# Appendix G

## **Environmental Impact Assessment**

Shanduka Coal (Pty) Ltd Road Deviation Basic Assessment Report

11/15/2013

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## DECLARATION OF CONSULTANT'S INDEPENDENCE

The author of this report, EndemicVision Environmental Services Pty (Ltd), does hereby declare that it is an independent consultant and has no business, financial, personal or other interest in the activity, application or appeal in respect of which it was appointed other than fain remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the consultant performing such work. All opinions expressed in this report are its own.

## 1. PROJECT DESCRIPTION

## 1.1. PROJECT BACKGROUND

## TRAFFIC VOLUME INCREASE

A study done by Traffic and Transportation Technology (TTT) Africa (Pty) LTD in 2010 showed an increase in traffic on the R575. The study was again done in 2013 and similar results were obtained. Traffic increased by an average of approximately 40, 1% over the period of 2010 to 2013. The growth of traffic during peak periods, specifically the afternoon (PM) peak is even higher and this may indicate an increase in local traffic volumes.

## MINING AREA

Shanduka Coal is one of the collieries in the area with access to the mine gained from the R575. The existing plant on the eastern side of the R575 regional road will be demolished and relocated to the east of the new planned opencast operations. The relocation of the plant is deemed necessary as the plant is currently located in the area demarcated for new opencast mining activities. The new opencast mining area will extend to either side the R575 road. This requires alteration of the access to the mine via the R575 as well as allow for additional traffic from future mining.

## NATURAL ENVIRONMENT

The area consists of undulating topography consisting of plains and rolling hills and river streams traversing it. The predominant land use is agriculture and mining in the area. The vegetation type in this area is Rand Highveld Grassland. Almost half has been transformed mostly by cultivation may also have had an impact on an additional portion of the surface area of the unit where old lands are currently classified as grasslands in land-cover classification and poor land management has led to degradation of significant portions of the grasslands. Scattered aliens (most prominently *Acacia mearnsii*) occur in about 7%. Only about 7% has been subjected to moderate to high erosion levels.

## NEED AND DESIRABILITY

## **Colliery expansion**

The provincial road P127-2 (R575) runs through the Uitkyk/Townlands reserve and will need to be relocated to free up reserves. The provincial road P127-2 (R575) cuts through the mining reserve of Shanduka Coal and will soon severely restrict mining operations and sterilize a strip of coal reserve.

## The need relocate entrance road

Due to the relocation of the wash plant and the offices new access and haul roads will be constructed between the open cast areas and the workshops and supporting infrastructure.

## Upgrade road condition and safety

It is proposed that this route be upgraded to accommodate the additional traffic and that improvements be made. Mine vehicles are crossing this public road as operations are taking place both sides and simultaneously. Coal dust and mist in the area reduce visibility and increase the risk of serious accidents given the slow moving heavy vehicles, the faster moving traffic as well as the crossing operation.

Following upgrade, the road will be safer than currently and will be in a better condition requiring less maintenance in the short term.

## **1.2.** PROJECT DESCRIPTION

#### **Environmental Impact Assessment**

The project scope includes the planning, design and construction of a deviation of the R575 by developing a parallel road extending the existing road by 0.88km, upgrading the current intersections to signalled intersections and widening of the existing bridge. The road will be 14.7 meters wide to accommodate double lines in any one direction at intersections.

The total footprint of the road will be 10.73 hectares with the existing road being 6.9 hectares.

The new upgraded road will be under jurisdiction of the Province. The existing Keiskamma Drive will be wider and upgraded to a three (3) lane road, signalized with turning lanes and a four (4) lane bridge. The existing R575 will be available for industrial vehicle use while it will be closed for the public. A portion (approximately 500 meters) of this will be mined in about 4 years.

## 2. ENVIRONMENTAL BASELINE

The following section gives a reflection of the environment on site relative to the environment in the surrounding area. Several characteristics will be discussed briefly. Firstly the cadastral properties of the Middelburg area will be given where after socio-economic challenges will follow. The topography of the area as well as geology will be discussed. The biophysical information of the area will follow and this part is divided into five parts namely temperature, wind, rainfall, vegetation and water. Lastly a reflection on biodiversity, conservation areas and nature reserves will be given.

## CADASTRAL

Middelburg is in the Steve Tswete Local Municipality which is under the jurisdiction of the Nkangala District Municipality (Figure 1). Middelburg is situated 139 km from Pretoria, 32 km from Emalahleni and 164 km from Lydenburg. Middelburg was established as Nasareth, in 1864 by the Voortrekkers on the banks of the Klein Olifants River. The name was changed in 1872 to Middelburg to mark its situation midway between Pretoria and Lydenburg. Since this time Middelburg began to draw more and more inhabitants which lead to extreme growth and development to where the town is today. **Middelburg** is a large farming and industrial town in the South African province of Mpumalanga. It is generally known as the 'Stainless Steel Capital of Africa' (Figure 2).



#### Figure 1: Nkangala District Municipality - Middelburg is in the Steve Tswete Local Municipality

Mines include Woestalleen Colliery, Optimum Colliery, Arnot Colliery, Black Wattle Colliery, Graspan Colliery, Polmaise Colliery, etc(Steve Tshwete Local Municipality, 2010). Shanduka Coal (Pty) Ltd. is one of the mining operations in close proximity to Middelburg and is busy with mining operations West of Middelburg. The provincial road P127-2 (R575) cuts through the mining reserve of Shanduka Coal (Pty) Ltd. The roads in the area vary from nationally- to Municipal administered roads. The existing tarred road, Keiskamma Drive, will be newly constructed with alternating lanes for traffic meaning one lane in one direction and two lanes in the other direction. Several intersections will be constructed as well to ease traffic flow. This newly constructed road on the tracks of Keiskamma Drive will be named the R575 and the old R575 will be closed. This newly constructed road will have a reserve of 3, 6 meters and have a width of approximately 14, 7 meters. This road will then be able to handle the increasing amount of traffic.

Furthermore, there are two major power stations in the Middelburg Dam catchment. Hendrina Power Station (2 000 MW) and Arnot Power Station (2 100 MW) are supplied with coal from Optimum Colliery and Arnot Colliery. Extensive coal mining for the foreign and domestic market is taking place in the Middelburg Dam catchment (Steve Tshwete Local Municipality, 2010).

Existing infrastructural elements in the vicinity of the new development include the following:

- Power lines
- Tarred roads
- Afroc gas pipeline
- Fences and gates



Figure 2: Cadastral Map - Middelburg

## TOPOGRAPHICAL

The town Middelburg is characterized by the typical undulating Highveld topography in the south at a height of  $\pm$  1600m above sea level (Ferrar & Lotter, 2007). A number of prominent hills and steep inclines are located towards the north-west of the Greater Middelburg (Figure 3) at a height of 1400m where the Klein Olifants River leaves the northern boundary (Steve Tshwete Local Municipality, 2010).



Figure 3: Topographical Map of Middelburg

#### **Environmental Impact Assessment**

## GEOLOGY

In the south and south-eastern area of Middelburg, sediments of the Ecca Formation of the Karoo Super group can be found. The lithology of the Ecca Formation consists of shale, shaly sandstone, grift, sandstone, conglomerate, coal (in places near base and top) (Norman & Whitfield, 2006). The southern parts of Middelburg fall within the socalled Springs-Emalahleni Coalfield. The Springs-Emalahleni Coalfields extends over a distance of some 180km from the Brakpan and Springs areas in the west, to Belfast in the east and about 40km in a north-south direction (Steve Tshwete Local Municipality, 2010).

The irregular northern margin of the coalfield is defined by the sub-outcrop of the Vryheid Formation against the Pre-Karoo rocks of the Transvaal sequence, the Waterberg Group and volcanic associated with the Bushveld Igneous Complex. North of this margin there are few coal-bearing outliers of Karoo sediments. The southern margin of the coalfield is clearly defined over the central portion of the area by pre-Karoo granite and felsite hills, which separate the Emalahleni Coalfield from the Highveld Coalfield from the Highveld Coalfield (Steve Tshwete Local Municipality, 2010).

The Selons River Formation of the Rooiberg Group, Transvaal Super group, is indicated to be present within the area south and southeast of Middelburg. It consists of a bed of sandstone or quartzite at the base as well as massive, red rhyolite of which the top shows flow bedding. It contains a few intercalations of sandstone, tuff, black rhyolite and breccia(Norman & Whitfield, 2006). A bed of dark, fine-grained mudstone is present approximately in the middle of the sequence(Steve Tshwete Local Municipality, 2010).

The Dwyka Group of the Karoo Super group is also indicated to be present in the area north of Middelburg. It is composed mainly of rudaceous rocks, i.e. diamictite with subordinate varved shale, and mudstone containing striated and faceted pebbles, fluvoglacial gravel and conglomerate, all presumably of glacial origin(Norman & Whitfield, 2006). The youngest geological deposits are represented by unconsolidated alluvium (soil transported by water), which is confined to the drainage channels throughout the area, colluvium (soil transported mainly through gravity) and ferricrete, all of Quaternary age(Steve Tshwete Local Municipality, 2010).

## SOIL TYPES

The Greater Middelburg is underlain by Rooiberg felsite (granite lava) in the south. The south-western section of the Greater Middelburg is characterized by the rich coal deposits especially on the farms Uitkyk and Riet Samora Machel. This rich coal deposits form part of the Ecca and Dwyka series of the Karoo system(Ferrar & Lotter, 2007). Clay deposits suitable for brick making, are located on the farm Riet Samora Machel and Council made it available to Federale Stene(Norman & Whitfield, 2006).

## BIOPHYSICAL

## TEMPERATURE

The temperature of Middelburg is generally the same as the temperatures occurring on the Highveld (Figure 4). The average annual winter temperature can be taken as 15,5 °C and the average summer temperature as 27,2 °C. The average known daily temperature difference varies from a minimum of 13,5 °C in January to a maximum of 20,6 °C in August (Steve Tshwete Local Municipality, 2010).



## Figure 4: The average high and low temperatures and the maximum and minimum recorded temperatures (Weather2, 2012)

#### WIND

In general, the wind is light to moderate for most of the time, ranging from 1,0 to 5,4 m/s for 51% of the year (Figure 5). Strong winds are associated with pressure gradient forces in winter and with thunderstorm activity in summer. Winds with a velocity greater than 29km/h occur on average 5% of the time (18 days per year). Calm conditions prevail on average 34% of the time (124 days per year)(Steve Tshwete Local Municipality, 2010).



Figure 5: Average daily wind speed and maximum recorded sustained wind speed for each month(Weather2, 2012).

## PRECIPITATION

The average annual rainfall for Middelburg has been determined at 740 mm and the figures vary from average 119 mm in January to 9 mm in the winter months (Figure 6). The annual rainfall probability is 18, 4% or 67 days per year. The most intensive downpours are experienced during the summer months of November, December, January and February although hail storms occur on average 4 to 7 times per year(Steve Tshwete Local Municipality, 2010).



#### Figure 6: The average monthly precipitation amount (Weather2, 2012).

#### VEGETATION

The Steve Tshwete Local Municipality Area falls within the Grassland Biome (Figure 7). Two grassland types (Low & Rebelo, 1998) occur in this area namely:

- The Rocky Highveld Grassland (Acocks veldt type 34) and
- The Moist Sandy Highveld Grassland (Acocks veldt type 37)



#### Figure 7: Vegetation map of Middelburg

Closer to Loskop Dam, the area borders onto the transition between Rocky Highveld Grassland (veldt type 34) of the Grassland Biome and the Mixed Bushveld (veldt type 18) of the Savannah Biome (Low & Rebelo, 1998). Thicket/bushland and forest and woodland were also identified in the vicinity of the Loskop Dam, which would correspond to the Mixed Bushveld vegetable type. According to the State of the Environment report (2003) the Grasslands is in a very poor condition as more than half have been lost and ecosystem functioning has been compromised(Ferrar & Lotter, 2007).

Wetlands constitute an important and restricted habitat type for a variety of plants and animals. The wetland vegetation throughout the Highveld region of Mpumalanga is under great threat from factors such as alien invasive plant species (Henderson & Musil, 1987), altered hydrological patterns, reduced water quality, ploughing and overgrazing. Any remaining area of untransformed wetland must therefore be regarded as of elevated conservation importance. The type, distribution and conservation status of wetlands within the said area needs to be verified (Steve Tshwete Local Municipality, 2010).

#### WATER

Drainage occurs in a northerly to north westerly direction in the southern part of the area, and south to southwest in the northern part of the area, towards the Klein Olifants River, which in turn flows west towards the Olifants River. The Olifants River drains into the Loskop Dam. The dam is approximately 30km long and supplies water to a vast irrigation scheme in the areas of Loskop, Groblersdal and Marble Hall. The Middelburg Dam catchment covers an area of 1 576km<sup>2</sup>, but a significant portion of it drains to pans. These pans act as small isolated catchments which reduces the effective total catchment area draining to Middelburg Dam to 1 401 km<sup>2</sup>(Ferrar & Lotter, 2007). The Klein Olifants River is the most significant river in the Middelburg Dam catchment. It is an important catchment, not only in context of water supply to the greater Middelburg area, but also in terms of the flow and pollution load contributions to Loskop Dam(Steve Tshwete Local Municipality, 2010).

Water in the Middelburg Dam and Loskop Dams catchments is used according to the following user categories as specified in the South African Water Quality Guidelines (1996):

- Domestic;
- Livestock watering;
- Irrigation;
- Industrial; and
- Aquatic environment

Water from the Klein-Olifants River is used extensively for irrigation and livestock watering purposes. Irrigation use is mainly for the growth of maize and potatoes(Nkangala District Municipality, 2012).

## Biodiversity, Conservation Areas and Nature Reserves

Steve Tshwete Local municipality is a very important area regarding threatened species. In total Steve Tshwete supports 79 threatened species, 18 of those being Red Data Flora species. The Giant Bull Frog (Pyxicephalus Adspersus) is the only Red Data frog species to have been recorded in the Nkangala District Municipality and it is found within the municipal boundaries of Steve Tshwete. The most critical areas in respect of biodiversity and environmental sensitivity are(Ferrar & Lotter, 2007):

- The Loskop Dam Nature Reserve (mammals, birds, reptiles);
- The grasslands between Middleburg and Loskop Dam Nature Reserve (Flora); and
- The ecological corridor traversing the western boundary in a north-south alignment towards Vandyksdrif.

Apart from the Fauna and Flora, a number of floodplain wetlands, seepage wetlands, and endorheic pans occur in Steve Tshwete(Lotter & Ferrar, 2006) which should be seen as priority conservation although this local municipality is very inadequately protected(State of the Environment, 2003)

## 3. SOCIO-ECONOMIC BASELINE

The socio-economic baseline section provides a demographic, cultural and economic overview of the Project Area and also describes the physical infrastructure and services available in the communities visited. The purpose of collecting this information is to provide a basis upon which the impact assessment can be conducted, and to enable the monitoring and measurement of changes over time.

## 3.1. METHODOLOGY

This socio-economic baseline is primarily based on statistics from the 2011 Census, the 2012 Quarterly labor Force Survey and Municipal documents such as the Spatial Development Framework (2010-2011) and the Integrated Development Planning document (2011-2012) from the Steve Tshwete Local Municipality (LM).

## 3.2. OVERVIEW

The province of Mpumalanga is characterized by high levels of unemployment and has the second largest number of youths per province that are not engaged in employment, education or training (Statistics South Africa, 2013). This means this category of individuals is disengaged from both work and education (Statistics South Africa, 2013). Nationally the province has the third highest unemployment rates. Rising levels of unemployment and the increase in the economically inactive population has resulted in increased pressure on the diminishing employed population and a high dependency on the State for support.

The dominant economic sectors of the province are mining, agriculture and tourism; although the mining sector has experienced fluctuating employment levels in the last three quarters of 2012 (Statistics South Africa, 2013). The instability within this sector can be ascribed to the long periods of mining protests and unrest the South African economy has experienced over the past year. Other reasons for these changes can be attributed to the relatively low growth experienced in the Nkangala District and negative growth experienced within in Gert Sibande and Ehlanzeni Districts in the mining sector and high growth rates within most of the other sectors (Laduma, 2007). The number of operating coal mines in South Africa has also declines from 112 in 1990 to almost 65 in 2004 (Laduma, 2007).

The provision of services and infrastructure continues to be a challenge. This is exacerbated by the highly dispersed distribution of settlements, which is as a result of the predominantly rural settlements. The provision of sanitation services in Mpumalanga has the highest backlog.

The town of Middelburg, which is located within the Nkangala District Municipality, is characterized by an extreme disparity in wealth between the previously advantaged racial group and other racial group (Steve Tshwete Local Municipality, 2013). It can therefore be assumed that the high illiteracy levels and lack of skills are not responsive to the local economic demands (Steve Tshwete Local Municipality, 2013). The area also experiences extremely high levels of Aids related deaths and HIV infections and rising levels of unemployment (Steve Tshwete Local Municipality, 2013).

## 3.3. Administrative Structure

This section outlines the administrative structure and spatially contextualizes the Project. Department of Finance (2012) depicts the relationship between the various spheres of government relevant to the Project. Further detail on each sphere of government is provided below.



