ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED MUTSHO POWER PROJECT NEAR MAKHADO IN THE LIMPOPO PROVINCE

Socio-Economic Impact Study

Draft

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TABLE OF CONTENT

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ABBREVIATIONS

CAGR	Compounded Average Growth Rate
CFB	Circulating Fluidised Bed
DM	District Municipality
DoE	Department of Energy
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
ESP	Electrostatic Precipitator
GDP	Gross Domestic Product
GDP-R	Gross Domestic Product per Region
Ha	Hectare
I&AP	Interested and Affected Parties
IDZ	Industrial Development Zone
IPP	Independent Power Producer
IPAP	Industrial Policy Action Plan
IRP	Integrated Resource Plan
LM	Local Municipality
MW	Mega Watt
NDP	National Development Plan
NEA	Not Economically Active
NGPF	New Growth Path Framework
PC	Pulverised Coal
SDF	Spatial Development Framework

1. INTRODUCTION

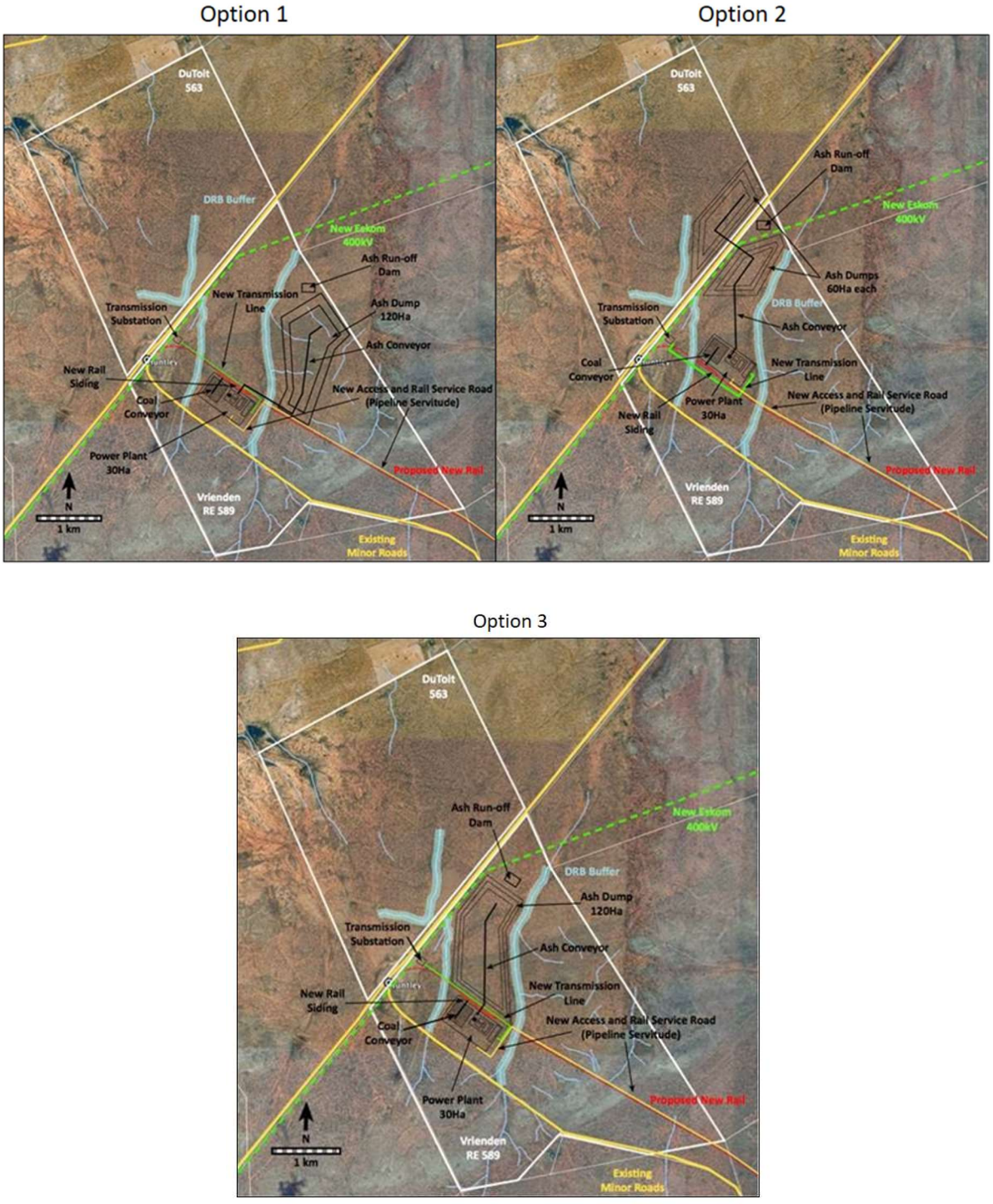
This document is prepared by **Urban-Econ Development Economists** (Urban-Econ) in response to a request by **Savannah Environmental (Pty) Ltd** (Savannah Environmental) to undertake a Socio-Economic Impact Assessment for the proposed Mutsho Power Project located near Makhado/Musina, in Limpopo.

