

The underlying rationale for this assessment is that if the proposed upgrade (power lines) is not visible from surrounding areas then the development will not produce a visual impact. On the other hand if one or more power lines are highly visible to a large number of people in surrounding areas then the potential visual impact is likely to be high.

Based on a combination of all these factors an overall rating of visibility was applied to each observation point. For the purpose of this report, categories of visibility have been defined as high (H), moderate (M) or low (L).

Assessment Criteria

For the purpose of this report, the quantitative criteria listed in Table 18 have been determined and used in the Visibility Assessment. The criteria are defined in more detail in the subsection following.

TABLE 18: VISUAL IMPACT ASSESSMENT CRITERIA

CRITERIA	DEFINITIONS
Category of Viewer	
Static	Farms, homesteads or industries
Dynamic	Travelling along road
View Elevation	
Above	Higher elevation than proposed upgrade.
Level	Level with upgrade view
Below	Lower elevation than upgrade viewed
View Distance	
Long	> 5 km
Medium	1 – 5 km
Short	200 m – 1000 m
Very Short	< 200 m
Period of View	
Long Term	> 120 minutes
Medium Time	1 – 120 minutes
Short Term	< 1 minute

Category Viewer

The visibility of the upgrade will vary between static and dynamic view types. In the case of static views, such as views from a farmhouse or homestead, the visual relationship between an upgrade and the landscape will not change. The cone of vision is relatively wide and the viewer tends to scan back and forth across the landscape.

In contrast views from a moving vehicle are dynamic as the visual relationship between the upgrade / structures is constantly changing as well as the visual relationship between the upgrade and the landscape in which they are seen. The view cone for motorists, particularly drivers, is generally narrower than for static views.

View Elevation

The elevation of the viewer relative to the object observed, which in this case are the upgrade / structure, significantly influences the visibility of the object by changing the background and

therefore the visual contrast. In situations where the viewer is at a higher elevation than the building/structure it will be seen against a background of landscape. The level of visual contrast between the upgrade and the background will determine the level of visibility. A white/bright coloured structure seen against a background of dark/pale coloured tree-covered slopes will be highly visible compared to a background of light coloured slopes covered by yellow/brown dry vegetation.

In situations where the viewer is located at a lower elevation than the proposed upgrade it will mostly be viewed against the sky. The degree of visual contrast between a white coloured structure will depend on the colour of the sky. Dark grey clouds will create a significantly greater level of contrast than for a background of white clouds.

View Distance

The influence of distance on visibility results from two factors:

- With increasing distance the proportion of the view cone occupied by a visible structure will decline; and
- Atmospheric effects due to dust and moisture in the air reduce the visual contrast between the structure and the background against which they are viewed.

Period of View

The visibility of structures will increase with the period over which they are seen. The longer the period of view the higher the level of visibility. However, it is presumed that over an extended period the level of visibility declines as people become accustomed to the new element in the landscape.

Long term views of the upgrade will generally be associated with rest camps located within the viewshed. Short term and moderate term views will generally relate to tourist moving through the viewshed mostly by vehicle.

Site Visibility

The procedure followed by Cymbian to assess Site Visibility involved:

- Generate a viewshed analysis of the area utilizing ArcGIS 9.
- Determine the various categories of observation points (e.g. Static, Dynamic).

Impact Assessment Methodology

Visual impact is defined as the significance and/or severity of changes to visual quality of the area resulting from a development or change in land use that may occur in the landscape.

Significance or severity is a measure of the response of viewers to the changes that occur. It represents the interaction between humans and the landscape changes that they observe. The response to visible changes in the landscape may vary significantly between individuals.

Perception results from the combination of the extent to which the proposed upgrade is visible (level of visibility) and the response of individuals to what they see. A major influence on the perception of

people/tourist in relation to the proposed upgrade will be the visual character and quality of the landscape in which it would be located. Natural landscape areas such as national parks, mountain areas or undeveloped sections of coast are valued for their high visual quality. The introduction of buildings and associated infrastructure may be seen as a negative impact on these areas of high visual quality. In the case of rest camps many people perceive them in a positive manner because they represent tourism/conservation infrastructure usually elegantly designed, non-conspicuous and contributing the local and national economy.

The potential visual impact of the proposed upgrade will primarily result from changes to the visual character of the area within the viewshed. The nature of these changes will depend on the level of the visual contrast between buildings/structures and the existing landscape within which they would be viewed.

The degree of contrast between the upgrade and the surrounding landscape will result from one or more of the following visual characteristics:

- Colour;
- Shape or form;
- Scale;
- Texture; and
- Reflectivity.

Visual Character

Landscape Character

The site and the surrounding area can be described as an agricultural landscape with intermittent mining and power generation activities. Elevations along the slope range from 1520 mamsl and 1600 mamsl. All the power line alternatives are located on this slope with very little screening from topography or vegetation, however the presence of numerous existing power lines in the area would provide a screening effect for the proposed lines. Please refer to Figure 9 for the topography of the site.

The major drainage features in the area include the Witbank Dam and the Olifants River. Alternatives 2 and 3 cross large sections of the Witbank Dam while Alternative 1 crosses only a small section of the unnamed tributaries. For an illustration of the surface water features please refer to Figure 8.

The landscape surrounding the proposed power lines can be described as open grassland with numerous fields used for grazing. In addition a large section of the site is occupied by the Witbank Dam. The natural vegetation does not provide any screening of the power lines. There are several existing power lines on site, and in deed the intention of the project is to connect existing power lines and by-pass the Duvha Power Station.

Residential homes, mining infrastructure and the Duvha Power Station comprise infrastructure in the area. There numerous formal and informal roads in the area.

Viewshed

It should be noted that the viewshed for each of the alternatives, which is plotted on Figure 26, Figure 27 and Figure 28, 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 visible 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 green having lower visibility. It should be noted that Alternatives 2 and 3 are more visible than Alternative 1 due to the fact that they are located along the Witbank Dam while Alternative 1 is located within a less sensitive visually.