Figure 8: Administrative Structure

## 3.3.1. MPUMALANGA PROVINCE

The province of Mpumalanga constitutes 6.3% of South Africa's land area (Statistics South Africa, Census 2011 Census in brief, 2012). Mpumalanga has three district municipalities; Nkangala, Gert Sibande and Ehlanzeni, which comprise of seventeen local municipalities (Nkangala District Municipality, 2011). The seventeen local municipalities are as follows: Victor Khanye Local Municipality, Emalahleni Local Municipality, Steve Tshwete Local Municipality, Emakhazeni Local Municipality, Thembisile Hani Local Municipality, Dr. J. S. Moroka Local Municipality, Albert Luthuli Local Municipality, Msukaligwa Local Municipality, Mkhondo Local Municipality, Lekwa Local Municipality, Pixley Ka Seme Local Municipality, Dipaleseng Local Municipality, Govan Mbeki Local Municipality, Thaba Chweu Local Municipality, Mbombela Local Municipality, Umjindi Local Municipality, Nkomazi Local Municipality and Bushbuckridge Local Municipality(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).

The important in the province are towns are Nelspruit, now renamed to Mbombela, Witbank, Standerton, Piet Retief, Malelane, Ermelo, Barberton and Sabie. The executive authority of Mpumalanga rests with the Premier. The Mpumalanga Provincial Growth and Development Strategy (MPGDS) provide the framework for development in the Province (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality Spatial Development Framework, Draft Report, 2010). The Province is governed by the following Departments:

- Office of the Premier;
- Department of Agriculture, Rural Development and Land Administration;
- Department of Economic Development, Environment and Tourism;
- Lepartment of Culture, Sport and Recreation;
- Lepartment of Co-Operative Governance and Traditional Affairs;
- Department of Education;
- Department of Health;
- Department of Social Development;
- Lepartment of Community Safety, Security and Liaison;
- Department of Finance;
- Lepartment of Human Settlements;
- Lepartment of Public Works, Roads and Transport

Most pertinent to the Project is the Department of Economic Development, Environment and Tourism which will be the approving authority in the event of a Basic Assessment evaluation.

## 3.3.2. NKANGALA DISTRICT MUNICIPALITY

The Nkangala District Municipality (NDM) is one of three District Municipalities in the Mpumalanga Province and covers 16, 892 square kilometers. The headquarters of the NDM is located in Middelburg. The District Municipality is composed out of six local municipalities, namely: Victor Khanye Local Municipality, Emalahleni Local Municipality, Steve Tshwete Local Municipality, Emakhazeni Local Municipality, Thembisile Hani Local Municipality and the Dr. J. S. Moroka Local Municipality (Nkangala District Municipality, 2011).



Figure 9: Geographic Location

A number of changes occurred in terms of provincial and municipal boundaries during the period between 2001 and 2011. Of the nine provinces, only two provinces (Western Cape and Free State) were not affected by changes. The provincial boundary changes were mostly as a result of eight cross boundary municipalities which were absorbed in full into respective provinces. Prior to the 2011 municipal elections large portions were managed as District Management Areas. The second largest decrease in land size was for Mpumalanga which decreased by 2991, 9 square kilometers with Limpopo being the main recipient of this land area (Statistics South Africa, Census 2011 Statistical release (Revised), 2012). In terms of which areas moved to which province, a detailed outline is provided for below.

#### Gauteng and Mpumalanga:

- A portion of Delmas municipality (2001) now called Victor Kanye was allocated to the City of Tshwane in Gauteng based on the current provincial boundaries.
- Kungwini municipality, now incorporated into the City of Tshwane, was a cross boundary municipality and is now fully allocated to Gauteng, based on the current provincial boundaries.

#### Mpumalanga and Limpopo:

- Greater Groblersdal, now Elias Motsoaledi, Greater Marble Hall now Ephraim Mogale, and Greater Thubatse were cross boundary municipalities between Mpumalanga and Limpopo and have now been allocated in full to the Limpopo province. Ephraim Mogale municipality was absorbed into the Schuinsdraai Nature Reserve.
- Bushbuck Ridge municipality was a cross boundary municipality between Limpopo and Mpumalanga and has now been allocated in full to the Mpumalanga province. (Bushbuck Ridge also absorbed a portion of the Kruger Park cross boundary District Management Area.) (Statistics South Africa, Census 2011 Statistical release (Revised), 2012).

The executive authority of the NDM rests with the Executive Mayor. The regional centre of the NDM is Middelburg. Strategic development within the NDM is aligned with the MPGDS and other national development initiatives. Despite this, the District suffers from a backlog of service delivery in terms of refuse removal and a lack of infrastructure in terms of access to hygienic toilets. The developmental focus of the municipality is currently centered on the provision of infrastructure and basic services. These issues are hampered by the spatial structure and locality of settlements in the area, which are extremely dispersed (Nkangala District Municipality, 2011).

The Nkangala District Municipality's Local Economic Development Strategy (LED) identified nine *thrusts* for the regeneration of the NDM economy formulated from economic opportunities and public sector interventions identified in an opportunity analysis for the NDM (Nkangala District Municipality, 2011). These thrusts are:

- Good Governance and Capacitating
- <sup>4</sup> Human Resource and Community Development
- 💪 Industrial and Big Business Development
- SMME Development and Support
- Le Agricultural Development
- Le Tourism Development
- <sup>L</sup> Rural Development
- *Sustainable Environmental Development*
- NEPAD and International Cooperation

## 3.3.3. LOCAL MUNICIPALITY: STEVE TSHWETE LOCAL MUNICIPALITY

Middelburg falls into the Steve Tshwete Local Municipality (LM). Nkangala district in Mpumalanga province is geographically the smallest district but, with a population of 1 012 542, has the highest population density (68.0 people per km2) (Massyn N, 2013). The two primary nodal points in the Steve Tshwete LM is, Middelburg/Mzhuli which is the commercial and administrative centre and the much smaller Hendrina/Kwazamokuhle (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011). The Steve Tshwete LM's ward numbers have increased from twenty-four to twenty-nine wards during the 2011 demarcation, which has resulted in a growing population size and increased pressure on service delivery (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality.

The role of the LM is to monitor and manage service delivery to settlements within its jurisdiction, implement plans and policies of the NDM and to carry out the development objectives outlined within the LED.

In the Reviewed 2013-2014 IDP, the LM has identified seven strategic objectives to achieve:

- \* Poverty Alleviation
- \* Service Delivery
- \* Financial Viability
- \* Economic Growth and Development
- Sood Corporate Governance
- Sood Cooperative Governance
- Integrated Environmental, Social, Economic and Spatial Planning

Key priorities for the LM between 2012 and 2017 include:

- Good Governance and Public Participation;
- Municipal Transformation and Organizational Development;
- Financial Viability;
- Local Economic Development;
- Service Delivery and Infrastructure Development and;
  - Spatial Planning and Land Use Management
  - o Human Settlements
  - Community Facilities
  - Municipal Infrastructure and Services
  - Safety, Security, Fire and Emergency
  - o Licensing
  - Education and Libraries
  - Municipal and Primary Health Care
  - Gender and Social Development
  - Youth Development
  - Recreation, Moral Regeneration, Arts, Culture and Sports. (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011).

Local government is represented in the communities by fifty-eight ward councilors, i.e. 29 councilors and 29 proportional councilors. These councilors represent local government in the various towns and work closely with local government departments. The role of the councilors is to monitor and maintain existing service delivery such as water, sanitation and refuse removal and to initiate new projects within the communities (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011).

On a regular basis, the municipality engages in to community consultation meetings in an Endeavour to:

- $\stackrel{l}{\smile}$  give feedback on progress in relation to the level of development
- le gather inputs from communities in relation to service delivery needs
- $\stackrel{l}{\smile}$  disseminate information on the roles and responsibilities of the municipality

These community consultation meetings were held in all the wards between September and October 2011(Steve Tshwete Local Municipality IDP 2012-2017, 2011).

Councilors work closely with the Community Development Workers (CDWs). These are local people employed by the Department of Housing and Local Government. The role of these CDWs is to represent their communities at the local and district government level and to identify potential development opportunities and needs.

The municipality also utilizes CDWs as another form of link in accessing communities in relation to community development initiatives/ programs. Whilst the CDWs are regarded as the link between government and the community, there are still communities especially the majority of people who fall in the poorer segment of the population that are unable to access the full potential of the municipality program. The municipality has initiated a reporting system that is intended to monitor the work of the CDWs and at the same time record identified community development needs. The CDWs are expected to submit reports on a monthly basis reflecting on the activities of the month (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011)

## 3.3.4. POLITICAL ADMINISTRATION

The ANC has overwhelming support in the municipality but the DA has gained a strong following. The ANC won thirty-nine of the fifty-eight seats during the 2011 local municipal elections with the DA holding seventeen of the fifty-eight seats.

## **3.4.** POPULATION STATISTICS

Mpumalanga covers 76 495km<sup>2</sup> and has a population of 4 039 939 people (Statistics South Africa, Census 2011 Statistical release (Revised), 2012). In the 2011 Census the population of the Mpumalanga represented 7, 8 percent of the national population. According to the Census 2011 data, Mpumalanga experienced out-migration of 191, 089 and an in-migration of 243, 934 resulting in a in a net increase of 52, 845. It is worth noting that nineteen percent of migrants to this province were born outside of the country or rather, about 2, 6 percent of the migrants to this province were non-South African citizens (Statistics South Africa, Census 2011 Statistical release (Revised), 2012).

The total population size was 1, 018 422 in the 2001 Census and has grown to 1, 308 129. Thus, the population size of the NDM has seen an increase (of 2, 5 percent) in population size from 2001 to 2011 (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012). In 2011 the NDM population constituted more than 34 percent of Mpumalanga's population. The Steve Tshwete LM in 2010 it was home to 14, 9 percent of the district's population and has experienced a population increase of 4, 76 percent from 2001 to 2011 (Nkangala District Municipality, 2011).

## Table 1: Nkangala District Population Distribution

	1980	1985	1991	%	1996	%	2001	%	2007	%	2010	%	2015	%
District						N	umber of pe	ople						
Victor Khanye LM	47,794	46,998	48,614	5.5%	52,589	5.5%	56,210	5.5%	50,455	4.1%	50,800	3.9%	51,200	3.8%
Emalahleni LM	152,797	157,150	183,016	20.8%	236,655	24.6%	276,410	27.1%	435,222	35.5%	460,000	35.6%	495,000	36.3%
Steve Tshwete LM	126,088	138,257	140,015	15.9%	135,412	14.1%	142,774	14.0%	182,506	14.9%	193,000	14.9%	210,000	15.4%
Emakhazeni LM	43,020	41,462	38,273	4.4%	37,014	3.8%	43,007	4.2%	32,840	2.7%	51,000	3.9%	54,060	4.0%
Thembisile LM			211,972	24.1%	242,542	25.2%	257,113	25.2%	278,517	22.7%	288,000	22.3%	302,000	22.1%
Dr J S Moroka LM			257,273	29.3%	258,757	26.9%	243,313	23.9%	246,969	20.1%	249,000	19.3%	252,000	18.5%
NKANGALA DM			879,163	100.0%	962,895	100.0%	1,018,827	100.0%	1,226,501	100.0%	1,291,800	100.0%	1,364,260	100.0%
						INCREN	IENT							
District	1980-	1985	1985-:	1991	<b>1991</b> -1	1996	1996 - 2	001	2001 - 2	007	2007- 2	010	2010 - 2	015
Victor Khanye LM	-796		1,616		3,975		3,621		-5,755		345		400	
Emalahleni LM	4,353		25,866		53,639		39,755		158,812		24,778		35,000	
Steve Tshwete LM	12,169		1,758		-4,603		7,362		39,732		10,494		17,000	
Emakhazeni LM	-1,558		-3,189		-1,259		5,993		-10,167		18,160		3,060	
Thembisile LM					30,570		14,571		21,404		9,483		14,000	
Dr J S Moroka LM					1,484		-15,444		3,656		2,031		3,000	
NKANGALA DM					83,732		55,932		207,674		65,299		72,460	

Source: (Nkangala District Municipality, 2011).

The above table shows the growth rates for the LMs in the NDM. Since 2001 most LMs have experienced a steady positive growth.

## 3.4.1. Age

*Figure 3.2* shows that the proportion of the population in the Nkangala DM between the age of five and nineteen in 2011 has decreased quite significantly since Census 2001. There has also been a drastic increase in the number of males in the age group of twenty to thirty-four since 2001. The females aged twenty-five to twenty-nine has also experience some level of growth, but not as much as their counterparts.

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)



Figure 10: Distribution of Population by Age and Sex, Nkangala - 1996, 2001 and 2011

Over the same period, the proportion of the population above the age of 65 has seen an increase, resulting in a higher dependency on the diminishing population that is economically active. This is exacerbated by the low levels of employment. The reason for the increase in the proportion of the population over 65 years is not apparent, but it is in accordance with the increase in national life expectancy that South Africa has been experiencing (Statistics South Africa, Census 2011 Statistical release (Revised), 2012).

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The figure below illustrates the dependency ratio of Mpumalanga and by district municipalities. Approximately 64, 1 percent of the population in the fifteen to sixty-four age group and is able to contribute to the economic base of the Municipality, provided that the skills base is matched to available employment. This is however not the case, and continued pressure on infrastructure and services.



Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

## 3.4.2. Gender

The figure below illustrates the percentage of the population who are female by province. The figure shows that



the female population of Mpumalanga is 51, 1 percent. Consequently on can deduce that the gender distribution for Mpumalanga is fairly even with 48, 9 percent being male and 51, 1 percent being female.

Source: (Statistics South Africa, Census 2011 Census in brief, 2012)

The table below shows that there is not much of a difference between the Nkangala DM and Steve Tshwete LM in terms of the gender distribution. Nkangala DM female population is only 1, 78 percent larger than the female inhabitants of the Steve Tshwete LM. In both instance there is a relatively even distribution of males to females.

#### Table 2: Gender profiles of Nkangala District Municipality and Steve Tshewete Local Municipality

Gender	Nkangala DM		Steve Tshwete	LM
	Number	Percentage (%)	Number	Percentage (%)
Female	651, 882	49,83	110, 421	48, 05
Male	656, 247	50, 17	119, 411	51, 95
Total	1308, 129	100	229, 832	100

**Source:** (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

## 3.4.3. RACE, ETHNICITY AND LANGUAGE

The racial profile of the Nkangala DM and Steve Tshwete LM is shown in *figure 1.5.* The NDM and LM predominantly comprise Black/African South Africans. In the NDM and the LM the White population (9, 9 and 21, 84 percent) is larger than the other minority population groups (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).



#### Figure 12: Racial profiles of Nkangala District Municipality and Steve Tshwete Local Municipality

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

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The table below illustrates the language groups in Mpumalanga. SiSwati is the most commonly spoken language in Mpumalanga, with well over the 1, 1 million people speaking the language. The other widely spoken language in the province is IsiZulu (Statistics South Africa, Census 2011 Census in brief, 2012).

<b>Table 3: Population</b>	group of I	Mpumalanga	by first	language	group	spoken
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Language	Mpumalanga		
		Number	Percentage (%)
Afrikaans	289, 446	7, 24	
English	124, 646	3, 12	
isiNdebele	403, 678	10, 10	
isiXhosa	48, 993	1, 23	
isiZulu	965, 253	24, 14	
Sepedi	372, 392	9, 31	
Sesotho	138, 559	3,47	
Setswana	71, 713	1,79	
SiSwati	1, 106 588	27, 67	
Tshivenda	12,140	0, 30	
Xitsonga	416, 746	10, 42	
Sign Language	8, 932	0, 22	
Other	39, 639	0, 99	
Total	3, 998 726	100	

Source: (Statistics South Africa, Census 2011 Census in brief, 2012)

## 3.5. EDUCATION

The figure below shows that since 2001 the amount of population in Mpumalanga between the ages of five and twenty-four attending school had increased slightly by 1, 3 percent. Census data also indicate that school attendance in all districts, with the exception of Nkangala had seen a slight increase since 2001 (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).



Figure 13: Distribution of the population aged between five and twenty-four years by school attendance and district municipality – 1996, 2001 and 2011.

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

The 2011 Census data shows that 14, 0 percent of the Mpumalanga population aged 20 years and above has no schooling, 29, 4 percent has grade twelve education and only 9, 3 percent were reported to have higher education in 2011 (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).

In the NDM 11, 42 percent aged 20 years and above has no schooling, 30, 0 percent has grade twelve education and 9,9 percent were said to have higher education (See *figure below*)(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012). This data is interesting, since this district has a greater population with higher education than the province. These results support the NDM's claim that it is situated within the economic heartland of Mpumalanga considering that this is the area where most of the province's skills capacity will be situated (Nkangala District Municipality, 2011).



#### Figure 14: Distribution of Nkangala DM population aged 20 years and older by highest level of education attained.

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

Of the communities in the Steve Tshwete LM, 7, 47 percent aged 20 years and above has no schooling, 35, 12 percent has grade ten or twelve education and 14, 44 percent were said to have higher education(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012). In summary the levels of education and thus the skills base is low and it suggests that approximately 35, 12 percent of the population aged 20 years and above would be eligible for employment opportunities that require Grade 12.