1.1 Brief description of the project

Mutsho Power (Pty) Ltd proposes to develop a 660MW coal-fired power plant near Makhado, Limpopo. The project will make use of Circulating Fluidised Bed (CFB) technology. The footprint of the development site is envisaged to be around 350ha. The following development infrastructure will need to be constructed on site:

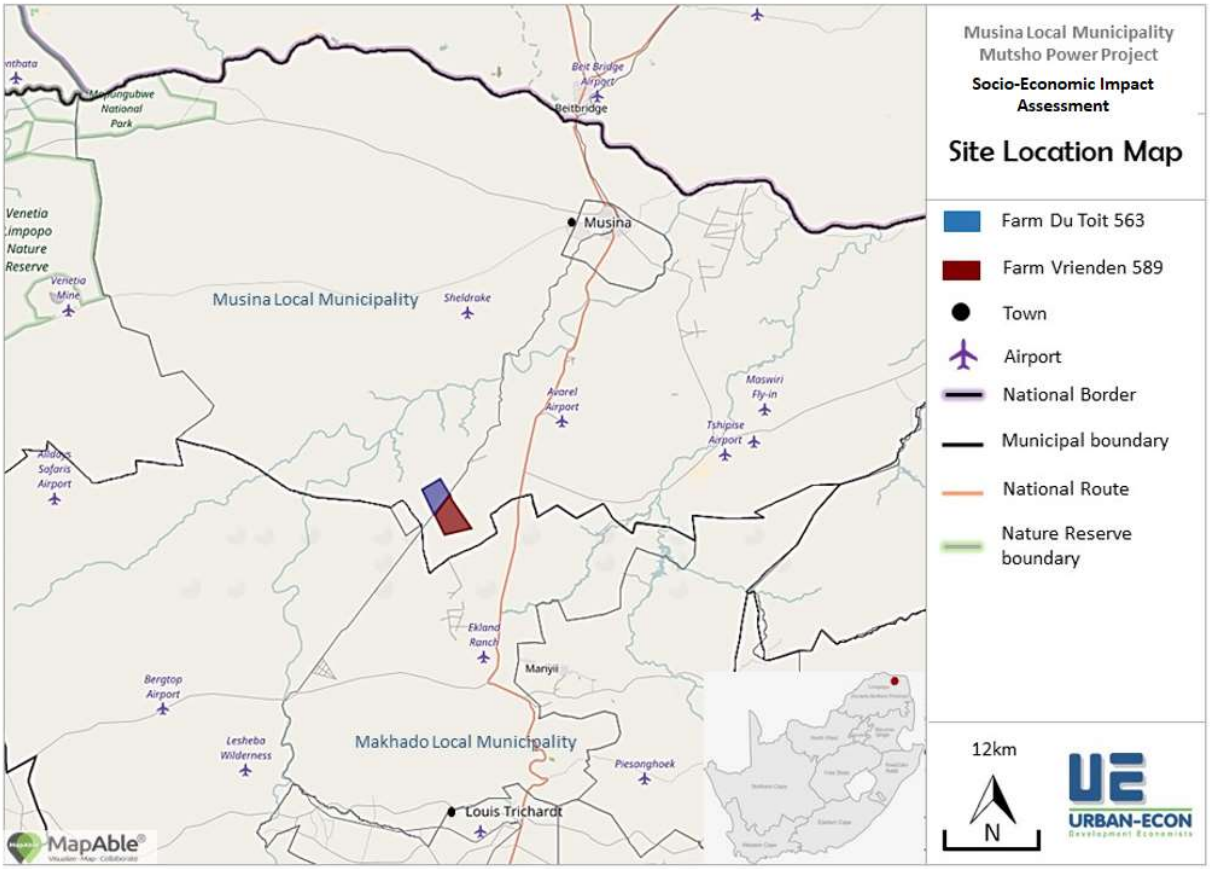
- Power island consisting of:
  - Circulating Fluidised Bed (CFB) boiler technology
  - Electrostatic Precipitator (ESP) or bag filtration systems and flue/smoke stacks
  - Direct or indirect air-cooling systems
  - Balance of plant components
- Coal and limestone/lime rail spur and road offloading systems
- Upgrading or establishment of a rail siding
- Coal crusher
- Strategic and working coal stockpiles
- Limestone storage and handling area
- Ash dump (dry-ash has been assumed with the recommendations of the National Development Plan (NDP) and Integrated Energy Plan (IEP))
- Water infrastructure
- HV Yard and substation components with HV overhead transmission lines connecting to the Eskom infrastructure.
- Control room, office or administration, workshop, storage and logistics buildings
- Upgrading of external roads and establishment of internal access roads
- Security