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

- The viewshed for Alternative 1 is low to moderate while Alternatives 2 and 3 are moderate to high;
- The area in the immediate vicinity of Alternative 2 has a high viewshed, this is compounded by it traversing the Witbank Dam; and
- To the south of Alternative 3, the viewshed reaches a moderate to high;

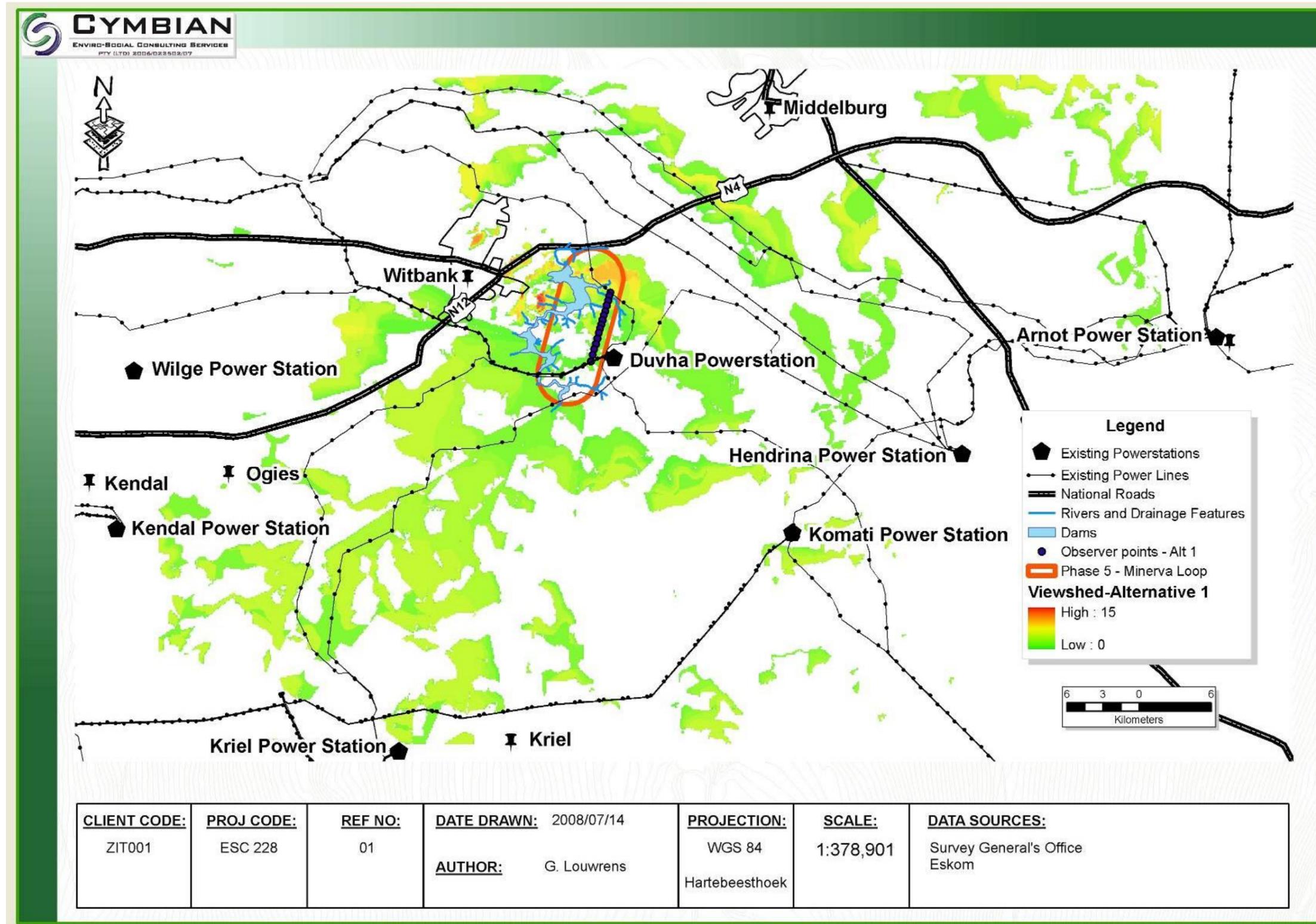


FIGURE 26: VISUAL IMPACTS – VIEWSHED ALTERNATIVE 1

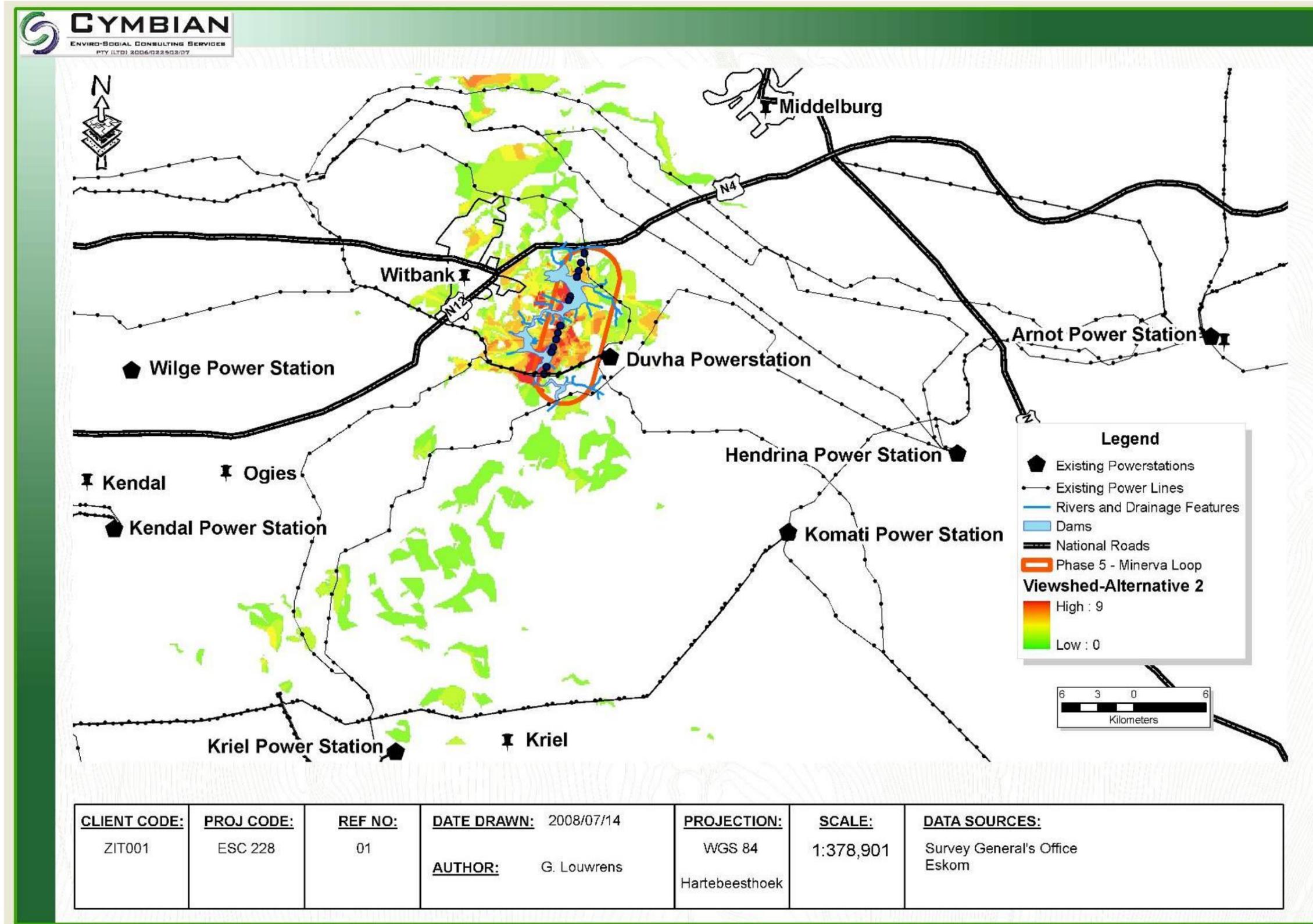


FIGURE 27: VISUAL IMPACTS – VIEWSHED ALTERNATIVE 2.

