and dwellings, both in urban and in rural areas. Although a contemporary stone architecture also existed in the Karoo and in the Eastern Free State Province of South Africa a wider variety of stone types were used in the Eastern Highveld. These included sandstone, ferricrete ('oukclip'), dolerite ('bloukclip'), granite, shale and slate.

The origins of a vernacular stone architecture in the Eastern Highveld may be ascribed to various reasons of which the ecological characteristics of the region may be the most important. Whilst this region is generally devoid of any natural trees which could be used as timber in the construction of farmsteads, outbuildings, cattle enclosures and other structures, the scarcity of fire wood also prevented the manufacture of baked clay bricks. Consequently stone served as the most important building material in the Eastern Highveld.

Late Iron Age communities who contributed to the Eastern Highveld's stone walled architecture were the Sotho, Pedi, Ndebele and Swazi. The tradition set by these indigenous groups may have influenced the first settlers from Natal and the Cape Colony to utilize the same resources that their predecessors did. Many farmers from Scottish, Irish, Dutch, German and Scandinavian descent settled and farmed in the Eastern Highveld. These colonials brought the knowledge of stone masonry from Europe which compensated for the lack of fire wood necessary to manufacture baked clay bricks.

7.3 Socio-Economic Environment

In order to address the overall objective of this study, it was necessary to compile a detailed description of the study area. The first subsection below provides a profile of the social processes in

terms of demographic, economic, institutional and empowerment, socio-cultural, geographical and biophysical baseline conditions in the study area. Each subsection concludes with a table summarising how the project is likely to change these baseline profiles, and the related impacts that could be expected as a result of the project.

A change process can be defined as change that takes place within the receiving environment as a result of a direct or indirect intervention. A potential impact follows as a result of the change process. However, a change process can only result in an impact once it is experienced as such by an individual/community on a physical and/or cognitive level.

7.3.1 Baseline Demographic Processes

Demographic processes relate to the number of people and composition of a community and include an overview of the population size and the educational profile of the affected communities.

Population

The Emalahleni Local Municipality (ELM) covers an area of approximately 2 678 km² and in 2007 had a total population of 435 217 people. Compared to the population size of 2001, when the population stood at approximately 276 413 people, this means that the population size within the ELM increased at an average rate of 26 467 people per annum or a total of 158 804 over the 6-year period between 2001 and 2007. This population increase also brought about a change in the population density in the area from 103.2 persons per km² in 2001 to 162.5 persons per km² in 2007.

In comparison, the Govan Mbeki Local Municipality (GMLM) covers an area of approximately 2 954.6 km² and in 2007 had a total population of 268 947 people. Compared to the population size of 2001, when the population stood at approximately 221 739 people, this means that the population within the GMLM grew at an average rate of 7 868 people per annum or a total of 47 208 over the 6-year period between 2001 and 2007. This population growth also brought about a change in the population density in the area from 75.0 persons per km² in 2001 to 91.0 persons per km² in 2007.

Although the population density within both areas increased significantly, such population densities are still regarded as fairly low when compared to an urban area such as Johannesburg where the population density in 2007 stood at approximately 2 364 people per km².

When considering the households within these areas, the following definition was applied: *“One or more people occupying a housing unit as their usual place of residence. The occupants may be a*

single family, one person living alone, two or more families living together, or any other group of related or unrelated people who share living arrangements”.⁵

In 2001, the ELM had a total of 74 917 households which increased steadily at a rate of 5 113 households per annum to a total of 105 592 households in 2007. It seems that in both areas the number of households developed more or less on par with the population growth rate so that there has been an average increase of between 0.1 and 0.4 persons per household over the 6-year period between 2001 (when the average number of persons per household was estimated at 3.7 for the ELM and 3.3 for the GMLM) and 2007 (an average of 4.1 persons per household for the ELM and 3.4 for the GMLM).

The predominant population groups in the both areas remained the same between 2001 and 2007 and are therefore still Black African (85.8% for the ELM and 82.5% for the GMLM), followed by White (12.7% for the ELM and 15.8% for the GMLM). However, the population growth rate amongst the White population group (estimated at 25.1%) within the GMLM is much faster than that of their Black African counterparts (estimated at 16.4%), whereas in the ELM the growth rate amongst the Black African population is faster than that of the White group (which decreased by 3.2% between 2001 and 2007).

The same sort of phenomenon can be found amongst the gender distribution in the study area. In the GMLM in 2001 there was an almost equal split between the male and female ratio (with males dominating slightly at 50.3% in the GMLM and at 50.6% for the ELM). The gender ratio in the GMLM has since been far surpassed by the females so that in 2007 females dominated at 53.5%. This is due to the fact that the male growth rate in the area is at 2.6% per annum; whereas the female growth rate is almost double that at 4.6% per annum. A declining male population might also be ascribed to the migrant labour patterns in South Africa where the male moves to a different area in search of work in order to support his family. The reverse was true for the ELM, where the male population kept increasing so that in 2007, 51.1% of the total population was male. This might also be ascribed to the migrant labour patterns which might have resulted in an influx of males from GMLM to the ELM in search of employment. This scenario is however unlikely in view of the fact that most of the major industries (notably Sasol and other major mining houses) are located in the GMLM and not the ELM.