Three alternative site layout options are presented below.



Map 1-1: Project site layout options

The project is located in the Musina Local Municipality (LM) within the Vhembe District Municipality (DM) in the Limpopo Province, as outlined in the map below.



Map 1-2: Location of Proposed Coal-fired Power Plant

1.2 Scope and purpose of the study

The socio-economic impact assessment contains information that together with other specialists allows assessment of the project from a sustainable development perspective and assists in identifying "the most practicable environmental option" that provides the "most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society", in the long-term and the short-term. In light of the above and in line with the Environmental Impact Assessment (EIA) Regulations of 2014, the purpose of the socio-economic impact assessment is to assess the need and desirability of the project. It specifically aims to ensure that the project, if approved, provides for justifiable social and economic development outcomes. As such, it aims to:

» identify, predict, and evaluate geographical, social, economic, and cultural aspects of the environment that may be affected by the project activities and associated infrastructure; and
» advise on the alternatives to best avoid negative impacts, or allow to manage and minimise them to acceptable levels, while optimising positive effects.

The specific objectives of the study include:

» Engage with the environmental practitioner, other specialists on the team and the client to gain necessary background on the project;
» Delineate the zone of influence in consultation with other specialists on the team;
» Determine the affected communities and economies located in the zone of influence and identify sensitive receptors within the delineated study area, i.e. communities,

land uses and economic activities that could be directly or indirectly negatively affected by the proposed project or benefit from it;
» Review secondary data and assess data gaps;
» Conduct a site visit and collect primary social and economic data of the parties that may be directly or indirectly affected (positively or negatively) by the proposed project to address data gaps;
» Create profiles for the communities and economies representing the study area and the environmentally affected zone;
» Assess the need and desirability of the project and its alternatives in line with the specified guidelines;
» Identify, predict, and evaluate the potential positive and negative impacts associated with the project following Savannah Environmental's methodology;
» Advise on the most suitable alternative, inclusive of the "no-go" option; and
» Develop a mitigation plan by proposing mitigation measures for negative effects and enhancement measures for positive impacts.

1.3 Methodology

The following methodology was followed in completing the study:

» **Orientation:** The study started with gaining an understanding of the proposed project during various stages of its lifecycle and the potentially affected environment. A review of various data and maps provided for the project, as well as discussions with the project team, informed the delineation of the potential zone of influence associated with each component of the project. The delineated zone of influence defined the spatial boundaries of the area to be included in the assessment and assisted in identifying likely impacted and beneficiary communities and economic activities, as well as other stakeholders of the project.
» **Policy alignment review:** Relevant government policies and other strategic documents were gathered and reviewed to determine the alignment of the proposed project with the strategic plans of various government spheres and highlight any potential red flags, if such exist.
» **Baseline profiling:** Following policy review, primary and secondary data were gathered to create the socio-economic profile of the delineated zone of influence. The baseline profile assisted in gaining an understanding of the communities and economic activities likely to be affected or benefit from the proposed project. This included the description of the study area's composition and locational factors, economic and labour profiles, way of life of communities located within the zone of influence, their demographic trends and cultural references, their health and wellbeing, and their living environment. Specific attention was paid to the socio-economic composition of the area affected by the project's footprint and its potential environmental effects, i.e. visual, noise, air pollution, etc.
» **Impact analysis and evaluation**: derived from the review of the project and its need and desirability is the list of various negative and positive socio-economic impacts that can ensue as a result of the proposed activity during various stages of its life cycle. All identified socio-economic impacts were assessed and categorised in line with the rating provided by Savannah Environmental (refer to Annexure A).