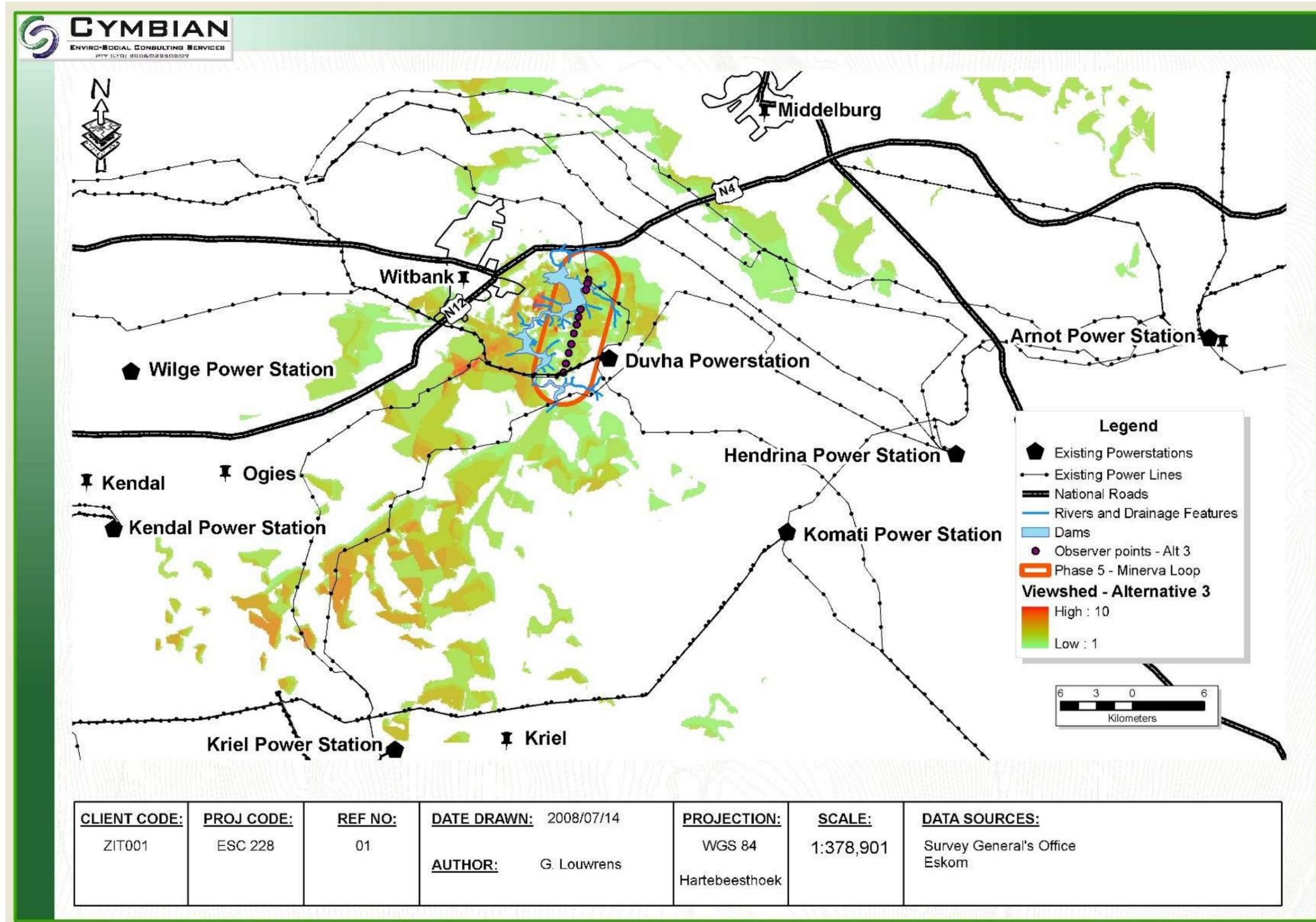


FIGURE 28: VISUAL IMPACTS – VIEWSHED ALTRERNATIVE 3/

7.2 Cultural Environment

7.2.1 Archaeological and Cultural Historical Features

The Eskom Project may impact on any of the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No. 25 of 1999). Consequently, Zitholele Consulting commissioned Mr. Julius Pistorius to undertake a Phase 1 Heritage Impact Assessment study for the proposed project with the following aims:

- To establish whether any of the types and ranges of heritage as outlined in Section 3 of the National Heritage Resources Act do occur within the parameters of the project area and, if so, to determine the level of significance of these heritage resources;
- To make recommendations regarding the mitigation or the conservation of any significant heritage resources that may be affected by the proposed project.

Site Description

The project area involves parts of the farms Rhenosterfontein 312 and Naauwpoort 335, located approximately fifteen kilometres to the south-east of Emahlaleni (Witbank) on the Eastern Highveld in the Mpumalanga Province of South Africa (2528 Pretoria 1:250 000).

The alternatives for the 400 kV by-pass line run across the farms Rhenosterfontein 312 and Naauwpoort 335 across undulating country and across parts of the Witbank Dam. The project area is an undulating piece of land which is cut into small holdings and upmarket suburbs along the Witbank Dam in the south while agricultural fields occur towards the north.

The project area has experienced major developments in the south such as the presence of the Duvha Power Station and its associated open cast mines. A large number of small holdings, upmarket suburbs and the Ikageng and Lesedi townships occur in the south and in the central part of the project area. An extensive squatter camp stretches along the Duvha-Kendall power line in the south.

This part of the Mpumalanga Province is known for its long standing production of agricultural crops such as maize wheat, sorghum, dairy, potatoes and other vegetables. Cattle and sheep ranching also make a significant contribution to the local economy. Gold and silica mines also occur in the area.

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. However, the historical character of the Eastern Highveld, which is so pronounced further towards the south, has largely been erased by various kinds of development in the project area.

The archaeological and historical significance of the Eastern Highveld must be described and explained in more detail before the results of the Phase I HIA study is discussed (see below, Section 10.1.9 and 10.2. 8).



FIGURE 29: THE PROJECT AREA TO THE SOUTH-EAST OF EMAHLALENI (WITBANK) ON THE EASTERN HIGHVELD OF THE MPUMALANGA PROVINCE (ABOVE). THE ESKOM PROJECT AREA IS CHARACTERISED BY OUTSTRETCHED GRASS VELDT AND AGRICULTURAL FIELDS. ITS SOUTHERN PART IS MARKED BY VARIOUS KINDS OF DEVELOPMENT WHICH HAS LARGELY EASED THE HISTORICAL CHARACTER OF THE PROJECT AREA.

The following brief overview of pre-historical, historical, cultural and economic evidence will help to contextualise the proposed Eskom 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 Eskom Project Area include Witbank and Middelburg. A brief historical background to each of these towns is provided below.

Witbank came into being as the railway line between Pretoria and Lourenzo Marques which was built in 1894 passed close to where Witbank is located today. The first Europeans who came to the area observed the abundance of coal, which is evident on the surface or in the beds of streams. A stage post for wagons close to a large outcrop of whitish stones (a 'white ridge') gave the town its name. Witbank was established in 1903 on a farm known as Swartbos which belonged to Jacob Taljaard.

Middelburg is one of the oldest towns that were established by the Voortrekkers in the previous Transvaal. The town was established on the farms of Klipfontein and Keerom on the banks of the Klein Olifants River in 1859. It is generally accepted that Middelburg's name is derived from the fact that the Transvaal Republic established the town midway between Pretoria and Lydenburg.

The choice for Middelburg's location was not well accepted by the inhabitants and it was moved to the farm Sterkfontein. Here, a town was established and named Nasaret (Nazareth). However, the name did not appeal to the local community and its original name was reinstated. Middelburg temporary served as the seat of the Transvaal Republic after the siege of Pretoria during the Second Anglo Boer War.

Today Middelburg and Witbank are important centres where coal is mined and transported to Richards Bay from where it is exported all over the world. The 20th

century also saw the introduction of large-scale irrigation and dry land farming on the Eastern Highveld.. Today the economic activities of the area include diamond and coal mining, light and heavy industries as well as steel and vanadium operations.

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 ('blouklip'), 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.