Table 4: Education Levels	by Population Aged 20	) years and above
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Level of Education	Nkangala DM		Steve Tshwe	te LM
	Number	Percentage (%)	Number	Percentage (%)
No schooling	325, 540	26, 70	11, 117	7, 47
Std 10/Grade 12	670, 343	55,0	52, 291	35, 12
Higher	223, 579	18, 30	21, 502	14, 44
Total	1,219,462	100	84, 910	100

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

## 3.5.1. OPTIONS FOR POST-SCHOOL STUDY

Although some barriers to further education options for the NDM area is a reality, the option of further education training (FET) can be realized within favorable conditions. Nkangala District currently has four FET Colleges located in the following municipalities, namely, Steve Tshwete, Emalahleni, Dr. J. S. Moroka and Emakhazeni(Nkangala District Municipality, 2011).

It seems as if the reason that these FET Colleges aren't successfully contributing to the skills gap in the region is firstly, due to a lack of investment at foundation phase with learners in subjects such as Mathematics, Science, Medicine and Technology (Nkangala District Municipality, 2011). This results in a very low number of learners being able to enroll in FET Colleges. Secondly, strategies need to be put in place to make bursaries, work place opportunities and internship programs available to learners to increase and develop their skill sets.

## 3.5.2. Skills

As briefly discussed above, skills base in the district in subjects areas such as Mathematics, Science, Medicine and Technology are low, perpetuating the cycle of poverty and disempowerment and deepening dependency on the state. The low skills base is recognized by the NDM who have plans underway to initiate a retention strategy by ways of bursaries, opportunities in the work place and job placement programs (Nkangala District Municipality, 2011). The NDM have also stated that the FET Colleges together with their curriculum needs to be further aligned to close the critical gap in the market and that a University within Mpumalanga needs to be built since the region is currently losing its graduates to other provinces (Nkangala District Municipality, 2011).

## 3.6. HEALTH

## **3.6.1.** HEALTH FACILITIES

In 2011 the district of Nkangala recorded that the region has access nine provincial hospitals, nineteen Community Health Centers, and eighty-five clinics(Department of Finance, 2012). Despite these figure, access to health services and health levels in the Nkangala District remain a challenge, with only 13,2 percent of the population with medical aid coverage(Massyn N, 2013).

In order to enhance the effectiveness of health care services in the area, the Department of Health has rolled out mobile clinics to local communities. In spite of this, the number of mobile clinics rolled out by 2010 remains very low (See Table below) (Nkangala District Municipality, 2011).

## Table 5: Nkangala District Mobile Clinics and Points

Sub District	Number of Mobile Units 2010
Emalahleni	9
Emakhazeni	2
Dr J. S. Moroka	2
Steve Tshwete	4
Thembisile	3
Victor Khanye	2
District Total	22

Source: (Nkangala District Municipality, 2011)

It is reported that during all the community meetings of the District Community Outreach Program during September 2010 and February 2011 respectively, the issue of accessibility to health services were raised continually (Nkangala District Municipality, 2011). The following points were raised as issues of concern regarding the health services at the community meetings:

- Steve Tshwete LM:
  - A need for the clinic to be extended since the population is growing in ward 29.
- Emalahleni LM:
  - Lack of access to clinics by farm dwellers, especially in ward 32;
  - There is a need for a clinic in phase 1 ward 8, ward 26 and 27.
- Dr J. S. Moroka LM:

- Access to clinics is a problem throughout the municipality. A particular need for clinics was expressed for ward 6, 11, 13, 15, 16 and 22;
- Limited capacity and/or operating times of the local clinics (ward 21, 22, 23, 25, 29 and 30);
- Limited capacity of the local hospital.
- Emakhazeni LM:
  - The mobile unit servicing ward 5 is not accessible to the broader community;
  - $_{\odot}$  There is a need for a clinic in ward 7.
- Thembisile LM:
  - $\circ~$  There is a need for a clinic in ward 31;
  - $_{\odot}$  The clinic in ward 13 (Tweefortein) is not accessible due to poor road conditions;
  - The clinic at Sun City is dilapidated;
  - $\circ$   $\;$  There is a staff shortage at Moloto clinic.
- Victor Khanye LM:
  - There is a need for a clinic in ward 8;
  - $\circ~$  The clinic hours should be extended to 24 hours in ward 3;
  - $\,\circ\,\,$  The ambulance cannot reach the community at ward 7.

The district has 0.6 hospital beds per 1 000 population. The bed utilization rate at 72.2 percent is greater than the national average of 67.2 percent and is the highest utilization level in the province. The average span of a hospital stay was 4.4 days, close to the national average of 4.3 days(Massyn N, 2013).

## **3.6.2.** STATE OF HEALTH

The Aids and HIV prevalence in the district remains a major concern confronting health care. Although a downward trend in Aids level have observed since 2004, which recorded the highest figures (141 846), the HIV figures remain high in the Nkangala District (see *figure below*)(Nkangala District Municipality, 2011). It is also reported that even though HIV levels have seen a decrease in the district, the HIV prevalence amongst antenatal women increased from 27, 5 percent in 2007 to 32, 6 percent in 2009 (Nkangala District Municipality, 2011).



Source: (Nkangala District Municipality, 2011)

Figure 15: Estimated HIV and Aids numbers in Nkangala, 1996-2009.

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The primary causes of death in the region, in no particular order, were tuberculosis, HIV/AIDS, pneumonia, acute repertory infections, bronchitis, bronchopneumonia, gastro cardiac conditions, diabetes, and stillbirths/prematurity (Nkangala District Municipality, 2011). The figure below indicates the leading causes of years of life lost (YLLs) in the Nkangala District (Massyn N, 2013).



#### Source: (Massyn N, 2013)

The stillbirth rate has increased progressively over the past four years from 24.3 per 1 000 births in 2007/08 to 31.1 per 1 000 births in 2011/12 – now the second highest in South Africa. Despite a 36.6 percentage point improvement over the last five years, the TB cure rate of 68, 0 percent in 2010 remained well beneath both the provincial (72, 6 percent) and the national (73, 1 percent) averages. The TB defaulter rate increased from 8, 0 percent in 2009 to 9, 9 percent in 2010. Nkangala is the only region in Mpumalanga where defaulters increased. The hypertension detection rate was 0, 3 percent, matching the provincial and national averages. The mental health case load was 2, 6 percent of the total case load, well above the national average of 1, 4 percent. (Massyn N, 2013).

## 3.6.3. COMMUNICABLE DISEASES (HIV/AIDS, TB)

HIV prevalence remains a major challenge in South Africa, particularly in KwaZulu Natal and Mpumalanga Provinces. Mpumalanga Province HIV prevalence is the second highest after KwaZulu Natal while Gert Sibande District recorded the highest HIV prevalence of 46, 1 percent amongst the 52 districts in the country. The prevalence rates of HIV/AIDS for the country have increased from 9, 4 percent in 2001 to 10, 6 percent in 2011. The prevalence rate for women aged between 15 and 49 is 19, 4 percent, which suggests that one in five women in South Africa is HIV positive. The prevalence rate for men is 13, 3 percent base on the prevalence rate of 10, 6 percent for adults (aged 15 to 19) (Statistics South Africa, Mid-year Population Estimates Statistical Release P0302, 2011).

Although the Mpumalanga has followed a similar trend over the same period, data of the South African Health Review Report for 2011 suggest that the prevalence rates for the Province is still higher than the national rates (Padarath & English, 2011). Padarath & English (2011) illustrates the incidence of HIV in Mpumalanga according to the NDM and its local municipalities. The incidence in the NDM increased from 6 percent in 1996 to 12, 7 percent in 2001 and decreased to 11, 3 percent in 2008. The incidence of HIV/AIDS in the NDM was the fourth lowest in the Province in 2008.

#### Table 6: Incidence of HIV in Mpumalanga according to District Municipalities

Source: (Nkangala District Municipality, 2011)

Region	1996	2001	2008
Mpumalanga	5.9%	12.4%	11.0%
Nkangala	6.0%	12.7%	11.3%
Dr JS Moroka	5.9%	11.7%	9.8%
Thembisile	6.1%	12.6%	11.1%
Emakhazeni	6.1%	12.7%	11.2%
Victor Khanye	6.1%	12.9%	11.4%
Steve Tshwete	5.6%	12.9%	11.9%
Emalahleni	6.3%	13.6%	12.2%

Care and support to people living with AIDS is provided through home based care organizations. The Home Community based Care program forms part of the HIV/AIDS funded programs of which 152 Home Community Care organizations were funded appointing care givers receiving stipends (Mpumalanga, 2011).

303 Facilities including Hospitals provide Anti Retroviral Therapy (ART) in the province.

More than 186 889 patients have been put on treatment (adults and children) of which 35 257 are adult patients and 2 872 are children. Facility Space and human resources remains a challenge. Thirty two of the thirty three hospitals are providing ART services, with the exception of Matikwana hospital which is under consideration for inclusion(Mpumalanga, 2011).

## 3.6.4. TUBERCULOSIS (TB)

The management of Tuberculosis remains one of the key challenges in the Province given that is still one of leading causes of deaths. In response to the resolution of the National

Health Council the TB Program has been split from the HIV and AIDS Program with its own dedicated budget and management structure (Mpumalanga, 2011).

A TB crisis plan is in place and current TB cure rate is 74 percent, which is above the provincial target of 60 percent, but still below the National Target of 85 percent. TB defaulter rate reduced from 7, 5 percent in 2010/11 to 5, 7 percent in 2011/12. TB cure rate increase from 72, 7 percent in 2010/11 financial year to 73, 3 percent 2011/12 financial year (Mpumalanga, 2011).

## 3.7. MAJOR ECONOMIC ACTIVITIES AND SOURCES OF EMPLOYMENT

## 3.7.1. OVERVIEW

The figure below shows Mpumalanga's provincial contribution to the South African economy has remained constant over the period of 1996 to 2006 with 6, 9 percent and had seen a very small increase of 0, 1 percent for 2011. This is an indicating that the province has kept pace with economic growth on the whole, but has not experienced accelerated economic development (Statistics South Africa, Gross Domestic Product: Annual estimates, Regional estimates 2002 – 2011. Third quarter 2012, 2012).

Source: (Statistics South Africa, Gross Domestic Product: Annual estimates, Regional estimates 2002 - 2011.



Figure 17: Provincial Contribution to South African Economy: 1996, 2006 and 2011

Third quarter 2012, 2012)

The figure below illustrates that the average annual growth rate for the district and the province over the period of 2001 to 2011 was 3, 2 percent and 2, 5 percent respectively. Although this is still below the national growth rate of 4, 0 percent, Mpumalanga recorded positive growth in terms of relative size(Statistics South Africa, Gross Domestic Product: Annual estimates, Regional estimates 2002 – 2011. Third quarter 2012, 2012).



Figure 18: Average Real Annual Economic Growth Rate Per Region: 2001 – 2011

Source: (Statistics South Africa, Gross Domestic Product: Annual estimates, Regional estimates 2002 – 2011. Third quarter 2012, 2012)

The figure below provides an illustration of the sectors that contributed to the province's economic activity. The economy of Mpumalanga is largely driven by the mining and quarrying industry, which contributed 20, 0 percent to the province's economy in 2011. The second largest contributor to the region's market was utility services with 15, 1 percent. Utility services are followed by Agriculture, forestry and fishing at 9, 0 percent; manufacturing at 7, 1 percent and construction at 6, 8 percent (Statistics South Africa, Gross Domestic Product: Annual estimates, Regional estimates 2002 – 2011. Third quarter 2012, 2012).


#### Figure 19: Contribution by Industry of Mpumalanga Province 2011

Source: (Statistics South Africa, Gross Domestic Product: Annual estimates, Regional estimates 2002 – 2011. Third quarter 2012, 2012)

### 3.7.2. Key Sectors of Nkangala District Municipality

According to a Socio-Economic Profile Report, compiled by Mpumalanga's Finance Department, trade and mining are the largest employers in the NDM in 2011, providing approximately 21, 0 percent and 18, 6 percent of the jobs respectively(Department of Finance, 2012). Further detail on employment in these key sectors will be provided in a later section.

### TRADE

In 2011, the trade sector contributed 9 percent to the District's economy, which made it one of the largest sector contributors. A key concern however, was that the sector's contribution to employment has been declining. The sector seen a decreasing role as employer since 2001 and has experienced a 4, 2 percent decrease in employment rates during the period of 2001 to 2011 (Department of Finance, 2012).

The Tress Index measures the level of concentration or diversification of the economy, with zero representing a much-diversified economy and 100 representing a high level of concentration. According to this Index, the economy of the NDM is rated a score of 51, 9 compared to the provincial score of 40, 6. It can therefore be deduced that the economy of the NDM is less diversified than the provincial economy (Nkangala District Municipality, 2011).

### Mining

The mining sector is mostly concentrated within the Nkangala District contributing 70 percent of the total GVA of mining in the province. In 2011, the mining sector contributed 29, 8 percent to the District's economy, which made it the largest sector contributor amongst the three district municipalities in the province. A key concern however, was that the sector's contribution to employment has been declining as a number of mines have closed

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and the relatively low growth experienced by the District (Laduma, 2007). Over the period of 2001 to 2011, the mining sector has seen a decrease of 3, 6 percent in terms of its economic contribution (Department of Finance, 2012). Extensive mining is done all over the province, but coal is by far the most extracted mineral. Extensive coal resources are situated in the western and south-western part of Mpumalanga. The Witbank/Highveld coalfields are one of the most important collieries in South African, and its remaining energy generation is estimated at 40 to 45 years. The on-going challenge is achieving economic diversification however, to reduce the high dependency on mining as well as stimulating increased levels of minerals processing (Laduma, 2007).



### Figure 20: Kusile Power Plant neat Witbank

3.7.3. OTHER SECTORS

### AGRICULTURE

Natural resources play a significant role to the District's economy due to the nature of the District's economy, which is a 'resources based' economy. The agriculture sector is an important economic activity in the Nkangala District. In the southern regions, extensive farming, particularly in the form of crop farming is promoted. In the northern regions cattle and game farming is more prominent. An area of opportunity for intensive agriculture is along the N4 and N12 Corridors, to establish access to markets at regional and local level. The agriculture sector also plays an important role in support of the tourism sector.

An area of opportunity identified in the 2004 Local Economic Development Framework for the Nkangala LM (2010), is the establishment of argo-processing plants, which entails the production of bio-fuels through crops. This project will involve the cultivation, harvesting and processing of essential oils. Development in this area is critically important in the wake of that South Africa's steadily decreasing coal reserves, which serves as the country's main source of energy.

### TOURISM

Tourism as an industry spans several economic sectors ranging from accommodation to catering retail and wholesale, manufacturing, transport and communication, businesses and social services. The NDM offers considerable tourism potential due to the natural beauty and open spaces of the District. The region has already experienced increased growth due to its already popular tourist destinations(Nkangala District Municipality, 2011).

The NDM has recognized the tourism sector as an area of important growth and has proposed the demarcation of a Tourism Belt and Focus Areas in the District to promote and enhance its tourism potential. The intention is to focus investments and incentives in this area so that underprivileged communities can benefit from this initiative. The NDM has the tourism potential in the following markets:

- eco-tourism due to the vast open land, natural flora and fauna and a number of national parks and conservancies;
- Le historical and cultural tourism due to the rich local heritage of the Ndebele people in the North West of the District and;
- $\stackrel{l}{\smile}$  adventure tourism through hiking and fly-fishing.

(Nkangala District Municipality, 2011)

### 3.7.4. REGIONAL

The unemployment rate in Mpumalanga decreased to approximately 31, 9 percent in 2011 compared to 43, 1 percent in 2001. With regard to the sectoral division of employment opportunities, for the Nkangala District as a whole, the dominant sector in terms of employment is trade. Trade provided 21, 0 percent of all the employment opportunities in 2011 followed by mining which provided 18,6 percent of all jobs (See figure below). Together, these sectors provide approximately 40 percent of all jobs in the NDM (Department of Finance, 2012). Although these sectors remain major employers, the relative contribution made by the trade industry declined by 4, 2 percent during the period of 2001-2011. The mining sector showed the greatest proportional increase in job creation over the period up from 13, 6 percent of employment in 2001 to 18, 6 percent in 2011.



Figure 21: Sectoral Employment in the Nkangala District 2001-2011

Source: (Department of Finance, 2012)

### EMPLOYMENT

#### **Environmental Impact Assessment**

The NDM has a shortage of skilled and highly skilled people, where only 39, 7 percent of the economically active population in 2011 had a matric and higher. In 2001, the District's average unemployment rate of 30, 2 percent was higher than the provincial rate(Nkangala District Municipality, 2011). The rate of unemployment has decreased for Mpumalanga as well as the NDM from 2001 to 2011. The unemployment rate for the District decreased from 43, 8 percent to 30,2 percent over the period of 2001- 2011. This brings the unemployment rate of the District to an unemployment level lower than that of the Province, standing at 31, 9 percent for 2011(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012). In the Steve Tshwete LM similar trends can be seen in unemployment rates as experienced in the District. The unemployment rate of the Steve Tshwete in 2001 stood at 35, 4 percent and decreased to 19, 7 percent by 2010.