» **Formulation of mitigation and enhancement measures:** Following the analysis and ranking of impact, mitigation, and enhancement measures, where applicable, were formulated whereby recommendations to reduce or eliminate the potential negative effects on the affected parties and enhance positive impacts were provided.

1.4 Data gathering and consultation process

The project made use of both primary and secondary data in order to assess the impacts and desirability of the project.

a) <u>Secondary data analysed</u>

» Stats SA Census, 2011
» Quantec Research Standardised Regional Data, 1995-2013
» National, provincial and local government strategic documents and policies

b) <u>Primary data collected</u>

The primary data gathering for this project was done in the form of in-person interviews and engagements over telephone and e-mail. The site visit and meetings with key respondents took place on the 24th of January 2018. Furthermore, telephonic and e-mail interviews were conducted in late January 2018. The following people were engaged with and interviewed:

Table 1-1: Engagement schedule

Name and Surname of Key Respondent	Position	Date
Henk Osmers	Adjacent land owner- Farm Verdun 535 RE/535	23 January 2018
Souis Hendrie Van de Walt	Directly affected land owner- Farm Du Toit 563, 0/563	24 January 2018
Helena Van de Merwe	Adjacent land owner- Farm Hermanus 533, 0/53	24 January 2018
Louis Andre Du Preez	Adjacent land owner- Farm Goosen 530, 1/530	24 January 2018
Julian Dreyer	Adjacent land owner- Farm Command 588, 0/588	25 January 2018

1.5 Assumptions, limitations and gaps in knowledge

» The secondary data sources used to compile the socio-economic baseline (demographics, dynamics of the economy) although not exhaustive, can be viewed as being indicative of broad trends within the study area.
» The study was done with the information available to the specialist within the time frames and budget specified.
» Possible impacts and stakeholder responses to these impacts cannot be predicted with complete accuracy, even when circumstances are similar, and these predictions are based on research and years of experience, taking the specific set of circumstances into account.

- » It is assumed that the motivation, and ensuing planning and feasibility studies for the project were done with integrity and that all information provided to the specialist by the project proponent and its consultants to date is accurate.
- » With regard to the telephonic, email and in-person interviews undertaken, the following assumptions and limitations apply:
  - Questions asked during the interviews were answered accurately.
  - Nine of thirteen adjacent land owners could not be contacted due to no response to email questionnaires and telephones. Two repeat attempts were made to follow up on emailed questionnaires with no success. Therefore, their views are not represented in this study.
  - The limitation of this is that the views and issues identified are solely based on the baseline data of the environment and the views of the directly impacted land owners and 3 adjacent land owners. It was assumed though that the views of the other adjacent land owners whose feedback was not possible to would reflect concerns and perceptions similar to the those affected parties, who participated in the study.
- » Due to the limited data available concerning the project and future IPP procurement rules, it was not possible to quantify the potential production and employment impacts and to determine with greater accuracy the extent to which the proposed project will affect the current socio-economic environment. While all due care was taken to ensure that the assessment of impacts is accurate (and follows the conservative approach), provision of additional data could potentially impact the assessment of the significance of production and employment impacts.
- » Since the information concerning the project's actual investment and operational expenditure was not available at the time, other similar coal-fired power plants planned to be developed by Independent Power Producers were used as references for the estimation, of Operation Expenditure (OPEX) and Capital Expenditure (CAPEX). This means that the economic benefits to be derived during the construction and operational phases of the project are estimates only and should be treated as such. They do though provide an estimation of the size of economic benefits in terms of job creation and economic stimulus to be generated by the project-related activities in South Africa, which assists in determining the significance of the respective impacts.