More than two thirds (approximately 70%) of the total population of the study fall within the working age category, which is defined by Statistics South Africa as the ages between 15 and 64.

Table 21 below provides an overview of the population demographics of the study area in relation to South Africa as a whole, the province and the district. From this table it is evident that there are more

⁵ irhr.ua.edu/blackbelt/glossary.html

females than males in the study area, which, as mentioned above, might be ascribed to the migrant labour patterns in South Africa where the male moves to a different area in search of work. If this is the case, it can very well be assumed that these males are employed elsewhere and would therefore not be seeking work at the proposed project. It is therefore necessary to take cognisance of the fact that the majority of work seekers might be female.

TABLE 21: SUMMARY OF POPULATION CHARACTERISTICS

	South Africa	MP	NDM	ELM		GSDM	GMLM	
	2007			2001	2007	2007	2001	2007
Area size (km ²)	1 219 912	79 511.5	16 892.6	2 678		31 845.9	2 954.6	
Total population	48 502 063	3 643 435	1 226 498	276 413	435 217	890 699	221 739	268 947
	<			Average decrease of 26 467 persons per annum			Average increase of 7 868 persons per annum	
Population density (people per km ²)	39.8	45.8	72.6	103.2	162.5	28.0	75.0	91.0
	<			Average increase of 9.9 persons per km ² per annum			Average increase of 2.7 persons per km ² per annum	
Total households	12 500 610	940 403	305 566	74 917	105 592	247 518	67 622	79 192
	<			Average increase of 5 113 households per annum			Average increase of 1 928 households per annum	
Avg. persons per household	3.9	3.9	4.0	3.7	4.1	3.6	3.3	3.4
Predominant Population Groups	Black African (79.5%) ⁴	Black African (92.0%) White (6.8%)	Black African (90.9%) White (7.8%)	Black African (82.2%) White (15.9%)	Black African (85.8%) White (12.7%)	Black African (89.5%) White (9.1%)	Black African (83.6%) White (14.4%)	Black African (82.5%) White (15.8%)
	<			Average increase of 24 381 Black Africans p.a., with an equal increase of 3.6% proportion of total population.			Average increase of 6 076 Black Africans p.a., but decrease by 1.1% proportion of total population.	

	South Africa	MP	NDM	ELM		GSDM	GMLM	
	2007			2001	2007	2007	2001	2007
				Average decrease of 1 866 Whites p.a., with an equal decrease of 3.2% proportion of total population.			Average increase of 1 782 Whites p.a., and increase by 1.4% proportion of total population.	
Predominant Gender	Female (50.8%) ⁶	Female (51.4%)	Female (50.1%)	Male (50.6%)	Male (51.5%)	Female (51.0%)	Male (50.3%)	Female (53.5%)
	<			Male population growing faster than female population.			Female population growing faster at 4.6% p.a. against male counterparts' growth of 2.6% p.a.	
Predominant Age Group	Working age (% unknown)	Working age (62.0%)	Working age (64.3%)	Working age (68.8%)	Working age (69.1%)	Working age (62.4%)	Working age (68.1%)	Working age (70.0%)
	<			Working age population increased by an average of 18 409 persons p.a., and proportionally increased by 0.05% p.a.			Working age population increased by an average of 6 200 persons p.a.	

⁶ Census 2001 data (2007 data not readily available)

Education

An overview of the educational profile for the study area on local municipal level is provided in Figure 52. Overall it would appear as if the area is characterised by a semi-skilled to skilled population, which is reflected in the fact that, in 2007, only a small minority (7.6% for the ELM and 8.0% for the GMLM) of the population has had no form of formal education.