### Figure 22: Unemployment Rate at Provincial and Municipal Level, 1996, 2001 and 2011

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

### 1.2.1 DEPENDENCY

The figure below illustrates the dependency ratios at the NDM and the LM between 1996 and 2011. The dependency ratios have consistently decreased since 1996 for the Province as well as the NDM and LM. The decrease in the dependency ratio of the LM from 49, 2 percent in 2001 to 41, 5 percent in 2011 is possibly related to the change in the population structure with an increase in the number of people that are economically active.



### Figure 23: Dependency Ratios at the Provincial and Municipal Levels, 1996, 2001 and 2011

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

### 3.7.5. HOUSEHOLD INCOME

The figure below shows the trend in annual household income levels at the Provincial and Municipal levels between 2001 and 2011. There has been a significant increase in the average household income, observed across all levels. The income levels have increased by almost more than 100 percent over the past decade. Despite this, the average income level is still fairly low for the Province and the District. The monthly average household income is approximately R6466, 40 and R7417, 17 respectively. The monthly average household income of the Steve Tshwete LM on the other hand is nearly twice that of the Province at R11 168, 83 (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).



#### Figure 24: Annual Household Income at Provincial and Municipal Levels 2001 and 2011.

Source: (Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012)

### 3.7.6. NATURAL RESOURCE USE

### COAL

Coal serves as an important source of energy, not only for the Province, but for the broader South Africa. Mpumalanga accounts for 83 percent of South Africa's coal production. Approximately 2, 25 million people are dependent on the mines in the Witbank-Highveld. This serves as an important source of income as they have limited access to any other form of income generation.

### 3.8. SOCIAL CHALLENGES AND VULNERABILITY

### **3.8.1.** SOCIAL CHALLENGES

Key social challenges include:

- high incidence of poverty;
- high unemployment rate; and
- dependency on state grants;

### TEENAGE PREGNANCY

High teen pregnancies are prevalent within the District, which present a challenge in bridging the skills gap between boy and girls children (Nkangala District Municipality, 2011)

### CRIME

The leading crimes in the Steve Tshwete LM region in order of highest to lowest include burglary at residential premises, robbery with aggravating circumstances, driving under the influence of alcohol or drugs, sexual crimes, drug-related crimes and murder.

### **3.8.2.** VULNERABILITY

Vulnerability is defined as the capacity of individuals or groups to respond to, cope with, adapt to or recover from an external stress or change that will affect their livelihoods and well-being. This approach to defining vulnerability allows for a focus on socio-economic and institutional constraints that limit individuals' or groups ability to respond to change (Kelly, 2000).

The above issues and associated poor quality of life give rise to vulnerabilities in the communities in the settlements within the Area of Influence. Specific vulnerable groups include:

- unemployed;
- elderly;
- children and youth (including orphans);
- women (especially single women); and
- disabled and chronically ill.

### CHILDREN AND YOUTH

Violence against children within the District remains a challenge (Nkangala District Municipality, 2011).

### WOMEN

It is reported that violence against women within the District remains a challenge (Nkangala District Municipality, 2011).

### DISABLED AND CHRONICALLY ILL

There's a lack of amenities, particularly in urban areas as well as Mhluzi and Kwazamokuhle, which cater for the disabled in the community. Facilities for the physically disabled and mentally ill is not available, even though there is a great need for these facilities. (Venter, 2008).

# 3.9. Bulk Services and Infrastructure

The bulk services and infrastructure in the Steve Tshwete LM is generally in good condition, but more so for the urbanized areas. The rural region, which generally includes wards 1-10, is situated in the Mhluzi area. This area is still very underdeveloped in terms of services and infrastructure. It lacks proper housing infrastructure as well as access to basic services such as electricity, water, refuse removal and sanitation infrastructure (Venter, 2008).

A number of infrastructural needs have been identified as reported in the NDM IDP:

- Minimize existing infrastructure backlogs;
- unblock housing projects, address existing housing backlog and improve quality of RDP houses;
- eradicating spatial distortions which pose severe challenges to equitable and sustainable service delivery; and
- efficient and effective maintenance of existing infrastructure.

The municipality attributes the lack of services and infrastructure in the rural areas to the sheer geographical size of the rural wards.

### 3.9.1. HOUSING

In Mpumalanga there are approximately 805 000 households. The Province is predominantly rural with approximately 61 percent of its population living in rural areas. Indian, white and colored population groups of Mpumalanga were highly urbanized; with 92,2 percent; 82,7 percent and 79,6 percent respectively of them living in urban areas. The highest proportion (64,5 percent) of the black African population lived in non-urban areas(Statistics South Africa, Provincial Profile 2004: Mpumalanga, 2006).

In Mpumalanga 77 percent of the province's population is living in formal dwellings and 11, 7 percent living in informal dwellings. The households living in formal structure in Mpumalanga is above the national level, which is currently at 70, 6 percent(Statistics South Africa, Community Survey, 2007 Basic Results: Municipalities, 2008). The average household size for the Province is 3.7 compared to 3.6 for the District and Local Municipalities. The average size of households has been steadily decreasing since 1996 at all levels(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).

It is estimated that there are 246 049 households in the NDM. Of these, 82, 8 percent are formal dwellings, 13, 9 percent are informal dwellings and 2, 4 percent are traditional. It is estimated that the LM consists of 64 221households. Of these 84 percent (53 929) of households reside in formal dwelling structures, 14, 3 percent (9190) of these households reside in informal dwellings and 1, 7 percent (1 102) in traditional huts. According to the IDP of the Steve Tshwete LM, the need for provision of housing in urban, as well as rural areas is rampant and the municipality is currently experiencing a housing backlog of 15712 units. According to the IDP of the Steve Tshwete Local Municipality IDP 2012-2017, 2011).

The main informal settlement in the LM area is concentrated in the following areas; Kwazamokuhle, Newtown, Uitkyk and Rondebosch (Vaalbank). The number of informal dwellings has increased in the municipality from 5937 in 2001 to 9190 in 2011(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012). The high increase in informal dwellings can quite possibly be attributed to the high influx of non-South African citizens the Province has been experiencing lately.

### 3.9.2. WATER SUPPLY

The Mpumalanga Regional Office of the Department of Water Affairs (DWA) is responsible for managing water resources in the Province. The Province is located in a sub-tropic region and experiences summer rainfall in the form of heavy thunderstorms. Middelburg, in the heart of the Highveld, experiences summer rain, and has a summer (October to February) to winter (April to August) range of around 19° C with average temperatures in the contrasting seasons, of 26° C and 8° C. Nelspruit, the capital city of Mpumalanga, lies at the edge of the Lowveld near the Kruger National Park, and enjoys relatively plentiful summer rainfall (an average of around 620 mm falls between September and March)

Approximately 12, 6 percent of households in the Province have no access to clean piped water(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012). According to the Department of Water Affairs' standard requirements for adequate access to water, households must have at least 20 to 30 liters of clean safe water per person per day, available within 200 m of the household(Venter, 2008).

In the NDM 81, 6 percent of households have access to piped water in their dwellings, 11 percent have access to piped water from a communal stand and 7,3 percent have no access to piped water(Nkangala District Municipality, 2011). Of the households in the Steve Tshwete LM area 85, 7 percent (55 680) have access to piped water inside their dwelling or yard(Statistics South Africa, Census 2011 Municipal Report Mpumalanga, 2012).

Middelburg received its water supply from the Middelburg Dam, situated on the Klein Olifants River which presently offers a water supply of 36 438 cubic meter per day. Currently two water purification works, with a total design capacity of more than 50 000 cubic meter per day, meets the needs of Middelburg and Mhluzi.

The Steve Tshwete LM has received the Blue Drop Accreditation Status every year since 2010(Department of Finance, 2012). Blue Drop Accreditation is a flagship status program to encourage and monitor water quality across the country.

### GROUNDWATER

Many farm areas and informal settlements do not have access to piped water in the Steve Tshwete LM region, and as many as 70 percent of all settlements obtain their water from boreholes and only 16 percent of these settlement acquire their water source from rivers, streams and springs.

### 3.9.3. SANITATION

The percentage of households that have access to flush or chemical toilets has steadily increased in the Province since 1996. The LM has shown the greatest increase between 1996 and 2011 and also had the highest percentage (79 percent) of households across all levels. Significant progress has been made to eradicate bucket toilets in the Province. In 2007 only 0, 5 percent of households in the Province still used a bucket toilet, which is down from 2, 6 percent in 2001. In 2007 the NDM had 0, 8 percent and Steve Tshwete LM had 1, 7 percent of households use a bucket toilet, which is down from 17 percent and 10 percent, respectively since 2001. In 2007 the NDM had 0, 8 percent of households use a bucket toilet in 2001. This percent since 2001. The Steve Tshwete LM had 1, 2 percent of households use a bucket toilet in 2001. This percentage has increased in 2007 with 0, 5 percent, standing at 1, 7 percent in 2007. In 2007 8 percent of households in the Province had no access to sanitation and 3,5 percent and 3,3 percent of households did not have access to sanitation for the NDM and Steve Tshwete LM respectively. Although the number of households who have no access to sanitation service has decreased, it is clear that a lot of work still needs to be done to provide better sanitation facilities to the local communities (See figure below).(Statistics South Africa, Community Survey, 2007 Basic Results: Municipalities, 2008).

Municipality/Province		% Households using pit latrines		% Households using a bucket toilet		% Households with no toilet facility	
		2001	2007	2001	2007	2001	2007
Nkangala Municipality	District	48,7	44,8	1,3	0,8	4,8	3,5
Steve Tshwete Municipality	Local	10,4	11,5	1,2	1,7	6,7	3,3
Mpumalanga		48,4	46,7	2,6	0,5	12,1	8,0

# Figure 25: Distribution of Households by the Type of Sanitation Facilities between 2001 and 2007 for the Province, DM and LM

Source: (Statistics South Africa, Community Survey, 2007 Basic Results: Municipalities, 2008)

### 3.9.4. REFUSE REMOVAL

The waste disposal of the District Municipality is centralized, and therefore all refuse that's collected at various service delivery areas is transported to the registered Middelburg landfill site for disposal (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011)

Once again, the geographical size of the area, especially in the rural wards, proves difficulty for the District Municipality. Since 2001 the proportion of households in the District whose refuse was removed by local authority/private company has increase from 43, 3 percent to 45, 1 percent in 2007. Although the District has seen an increase in refuse removal the Local Municipality has experienced a slight decrease in refuse removal from 85, 3 percent in 2001 to 84, 8 percent in 2001.

### 3.9.5. POWER SUPPLY

The figure below shows that the use of electricity for lighting, heating and cooking has steadily increased between 2001 and 2007 for the Province as well as the NDM and Steve Tshwete LM.

Steve Tshwete LM has the highest increase in the use of electricity for lighting and cooking where 90, 4 percent of households used electricity for lighting in 2007 compared to 74, 7 percent in 2001. Similarly, the use of electricity for cooking increased approximately 24 percent in the LM from 52, 6 percent in 2001 to 77, 0 percent in 2007(Statistics South Africa, Community Survey, 2007 Basic Results: Municipalities, 2008).

Municipality/Province	%	Households	using	%	Households	%	Households
	electricity for lighting		using	electricity	usi	ng electricity	
			for coc	oking	for	heating	

	2001	2007	2001	2007	2001	2007
Nkangala District Municipality	79,3	81,5	47, 8	59,6	46,8	49,3
Steve Tshwete Local Municipality	74,7	90,4	52,6	77,0	52,8	64,5
Mpumalanga	68,9	82,2	38,0	55,7	37,4	45,0

### Figure 26: Distribution of Households That Use Electricity for Lighting, Heating and Cooking from 2001 to 2007.

Source: (Statistics South Africa, Community Survey, 2007 Basic Results: Municipalities, 2008)

Due to various new developments in areas such as Hendrina, Mhluzi, kwaza, Dennesig and Kannonkop there is a greater demand on electricity supply, and therefore electricity provision is a high priority. An estimated R51, 4 million is set aside in the Local Municipality's budget to ensure the provision of electricity to new developments (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011).

### 3.9.6. ROADS

Major routes that run through the town of Middelburg are the N4, which runs east/west through the municipal region and the N11, which runs in a north/south direction. Other than these two important routes, some six other provincial roads link Middelburg to other towns in Mpumalanga (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011).

The municipality is responsible for local roads, which includes all streets within formal towns. The municipality also assists in the maintenance of some minor district roads that serve small communities. Many of the municipal roads are paved, with gravel roads only comprising some 16 percent of all municipal roads (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality IDP 2012-2017, 2011). A vigorous process of tarring roads over the past few years have left most of the urbanized areas tarred. Roads in rural areas are mostly graveled roads. (Venter, 2008). The condition of the roads is largely fair to good, with approximately 1 percent being in very poor condition (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality, Steve Tshwete Local Municipality, Steve Tshwete Local Municipality.

The Province currently contains a network of tarred and gravel roads. As illustrated in *Figure 1.21*, the condition of the Province's roads isn't extremely poor, having a total of 6, 144 km of its roads tarred. Although Mpumalanga isn't one of the Provinces with the lowest number of tarred roads, there is much room for improvement since there are more roads that are not tarred than that is.

Province	Surface	Gravel roads	Access roads	Total	Total	Road densities
	roads (km)	(km)	(km)	kilometres	number of	(vehicle/km)
Eastern Cape	5,493	34,692	7,631	47,816	480,059	10,040
Free State	6,310	22,046	20,000	48,356	416,029	8,603
Gauteng	3,357	1,771	2,410	7,538	2,893,665	383,877
KwaZulu-	7,216	19,373	10,571	37,160	1,023,368	27,540
Natal						
Limpopo	4,973	11,631	10,578	27,182	352,906	12,983
Mpumalanga	6,144	10,752	7,479	24,375	432,313	17,736
Northern	3,013	53,725	12,023	68,761	160,113	2,329
Cape						
North West	5,691	19,161	10,017	34,869	400,098	11,474
Western Cape	6,621	24,991	7,822	39,434	1,236,809	31,364
Total	48,818	198,142	88,531	335,491	7,395,360	22,043

# 3.10. LAND REFORM

### 3.10.1. LAND REFORM

The land reform process is currently in progress in the Province and consists of land restitution, redistribution and tenure reform.

### 3.10.2. LAND RESTITUTION

The Restitution of Land Rights Act (22 of 1994) addresses the restitution of land rights lost by South Africans due to discriminatory laws passed since 1913. The Act governs the establishment of the Commission on Restitution of Land Rights as well as the Land Claims Court. A total of 270 claims have been lodged and registered in the Steve Tshewete Local Municipality. According to the Local Municipality's SDF, virtually the entire northern part of the municipal area has been claimed for restitution purposes. More claims have also been claimed towards the southeast and south-west region of the municipal area (Steve Tshwete Local Municipality, Steve Tshwete Local Municipality Spatial Development Framework, Draft Report, 2010).

### 3.10.3. LAND REDISTRIBUTION

Land redistribution involves making land available for agricultural production, settlement and non-agricultural enterprises. In the past, state agricultural land was made available to emerging commercial farmers, via leasing, outright sale and access to grazing land. This was undertaken through the Settlement Land Acquisition Grant (SLAG) and Land Redistribution for Agricultural Development (LRAD). SLAG was a R16, 000 grants for which poor landless Black South Africans could form a group to apply to buy and develop farm land. The SLAG programme came to an end in 2000 and LRAD was introduced later that year. The LRAD programme is designed to reduce rural poverty by helping previously disadvantaged people to manage their own farms effectively.

### 3.10.4. TENURE REFORM

Tenure Reform refers to laws introduced after 1994 to give people security of tenure over both house and the land where they work and stay (especially farm workers and labour tenants).

The land reform projects and land claims in the Steve Tshwete LM are as follows:

Land claims have been registered on the farms Doornkop, Lemoen Samora Machel (8), Klein Samora Machel (17), Hartebeesthoek (24), Bankplaats (25), and Mooiwater (35)(Steve Tshwete Local Municipality, Steve Tshwete Local Municipality Spatial Development Framework, Draft Report, 2010)

# 4. ASSESSMENT APPROACH

Standard evaluation methods are applied as defined below.

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. Assessment of impacts will be based on DEAT's (1998) Guideline Document: EIA Regulations.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

#### **<u>Probability</u>** This describes the likelihood of the impact actually occurring.

**Improbable:** The possibility of the impact occurring is very low, due to the circumstances, design or experience.

**Probable:** There is a probability that the impact will occur to the extent that provision must be made therefore.

**Highly Probable**: It is most likely that the impact will occur at some stage of the development.

**Definite**: The impact will take place regardless of any prevention plans, and there can only be relied on mediatory actions or contingency plans to contain the effect.

#### **<u>Duration</u>** The lifetime of the impact.

**Short term**: The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.

Medium term: The impact will last up to the end of the phases, where after it will be negated.

**Long term**: The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.

**Permanent**: Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

### Scale The physical and spatial size of the impact

Site: The impacted area extends only as far as the activity, e.g. footprint

**Local**: The impact could affect the whole, or a measurable portion of the above mentioned properties and adjacent properties.

**Regional**: The impact could affect the area including the neighboring residential areas.

### <u>Magnitude/ Severity</u>: Does the impact destroy the environment, or alter its function.

Low: The impact alters the affected environment in such a way that natural processes are not affected.

Medium: The affected environment is altered, but functions and processes continue in a modified way.