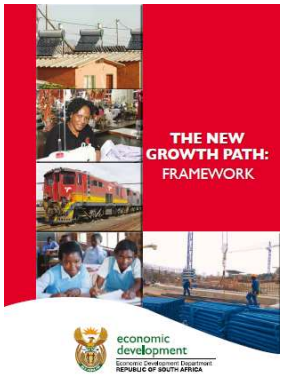
2. POLICY REVIEW

A policy review plays an integral role in the initial stages of a project. The review provides an indication of whether a project is aligned with the goals and aspirations of the developmental vision across the three spheres of government. Furthermore, the analysis signposts any red-flags or developmental concerns that could jeopardise the development of the project and assists in amending it, preventing costly and unnecessary delays.

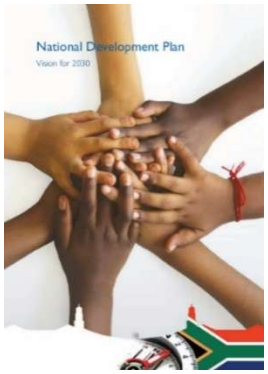
The following government strategic documents applicable to the delineated study area were examined:

- National (South Africa):
  - New Growth Path Framework (NGPF) (2011)
  - National Development Plan (NDP) 2030 (2011–2030)
  - Integrated Resource Plan for Electricity (IRP) 2010-2030 (2016)
  - Industrial Policy Action Plan (IPAP) (2017/18–2019/20)
  - South African Coal Roadmap (2013)
- Regional (Limpopo Province):
  - Limpopo Employment, Growth and Development Plan 2009-2014 (2009)
  - Limpopo Development Plan (2015)
- Local (Vhembe District Municipality and Musina Local Municipality):
  - Vhembe District Municipality Integrated Development Plan 2016/17
  - Musina Local Municipality Integrated Development Plan 2014/15
  - Musina Local Municipality Spatial Development Framework 2014/15
  - Special Economic Zone Act 16 of 2014

2.1 Project alignment with national policies and strategic documents

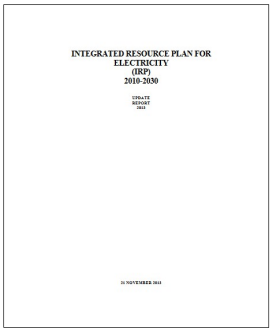


The vision of the **New Growth Path Framework (NGPF)** is to ensure that jobs and decent work are at the centre of economic policy (Development D. o., 2011). The key problem issues are mass joblessness, poverty, and inequality. In addition, the lack of access to energy is identified as a major concern for the growth of the economy. Therefore, increased access to energy would have a profound effect on curbing poverty and unemployment. The framework states that public investment can create 250 000 jobs per annum in energy, transport, water, communications infrastructure, and housing. These jobs are said to be in four activities, the construction of new infrastructure; the operation of new facilities; expanded maintenance; and the manufacture of components for the infrastructure programme (Development D. o., 2011).



The **National Development Plan (NDP)** aims to address South Africa's triple development challenges of poverty, unemployment, and inequality by 2030. The plan is informed by the NGPF and envisages that by 2030 the South African energy sector will promote economic growth and development through adequate investment in energy infrastructure (Commission, 2011).

Furthermore, the plan states that coal will contribute much less to primary energy needs; however, in terms of fuel, coal will continue to dominate over the next 20 years (Commission, 2011). Cleaner coal technologies will be promoted through research and development investments and technology transfer agreements.

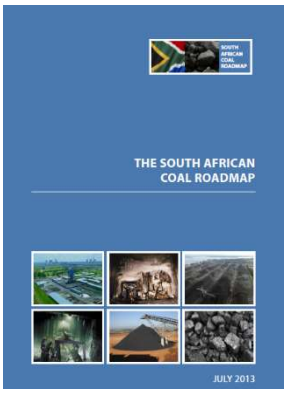


The **Integrated Resource Plan for Electricity (IRP) 2010 – 2030** argues that the development of the electricity generation sector can support the growth of the national economy (Energy, 2013). According to Eskom (2015), South Africa has more than 66 billion tonnes of coal resources and reserves remaining. At current production rates, it is estimated that coal supply is in excess of 200 years. More than 70% of these resources lie in the Waterberg Coalfield in the Limpopo province.