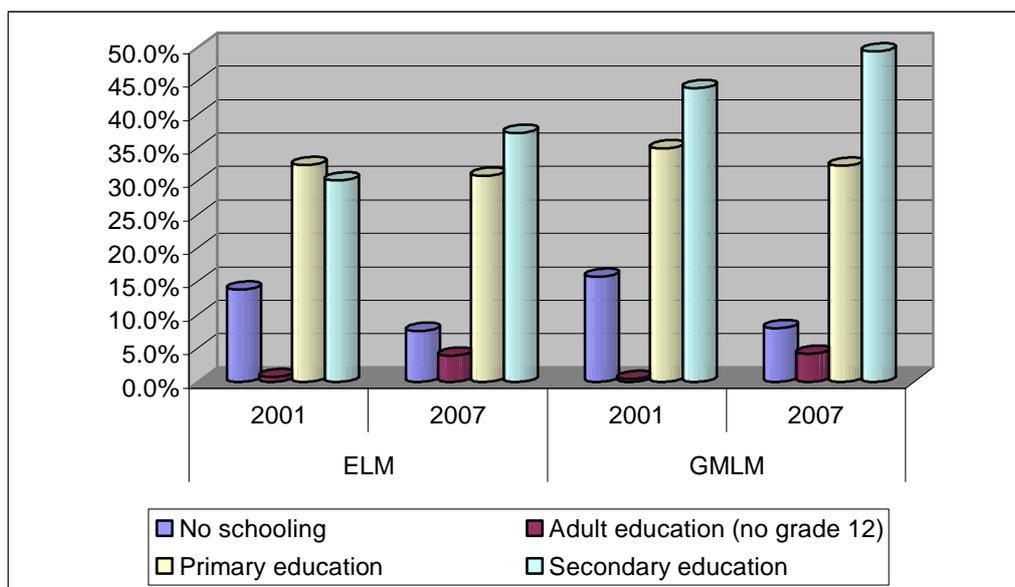


FIGURE 52: COMPARATIVE EDUCATIONAL PROFILE (GROUPED) FOR THE STUDY AREA

When considering the educational levels reported for the total population of the study area between 2001 and 2007, the number of people who attended and/or completed a primary level education, decreased in both areas as reflected in Figure 52 above. On the upside, the number of people who have had no schooling also decreased, while at the same time the number of people who completed some form of secondary education increased by between 5.5% and 7.1%.

The number of people who obtained a higher (post-Grade 12) qualification also increased by between 0.5% and 0.9%. The increase in the secondary and tertiary educational levels could be as a result of a need to get out of the poverty cycle, realising that some form of education might be beneficial.

One of the driving forces behind social change is educational attainment, which in turn is linked to poverty levels as there appears to be a correlation between the level of educational attainment and income levels. People with higher educational levels tend to be economically better off, and therefore contribute more to the reduction of the unemployment rate. Educational attainment is also linked to poverty in the sense that funds are required to further studies, therefore people living in less favourable economic conditions tend to be unable to further their education, which in turn holds them in a downward poverty spiral.

7.3.2 Baseline Geographic Processes

Geographical processes relate to land use patterns and infrastructure in the area. This section therefore describes the land use in the study area from a social perspective, specifically in terms of settlement patterns and land use developments.

Land use is defined as “the way land is developed and used in terms of the types of activities allowed (agriculture, residences, industries, etc.) and the size of buildings and structures permitted. Certain types of pollution problems are often associated with particular land uses, such as sedimentation from construction activities”.⁷

Another definition of land use is as follows: “Patterns of land use arise naturally in a culture through customs and practices, but land use may also be formally regulated by zoning, other laws or private agreements such as restrictive covenants”.⁸

Current Land Use

The ELM IDP⁹ states that the southern parts of the municipal area is known as the “Energy Mecca of South Africa”, which is as a result of rich coal deposits and coal reserves and the presence of a number of power stations. The area is further described as an urban and rural area, which includes large farms and dispersed urban settlements.

According to the GMLM IDP¹⁰, the main land use in the area is commercial farming followed by coal and gold mining, and then industries, of which the petro-chemical industry is said to be the largest.

A general assessment of the land uses in the study area indicated the following trends:

- Residential;
- Commercial cattle and crop farming;
- Mining; and
- Industries.

The following subsections briefly describe the current land use in the towns and areas in the immediate vicinity and/or in close proximity to the proposed transmission power line corridor

⁷ www.soil.ncsu.edu/publications/BMPs/glossary.html

⁸ www.wikipedia.org/wiki/Land_use.html

⁹ Emahlaheni Local Municipality IDP 2008/2009

¹⁰ Integrated Development Plan 2007-2011 for the Govan Mbeki Local Municipality

alternatives. Unless otherwise stated, the information was adapted from the GMLM Spatial Development Framework (SDF)¹¹ and the ELM IDP.

Emalahleni Local Municipality

The land use within the ELM has been divided into five main uses, namely business activities, industrial activities, mining areas, electricity and agriculture. These land uses will be discussed briefly.

- **Business Activities:** The eMalahleni Central Business District (CBD) is the primary business centre within the ELM. The area includes offices, retail, general businesses and commercial uses. The most prominent focal point within the ELM is the junction between the N12 and the N4, which the ELM believes offers opportunities for further business and commercial development. This junction offers a highly visible site of approximately 89ha, for which there is a high demand for high tech industrial and office development. Apart from the eMalahleni CBD, business nodes can also be found in areas such as Ga-Nala and Ogies, which has offices, retail and general business uses. These two centres mostly serve as business areas to the surrounding farms.
- **Industrial Activities:** The nine industrial areas in the ELM are all mostly centred in and around the town of eMalahleni. These nine areas also constitute the largest concentration of industrial areas in the whole district. The development of these areas is constrained as a result of the presence of undermining, which is viewed by the ELM as a huge constraint as there is a demand for industrial sites within the area.
- **Mining areas:** The central and southern portions of the ELM are characterised as mining areas, with large parts of the area affected by shallow undermining. Also, a number of mines in the area closed down, which had significant environmental impacts in the form of sinkhole formation, subsiding, underground fires and water seepage. Mine closure also gave rise to economic impacts with large scale retrenchments which in turn lead to the closure of mining towns.
- **Electricity:** Eskom developed a number of power generating facilities within the ELM, mainly as a result of the presence of rich coal reserves within the ELM. The presence of these power stations lead to the development and expansion of towns such as Ga-Nala, Thubelihle, and Wilge (which closed down).
- **Agriculture:** The rural areas of the ELM consist mostly of farms and agricultural holdings, characterised by cattle farming and maize farming. Agricultural holdings are mostly located on the periphery of the urban areas.