**High**: Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

**<u>Significance</u>** This is an indication of the **importance of the impact** in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

**Negligible**: The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.

**Low**: The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

**Moderate**: The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

**High**: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

# **5.** Assessment of Potential Impacts

# 5.1. INTRODUCTION

This chapter identifies and evaluates the actual and potential environmental consequences associated with the development of the project. This assessment proposed potential for mitigation of negative impacts and enhancement of positive impacts (DEAT, 2003) to enable sustainable development principles are adhered to.

This report considers the extent of issues created during the construction and operational phases of the proposed project: "the realignment of a portion of Provincial Road R575 (P127-2)" (hereafter referred to as 'the Road') and associated infrastructure.

No decommissioning of the new road will take place, therefore it is not included in the assessment. The R575 as it is will be closed, approximately 800 meters of it will be mined according to the approved mining EMP and those conditions with no final land use confirmed thereafter. The mine is still open for discussion whether they want to re-instate the road afterwards. However, all engineers are however skeptical about the practicality of this as the road will be dug up too deep to be stable afterwards.

# 5.2. SUMMARY OF IMPACTS TO BE ASSESSED

The following impacts were identified as potentially significant and important to evaluate:

- \* Dust Emissions
- \* Air Quality
- Noise
- \* Waste Residue and Effluent
- \* Archaeological and Heritage Resources
- \* Biodiversity
  - Floral species and diversity
  - Faunal species and diversity
- \* Landscape connectivity and broad-scale ecological processes
- \* Health & Safety
- Traffic
- Socio-economic
- Wetlands

General social and economical inputs from local experts were obtained for the completion of this assessment. The following in depth specialist studies were done and is included in the appendices of the Basic Assessment Report:

- Appendix D1:Air quality test (Environmental Health and Risk Consulting [Pty] Ltd)
- L Appendix D2:Heritage impact assessment (Dr Julius CC Pretorius, Archaeologist and Heritage Consultant)
- Le Appendix D3:Ecological scan and wetland assessment (Scientific Aquatic Services CC)
- $\stackrel{l}{\smile}$  Appendix D4:Traffic investigation (Transportation and Traffic Technology Africa [Pty] Ltd)

Upon evaluation it was determined that the impact evaluation address key issues in proportion to the impacts and risks encountered for this project. Mining is excluded from this report as it will only take place in about 4 years. The mining situation will be dealt with in the EMPR of the approved mining right and Water Use License held by Shanduka (License No: 04/B12D/ABGJ/1588). Please find the discussion of each of these potential impacts below.

# 6. DUST EMISSIONS

This section considers the extent to which dust emissions will be created during the construction, operational and decommissioning phases of the proposed project. The two primary areas of interest are:

- \* Dust generated during site clearing and earthmoving activities;
- \* Dust generation by vehicles on site travelling along unpaved roads

### **Table 7: Impact Characteristics: Dust Emissions**

	Construction	Operation		
Project Aspect /	Soil disturbance and excavating.	Vehicle movement on tarred road.		
Activity	Vehicle movement on gravel roads.			
Impact Type	Direct negative	Indirect negative		
Stakeholders/	Adjacent landowners and residents	Adjacent landowners and residents		
Receptors Affected	Travelling pedestrians	Travelling pedestrians		
	Road users	Road users		
	Construction Workers			

# 6.1. CONSTRUCTION PHASE IMPACTS

The presence of dust can be a nuisance to site users, including construction workers and other nearby receptors. The vegetation condition along roadside is of poor ecological integrity. It consists mainly of reseeded species and increaser one grasses such as *Hyparrhenia tamba*. Dust from the activity will have a negligible negative effect on

vegetation along the roadside in its current state. The dust impacts will be localized and in the short term. Rainfall events during and after the construction period will remove dust deposited on vegetation.

During the construction phase, dust will be generated from increased vehicle movements from trucks driving on gravel roads and from activities that cause soil disturbance (i.e. excavation and material movement).

Dust becomes airborne due to the action of winds on material stockpiles and other dusty surfaces, or when thrown up by mechanical or manual activities, for example the movement of tires on a dusty road or activities such as excavation or soil handling. The quantity of dust released during construction depends on a number of factors, including:

- L The type of construction activities occurring;
- L The area of exposed materials;
- L The moisture and slit content of the materials;
- Distances travelled on unpaved surfaces; and
- L The mitigation measures employed

Key construction activities are likely to result in increased dust levels are the movement of trucks transporting equipment and infrastructure (i.e. road construction equipment and material etc.) to and from the site, movement of construction vehicles along unpaved roads, clearance of the site, excavations of existing road surfaces and normal traffic over disturbed soil. Such activities are likely to pose a negative impact on receptors located in close proximity to the source if not managed properly. The extent of the dust impact will be exacerbated in the dry winter months and with higher wind speeds.

### 6.2. IMPACT ASSESSMENT

### CONSTRUCTION IMPACT: DUST EMISSIONS

Nature: Construction activities that generate dust will result in a **direct negative** impact on receptors in the area.

### Impact Magnitude: LOW

Extent: The extent of the impact is local, limited to within 200 m of the construction activities.
Duration: The duration will be short term lasting for the duration of the construction phase.
Intensity: The site is very remote and dust generated is therefore unlikely to impact any sensitive receptors, the intensity thereof can be considered low.

Likelihood: There is a **definite** likelihood of dust generation during the construction phase.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE

### **OPERATIONAL PHASE IMPACTS**

The final constructed road will be tarred – this road will be upgraded and wider than the existing road without a shoulder. It is expected that this road will improve the traffic experience and safety of commuters. During the operational phase it is highly unlikely that dust will be created by vehicles.

The existing road will continue to be used for industrial and other use, but be closed for public use. The future mining of a portion of this road is excluded from this assessment and part of the mining right environmental management plans.

### 6.3. MITIGATION

Mitigation objective

To avoid and/or reduce the extent to which increased levels of dust emissions are created by activities related to the construction and operational phases of the project.

### Mitigation measures

The following methods should be employed to reduce dust generation during the construction and operational phases of the project:

- Vehicles travelling on gravel roads at the site and directly to and from the site (5 km radius) will not exceed a speed of 30 km/h.
- Overburden spoil of dusty materials will be covered by suitable shade cloth or netting to prevent escape of dust during loading and transfer from site.
- Any directly affected individuals including neighboring landowners will be able to lodge grievances according to the grievance procedure. Complaints can be lodged with the Steve Tswete local municipality using the complaints procedure of the municipality or by lodging complaints with the Shanduka Coal social project manager (included in the EMP) regarding dust emissions that could be linked to the project. The Contractor will take preventative measures to minimize complaints regarding dust nuisances by employing:
  - Covering stockpiles
  - Dust control by wetting with water and dust suppression chemicals
  - Timing dust generating work to have least impact on receptors (outside peak traffic periods and not after working hours)
  - Pre-notification of directly affected parties of the period of construction and construction hours.
  - Covering or sufficient wetting of materials stored over periods that construction will not take place (weekends).
- \* Additional appropriate dust suppression measures or temporary stabilizing mechanisms should be used when dust generation increase to levels affecting operation and traffic movement around the site by means of:
  - Being aware of prolonged periods of dry weather and/or high wind speeds and be prepared on site to increase dust management measures
  - Dampening with water and dust suppression chemicals
- It must be ensured that all temporary access roads and construction areas are regularly sprayed with water in order to curb dust generation. This is particularly necessary during the dry season when increased levels of dust generation can be expected. These areas should not be over-sprayed causing water run-off and subsequent sediment loss into waterways and wetland lines in the vicinity of the proposed linear development.

# 6.4. RESIDUAL IMPACTS

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and operational phases.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
	Construction Impact	Direct Negative	LOW	MINOR	NEGLIGIBLE
Dust Emissions	Operational Impact	Indirect Negative	LOW	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 7. AIR QUALITY

This section considers the extent to which carbon and other emissions will be created during the construction, operational and decommissioning phases of the proposed project. The main areas of interest are:

- \* Emissions generated during construction by earthmoving machines and construction vehicles
- \* Emissions generation by general traffic of vehicles travelling along the roads.

No other emissions besides carbon emissions are expected during the project.

Construction vehicles (i.e. transport vehicles, trucks, as well as employees and contractors vehicles) and other construction equipment and machinery will generate exhaust emissions. Owing to the scale of this development, it is anticipated that a certain volumes of exhaust emissions will be generated during the construction and operational phase of the project. The volume of exhaust emissions in proportion to the area background emissions is considered negligible, localized and of short term during construction. Carbon emissions during operational phase will be prevalent and in proportion to the increase in traffic volumes over time. Under current, immediate circumstances traffic volume is not anticipated to increase because of the project. Location of emission release will however move from the current R575 to the existing Keiskamma drive. These roads are close to each other (within 2.5km radius) and seen as a minor shift in location considering the airborne / dispersal characteristics of emissions.

### **Table 8: Impact Characteristics: Air Quality**

	Construction	Operation	
Project Aspect /	Soil disturbance and excavating.	Vehicle movement on tarred road.	
Activity	Vehicle movement on gravel roads.		
Impact Type	Direct negative	Direct negative	
Stakeholders/	Adjacent landowners and residents	Adjacent landowners and residents	
Receptors Affected	Travelling pedestrians	Travelling pedestrians	
	Road users	Road users	

# 7.1. IMPACT ASSESSMENT

CONSTRUCTION IMPACT & OPERATIONAL IMPACT: AIR QUALITY

**Nature:** Construction activities that generate air emissions will result in a **direct negative** impact on receptors in the area.

### Impact Magnitude: LOW

**Extent:** The extent of the impact is **site**, limited to the area of the road.

**Duration:** The duration will be **long term** lasting for the duration of the construction phase and the entire operational phase.

**Intensity:** The site is situated in a relative dense area and emissions released are therefore likely to impact on sensitive receptors, the intensity can be considered **medium**.

**Likelihood:** There is a **definite** likelihood of emissions.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE

# 7.2. MITIGATION

### Mitigation objective

To avoid and/or reduce the extent to which increased levels of air emissions are created by activities related to the construction and operational phases of the project.

#### **Environmental Impact Assessment**

#### Mitigation measure

The following method(s) should be employed to reduce emissions during the construction and operational phases of the project:

- \* Vehicles are to be kept in good working order and serviced regularly to minimize emissions.
- \* Fuel efficient machinery should be considered where possible.
- \* Internal reporting during construction of smoking / mal functioning vehicles and immediate fixing

# 7.3. RESIDUAL IMPACTS

If the above stipulated mitigation measure are implemented, the residual impact significance will be reduced to *Negligible* for the construction phase however no mitigation measures will reduce the impact significance during the operational phase of the project therefore it stays *Minor*.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Air Quality	Construction Impact	Direct Negative	LOW	MINOR	NEGLIGIBLE
	Operational Impact	Direct Negative	LOW	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 8.NOISE

This section considers the extent to which noise created during the construction and operational phases of the proposed project will impact on nearby sensitive receptors.

The road infrastructure is located in a low-medium density urban area with adjacent landowners to the road. Sensitive receptors that are located in the direct vicinity of the road include:

- Farm owners (< 50m),</li>
- Proposed housing developments (< 200m),</li>
- Small business owners (< 20m),</li>
- Existing residences (< 500m)</li>
- Informal settlements (< 20m).</li>

In addition to this, the following receptors are within an extended area of influence of the proposed road:



Figure 27: Landowners along Keiskamma Drive

- \* The adjacent farm owners
- \* The adjacent mines and mining areas
- \* The Aerorand suburb near Middelburg (± 1,5 km)
- \* Construction staff employed for construction
- Local fauna
- \* Recreational users (i.e. bikers)
- \* Road users (pedestrians and drivers)

Currently, there are existing moderate baseline noise levels in the area (2.5 km radius) primarily emanating from mining activities such as heavy machinery and blasting. The proposed upgrade will result in the marginal generation of increased noise levels through construction activities such as earthworks and construction vehicles. The possible impacts of the increased noise levels are discussed in more detail below. Considering that the activity in its operational phase is subject to the same noise generating factors as the activity pre- construction, the existing route is the baseline against which noise can be assessed. The operational noise evaluation is therefore the same as the current noise level in the area with local impact on directly adjacent residents.

	Construction	Operation		
Project Aspect /	Construction activities (i.e. material	Traffic (Commuters)		
Activity	handling, manual labor, earthworks)			
	Construction vehicles			
	Heavy machinery			
Impact Type	Direct negative	Direct negative		
Stakeholders/	Neighboring landowners and dwellers,	Neighboring landowners and dwellers,		
Receptors Affected	pedestrians, livestock	pedestrians, livestock		
Construction contractor employees		Construction contractor employees		
	Recreational users	Recreational users		
	Road users	Road users		

### **Table 9: Impact Characteristics: Noise**

# 8.1. IMPACT ASSESSMENT

An increase in noise would be expected from a number of activities that are going to be undertaken during the construction phase of the project. Specific construction activities that are likely to create localized increases in noise include the following:

- Operation of machinery and equipment;
- \* Transport of equipment and construction personnel; and
- \* Increased traffic in the area according to normal traffic growth rates

Noise sensitive receptors that are likely to be impacted upon by noise created by construction activities include the affected landowners, farmers, local fauna, road users, recreational users and residents from the nearby informal settlement. Although an increase in noise is expected, this noise will be localized and temporary and will only impact those receptors located in close proximity to the source.

Noise levels from work areas will vary during the construction period. In this regard, if the construction activities are restricted to the daytime, the impact on sensitive receptors identified within the project area will be minimized.

### CONSTRUCTION & OPERATIONAL IMPACT: NOISE

**Nature:** Construction activities as well as operational activities have the potential to have a **direct negative** impact on the noise levels in the project area.

### Impact Magnitude (Construction): LOW Impact Magnitude (Operational): LOW

**Extent:** The extent of the impact of both the construction & operational phases will be **local** as significant noise sources will only affect receptors located in close proximity to the source.

**Duration:** The duration of the impact for the construction phase will be **short term** as it will only last for the duration of construction. The duration of the impact for the operational phase will be **long term** as the road will carry traffic for its whole lifetime.

**Intensity:** The intensity of the impact will be **low** as the project area has disturbed vegetation present although sensitive receptors may be present at some times.

**Likelihood:** There is a **definite** likelihood of noise creation during the construction and operational phase of this project.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE

# 8.2. MITIGATION

### Mitigation objective

To reduce the extent to which construction activities will create noise that has an adverse effect on humans and the environment within the project area.

### Mitigation measure(s)

- \* Working hours to be agreed upon with Project Manager, so as to minimize disturbance to landowners and community members. The noise generating construction phase activities shall be restricted to normal working hours, between 08h00 and 17h00.
- Adjacent landowners to the proposed activity will be notified of commencement of construction and expected timing for construction activities that would result in significant noise generation (i.e. blasting).
- \* Construction activities generating output levels of 85 dB or more will be confined to normal working hours.

- Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas (landowners).
- \* The responsible engineer should ensure that municipal regulations relating to noise generation are observed.
- Truck traffic will be confined to existing roads.
- It must be ensured that employees and contractors working conditions comply with the requirements of the Occupational Health and Safety Act (OHSA, Act No 85 of 1993). Where necessary, workers will be required to wear ear protection equipment.
- Noise / visual barriers in the form of vegetation (hedges) should be considered post construction. The noise barrier constructed /grown should be at least 1.2 meters high when fully grown and at least two rows of plants. The location and length of the hedges should be done in consultation with an independent practitioner.

# 8.3. RESIDUAL IMPACTS

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction phase however no mitigation measures will reduce the impact significance during the operational phase of the project therefore it stays *Negligible*.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Noise	Construction Impact	Direct Negative	MINOR	MINOR	NEGLIGIBLE
	Operational Impact	Direct Negative	LOW	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 9. WASTE RESIDUE AND EFFLUENT

Waste residues and effluent will be generated during the construction phase of the road. The key types of waste generated and impacts associated with the generation of such waste during each phases of the project are set out in this section.

 Table 10: Impact Characteristics: Waste and Effluent

	Construction	Operation	
Project Aspect/Activity	Construction activities include excavation, unpacking of infrastructure and equipment, working on site and ablution facilities	Maintenance activities.	
Impact type	Direct Negative	Indirect Negative	
Stakeholders/ Receptors	Adjacent landowners/inhabitants	Adjacent landowners/inhabitants	
Affected	Surrounding habitat	Surrounding habitat	
	Steve Tswete municipal waste areas		

# 9.1. CONSTRUCTION PHASE IMPACTS

The construction phase of the project will produce a variety of waste products. The initial solid waste generated on site will be the cleared rock overburden, existing road material generated from excavations, packaging of material brought on site, leveling and grading of proposed development areas. Some building rubble will be produced throughout the construction phase from activities such as the cement mixing, stone packing, tarring of the road.

Packaging material will be accumulated from unpacking of construction materials, infrastructure and equipment. General waste from construction staff will be generated from food brought on site. Sanitary waste from construction staff will be generated during working hours on site.