The IRP provides for a diversified energy mix, in terms of new generation capacity, that includes coal at 14.7% of the total capacity. The alternatives considered for this extension include the establishment of new and more efficient coal-fired generation capacities with lower emission rates. Although the contribution of coal-based power plants towards electricity generation capacity in the country is expected to slowly diminish towards 2050, it can be argued that the coal-fired power stations will remain to be significant contributors to the generation of electricity in the country (Department of Energy, 2016).

In 2012, the Minister of Energy had made a determination to procure baseload energy generation capacity to the value of 2 500 MW, which is to be generated from coal. These are to be procured through one or more Independent Power Producer (IPP) procurement programmes.

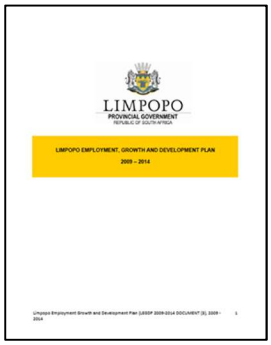
The **Industrial Policy Action Plan (IPAP) 2017/2018 – 2019/2020** represents a significant step forward in scaling up the country's efforts to promote long-term industrialisation and industrial diversification (Department of Trade and Industry, 2017). The plan calls for radical economic transformation whereby decent sustainable jobs-particularly for the most marginalised and vulnerable groups of society are created. In addition, the plan calls for shared and inclusive growth (Department of Trade and Industry, 2017).



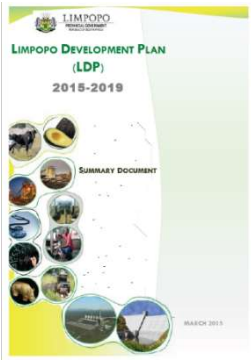
The **South African Coal Roadmap** was developed to explore the required interventions in support of the coal industry to 2040 (Fossil Fuel Foundation and SANEDI, 2013). The roadmap asserts that coal has an important role in the South African economy and is the primary energy source for electricity generation. To maintain a prosperous country, energy security is a priority. Approximately 224 million tonnes of coal is mined annually; 28% of this coal is exported, 53% is utilised for electricity generation, and the remainder is distributed across various industries (Eskom, 2016). In a quest to advance coal power station technologies, an assessment and applicability of coal combustion technologies and the deployment of carbon capture and storage is proposed.

National policy surmises that the energy sector is an avenue for job creation, economic growth, and development. Employment in the energy sector is said to lie in construction, operation, maintenance, and manufacturing of selected components. The national policies are in sync with the view that coal dependence will continue in the long-term, which suggests that coal-fired power stations will continue to be a prominent part of the South African energy mix in the foreseeable future. However, a proposal for research and development of cleaner coal technology with reduced emission rates is put forward. Evidently, the proposed coal-fired power station correlates with national policy.

2.2 Project alignment with provincial policies and strategic documents



The **Limpopo Employment, Growth and Development Plan** argues that there is a pressing need to fast-track sustainable socio-economic development. This includes a mass-scale roll out of physical, social, and economic infrastructure. The central aspects of socio-economic infrastructure include bulk electricity infrastructure. Like the IRP, this plan confirms that there are rich coal reserves in the Waterberg Coalfield. To make use of these resources, a coal-fired power station is identified as a potential growth sub-cluster. The plan thus sought to attract investment in coal and energy. Lastly, the plan aims to promote the coal and energy SMME Growth initiative (Limpopo Provincial Government, 2009).

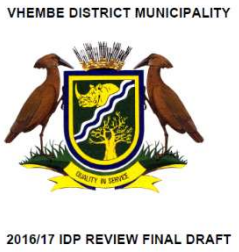


The **Limpopo Development Plan** serves to provide a framework for the strategic plans of each provincial government department. Similar to policies reviewed, the plan makes a case for the investment in a strong network of economic infrastructure designed to support economic and social objectives. This, it is stated, is a precondition for providing basic services such as electricity, among others. To achieve this, basic services must be sufficiently robust and extensive to meet industrial, commercial, and household needs. The Limpopo Provincial

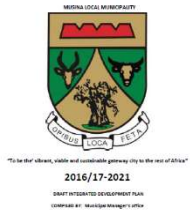
Government commits to ensuring that the supply of energy is reliable and sufficient for a growing economy (Limpopo Provincial Government, 2015).