¹¹ Govan Mbeki Municipality: Spatial Development Framework. June 2006.

Figure 53 below provides an overview of the current land use along the **Western alternative**, which mostly traverses agricultural land and follows the alignment of the existing transmission power line.



FIGURE 53: LAND USE ALONG THE WESTERN CORRIDOR WITHIN THE ELM

Govan Mbeki Local Municipality

Urban Areas:

Initially the town of **Leandra** was meant to be an agricultural support centre but over the years it grew and developed due to the various mining activities in the area. However, the town lacks economic diversification, which in turn resulted in substantial urban decay, notably in the Central Business District (CBD) and industrial areas within the town. The residential areas of Leandra is characterised by formal housing structures in the form of single dwelling units on stands ranging between 1200m² and 3000m². In addition, there are also still a fairly large number of vacant stands, some of which are serviced whilst others are not. Industrial and commercial land uses are located to the south of Leslie, south of the railway line and east of the R50. Again there are a number of vacant stands within the industrial and commercial area. Although some business can also be found in the Leslie industrial area, most businesses are located within the CBD. As is the case with the rest of the town, the CBD is also in a state of urban decay. Community facilities in the area include churches, a mosque, a clinic, a community hall, a police station and two primary schools, of which the one is vacant.

Secunda is the biggest urban centre within the GMLM. The town was established in 1975 around the Sasol II and III developments as a result of the urgent need to house Sasol employees. The development and expansion of Secunda also lead to the revitalisation of some of the more dormant town in the area, such as Trichardt. Today Secunda is the most diversified economic hub of the total district. As could be expected, the majority of the residential area consists of formal single dwelling housing structures, located on stands of approximately 900m² in size. Again there are a substantial

number of vacant residential stands throughout the town. Apart from Sasol who is located to the south of town, Secunda also has two other industrial and commercial areas, namely a newly established light industrial/commercial area north of the CBD, and an industrial area on the north-eastern edge of town that is partially undeveloped. The vast majority of businesses and retail centres are situated in the CBD, where some parts are in need of upgrading. In addition to the seven shopping centres scattered throughout the town, other community facilities include a number of churches, schools (5 primary and 3 secondary), a private hospital and municipal clinic, a police station, and a magistrate's court.

Trichardt is situated east of and adjacent to Secunda. These two towns are only separated by a railway line and therefore appear to be a single town as opposed to two separate towns. The town was initially established as a farming support centre during the early 1900s. Trichardt threatened to become a "ghost town" until SASOL developed its large plants in adjacent Secunda, which led to development and diversification albeit on a smaller scale as Secunda. As a result of the presence of SASOL's hostels in Trichardt, the town has quite a high proportion of multiple residential units. Apart from these residential units, single residential components of approximately 1 300m² can also be found in the town. There are no informal settlements in Trichardt. Trichardt has no clearly defined industrial area. Light industrial and commercial areas are situated to the north-western part of town with no clear distinction between these areas and the adjacent residential areas. The businesses are mostly concentrated along the N17, which includes mostly motor trade and associated businesses.

eMbalenhle is the largest residential urban settlement area in the GMLM and was established in 1978 to accommodate members of SASOL's workforce. In this regard, SASOL's further expansion and development also led to the development and growth of eMbalenhle. The main land use in eMbalenhle is residential in nature and therefore this town relies heavily on Secunda to meet its physical and economical needs. Although the town is well serviced, it is lagging behind economically.

- **Agriculture:** Despite the fact that large parts of the GMLM area are not suitable for arable agriculture, most of the rural areas within the GMLM are taken up by commercial farming activities. These agricultural activities are mostly centred on dry land crop cultivation (e.g. maize, sunflowers and beans), whereas the grasslands are used as grazing fields. Scattered chicken farms can also be found in the area. Notable improvements have been done on some of the commercial farms, but such improvements mostly relate to the farmsteads, e.g. the farmhouse, farm stores and labourers' complexes. Figure 54 below provides an overview of the current land use along the **Western alternative**, which mostly traverses agricultural land and follows the alignment of the existing transmission power line.



FIGURE 54: LAND USE ALONG THE WESTERN CORRIDOR WITHIN THE GMLM.