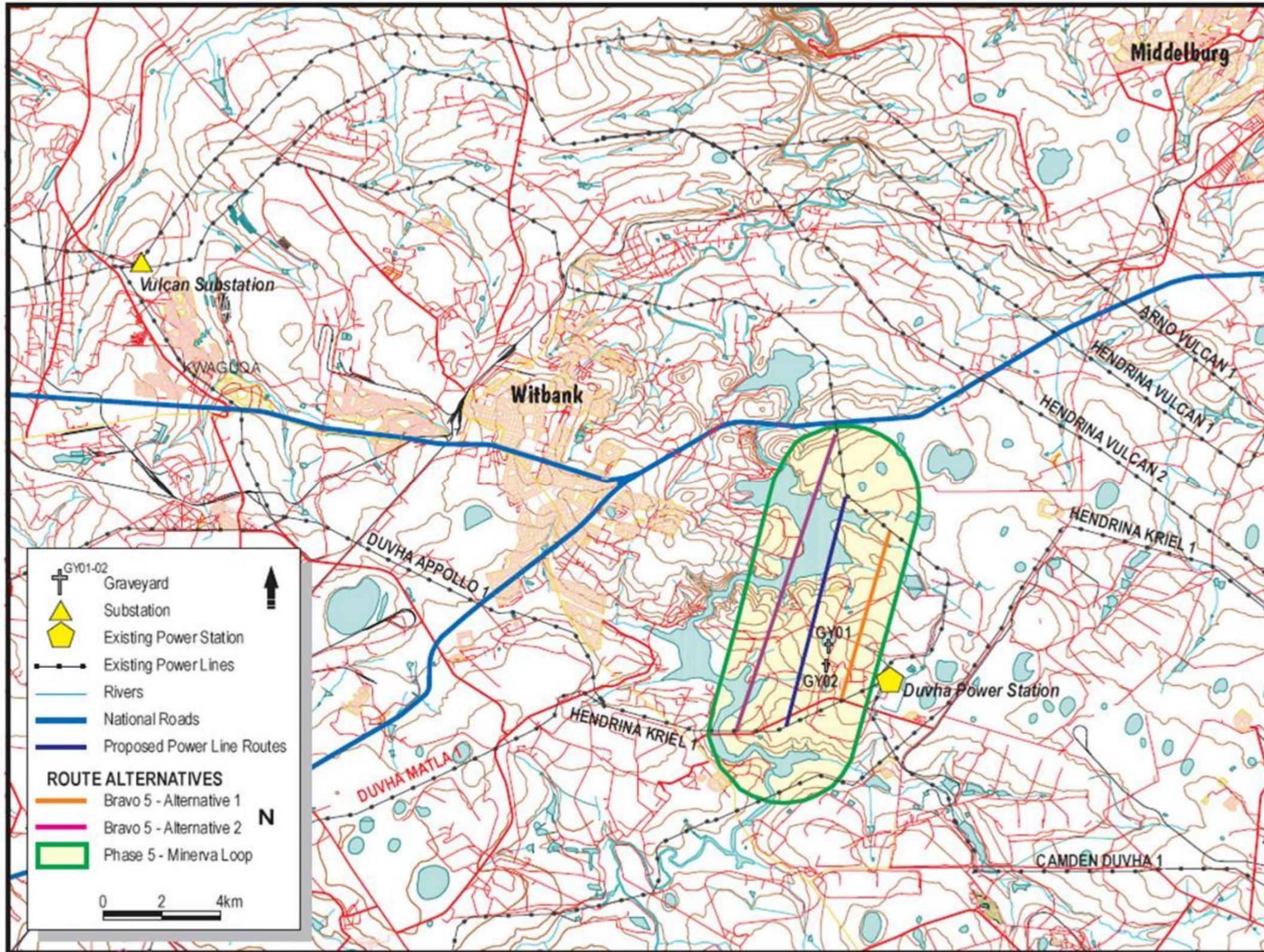


FIGURE 30: GRAVES LOCATED IN THE EASTERN PORTION OF THE STUDY AREA.

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.

Unless otherwise stated, the baseline social profile was compiled based on data obtained from Census 2001 and the Community Survey (CS) 2007. It is important for readers to note that CS data does not replace Census data, but that the CS is merely an attempt to adjust measurements to a best estimate. In this regard, Statistics South Africa has stated the following: "Any adjustment done [in CS 2007] has maintained the profiling of the community in terms of the people and households while compensating and correcting the undercounted bias by different projections on national, provincial and municipalities."³

Therefore, please bear in mind that the following data should only be viewed as indicative of the broad trends within the area and not as a rigid representation of the area.

7.3.1.1 Population

The 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.

³ Statistics South Africa: Community Survey 2007: Key Municipal Data: ix.

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”.⁴

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 the number of households developed more or less on par with the population growth rate so that there has been an average increase of approximately 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) and 2007 (an average of 4.1 persons per household).

The predominant population groups remained the same between 2001 and 2007 and are therefore still Black African (85.8%), followed by White (12.7%). The population 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 2001 there was an almost equal split between the male and female ratio (with males dominating slightly at 50.6%). The gender ratio has since been surpassed by the males so that in 2007 males dominated at 51.1%.

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

Table 19 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 males than females in the study area. It is therefore necessary to take cognisance of the fact that both males and females might be seeking employment and that the majority of work seekers might not necessarily be exclusively male.

⁴ irhr.ua.edu/blackbelt/glossary.html

TABLE 19: SUMMARY OF POPULATION CHARACTERISTICS

	South Africa	MP	NDM	ELM	
	2007			2001	2007
Area size (km ²)	1 219 912	79 511.5	16 892.6	2 678	
Total population	48 502 063	3 643 435	1 226 498	276 413	435 217
				Average decrease of 26 467 persons per annum	
Population density (people per km ²)	39.8	45.8	72.6	103.2	162.5
				Average increase of 9.9 persons per km ² per annum	
Total households	12 500 610	940 403	305 566	74 917	105 592
				Average increase of 5 113 households per annum	
Avg. persons per household	3.9	3.9	4.0	3.7	4.1
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%)
				Average increase of 24 381 Black Africans p.a., with an equal increase of 3.6% proportion of total population. Average decrease of 1 866 Whites p.a., with an equal decrease of 3.2% proportion of total population.	
Predominant Gender	Female (50.8%) ⁵	Female (51.4%)	Female (50.1%)	Male (50.6%)	Male (51.5%)
				Male population growing faster than female population.	
Predominant Age Group	Working age (% unknown)	Working age (62.0%)	Working age (64.3%)	Working age (68.8%)	Working age (69.1%)

⁵ Census 2001 data (2007 data not readily available)

	South Africa	MP	NDM	ELM	
	2007			2001	2007
				Working age population increased by an average of 18 409 persons p.a., and proportionally increased by 0.05% p.a.	

7.3.1.2 Education

An overview of the educational profile for the study area on local municipal level is provided in Figure 31. 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%) of the population has had no form of formal education.