The Limpopo Provincial Government views economic infrastructure as a base for economic and social upliftment. As a means to achieve this, the provincial government sought to attract investment in coal and energy. Furthermore, to expand business activities in the province, the coal and energy SMME growth initiative is promoted. The energy sector is thus powered to maintain and contribute to the growth of the economy. The proposed coal-fired power station is thus in alignment with the objectives of the Limpopo Provincial Government.

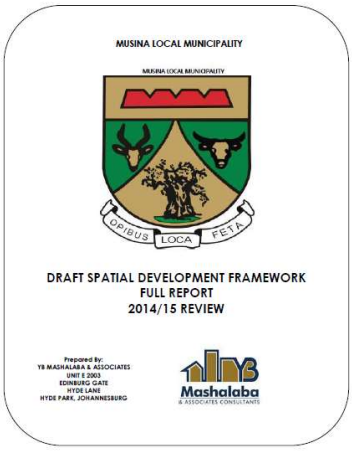
2.3 Project alignment with local policies and strategic documents



The vision of the **Vhembe DM Integrated Development Plan (IDP)** is "a developmental municipality focusing on sustainable service delivery and socio-economic development towards an equal society" (Vhembe District Municipality, 2016:5). Service delivery and infrastructure development is a priority area. The strategic objective aligned to this priority area is to improve access to services through the provision, operation, and maintenance of socio-economic and environmental infrastructure (Vhembe District Municipality, 2016).



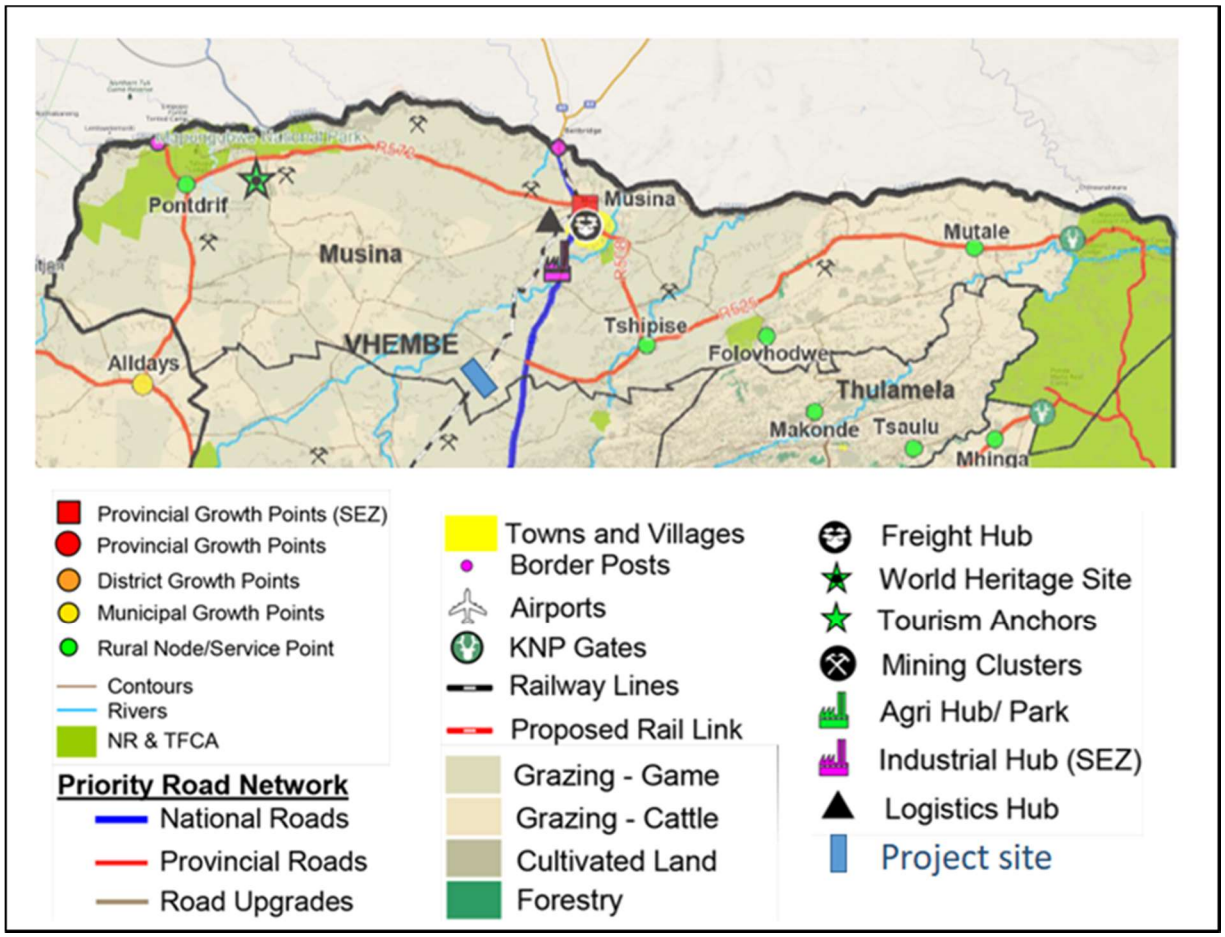
The mission of the **Musina LM IDP** is to be a "vehicle of affordable quality services and stability through socio-economic development and collective leadership" (Musina Local Municipality, 2016:14). One of the major challenges in the municipality is bulk electricity capacity. Additional challenges are energy supply and interruption, lack of capacity to meet demand, and insufficient capacity of the operating power stations to supply all areas in the district. A backlog in rural areas is prevalent; however, no backlog in urban areas exists. One key performance area is to initiate and improve the quantity and quality of municipal infrastructure services (Musina LM, 2016).