Mining:

Two types of mining occur within the GMLM, namely coal and gold mining. According to the GMLM SDF, almost the whole municipal area is underlain with coal reserves. Although Sasol is the major role player in the coal mining sector, other mining title holders include Anglo, Ingwe, Xstrata, Eysiswe and Tesa. A total of 13 shafts are located in the central part of the GMLM, together with an extensive network of surface conveyor belts. Despite the fact that it seems as if the coal seams are generally shallow, opencast mining only takes place at Syferfontein to the north of Secunda. The level at which these coal seams are found therefore sterilizes large parts of the GMLM for surface development.

Harmony Gold is the only gold mining company in the GMLM and mostly operates in the vicinity of Evander and eMbalenhle, which lies to the west of Secunda. As opposed to the shallow coal seams, the gold reefs are generally deep below the surface and therefore gold mining operations do not pose a significant development constraint. However, despite the fact that these operations do not sterilise the land as is the case with the coal mining operations, the surface infrastructure associated with these gold mining operations does sterilise large parcels of land. Infrastructure associated with gold mining operations include rock dumps, mine dumps and tailings facilities, of which the tailings facilities in particular pose the biggest constraints to development as a result of the size of such facilities, the associated dust pollution and the potential impact on downstream areas.

Future Land Use

The proposed Evander South gold mine is located to the west of the R50 on the farms Rietkuil and Wildebeestspruit. The area is located along the south-western extent of the Evander Goldfields in the Mpumalanga Province, approximately 15 km south-southeast of Leandra and 27 km west of Secunda.

Harmony Gold Mining (Pty) Ltd. undertook a pre-feasibility assessment in 2006/07 to determine the viability of developing the proposed Evander South gold mine. The results of the pre-feasibility study indicated the need for further drilling to clarify the extent of the ore body, as well as to improve the geological and resource modelling. If the feasibility of the proposed new mine is proved by means of this additional drilling, a full EIA process will be undertaken.

The proposed operation plans to make use of conventional stoping, which will be supported by a trackless infrastructure (meaning that trucks will collect the ore from box holes and tip this onto truck conveyors on the decline system). The footwall infrastructure will be mechanised and there is also an option to mechanise the stoping.

The ore will be milled on site and then transported to the existing metallurgical plant at Kinross via the use of an underground pipeline that will be approximately 16 km in length. It is believed that the use of an underground pipeline would reduce the surface infrastructure required at the proposed mine, while at the same time making optimal use of existing infrastructure and resources.

Municipal-wide Development Framework

The GMLM has included a municipal-wide development framework in their SDF with the aim to integrate development principles and objectives. As part of this municipal-wide development framework, Secunda has been identified as a primary urban node, supported by Bethal and Leandra. The N17 has furthermore been earmarked as a primary high-order mobility corridor. Secunda and Evander have been identified as nodal development areas (refer to Figure 55 below, study area marked in red).

Areas such as Secunda, Evander and parts of Kinross are viewed as fully serviced urban areas and therefore the emphasis in these towns are placed on the maintenance of infrastructure, social services and densification. One such densification project entails a mixed use township development in the Secunda area (an area of approximately 28 km² between Secunda and Evander), which will consist of commercial, shopping, social, housing and other land uses. This project has been initiated by Harmony Gold and approved by the GMLM. This project forms part of the GMLM's urban infill zone where they foresee that most developments in the area would be of a residential nature, but that other development such as industrial and commercial developments would also have to be promoted to aid the creation of employment opportunities.

Other areas that have been identified for urban development is mostly situated to the north of Secunda. However, development in this area would only be allowed once the urban infill zone has

been developed and therefore urban expansion into this area is not foreseen within the short to medium term (or within the next 10 years).