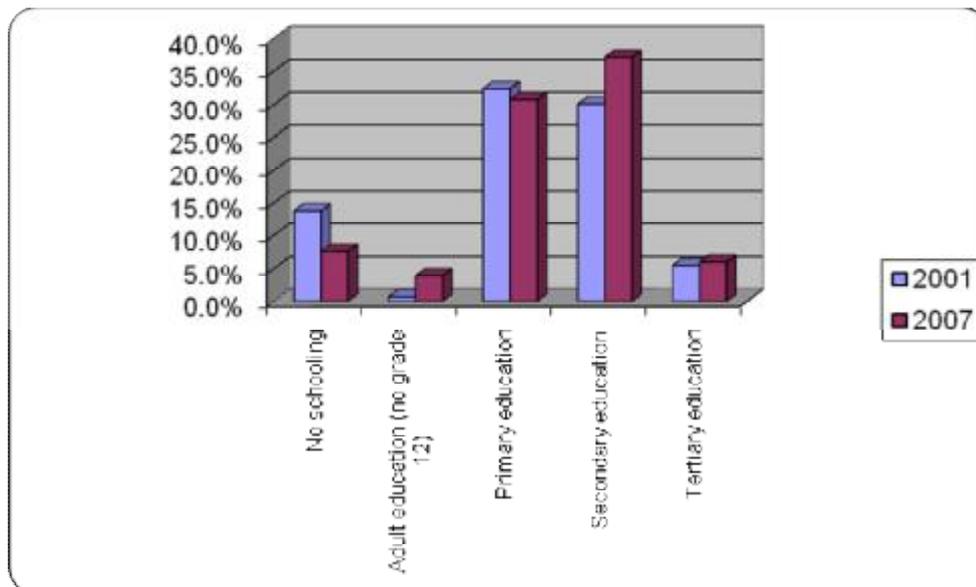


FIGURE 31: COMPARATIVE EDUCATIONAL PROFILE (GROUPED) FOR THE STUDY AREA

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 as reflected in figure 4 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 7.1%.

The number of people who obtained a higher (post-Grade 12) qualification also increased by 0.5%. The increase in the secondary and tertiary educational levels could be as a result of a need to get out of the poverty cycle, whereby people might realise 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 Expected Demographic Change Processes

It is expected that the construction and operation of the proposed transmission power lines will lead to a change in the number and composition of the population within the affected areas, which in turn may impact on health, safety and community cohesion (these impacts are discussed in more detail in the socio-cultural section).

Expected Impacts

Table 20 below provides an overview of the expected change process to occur as well as the expected impacts that might occur as a result of these change processes taking place.

TABLE 20: EXPECTED DEMOGRAPHIC CHANGE PROCESSES

DEMOGRAPHIC CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
Population change	Will the development lead to an increase in numbers of a certain section of the population, e.g. migratory workers?		X	No impact foreseen.
In-migration of unemployed work seekers	Will the development intentionally or unintentionally contribute to the in-migration of work seekers into the area?		X	No impact foreseen.
Relocation or displacement of individuals or families	Will the development at this or future stages lead to the relocation of residents?		X	No impact foreseen.

7.3.3 Baseline Geographical Profile

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*”.⁶

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*”.⁷

Current Land Use

The ELM IDP⁸ 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.

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.

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 alternatives. Unless otherwise stated, the information was adapted from the ELM IDP.

- **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 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.

⁶ www.soil.ncsu.edu/publications/BMPs/glossary.html

⁷ www.wikipedia.org/wiki/Land_use.html

⁸ Emalahleni Local Municipality IDP 2008/2009

- **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.

Figure 32 and Figure 33 below provide an overview of the current land use within the study area.



FIGURE 32: LAND USE SURROUNDING THE DUVHA POWER STATION



FIGURE 33: LAND USE EAST OF THE R544

7.3.4 Expected Geographical Change Processes

Geographical change processes refer changes in land use, whether it is on a temporary or permanent basis. The construction and operation of a transmission power line will lead to a change in the land use, mostly as a result of the surface infrastructure. The assessment of a land use change process from a social perspective takes into account how the proposed transmission power lines might affect the behaviour and/or lives of landowners and/or land users in the area.

Expected Impacts

Table 21 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 21: GEOGRAPHICAL CHANGE PROCESSES

GEOGRAPHICAL CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
Access to environmental resources	Will the development impact on people's access to environmental resources, such as water, wood, medicinal plants etc?		X	No impact foreseen.
Change in access to resources that sustain livelihoods	Will the development impact on people's (legal or illegal, formal or informal) access to environmental resources that help to sustain their livelihoods, e.g. grazing land for their cattle; wood for heat/cooking/selling, etc.?	X		Transmission power lines should avoid mining activities due to the possibility of slumping and underground fires. Also, towers pose a risk to mining activities in the form of towers falling over, with health and safety as well as economic impacts as a

GEOGRAPHICAL CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
				result. In turn, the mining activities might also pose a risk to the safety of the Transmission power line; if for example, blasting takes place at the mining operation. At least 1 existing mining operation have been identified that will be affected by the eastern alternative.
Land acquisition and disposal, including availability of land	Will the development contribute to or directly impact on the ability of local residents to keep or acquire property/land?		X	No impact foreseen.
	Will the development set a precedent for change in land use in the area?		X	No impact foreseen.
	Are there any potential land-claims for the area?		X	No impact foreseen.
	Will the development affect the claims process?	-	-	Not applicable.

7.3.5 Baseline Economic Processes

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%) of the working age population within the study area is formally employed. This represents an average increase of 8.5% 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	
	2001 ⁹	2007		2001	2007
Employed ¹⁰	33.7%	40.1%	42.1%	40.2%	50.0%
Unemployed ¹⁴	24.0%	20.0%	19.8%	25.0%	21.3%
Not economically active	42.3%	39.9%	38.1%	34.8%	28.7%
Employment rate ¹¹	58.4%	66.7%	68.0%	61.6%	70.1%
Predominant industry	Community services (29.1%)	Unspecified (29.0%)	Unspecified (26.1%)	Unspecified (73.8%)	Unspecified (32.6%)

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 ELM, close on half (45.6%) lived above the acceptable minimum standard (> R20 000 p.a. per household).