Waste will not be generated from the temporary construction camp. Construction staff arrives on site on a daily basis. The volume of waste is considered low for this project. Wastes will be produced daily during construction activities. This comprise of the following waste streams:

- Seneral waste from designated eating areas:
  - Residual packaging
  - Metal cans (from food and drinks)
  - Plastic drink bottles
  - Glass jars and bottles
  - Organic waste (food waste)Paper and cardboard;
- \* Construction Waste from building the road:
  - Concrete waste
  - Site clearance waste:
  - Vegetation debris
    - Building rubble Barricading tape & barriers, bags
- \* Hazardous waste
  - Sanitary waste

The following hazardous wastes will also be produced from construction activities:

- Batteries (including large lead acid type);
- Oily rags and absorbents;
- \* Used oil and oil spillages cleaned up;
- \* Contaminated water slops and oily water from drip trays; and
- Sewage from toilets
- \* Tar, bitumen containers and waste generated from residues and spillages

Waste will be sorted, as a minimum, according to the above categories.

### CONSTRUCTION IMPACT: WASTE

**Nature:** Construction activities that produce waste would result in a **direct negative** impact on site. **Impact Magnitude: LOW** 

**Extent:** The extent of the impact is **local** as impacts may be just beyond the site boundaries. **Duration:** The duration would be **medium term** as impacts will last up to the end of this phase. **Intensity:** The intensity is likely to be **medium** as levels of waste volumes generated will be high based on the large workforce required on site.

**Likelihood**: It is **likely** that waste and effluent generated on site, if unmitigated, will impact on the soil and/or groundwater and other site users.

IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW IMPACT SIGNIFICANCE (POST-MITIGATION): MINOR

# 9.2. OPERATIONAL PHASE IMPACTS

### **OPERATIONAL IMPACT: WASTE**

**Nature:** The waste residue generated by the maintenance work on the bridge has the potential to have an **indirect negative** impact on water resources and soil quality. **Impact Magnitude: MINOR** 

### **Extent:** The extent of the impact is **site** as impacts the area only.

**Duration:** The duration would be **medium term** as impacts will last up to the end of the phases, where after it will be negated.

**Intensity:** The intensity is likely to be **low.** 

**Likelihood:** It is **probable** that waste generated on site, if unmitigated, may impact on the soil, groundwater and/or surface water.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE

# 9.3. MITIGATION

### Mitigation objective

To avoid and/or reduce the extent to which increased levels of waste residue generated during the construction and operational phase of the proposed project will impact on soil, habitat and surface water in close proximity to the source.

### Mitigation measure(s)

- \* Wastes produced from project activities on site will be transferred to designated temporary storage areas and where possible into secure containers.
- Storm water run-off will be discharged away from any identified drainage lines.
- \* The construction contractor will remove refuse collected from the designated waste storage areas at the site at least once a week.

### General Waste

- \* Wastes produced from project activities on site will be placed in drums and removed weekly; thereafter it is transferred to either the registered municipal waste site of Middelburg or transferred to designated temporary storage areas at the contractor office from where it will be transferred a municipal waste site.
- \* Littering and other waste will be placed in waste bins and be dumped in a registered land fill site.
- No dumping of waste material should be allowed within any sensitive area at any stage of the development. No temporary storage of construction material should be allowed within sensitive areas.

### Hazardous Waste

- Appropriate sanitary facilities must be provided for the duration of the construction and rehabilitation activities and all waste removed to an appropriate waste facility.
- \* Mobile toilets will be used during the construction phase for the employees to use. Mobile toilets will be cleaned regularly. Final disposal of sanitary waste will be at the Middleburg Waste Water Treatment Works.
- \* All hazardous and liquid waste materials (e.g. fuel for generators, including any contaminated soils) will be stored in a bunded area of 110 percent of the stored material's capacity and disposed of by a licensed contractor.
- \* All hazardous and liquid waste materials (e.g. fuel for generators, including any contaminated soils) will be stored in a bunded area of 110 percent of the stored material's capacity and disposed of by a licensed contractor.

- \* All hazardous wastes that cannot be reused or recycled will be collected by approved waste contractors and transferred to an appropriately licensed waste management facility for treatment and/or disposal.
- Material Safety Data Sheets for all applicable materials present on site will be readily available to on site personnel.
- \* Fuels on site will be stored in a locked container within a fenced and secure temporary staging area.

### **Construction Waste**

- Construction waste will most likely consist of concrete waste, site clearance waste, and vegetation debris, building rubble, barricading tape, barriers & bags, cement. All cement mixing will be undertaken on impermeable plastic lining to prevent contamination of the soils and surrounding areas. Construction solid waste will be managed and will incorporate reduction, recycling and re-use principles. Tar and bitumen will be contained in closed containers or tanks and stored with secondary bunding at all times. The impacts from tar and bitumen beyond the road surface will be contained and minimized at all times. Spillages of tar and/or bitumen will be seen as a hazardous spill where it interacts with the environment and cleaned up immediately.
- \* All vegetation debris removed for site clearance will be stockpiled for road verge re-vegetation and rehabilitation.
- All waste that cannot be reused or recycled will be appropriately disposed of. All construction debris will be placed in appropriate on site storage containers and periodically disposed of by a licensed waste contractor in accordance with applicable South African regulations. The construction contractor will remove refuse collected from the designated waste storage areas at the site at least once a week. Rubble generated during the construction phase will be removed from the site regularly to a licensed landfill site.
- \* Construction waste management will incorporate reduction, recycling and re-use principles.
- Concrete/tar mixing will be undertaken on impermeable plastic lining or a suitably sealed surface to prevent contamination of the subsurface.
- Effluent from the washing-down of concrete/tar mixing and handling equipment will be contained within a bunded area of 110 percent capacity of the stored material. This effluent will then be contained and dry residue used for backfilling as far as possible. Material not used for backfilling will be removed from site.
- Trucks and construction vehicles will be serviced off-site.
- It must be ensured that construction related waste or spillage and effluent do not affect the sensitive habitat areas.

### **Maintenance Waste**

- Maintenance of the road may require the repair when required. It is anticipated that this will happen at a low frequency. The main waste from road maintenance includes grass cuttings, debris removed from storm water drains and construction waste from road patching. The maintenance actions are required to adhere to all construction mitigation measures.
- \* The frequency of pipe cleaning maintenance activities will be monitored to indicate if this becomes a regular and constant source of additional waste generation on site.

# 9.4. RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Minor* for the construction phase however mitigation measures will keep the impact significance *Negligible*.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
	Construction Impact	Direct Negative	LOW	LOW	MINOR
Waste Residue and Effluent	Operational Impact	Indirect Negative	MINOR	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# **10.** ARCHAEOLOGICAL AND HERITAGE RESOURCES

# **10.1.** IMPACT ASSESSMENT

The site is situated in an already disturbed area with extensive traffic and use on a daily basis. A general screening level evaluation indicated that no historic activity or residue on the indirectly or directly impacted site require further investigation. No residence will be affected directly and the road that will be directly impacted does not have historic building relics (road walls etc.) evident at a screening level. The only item of historic value is a graveyard, but it is not situated in close proximity to the proposed road deviation.

Because only a graveyard was found a substantial distance away from the road, no impact assessment is needed. Only the mitigation measures must be applied in order to protect this graveyard. Some mitigation measures were made by the heritage specialist that conducted a site survey.

The site assessment is conducted with specific reference to legal requirements of the National Heritage Resources Act (No 25 of 1999):

- 1) Subject to the provisions of subsections 7), 8) and 9), any person who intends to undertake a development categorized as
  - a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
  - b) the construction of a bridge or similar structure exceeding 50 m in length;
  - c) any development or other activity which will change the character of a site
    - i. exceeding 5 000 m<sup>2</sup> in extent; or
    - ii. involving three or more existing erven or subdivisions thereof; or
    - iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
    - iv. the costs which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- d) the rezoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the

responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.



Figure 28: The deviation of Road 575 to South-West of Middelburg in the Mpumalanga Province. Note the presence of a single graveyard in the Project Area (above).

# 10.2. MITIGATION

### Mitigation objective

To ensure any possible archaeological and/or heritage findings are managed properly.

### Mitigation measures

- \* As precautionary measure, any man-made or out of place item found during construction should:
  - Be reported to the site manager
  - The client should be informed immediately
  - A suitable specialist should be contacted and details of the finding provided.
  - Result in all construction work ceasing until approval for continuation is granted by the client and the site manager.
- \* The nearby graveyard should be fenced off during construction activities. The graveyard must also be fitted with a gate in order to provide access to family and friends.

# 10.3. RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction phase. After construction the fencing around the graveyard will be removed thus the impact from before construction and after construction remains the same, *Negligible*.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Archaeological	Construction Impact	Indirect Negative	MINOR	MINOR	NEGLIGIBLE
and Heritage resources	Operational Impact	Indirect Negative	MINOR	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 11. BIODIVERSITY

# 11.1. PLANT SPECIES AND DIVERSITY

This section considers the extent to which biodiversity will be affected during the construction and operational phases of the proposed project.

The impacts on biodiversity are assessed at the producer level (floral species, floral diversity and important species), followed by an assessment of impacts on the consumer level (faunal species, habitat and important species). Wetlands are assessed separately in section 16 of this document. this See specialists report in appendix D for biodiversity details not included in this report and appendix F for mitigation measures pertaining to biodiversity in general.

The proposed development falls within the Grassland Biome and the Rand Highveld Vegetation Type. The natural vegetation prior to disturbance consisted of disturbance driven, grassland with scattered shrubs and small trees. The general area around the proposed activity is in poor ecological condition. The areas surrounding the road are heavily utilized and highly disturbed as indicated by a dominance of alien vegetation such as *Acacia mearnsii*, *Eucalyptus diversicolor, Eucalyptus camaldulensis* and *Agave sisal, Melia azedarach, Eucalyptus camaldulensis, Tagetes minuta* and *Solanum mauritianum*.

	Construction	Operation		
Project Aspect / Activity	(i) Clearing of soils	(i) Pollution from roadsides		
	(ii) Topsoil deterioration			
	(iii) Construction activities such as	(ii) Littering from construction staff		
	earthworks and site clearance	and road users, hydrocarbons		
	(iv) Hydrocarbon pollution from	flowing from road surface into		
	vehicles and trampling by	vegetation etc.		
	vehicles moving outside			
	construction footprint etc.			
Impact Type	Direct negative	Direct negative		
Stakeholders/Receptors Affected	(i) Plant species diversity and	(i) Plant species diversity and		
	related ecological processes	related ecological processes		

### Table 11: Impact CHaracteristics: Plant Species and Diversity

### 11.1.1. CONSTRUCTION PHASE IMPACTS

Earthworks and movement of machinery related to road expansion will have no negative impact on the tree layer in the area as it consists mostly of alien species. Grasses in the construction area consists of reseeded species on visual barriers and naturally occurring grass patches along roadside, including disturbed and undisturbed patches. These areas may be affected by earthworks and movement of machinery to some extent as areas may have to be cleared for construction. Vegetation units of concern are:

- Relatively undisturbed grass patches;
- E Temporarily disturbed grass patches (burnt) and

The Relatively undisturbed grass patches are located mostly around the R575 bridge area, but some patches are staggered along roadside. This community consists mostly of increaser one species (grasses that increase with underutilization) such as *Hyparrhenia tamba and Cymbopogon excavatus* and represents a community in need natural disturbance (i.e. fire and grazing). The disturbed grass patches occur scattered along roadside and represent a more diverse community of species due to the natural succession effects of fire. The community in the bridge area will not be negatively affected. The reseeded barriers consist of *Panicum spp.* and *Sporobolus spp.* They are relatively close to the roadside and may be impacted. However, it is by definition not a natural community and if the barriers need to be removed, the reseeding process can merely be repeated when new barriers are created post construction. In some areas within the road reserve complete vegetation clearance and bare soil was encountered during site visit. Due to the low plant species diversity of the development site as a result of to extent of vegetation transformation within this vegetation unit, no significant additional impacts resulting from the road upgrade are expected on species diversity.

Considering the fact that most woody species are alien invasive species, the erosion effects from tree removal is considered a greater concern than the loss of tree species. It is however recommended that all indigenous species be retained as far as possible and where alien species are removed, these be replaced with indigenous species in the extended area as a preventative measure.

According to the specialists report (Appendix D), no important plant species were encountered in the site. However some species have a probability of occurrence in the wetland area as no suitable habitat was found in the road reserves, such as *Crinum bulbispermum* (30%), *Crinum macowanii* (40%) and *Hypoxis hemerocallidea* (40%). Impacts on important species are considered low (pre-mitigation) and negligible (post-mitigation).

### 11.1.2. IMPACT ASSESSMENT

The construction phase will require clearing of topsoil for related infrastructure resulting in a **direct negative** impact on plant species and diversity in both the disturbed and relatively undisturbed grass communities. The extent of the impact is **local** as the impact will be limited to the boundaries of the site. The duration would be **short term** as suitable conditions for vegetation growth will only return post construction. The intensity is **low** given the poor ecological integrity of the development area.

The construction phase will require clearing of topsoil for related infrastructure resulting in a **direct negative** impact on important plant species that may occur in the area. The extent of the impact is **local** as the impact will be limited to the boundaries of the site. The duration would be **short term** as suitable conditions for vegetation growth will only return post construction. The intensity is **low** given the poor ecological integrity of the development area.

### CONSTRUCTION IMPACT: PLANT SPECIES AND DIVERSITY

**Nature**: The construction phase will require clearing of topsoil for infrastructure, resulting in a **direct negative** impact on vegetation diversity in the site.

### Impact Magnitude: LOW

**Extent**: The extent of the impact is **local** as the impacts will be limited to the boundaries of the site. **Duration**: The duration would be **medium term Intensity**: The intensity is **low** given the poor ecological integrity of the development area.

**Likelihood:** The impact has a **definite** likelihood of occurring.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR

### CONSTRUCTION IMPACT: IMPORTANT PLANT SPECIES

**Nature**: The construction phase will require clearing of topsoil for infrastructure, resulting in a **direct negative** impact on vegetation diversity in the site.

### Impact Magnitude: LOW

**Extent**: The extent of the impact is **local** as the impacts will be limited to the boundaries of the site. **Duration**: The duration would be **short-term Intensity**: The intensity is **low** given the poor ecological integrity of the development area.

Likelihood: The impact has a **definite** likelihood of occurring.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR

### 11.1.3. OPERATIONAL PHASE IMPACTS

During the operational phase, the main impacts may be littering from road users and hydrocarbon pollution from vehicles. That being said, the conditions of the road prior to construction is subject to the same impacts as the operational phase post construction and therefore the impacts of the operational phase can be seen as negligible.

### 11.1.4. MITIGATION

### Mitigation objective

To avoid and/or reduce the extent to which plant species and diversity is negatively affected by activities related to the construction and operational phases of the project, and to promote positive impacts on vegetation diversity by implementing certain practices during construction the phase that will benefit the ecosystem post operational phase.

### Mitigation measures

The following methods should be employed to reduce impact on plant species and diversity in the three main areas of concern during the construction and operational phases of the project:

- \* All indigenous species should be retained as far as possible and where alien species are removed, these be replaced with indigenous species. (The area left exposed from removing an alien tree should be covered with topsoil and reseeded with grasses indigenous to the area.)
- In order to minimize the disturbed area and disturbance impact the project should be completed as soon as possible in order for the vegetation to return to a state of recovery before the next rain season.
- \* All construction staff should undergo an environmental induction from a suitably qualified person to make sure they understand the difference between exotic and indigenous vegetation and the importance of footprint management.
- \* The relatively intact patch of grassland in the bridge area should be undisturbed as far as possible by construction activities.
- \* Alien trees with possible timber value may be harvested by a professional contractor to the benefit of the local community.
- \* All hazardous materials should be stored in the appropriate manner to prevent contamination of the wetland. Any accidental chemical, fuel and oil spills that occur in the area should be cleaned up in the appropriate manner as related to the nature of the spill.
- \* All construction vehicles to remain on demarcated roads and access routes to avoid unnecessary disturbance, compaction and/or pollution.

- \* The road and all other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may transport topsoil, reducing suitable conditions for vegetation growth.
- Regular monitoring for erosion during construction to ensure that no erosion problems have developing as result of the construction disturbance.
- Compacted areas should be suitably rehabilitated post construction, using appropriate techniques such as ripping, topsoil layering and reseeding.
- \* All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and re-vegetation techniques.
- Construction vehicles and machinery working in the wetland area should employ measures to prevent hydrocarbon pollution such as: using secondary bunding for spills; having a spill kit onsite at all times to deal with different spills (i.e. oil, bitumen etc.); and by making sure all machinery are properly maintained to prevent leakages.
- \* Construction vehicles and machinery may not be serviced on site.
- Quality control checks should be done by an Environmental Site Officer on site. At least once during each phase of the project.

### 11.1.5. RESIDUAL IMPACTS

The development would contribute to cumulative habitat loss and degradation in the area. Especially since the affected vegetation is already affected by alien species, compaction and littering.

The principal possibility for cumulative impact on flora will be through cumulative habitat loss, which is likely to be negligible given the disturbed nature of the surrounding landscape. Direct impacts on flora during construction will be temporary and could for the interim result in short term cumulative impact. The contribution to cumulative impact is likely to be relatively low to none if the mitigation measures are put in place.