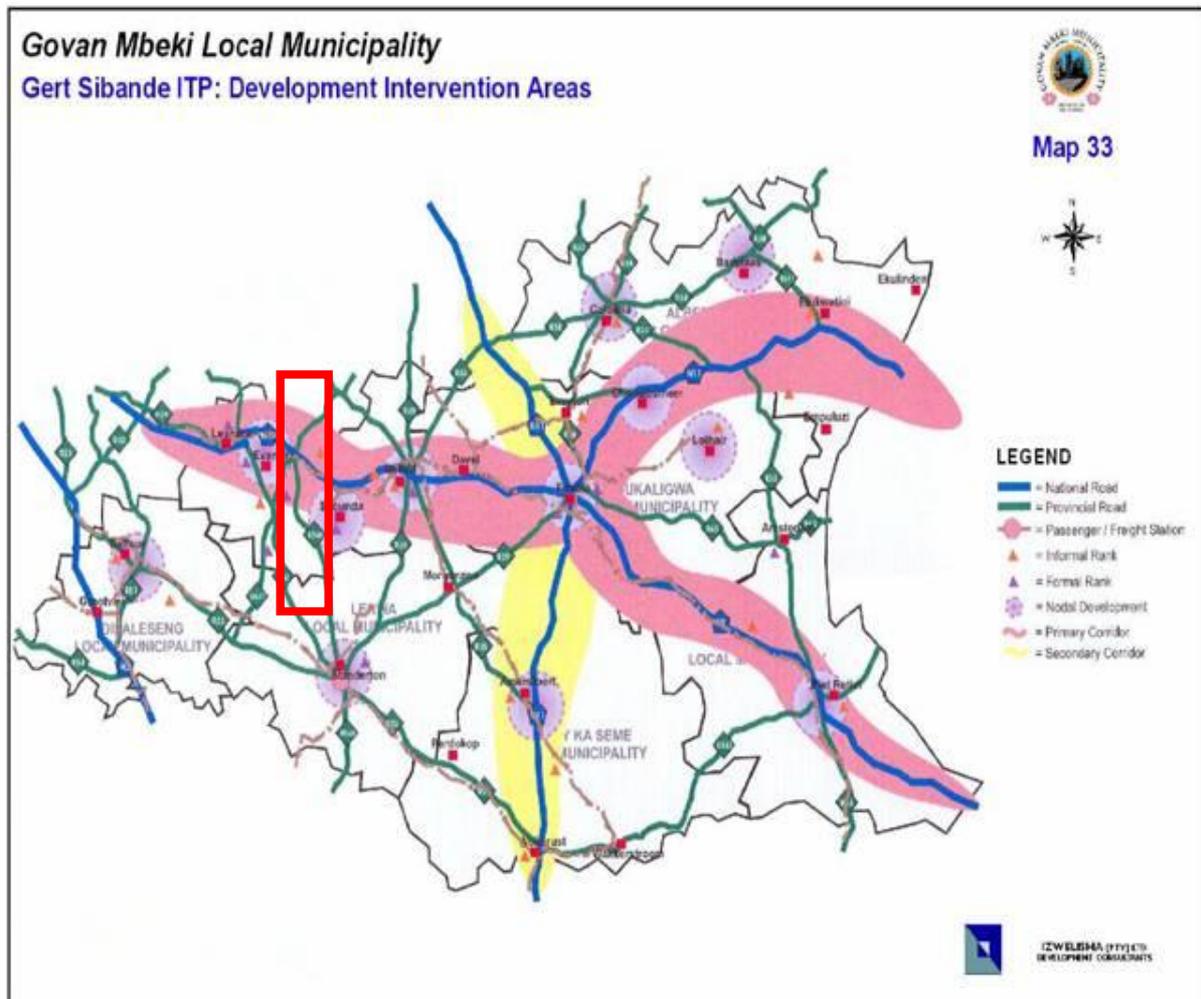


FIGURE 55: DEVELOPMENT INTERVENTION AREAS WITHIN THE GMLM

7.3.3 Baseline Economic Profile

Economic processes relate to the way in which people make a living and the economic activities within that society. The employment status within a community gives an indication of the economic stability of such a community and also serves as an indicator of such a community’s general well-being.

Employment and Economic Sectors

Table 22 below provides an overview of the employment and economic sectors of the study area in relation to South Africa as a whole, the province and the district. From this table it is clear that the

study is not only characterised by a predominantly semi-skilled to skilled male population, but also a fairly high employment rate.

Close on three quarters (or 70.1% for the ELM and 72.9% for the GMLM) of the working age population within the study is formally employed. This represents an average increase of 10.6% in the employment rate in the whole study area.

Overall it would therefore appear as if the economy of the study area is growing at a steady pace. As economic industries are growing, more employment opportunities are created thereby further reducing the unemployment rate, creating sources of income which in turn leads to the creation of other opportunities such as further education, a need for housing (which in turn creates further employment opportunities, both directly and indirectly), etc.

TABLE 22: SUMMARY OF EMPLOYMENT AND ECONOMIC SECTORS

	South Africa	MP	NDM	ELM		GSDM	GMLM	
	2001¹²	2007		2001	2007	2007	2001	2007
Employed¹³	33.7%	40.1%	42.1%	40.2%	50.0%	43.4%	40.0%	53.8%
Unemployed¹⁴	24.0%	20.0%	19.8%	25.0%	21.3%	21.6%	26.5%	20.0%
Not economically active	42.3%	39.9%	38.1%	34.8%	28.7%	35.1%	33.5%	26.2%
Employment rate¹⁴	58.4%	66.7%	68.0%	61.6%	70.1%	66.8%	60.2%	72.9%
Predominant industry	Community services (29.1%)	Unspecified (29.0%)	Unspecified (26.1%)	Unspecified (73.8%)	Unspecified (32.6%)	Unspecified (48.6%)	Unspecified (74.6%)	Unspecified (41.3%)

¹² Census 2001 data (2007 data not readily available)

¹³ This is the percentage employed/unemployed of the entire working age population and should not be read as the unemployment rate, i.e. the *not economically active* population is included in this segment.

¹⁴ In order to reflect a more accurate employment rate, the *not economically active* population has been excluded from this segment.