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 34) 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

⁹ Census 2001 data (2007 data not readily available)

¹⁰ 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.

¹¹ In order to reflect a more accurate employment rate, the *not economically active* population has been excluded from this segment.

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.

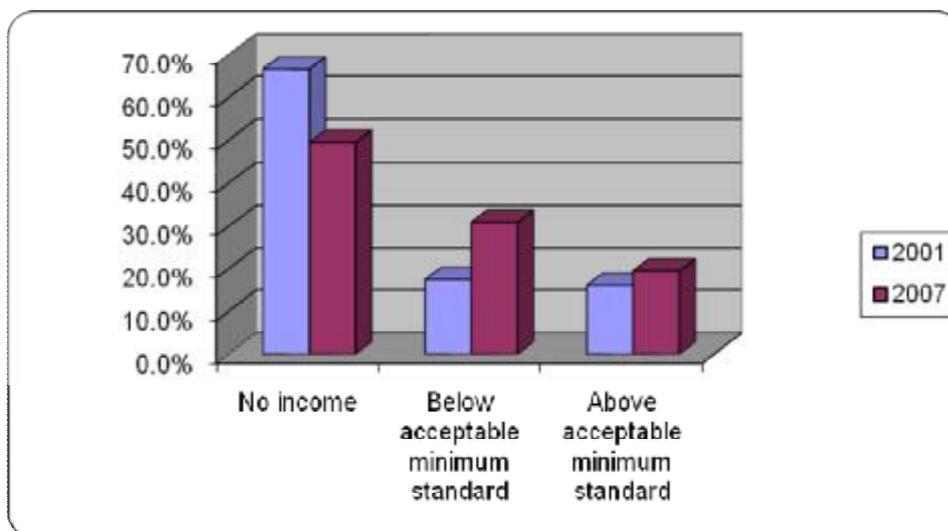


FIGURE 34: OVERVIEW OF MONTHLY PERSONAL INCOME (2001 AND 2007 COMPARED)

The number of individuals with no personal income decreased by approximately 17.1% 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 13.6% between 2001 and 2007. The number of individuals who earn above the acceptable minimum standard increased only marginally by 3.5%.

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.

7.3.6 Expected Economic Change Processes

Economical change processes relate to the changes brought about to the employment and general economic profile of the area as a result of the introduction of any development. Employment creates a source of income, which in turn enables the employed individual to access services and a support mechanism for his/her family, thereby enhancing not only the individual's quality of life, but also that of his/her household.

Expected Impacts

Table 23 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 23: ECONOMICAL CHANGE PROCESSES

ECONOMIC CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
Increase in division between rich and poor	Will the development exacerbate class equalities?		X	No impact foreseen.
Enhanced reinforced economic inequities	Will the development enhance or enforce class inequality?		X	No impact foreseen.
	Will the development deny or enhance economic opportunities for vulnerable communities?		X	No impact foreseen.
	Will the project create different levels of economic opportunity?		X	No impact foreseen.
	Will the employment opportunities created by the development be sustainable?		X	No impact foreseen.
Change in the commercial / industrial focus of the community	Will the development change the income generating focus of the community?		X	No impact foreseen.
	Do residents have the required skills, life experience and contextual understanding to benefit from the proposed development?		X	No impact foreseen.
	Will a change in economic focus associated with the development have repercussions for social cohesion?		X	No impact foreseen.
Change in employment equity of vulnerable groups	Are vulnerable groups able to take advantage of changed employment opportunities associated with the development?		X	No impact foreseen.
	Will vulnerable groups have to compete with more appropriately qualified applicants from elsewhere?		X	No impact foreseen.
Change in occupational opportunities	Will the development lead to an increase or decrease in employment opportunities?		X	No impact foreseen.
	Will the development create different levels and types of employment?		X	No impact foreseen.
	What types of skills will the development require?			Skilled workers would be required.
Land	Will the development lead to a		X	Visibility of transmission line

ECONOMIC CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
acquisition and disposal, including cost of land	significant increase in the cost of land/property in the area?			could affect the property value in some areas, although a decrease is expected as opposed to an increase in property value.
	Will the development result in an increase of land/property prices?		X	
	Will the increase in land/property prices exacerbate class and race inequity?		X	

7.3.7 Baseline Empowerment and Institutional Processes

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 decline in the delivery of municipal services to the households within the study area. 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 24 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. It appears as if municipal service delivery has decreased within the ELM. 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.

TABLE 24: OVERVIEW OF MUNICIPAL SERVICE DELIVERY TO THE AFFECTED AREAS

	South Africa	MP	NDM	ELM	
		2007		2001	2007
Energy cooking		Electricity (55.7%)	Electricity (59.6%)	Electricity (62.6%)	Electricity (56.4%)
Energy heating		Electricity (45.0%)	Electricity (49.3%)	Electricity (59.2%)	Electricity (47.1%)
Energy lighting		Electricity (82.2%)	Electricity (81.5%)	Electricity (70.3%)	Electricity (60.1%)
Refuse		Own disposal (49.6%)	Own disposal (48.1%)	Removed once a week (64.2%)	Removed once a week (56.9%)
Sanitation		RDP standard or above (55.5%)	RDP standard or above (54.9%)	RDP standard or above (74.7%)	RDP standard or above (66.2%)
Water		RDP standard or above (91.1%)	RDP standard or above (96.6%)	RDP standard or above (94.2%)	RDP standard or above (98.6%)

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 35).

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 35: MASLOW'S HIERARCHY OF NEEDS

Source: www.arrod.co.uk

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.