### PLANT SPECIES AND DIVERSITY RESIDUAL IMPACTS

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Riodivorsity	Construction Impact	Direct Negative	MINOR	MINOR	NEGLIGIBLE
Plant Species	<b>Operational Impact</b>	Direct Negative	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
and Diversity	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### **Environmental Impact Assessment**

### IMPORTANT PLANT SPECIES RESIDUAL IMPACTS

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
	Construction Impact	Direct Negative	LOW	LOW	NEGLIGIBLE
Important species	Operational Impact	Direct Negative	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 11.2. FAUNAL SPECIES AND DIVERSITY

Although no indigenous fauna or indication of indigenous fauna was found on site or in the extended area and it is highly unlikely that the area will support a diversity of fauna, precautionary measures for possible presence of some fauna is incorporated. The upgrade of the road and associated infrastructure will result in an increase in levels of noise, pollution, disturbance and human presence during construction that may affect fauna in the three aforementioned units of concern. Timid fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Direct and indirect impacts of the development on avifauna are expected to be negligible.

	Construction	Operation	
Project Aspect /	Habitat loss and fragmentation due to	Habitat degradation due to littering from	
Activity	earthworks	road users and pedestrians	
	Displacement of fauna due to movement		
	of staff and construction vehicles		
Impact Type	Direct negative	Direct negative	
Stakeholders/	Indigenous fauna	Indigenous fauna	
Receptors Affected	Livestock	Livestock	

### **Table 12: Impact Characteristics: Faunal Species and Diversity**

### 11.2.1. CONSTRUCTION PHASE IMPACTS

Earthworks and movement of machinery related to road expansion will have a negative impact on suitable habitat for faunal species. Direct impacts on fauna by means of noise, dust and disturbance are also applicable. Habitats currently available include the three vegetation units discussed in the previous section.

No mammals were identified during the assessment of the proposed linear development. This was expected due to the habitat transformation associated with the existing road. The proposed linear development in its present ecological state does not offer suitable habitat for any larger mammal species. However, habitat is present for smaller mammal species such as the Scrub Hare (*Lepus saxatilis*) and the Southern African Spiny Mouse (*Acomys spinosissimus*), which are not of conservation concern. Due to the transformed nature of the proposed linear development, no RDL or threatened mammal species are likely to occur. Thus, the proposed development does not pose a threat to RDL or protected mammal species conservation.

The following bird species were recorded during the specialists site visit: Common Myna (*Acridotheres tristis*) Cape Turtle-Dove (*Streptopelia capicola*) Cape Sparrow (*Passer motitensis*) Blacksmith Plover (*Vanellus armatus*)

Crowned Plover (Vanellus coronatus) Hadeda Ibis (Bostrychia hagedash). None of these species are of any conservation concern and very little suitable habitat remains for any important avifaunal species. The only important bird species that may use the available habitats are the African Grass Owl (Typo capensis) and the Secretary bird (Sagittarius serpentarius).

No reptile species were encountered during the assessment of the proposed development. Mainly due to the lack of suitable habitat available within the proposed linear development that could support viable reptile populations. As a result, no rare or threatened reptile species are likely to occur, and the proposed road upgrade is not expected to pose a significant threat to reptile conservation.

The wetland area is likely to support more common and tolerant amphibian species such as guttural toad (Amietophrynus gutturalis) and common river frog (Amietia angolensis). The above-mentioned amphibians are all considered not threatened in Mpumalanga Province. These species are more likely to occur further away from the existing main road due to the edge effects from the existing road. Thus, the proposed activity of the road upgrade will have a low impact on amphibian species, should mitigation measures such as sediment and erosion control be implemented.

No invertebrate species of concern were identified in the area and it is doubtful that any rare or endangered species will reside within the proposed development due to the vegetation transformation limiting breeding and foraging habitat.

### 11.2.2. IMPACT ASSESSMENT

Construction activities and the presence of construction personnel at the site will result in a direct negative impact on indigenous fauna in the area. The extent of the impact is **local** as the impact will be limited to the boundaries of the site. The duration would be **short term**. The intensity is **low** given the poor condition of the immediate environment.

### CONSTRUCTION IMPACT: FAUNAL SPECIES AND DIVERSITY

Nature: Construction activities and the presence of construction personnel at the site will result in a direct **negative** impact on indigenous fauna in the area.

### **Impact Magnitude: LOW**

**Extent**: The extent of the impact is **local** as the impacts will be limited to the boundaries of the site. Duration: The duration would be short term

Intensity: The intensity is low given the poor ecological integrity of the development area.

Likelihood: The impact has a definite likelihood of occurring.

### **IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR**

### 11.2.3. OPERATIONAL PHASE IMPACTS

During the operational phase, the main impacts may be littering from road users and hydrocarbon pollution from vehicles. That being said, the conditions of the road prior to construction is subject to the same impacts as the operational phase post construction and therefore the impacts of the operational phase can be seen as negligible.

### 11.2.4. MITIGATION

### Mitigation objective

To avoid and/or reduce the extent to which faunal species, diversity and habitat is negatively affected by activities related to the construction and operational phases of the project, and to promote positive impacts on habitat recovery by implementing certain practices during construction the phase that will benefit the ecosystem post operational phase.

#### Mitigation measures

The following methods should be employed to reduce impact on vegetation diversity during the construction and operational phases of the project:

- In order to minimize the disturbed area and disturbance impact the project should be completed as soon as possible in order for the habitat to return to a state of recovery before the next rain season.
- \* No trapping or hunting of fauna is to take place, with specific reference to construction phase activities when an increase in human activity is expected.
- It must be ensured that all areas of increased ecological sensitivity are taken into account during all development phases. No activities are to needlessly infringe upon these areas.
- \* All areas of increased ecological sensitivity should be marked with a buffer area around it as such and be off limits to all vehicles and personnel.
- It must be ensured that as far as possible all infrastructures, including temporary facilities is placed outside of sensitive faunal habitat areas
- \* All faunal habitat areas, where disturbed, are to be rehabilitated to ensure that faunal ecology is reinstated upon completion of construction works.
- \* All construction staff should undergo an environmental induction from a suitably qualified person to make sure they understand the difference between exotic and indigenous fauna and the importance of their conservation.
- \* Any fauna directly threatened by the construction activities such as earthworks should be removed to a safe location by a person suitable to do so (Search and Rescue).
- \* All areas of increased ecological sensitivity should be marked as such and be off limits to all vehicles and personnel.
- No fires should be allowed on-site. However, the relatively intact patch of grassland in the bridge area should be burned pre-construction under controlled conditions by an appointed professional. A search and rescue effort must be made to ensure all faunal species escape the effects of fire.
- \* All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises, as well as to minimize dust generation.
- \* All construction vehicles to remain on demarcated roads and access routes.
- Existing and planned road verges should be cleaned up as part of the road upgrading and waste / littering removed to permitted landfill site.
- \* Any road kills found during construction should be reported to the Environmental Site Officer.

### 11.2.5. RESIDUAL IMPACTS

The development would contribute to cumulative habitat loss and degradation in the area. Especially since the affected vegetation is already affected by alien species, compaction and littering.

The principal possibility for cumulative impact on fauna will be through cumulative habitat loss, which is likely to be negligible given the disturbed nature of the surrounding landscape. Direct impacts on fauna during construction will be temporary and could for the interim result in short term cumulative impact. The contribution to cumulative impact is likely to be relatively low to none if the mitigation measures are put in place.

### FAUNAL SPECIES AND DIVERSITY RESIDUAL IMPACTS

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Biodiversity	Construction Impact	Indirect Negative	MINOR	MINOR	NEGLIGIBLE
Faunal Species and Diversity	Operational Impact	Indirect Negative	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 12. LANDSCAPE CONNECTIVITY AND BROAD-SCALE ECOLOGICAL PROCESSES

The presence of the infrastructure and the alternations to the habitat does not indicate significant disruption of ecological processes and patterns. The main reason for this is that:

- \* Even though the development crosses a natural slope/valley wetland area area that may act as an ecological corridor, the removal of alien vegetation from the catchment area and wetland itself may in fact benefit the system.
- \* Faunal activities and processes are already fragmented due to impacts of mining activities.
- Processes in the patch of relatively intact grassland will not be negatively affected, since an already alien infested, polluted (littering) area in the road reserves will act as a buffer.
- \* Botanical patterns are already fragmented due to mining impacts.

### 12.1. IMPACT ASSESSMENT

### **CONSTRUCTION & OPERATIONAL PHASE IMPACT**

**Nature**: The presence of the facility and the alterations to the habitat will not significantly disrupt the connectivity of the landscape or the ecological functioning compared to existing fragmentation present on site. **Impact Magnitude: LOW** 

**Extent**: The extent of the impact is **local** as the impacts will be limited to the boundaries of the site. **Duration**: The duration will be **short term** as the fauna of the site will be affected marginally during operations. **Intensity**: The intensity is **low** given the conservation value of the vegetation on site, lack of indigenous fauna and the extent to which the proposed development footprint has already been disturbed.

Likelihood: The impact is likely to occur.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW

### 12.2. MITIGATION

### Mitigation Measures

- If any parts of the infrastructure need to be fenced-off, this should be in a manner which does not pose a threat to fauna, and as such no electrical stands should be placed within 30cm of the ground.
- \* Regular monitoring for alien plants within the development area during operation.

- All alien plants present at the site should be controlled at least biannually using the best practice methods for the species present and make out part of operational maintenance management.
- Regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. All erosion problems observed should be rectified as soon as possible, using the appropriate flow management and erosion control structures.
- \* All maintenance vehicles to remain on the demarcated access roads.

# 12.3. RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Minor* for the construction phase. After construction the significance will stay *Minor*, even with mitigation.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Landscape	Construction Impact	Indirect Negative	LOW	MINOR	NEGLIGIBLE
Functioning Connectivity	Operational Impact	Indirect Negative	LOW	LOW	MINOR
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 13. HEALTH AND SAFETY RISKS

This section describes potential impacts on workers, contractors and road users' health and safety resulting from the development and operation of the road and associated infrastructure. The potential impacts of this development are assessed and mitigation measures to reduce the impacts are outlined below.

### Table 13: Impact Characteritics: Health and Safety Risks

	Construction	Operation
Project Aspect/ activity	Risk of injury and damage to persons and/or property due to increased traffic and presence of heavy machinery and lifting equipment.	Risk of injury and damage to persons and/or property due to increased traffic and presence of machinery.
Impact Type	Increased health risk and nuisance associated with dust emissions.	Erosion and trip and fall areas
Stakeholders/ Receptors Affected	Direct, Negative Town residence and contractor workforce	Direct, Negative Town residence and contractor workforce

During construction there will be a number of activities that could impact worker safety, including pedestrian, residence and contractors. During construction, risks are posed by the movement of a relatively higher number of vehicles and large machinery required for activities such as site clearance and excavation, trenching, delivery of equipment and the removal of soil. Furthermore, with increased traffic related to the movements of heavy machinery, trucks and cars, both on and off site there is increased risk potential for traffic or road accidents. This increased risk could result in physical injuries and health associated risks, which have the potential to result in long-term debilitation and death.

Wind at the site and activities such as site excavations vehicle movements could create/suspend dust resulting in worker and residence exposure. Exposure to dust has the potential to cause or exacerbate existing respiratory

problems during exposure. In addition to this, heavy machinery and equipment being used on site, could lead to worker exposure to noise levels (i.e. noise levels above 85 (dB) that are considered to be harmful to human hearing.

## 13.1. CONSTRUCTION PHASE IMPACTS

The impact on health and safety would be a **direct negative** impact. The health and safety risks linked to the construction activities would occur at the **local** level. This impact will be for the construction phase, and would therefore be **short-term**. The intensity would be **low** as those who are directly affected would (in most cases) be able to adapt. It is **unlikely** that accidents would happen on site during the construction phase (as potential accidents can be mitigated through a health and safety plan).

### CONSTRUCTION IMPACT: HEALTH AND SAFETY

**Nature**: The impact on health and safety would be a **direct negative** impact. **Impact Magnitude: LOW** 

Extent: The health and safety risks linked to the construction activities would occur at the local level.Duration: This impact will be for the construction phase, and would therefore be short term.Intensity: The intensity would be low as those who are directly affected would (in most cases) be able to adapt.

**Likelihood** – It is **likely** that accidents will happen on site during the construction phase, unless such accidents can be avoided and/or mitigated through a prescribed health and safety plan.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR

### 13.2. MITIGATION MEASURES

### Mitigation objective

To manage construction activities so that impacts on health and safety risks to local residents, contractors, employees and animals are reduced and where possible all together avoided.

### Mitigation measure(s)

- Develop or apply standard Health and Safety Precautions which will include specific procedures on chemical hazards, fire and explosions, heavy lifting, work at heights, confined spaces and on site-traffic hazards. The implementation of practical health and safety procedures would reduce the risk of injury and promote a culture of safe working practices. This plan must be adhered to by the appointed construction contractors and meet OHS Act, requirements. These requirements should be implemented by the designated Health & Safety Officer.
- Potentially hazardous areas must be clearly demarcated (i.e. unattended foundation excavations).
- Appropriate Personal Protection Equipment (PPE) must be worn by construction personnel and site visitors (e.g. footwear, masks, protective clothing and goggles) where necessary.
- Undertake a job safety analysis to identify specific potential occupational hazards and industrial hygiene surveys, as appropriate, to monitor and verify chemical exposure levels, and compare with applicable occupational exposure standards.
- Develop a Traffic Management Plan which provides procedures and guidelines for the safe management of onsite traffic.
- \* Adapt the existing Emergency Preparedness and Response Plan, where necessary.
- \* For public safety, the following mitigation measures are provided:
- The correct beacons must be placed at the site of construction prior to the commencement of construction.
- \* The beacons that will be placed must be visible during the day and night time.
- \* In the event that pedestrians will be crossing the designated road, guidelines must be provided on site to ensure their safety.
\* The management plan must stipulate that the old R575 road may not be closed until the construction phase has ceased at the new road and it is in working order, to ensure an alternative is provided to motorists.

## 13.3. OPERATIONAL PHASE IMPACTS

Operational maintenance activities could impact on the health and safety of employees or contractors on site during operation. Maintenance activities include the maintenance of the constructed road if and when required and possible erosion measure maintenance. Specific aspects associated with such activities (e.g. driven machinery and the handling of debris substances) could present specific hazards to employees and/or contractors accessing the site. Maintenance may also result in increased traffic related to the movements of heavy machinery, trucks and cars, both on and off site there is increased risk potential for traffic or road accidents. This increased risk could result in physical injuries, which have the potential to result in long-term debilitation and death.

It is however noted that besides the negative effects associated with the construction and operation phases of this project, the project will ultimately contribute to improved road safety conditions and infrastructure.

### IMPACT ASSESSMENT

The impact on health and safety would be a **direct negative** impact. The health and safety risks linked to the operational activities would occur **on-site**. This impact will occur infrequently if required and would therefore have an impact on the **short-term**. The intensity would be **low** as damage or injury associated with operational activities on site can be mitigated. It is **possible** that accidents would happen on site during the operation phase, unless such accidents are avoided or mitigated through a prescribed health and safety plan.

### OPERATIONAL IMPACT: HEALTH AND SAFETY

**Nature**: The impact on health and safety would be a **direct negative** impact. **Impact Magnitude: Minor** 

Extent: The health and safety risks linked to the operational activities would occur on site.Duration: This impact will occur only during construction and be short term.Intensity: The intensity would be low as damage or injury associated with operational activities on site can be mitigated.

**Likelihood:** It is **possible** that accidents would happen on site during the operation phase, unless such accidents are avoided or mitigated through a prescribed health and safety plan.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MINOR

### 13.4. MITIGATION MEASURES

### Mitigation objective

The objective of mitigation is to manage operational activities so that impacts on health and safety risks to local residents, contractors, employees and animals are reduced and where possible all together avoided.

#### Mitigation measure(s)

- Develop a Health and Safety Plan which will include specific procedures on chemical hazards, fire and explosions, heavy lifting, work at heights, confined spaces and on site-traffic hazards. The implementation of health and safety procedures would reduce the risk of injury and promote a culture of safe working practices. This plan must be adhered to by the appointed construction contractors and plant operations staff and meet OHS Act requirements.
- Firefighting equipment (e.g. fire hydrants, fire hose reels and an automatic sprinkler system) shall be installed to meet the minimum requirements of the OHS Act.

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- Appropriate Personal Protection Equipment (PPE) must be worn by construction personnel and site visitors (e.g. footwear, earplugs, masks, protective clothing and goggles) where necessary.
- Implement Health and Safety communication and training programs to prepare workers to recognize and respond to workplace hazards. Programs will include aspects of hazard identification, safe operating and materials handling procedures, safe work practices, basic emergency procedures and special hazards unique to their jobs.
- \* A Traffic Management Plan should be developed to provide procedures and guidelines for the safe management of on-site traffic.

## 13.5. RESIDUAL IMPACT

The implementation of the above mitigation measures would reduce the construction impacts from minor to negligible and the operational impacts from minor to negligible. The pre- and post-mitigation impacts are compared in the table below.

Aspect		Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
		Construction Impact	Direct Negative	LOW	MINOR	NEGLIGIBLE
Health aı Safety	nd	Operational Impact	Direct Negative	MINOR	MINOR	NEGLIGIBLE
		Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

## 14. TRAFFIC

This section considers the impacts to traffic and road users during the construction and operation of the project. During the operational phase there will only be an increase in traffic but there will be no other substantial effect.