Household and Personal Income

In 2001, close on a fifth to a quarter (or one in every 4-5 households) in the study area had no annual household income. A further 33.6% (or 27 621) of the households within the ELM lived below the acceptable minimum standard, which is nationally defined as an annual household income of at least R20 000 per annum. In the GMLM this figure was even higher and was estimated at 40.7% (or 27 528) of the households. In the ELM, close on half (45.6%) lived above the acceptable minimum standard (> R20 000 p.a. per household). This figure dropped again in the GMLM, where only slightly over a third (37.6%) lived above the acceptable minimum standard.

Unfortunately Community Survey 2007 did not include data on household incomes and therefore this report also includes an overview of personal income (which was covered in CS 2007) in an attempt to provide an overview of the baseline economic conditions of individuals in the area.

The graph below (Figure 56) provides a comparative overview of the personal income levels of individuals in the study area between 2001 and 2007. However, it should be noted that the 'no income' category also includes persons under the age of 14 (who is not regarded as people within a working age category and therefore would earn no income) as well as persons from the 'not economically active' population, who are therefore not only unemployed, but who are also not actively seeking employment and therefore also do not earn an income.

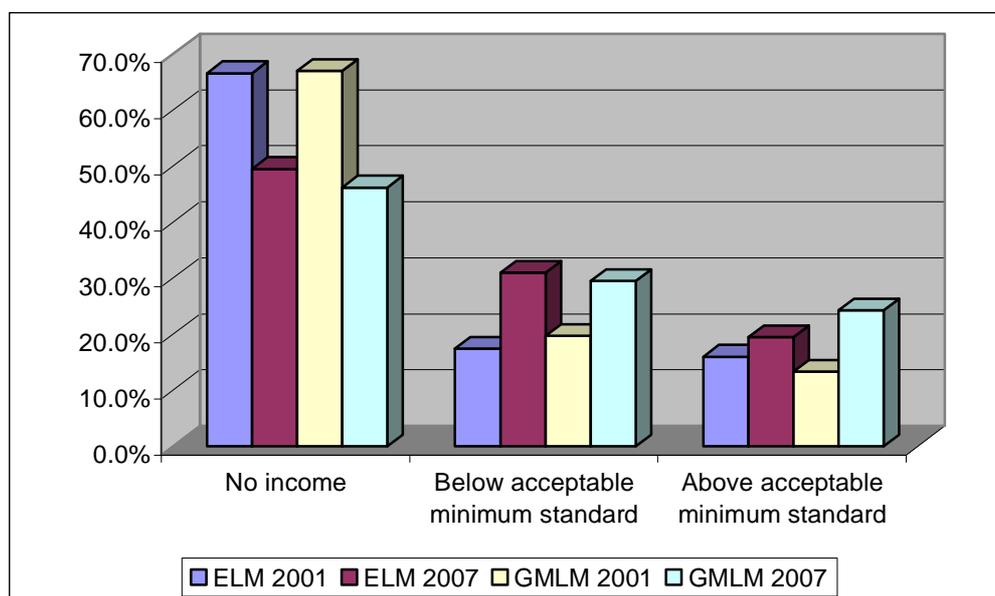


FIGURE 56: OVERVIEW OF MONTHLY PERSONAL INCOME (2001 AND 2007 COMPARED)

The number of individuals with no personal income decreased by between approximately 17.1% and 20.8% over the 6 year period between 2001 and 2007, bearing in mind that a large segment of those with no personal income are either under the age of 14 or not economically active. The number of individuals who earn a personal monthly income below the national accepted minimum standard (defined as earning at least R1 600 per month) has increased by between 9.8% (in the GMLM) and

13.6% (in the ELM) between 2001 and 2007. The number of individuals who earn above the acceptable minimum standard increased only marginally in the ELM (3.5%), but by 11% in the GMLM.

From this data, it would appear as if more people entered the economic market, which is linked to the increased employment rate and the broadening of the economic sectors within the study area.

7.3.4 Baseline Empowerment and Institutional Profile

Institutional and empowerment processes relate to the role, efficiency and operation of government sectors and other organisations within the area in terms of service delivery. It also investigates the ability of people to engage in decision-making processes to such an extent that they have an impact on the way in which decisions are made that would concern them.

Municipal Services

The years between 2001 and 2007 saw a steady increase in the delivery of municipal services to the households within the study area. Some of the most significant increases have been in the number of households who connected to the electricity network, most notably the fact that, of the almost half of all households who made use of coal for heating purposes in 2001, more than half made use of electricity for this purpose in 2007.

The municipal infrastructure is mostly located within the urban areas of the municipal areas. Municipal infrastructure backlogs are mostly confined to the previously disadvantaged township areas, and, as could be expected, in informal settlement areas. The outlying rural areas rely almost exclusively on water and sanitation services that are below Reconstruction & Development Programme (RDP) standard. In terms of water services, RDP standard is defined as piped water either within a dwelling or within 200m of such a dwelling. Sanitation services on par or above RDP standard is defined as any waterborne sanitation services that are connected to a municipal sewerage system or a ventilated pit latrine (VIP) system.