7.3.8 Expected Empowerment and Institutional Change Processes

Negotiation for land is a change process on legal and empowerment level. The same applies to the stakeholders that will be involved in the public participation process. The EIA process is an opportunity for these stakeholders to give input into the process and project. However, stakeholders would have to offer up their time to become actively involved in the process and they should clearly understand their rights in terms of the process to enable them to use these rights.

Attitude formation may start during the EIA process. Attitude formation is a change process, and not an impact. Attitude formation might result in delays in project implementation, which might result in secondary impacts such as economic impacts.

Expected Impacts

Table 25 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 25: INSTITUTIONAL & EMPOWERMENT CHANGE PROCESSES

INSTITUTIONAL AND EMPOWERMENT CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
Change in / disruption of power relationships	Will the development impact on the levels of power, opportunity and access of individuals or sections of the community, e.g. during the negotiation process?	X		A breakdown in the negotiation process could severely delay the project and result in an economic impact on both the landowner as well as on Eskom.
	Is the development being used for the political gain of a section of the community, and what are the implications for the larger social environment?		X	No impact foreseen.
Exclusivity	Will the development contribute to the culture of exclusivity?		X	No impact foreseen.
Inequality	Will the development increase unequal access to opportunities or resources?		X	No impact foreseen.
Change in community infrastructure	Will the development change any aspect of community infrastructure, such as crèches, clinics, schools, churches, formal or informal sports fields, open areas, dumping grounds etc?		X	No impact foreseen.
	Will the development create increased demand for basic services, e.g. water, electricity, sewerage, roads?		X	No impact foreseen.
	Will the existing access of the community to basic services be impacted by the development?		X	No impact foreseen.
Change in housing needs / demands	Will the development create a housing need, e.g. due to the in-migration of construction workers?		X	No impact foreseen.
	Has the need for more housing been addressed by the development and or the authorities?			Not applicable.

7.3.9 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.

7.3.10 Expected Social-Cultural Change Processes

Socio-cultural change processes that are associated with the construction and operation of the proposed project include changes to aspects such as health and safety and sense of place. In a social sense, it should be noted that the concept of 'health' is not only limited to physical health (i.e. the absence of ailments or illness), but also includes mental and social health. The expected changes that can occur in relation to health and safety aspects can be as a result of the presence of the proposed transmission power line and its associated infrastructure during operation, as well as the presence of construction workers and/or job seekers during construction.

The significance of the impacts of socio-cultural changes is difficult to determine on a prospective basis and are dependent on the demographic profile of, for example, construction workers and whether or not such differences affected local residents. For example, if construction workers were from a different cultural background than locals, conflict can be expected if such different cultural backgrounds are not respected. Conflict as a result of cultural differences or community disintegration as a result of the acceptance of construction workers' culture might occur – should the demographic profile of these construction workers be different, and should it matter to the communities involved.

Expected Impacts

Table 26 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 26: SOCIO-CULTURAL CHANGE PROCESSES

SOCIO-CULTURAL CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
Disruption of social networks	Will the development impact on existing social networks?		X	No impact foreseen.
Disruption in daily living and movement patterns	Will the development change the lifestyle of residents?		X	No impact foreseen.
	Will the development impact on access to facilities and resources, such as schools, hospitals, fields, forests, etc?		X	No impact foreseen.
	Will it impact on movement patterns, such as pedestrians crossing roads?		X	Impact of construction activities on movement patterns of local communities, potentially impacting on safety and ease of movement.
	Will it divide communities physically (e.g. through the building of a highway)?		X	No impact foreseen.

SOCIO-CULTURAL CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
Dissimilarity in social practices	Do new residents have dissimilar social practices to current residents?		X	No impact foreseen.
	Do the new residents have different values, religious practices, social standard, etc?		X	No impact foreseen.
Alteration in family structure	Could the development threaten family cohesiveness?		X	Socially acceptable integration, including the risk of spreading STIs and HIV/AIDS with an impact on health. The spread of STI and HIV is a matter of great concern, also in view of the light that construction workers move out of the area into another area where the spread of these STI and HIV continues. Apart from the obvious health implications, HIV infection in particular also has an economic impact.
	Could it impact on immediate or extended family networks?		X	
	Could it impact on the traditional roles played by members of the family?		X	
Conflict	Will the development lead to conflict between sectors of the social environment?		X	If social integration between newcomers and residents is hindered, it can lead to conflict, which in turn delays the construction process and has economic implications for the developer.
	Is there conflict between the developer and the public?		X	No impact foreseen.
	Is this conflict being addressed?			Not applicable.
Safety and crime impacts	Will the development impact on existing crime and safety patterns?		X	Not applicable.
Change in sense of place	Will the development impact on people's "sense of place", e.g. through the large scale development of a rural community?	X		The presence of a transmission power line has a visual impact, changing the landscape from unspoilt to 'spoilt'.
	Will the change "in sense of place" impact on people's relationship to the environment?	X		
Implications for social history	Does the development have any implications for the social history of affected communities?		X	No impact foreseen.
	Will the development further marginalise communities that have been relocated during <i>apartheid</i> ?		X	No impact foreseen.

SOCIO-CULTURAL CHANGE PROCESSES				
Expected Change Process		Yes	No	Expected Impact
	Will the development affect processes, structures or patterns that are valued as part of the social history of an area?		X	No impact foreseen.
Change in leisure opportunities	Will the development impact on access to existing leisure opportunities?	X		Linked to 'sense of place'.

7.3.11 Conclusions and Recommendations

The proposed by-pass transmission power lines will not pose any impacts of significance to the social environment during either the construction or the operational phases. Any impacts likely to occur during the construction phase are site specific (i.e. limited to the immediate surroundings of the project development site). However, the activities associated with this by-pass transmission power lines pale in comparison to those associated with the construction of the actual Bravo Power Station as well as the construction that will take place on Bravo 5.