**Table 14: Impact Characteristics: Traffic** 

	Construction	Operation
Project Aspect / Activity	Delivery of components and construction	Construction vehicles for repair of the
	equipment	road
	Delivery of materials (cement / tar)	Commuters
	Construction personnel commuting to	
	and from site	
Impact Type	Direct negative	Direct negative
Stakeholders / Receptors	Road users	Affected landowners / inhabitants
Affected	Affected landowners / inhabitants	

## 14.1. CONSTRUCTION PHASE IMPACTS

During the construction phase of the road there will be an increase in vehicle movement to and from the site and along the road itself. The increased vehicle movement is largely associated with the delivery of construction material and associated infrastructure during the construction phase. This has the potential to impact on traffic using the existing road network in the area.

The increase in traffic could create noise, dust and safety impacts for fauna, other road users and people living or working within close proximity to the roads on the associated road network. In addition to this, the increased volume of traffic along the transport route will increase the wear and tear on these roads and possible lead to

deterioration in road conditions. There will be some disruptions to traffic associated with creating stop-and-go's during construction.

## 14.2. IMPACT ASSESSMENT

CONSTRUCTION IMPACT: TRAFFIC

**Nature:** Construction activities that increase traffic would result in a **direct negative** impact on people who use the roads along the final transport route.

### Impact Magnitude: MEDIUM

Extent: The extent of the impact is local as the potential impact will extend along the selected transport route.Duration: The duration will be medium term for the duration of construction.Intensity: The intensity is likely to be low given that the disruption in traffic flow will only be temporary.

Likelihood: There is a **definite** likelihood of increased traffic.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW IMPACT SIGNIFICANCE (POST-MITIGATION): MINOR

### **OPERATIONAL IMPACT: TRAFFIC**

This activity will be limited in time, duration and frequency to such an extent that community health and safety issues are not expected during the operational phase. After completion, the road will have a positive impact on the commuter's experience. As consequence, the traffic of the improved road will be safer.

## 14.3. MITIGATION

### Mitigation Objectives

To reduce the inconvenience and safety risks associated with traffic deviation during construction phase.

#### Mitigation Measures

- \* Ensure that construction activities are staggered and vehicular activities are kept to a minimum, during daylight hours and as far as possible outside of peak traffic times.
- \* The contractor must ensure that half the road remains open or a bypass is available at all times when constructing bridge sections across the road.
- Adequate traffic signage and barricading guiding road users will be present at all times during construction.
- \* The transport of fuels on public roads is governed by the National Road Traffic Act and as such vehicles and drivers must meet stringent safety controls.
- \* A Traffic Management Plan should be developed to provide procedures and guidelines for the safe management of on-site traffic.
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.

## 14.4. RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Minor* for the construction phase. After construction the significance will stay *Minor*, even with mitigation.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
	Construction Impact	Direct Negative	MEDIUM	LOW	MINOR
Traffic	<b>Operational Impact</b>	Direct Negative	MEDIUM	MINOR	MINOR
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 15. SOCIO-ECONOMIC

The deviation of the road and associated infrastructure is expected to have a moderate impact on the socioeconomic receptors, due to its location and its nature. The main socioeconomic impacts associated with the project relate mainly to the loss of informal amenities for a nearby informal settlement. This issue of concern is still being investigated. An accurate account of the impact on this settlement can only be provided once it has been established whether or not the local municipality recognizes this settlement as an legal settlement that will be provided with the basic services in the future (including amenities).

Key benefits for the local economy include the temporary creation of employment and procurement of local goods and services. Additionally, skills transfer is expected to take place during the project to enable persons involved to obtain future job opportunities. The improved road safety and infrastructure will increase the accessibility to local business centers and the town of Middelburg. Indirectly, this will boost the local economy of Middelburg. Moreover, the possibility exists of potential economic benefits being obtained through the trade of invasive alien species trees located nearby. This is but a suggestion and should be taken into account so that the local economy can draw the maximum benefits from the proposed project. In this context, local economy refers to the local district of Nkangala District Municipality area.

## **15.1.** BENEFITS TO THE LOCAL ECONOMY

The project is expected to contribute to the local economy through direct and indirect job creation and procurement of local goods and services. The impacts will, however, be limited as there will be minimum revenue generated at a local and regional level.

Summary	Construction	Operation
Project Aspect/ activity	Employment (including training and development) and Procurement of Local contractors	Employment and Procurement of Local contractors
Impact Type	Direct, positive impact	Direct, indirect and induced positive impact
Stakeholders/ Receptors Affected	Local community and Local Municipality	Local community, Local Municipality, and suppliers

IMPACT CHARACTERISTICS: BENEFITS TO THE LOCAL ECONOMY

### **15.2.** DESIGN AND CONSTRUCTION PHASE IMPACTS

### EMPLOYMENT

The positive employment impacts of the proposed project will not be significant due to the limited employment opportunities that will be created for people living within the local area.

The design and construction phase of the Project is expected to create both direct and indirect employment opportunities for the local population. Currently the estimated jobs that will be created through the proposed project are still unknown. The skills mix would include highly skilled personnel, semi-skilled and unskilled personnel. All the design (and engineering) jobs during the construction phase will be temporary in nature, as will all construction related jobs. It is the intention to employ mainly people from the Nkangala District areas and thereafter regionally, depending on their capabilities to complete the project.

As suggested above, the likelihood exists that additional local employment can also be generated through the trade of invasive alien species trees, which there are plentiful. Since the strain invasive species place on the local natural habitat outweigh the decision to preserve them, this resource would be used more effectively to the advantage of the local economy. This source could provide temporary employment to semi-skilled and unskilled individuals in the local community.

Indirect employment will be created through employment in procurement of local goods and services.

### TRAINING AND DEVELOPMENT

The construction work will create an opportunity for 'on-the-job' training, increasing general skills levels. Initial recruitment and training for local personnel will take place prior to and during the construction phase as the contractor may require. The opportunities for skills development, training and transfer will extend through from skilled to unskilled workforce.

### PROCUREMENT OF LOCAL GOODS AND SERVICES

It is intended that the majority of the goods and services required for the Project will be procured locally and where possible, thereafter regionally. Local businesses are expected to benefit from the project primarily through civil and construction works, hospitality and services (such as catering, cleaning, amenities). The use of vehicles and machinery will result in a lesser extent in transport, vehicle servicing and security services. Due to the nature of the project and short construction period the procurement benefits will be limited.

### **15.3.** IMPACT ASSESSMENT

The construction phase of the Project will create temporary jobs including direct and in-direct opportunities as related to the proposed project. No permanent employment will take place.

The benefit to the local economy will be **direct** via employment and procurement of services and **indirect** benefits of expenditures in the local economy. Employment and procurement of service will be created at a **local** level, although this may not be Middelburg itself as appointment depends on accreditation, skills and capacity availability. Employment and procurement generated during the construction phase will take place over a few weeks and will therefore be **short-term**. The intensity will be **low** as there will be between jobs created with majority of goods and services procured locally and regionally during the construction phase. There is a **high** likelihood that this impact will occur.

### CONSTRUCTION IMPACT: BENEFITS FOR THE LOCAL ECONOMY

**Nature**: The benefit to the local economy will be **direct** via employment and procurement of services and **indirect** by means of expenditures in the local economy due to increase in wages. **Impact Magnitude: LOW** 

**Extent:** Employment and procurement of service will be created at a **local** level depending on skills and capacity availability.

**Duration:** Employment and procurement generated during the construction phase will take place over the **short-term**.

**Intensity:** The intensity will be **low** as there will be a few jobs created with majority of goods and services procured locally during the construction phase.

**Likelihood** – There is a **high** likelihood that this impact will occur.

### IMPACT SIGNIFICANCE (PRE-ENHANCEMENT): MINOR

### **15.4.** OPERATION PHASE IMPACTS

### LOCAL ECONOMY BENEFITS

Procurement of goods and services will also be limited and localized during operations. Operational procurement is expected to include a possible increase in traffic and a more consistent traffic flow during flooding periods that could potentially result in some local expenditure (catering, amenities).

### **15.5.** IMPACT ASSESSMENT

The benefit to the local economy will be **indirect** and induced benefits by means of expenditures in the local economy due to increase in traffic and consistent traffic flow during peak traffic times. Expenditures from travelers will be created at a **local** level. Expenditures from travelers will be **long-term**, generated for the indefinite duration of the operational phase. The intensity will be **medium** as the traffic trends are likely to increase since the road will be able to accommodate a higher number of vehicles. There is a **possible** likelihood that this impact will occur.

### **OPERATIONAL IMPACT: BENEFITS FOR THE LOCAL ECONOMY**

**Nature**: The benefit to the local economy will be **direct** via employment and procurement of services and **indirect** and induced benefits by means of expenditure in the local economy due to increase in wages; local supply chain etc.

#### Impact Magnitude – Minor

- **Extent:** Expenditures will be created at a **local** level depending on skills and capacity availability.
- **Duration:** Expenditures will be **long-term**, generated for the indefinite duration of the operational phase.
- **Intensity:** The intensity will be **medium** as the traffic trends are likely to increase since the road will be able to accommodate a higher number of vehicles.

**Likelihood** – It is **possible** that this impact will occur.

### IMPACT SIGNIFICANCE (PRE-ENHANCEMENT) - MINOR

### 15.6. MITIGATION

Mitigation objective

The objective of enhancement is to optimize opportunities for employment and procurement of local labor and services, wherever possible, or alternatively that procurement at a regional or national level should take place.

Mitigation Measures

- \* For this project a recruitment and procurement procedure will be followed which sets reasonable targets for the employment of local residents and South African, suppliers (originating from the local municipalities) and promote the employment of women as a means of ensuring that gender equality is attained. Criteria will be set for prioritizing local (local municipalities) residents/suppliers over regional or national residents/suppliers.
- \* All contractors will be required to recruit and procure in terms of standard recruitment and procurement processes according to the Public Finance Management Act (No 1 of 1999) (PFMA).
- \* Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the Project. This will help to ensure that they have future opportunities to provide goods and services to the sector.

## **15.7.** RESIDUAL IMPACT

Considering the unemployment state and limited employment opportunities any change in the area is considered to have some residual benefit to the community at large. The implementation of the above measures would ensure that the construction impacts remain of minor to negligible significance and ensure that the significance of the operation impact remains a negligible positive. The pre- and post- enhancement impacts are compared below.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
Local Economy	Construction Impact	Direct, positive impact.	LOW	MINOR	NEGLIGIBLE
	Operational Impact	Direct, indirect and induced positive impact.	MINOR	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

## 16. WETLANDS

The wetland habitat constituted of two wetland features, classified as channeled and unchannelled valley bottom wetlands.

The channeled valley bottom wetland feature was located within the northern section of the road upgrade on Dr. Mandela Drive. This feature forms part of a tributary of the Klein Oliphant's River. This wetland feature has been modified by the existing main road, a culvert system underneath the main road and an impoundment upstream of the crossing. The hydrology of the wetland feature has been severely altered by berms, thus obstructing the natural flow of the system.

The unchannelled valley bottom wetland feature was located within the southern section of the road upgrade. It is located adjacent to Keiskamma Drive flowing in a south-western direction, crossing the R575 and flowing into the Spookspruit. This system forms an unchannelled valley bottom wetland feature at the top section next to the road and forms a channeled valley bottom system further down, flowing into the Spookspruit. The unchannelled valley bottom wetland has been severely altered by alien vegetation invasion by species such as *Acacia mearnsii* and topographic and hydrological alteration due to impacts associated with the existing road. The wetland assessment results are taken from the specialist report done by Scientific Aquatic Services (2013).



Figure 29: Wetlands along the R575 road deviation

## 16.1. CONSTRUCTION AND OPERATIONAL PHASE ASSESSMENT

### CONSTRUCTION & OPERATIONAL IMPACT: WETLANDS

**Nature:** Construction & Operational activities have the ability to have an **indirect negative** impact on the wetland present.

### Impact magnitude: MEDIUM

**Extent:** The extent of the impact is **local** as the impact could affect the whole, or a measurable portion of the wetland.

**Duration:** The duration will be **medium term** as mitigation measures are in place to prevent impacts. **Intensity:** The intensity is likely to be **medium** given that the affected environment may be altered, but functions and processes will continue in a modified way.

Likelihood: There is a **probable** likelihood that the wetland will be impacted.

### IMPACT SIGNIFICANCE (PRE-MITIGATION): MODERATE IMPACT SIGNIFICANCE (POST-MITIGATION): LOW

## 16.2. MITIGATION

Mitigation objective

To protect wetlands in the area.

#### Mitigation measures

- \* The nature of the proposed development (road) means that it is necessary to cross the wetland areas within the project footprint, especially during bridge construction; disturbance to any wetland crossing must be minimized and suitably rehabilitated.
  - Ensure that bridge structures which may be upgraded do not alter stream flow patterns to ensure that flow is maintained and that movement of wetland faunal taxa is afforded.
  - Connectivity of the wetland features in the system need to be maintained in order to ensure linear
    protection of water quality within these systems as well as ensuring the continuity of the habitats
    and resources.
  - It must also ensure that obstruction of flow does not take place or for very short periods if this cannot be avoided.
  - Any activities occurring within the wetland boundary, including rehabilitation, must be authorized by the DWA in terms of Section 21 (c) & (i) of the National Water Act (Act 36 of 1998).
- No vehicles should be allowed to drive through designated sensitive wetland areas during the eradication of alien and weed species.
- \* The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas.
- \* It must be ensured that flow connectivity along the wetland features is maintained.
- Reprofiling of the banks of disturbed wetland areas.
- \* Reinforce banks and drainage features where necessary with gabions, reno mattresses and geotextiles.
- \* All vehicles should remain on designated roads with no indiscriminate driving through area.
- \* Rehabilitate the wetland zone to ensure that the watercourse functions are re-instated.
- Implement alien vegetation control program within wetland zone.
- \* Re-vegetate all disturbed areas with indigenous wetland species.
- If it is absolutely unavoidable that wetlands will be affected, especially during construction, disturbance to any wetland crossings must be minimized and suitably rehabilitated.
- Reprofiling of the banks of disturbed wetland areas.
- \* Restrict construction to the drier months if possible to avoid sedimentation of the wetland features.
- \* Edge effects of activities including erosion and alien/ weed control need to be strictly managed in the wetland area.
- As much vegetation growth as possible should be promoted within the Wetland in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydro seeding, wetland and rehabilitation planting (where applicable) are to be implemented.
- Planning of temporary roads and access routes should take the site sensitivity plan into consideration. If possible, such roads should be constructed a distance from the more sensitive wetland areas and not directly adjacent thereto.
- \* Areas of increased ecological importance and sensitivity, such as the wetland areas should be considered during all phases of development planning, construction and operations.
- \* It must be ensured that as far as possible all infrastructures, including temporary facilities is placed outside of sensitive potential RDL faunal habitat areas, with special mention of wetland areas.

## 16.3. RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Minor* for the construction phase. After construction the significance will reduce to *Negligible* with mitigation.

Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
	Construction Impact	Indirect Negative	MEDIUM	MODERATE	LOW
Wetlands	Operational Impact	Indirect Negative	MEDIUM	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

# 17. SUMMARY OF RESULTS

Description		Impact Evaluation		Residual Impact	
Aspect	Project Phase	Impact Type	Impact Magnitude	Significance (Pre- mitigation)	Residual Significance (Post- mitigation)
	Construction Impact	Direct Negative	LOW	MINOR	NEGLIGIBLE
Dust Emissions	Operational Impact	Indirect Negative	LOW	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Direct Negative	LOW	MINOR	NEGLIGIBLE
Air Quality	Operational Impact	Direct Negative	LOW	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Direct Negative	MINOR	MINOR	NEGLIGIBLE
Noise	Operational Impact	Direct Negative	LOW	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Direct Negative	LOW	LOW	MINOR
Waste Residue and Effluent	Operational Impact	Indirect Negative	MINOR	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Indirect Negative	MINOR	MINOR	NEGLIGIBLE
and Heritage	Operational Impact	Indirect Negative	MINOR	NEGLIGIBLE	NEGLIGIBLE
resources	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Biodiversity: Plant Species and Diversity	Construction Impact	Direct Negative	MINOR	MINOR	NEGLIGIBLE
	Operational Impact	Direct Negative	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Biodiversity:	Construction Impact	Direct Negative	MEDIUM	LOW	NEGLIGIBLE
Habitat and Ecological	Operational Impact	Direct Negative	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
Structure	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Biodiversity: Faunal Species and Diverstiy	Construction Impact	Indirect Negative	MINOR	MINOR	NEGLIGIBLE
	Operational Impact	Indirect Negative	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Indirect Negative	LOW	MINOR	NEGLIGIBLE
Functioning	Operational Impact	Indirect Negative	LOW	LOW	MINOR
connectivity	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Direct Negative	LOW	MINOR	NEGLIGIBLE
Health and Safety	<b>Operational Impact</b>	Direct Negative	MINOR	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Direct Negative	MEDIUM	LOW	MINOR
Traffic	<b>Operational Impact</b>	Direct Negative	MEDIUM	MINOR	MINOR
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Impact	Direct, positive impact.	LOW	MINOR	NEGLIGIBLE
Socio- Economic	Operational Impact	Direct, indirect and induced positive impact.	MINOR	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Wetlands	Construction Impact	Indirect Negative	MEDIUM	MODERATE	LOW
	Operational Impact	Indirect Negative	MEDIUM	MINOR	NEGLIGIBLE
	Decommissioning Closure Impact	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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