Table 23 below provides an overview of the municipal services of the affected area in relation to the province and the district as a whole. No data could be obtained for the overall municipal service delivery in South Africa. Although there has been a steady increase and expansion of municipal service delivery in the GMLM, the opposite has occurred in the ELM where it appears that municipal service delivery has decreased. The mostly likely explanation for this occurrence is that the municipal services were unable to keep up with the huge increase in the number of households, which had an average annual growth rate of 5 113 households (or 30 678 households between 2001 and 2007).

Therefore, it would appear that, in general within the study area, municipal services are at a very vulnerable stage and that the municipal network might not be able to sustain additional connections to the network. It should further be noted water is a scarce commodity in specifically the GMLM and

that there are limited water sources within the area. In this regard the GMLM IDP also stated that it is very crucial that all water supplies are regulated and measured so that water losses can be measured in a quantitative manner.

TABLE 23: OVERVIEW OF MUNICIPAL SERVICE DELIVERY TO THE AFFECTED AREAS

	South Africa	MP	NDM	ELM		GSDM	GMLM	
	<	2007		2001	2007	2007	2001	2007
Energy cooking	<	<i>Electricity (55.7%)</i>	<i>Electricity (59.6%)</i>	<i>Electricity (62.6%)</i>	<i>Electricity (56.4%)</i>	<i>Electricity (53.3%)</i>	<i>Electricity (42.2%)</i>	<i>Electricity (71.7%)</i>
Energy heating	<	<i>Electricity (45.0%)</i>	<i>Electricity (49.3%)</i>	<i>Electricity (59.2%)</i>	<i>Electricity (47.1%)</i>	<i>Electricity (39.7%)</i>	<i>Coal (42.1%)</i>	<i>Electricity (58.2%)</i>
Energy lighting	<	<i>Electricity (82.2%)</i>	<i>Electricity (81.5%)</i>	<i>Electricity (70.3%)</i>	<i>Electricity (60.1%)</i>	<i>Electricity (79.8%)</i>	<i>Electricity (71.3%)</i>	<i>Electricity (87.5%)</i>
Refuse	<	<i>Own disposal (49.6%)</i>	<i>Own disposal (48.1%)</i>	<i>Removed once a week (64.2%)</i>	<i>Removed once a week (56.9%)</i>	<i>Removed once a week (59.7%)</i>	<i>Removed once a week (82.9%)</i>	<i>Removed once a week (82.9%)</i>
Sanitation	<	<i>RDP standard or above (55.5%)</i>	<i>RDP standard or above (54.9%)</i>	<i>RDP standard or above (74.7%)</i>	<i>RDP standard or above (66.2%)</i>	<i>RDP standard or above (73.6%)</i>	<i>RDP standard or above (71.9%)</i>	<i>RDP standard or above (95.0%)</i>
Water	<	<i>RDP standard or above (91.1%)</i>	<i>RDP standard or above (96.6%)</i>	<i>RDP standard or above (94.2%)</i>	<i>RDP standard or above (98.6%)</i>	<i>RDP standard or above (91.9%)</i>	<i>RDP standard or above (91.1%)</i>	<i>RDP standard or above (97.5%)</i>

Empowerment and Participation

In terms of baseline empowerment processes, the hierarchy of needs as set out by Maslow, offers an insightful backdrop in terms of people's potential level of involvement in the EIA process and the issues that might be pertinent to them in a development of this nature. Maslow argued that the type of need that a person experiences is dependent on the fulfilment of other needs. The various categories of needs are organised in a hierarchy, which indicates which level of need has to be fulfilled before the next level of need would be experienced (refer to Figure 57).

Therefore, in order to expect people to fully participate in a process that might affect their future, people would have to function on a higher level within the hierarchy of needs (the need for self esteem, characterised by knowledge and understanding needs as well as the need for an environment that is aesthetically appealing, as indicated by the dashed red arrow). This means that their basic needs had to be met first (as indicated by the solid red arrow). The flipside is that people, who live in poverty as a result of high unemployment rates, low income levels and a poor education, struggle to survive on a daily basis and are therefore more focused on their more basic needs.



FIGURE 57: MASLOW'S HIERARCHY OF NEEDS

People who are more focused on their basic needs are therefore in a sense disempowered to fully participate in the process. The issue here is not that these communities are misinformed or lack information as such, but rather that these communities are ignorant about their rights and responsibilities as participants in the process. In such an instance it can very well be expected that such community members' expectation of the project mostly relates to employment opportunities. However, due to the fact such residents mostly function on a very basic needs level, they might fail to comprehend the "bigger picture" or in other words, the associated impacts (both negative and

positive) that the proposed project would bring to their area. Their lack of understanding has bearing on future generations that will inhabit the area.

7.3.5 Baseline Socio-Cultural Processes

Socio-cultural processes relate to the way in which humans behave, interact and relate to each other and their environment, as well as the belief and value systems which guide these interactions.