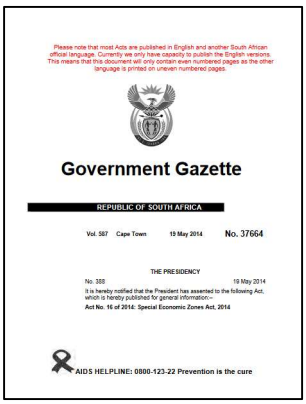
The aim of the **Musina LM Spatial Development Framework (SDF)** is to support the municipal vision by spatially interpreting the vision of the IDP. The vision of the municipality iterated in the SDF is to be a vibrant, viable, and sustainable gateway city to the rest of Africa. Musina has been identified as a provincial growth point and is a key district development priority area. Key areas connected by development corridors include Mopane, which is in close propinquity to the proposed project site. The Vhembe DM SDF does not, however, state spatial implications of the

mineral deposits or how it will impact or contribute to the development of the region (Musina Local Municipality, 2014).

As indicated in the figure below, the area where the proposed project is envisaged to be established is demarcated for game grazing. The SDF states that unlimited development can be supported on site, although a letter from the regional office of the Department of Agriculture should confirm that the site has low agricultural potential (Limpopo Provincial Government, 2015).



Map 2-1: Limpopo Provincial Spatial Development Framework (Limpopo Government, 2016)


Government Gazette

REPUBLIC OF SOUTH AFRICA

Vol. 587 Cape Town 19 May 2014 No. 37664

THE PRESIDENCY

No. 388 19 May 2014

It is hereby notified that the President has assented to the following Act, which is hereby published for general information:—

Act No. 16 of 2014: Special Economic Zones Act, 2014

AIDS HELPLINE: 0800-123-22 Prevention is the cure

"A SEZ is an economic development tool to promote national economic growth and export by using support measures in order to attract targeted foreign and domestic investments and technology" (Republic of South Africa, 2014:8). It is in this light that government has recognised **Special Economic Zones (SEZ)** as a apparatus that aid the realisation of economic growth and development goals. The purpose of establishing SEZs as outlined in the act are:

* Facilitating the creation of an industrial complex, including strategic national economic advantage for targeted investments and industries in the manufacturing sector and tradable services

- Developing necessary infrastructure to support the development of targeted industrial activities
- Drawing in foreign and domestic direct investment
- Making provision of the location for the establishment of targeted investments
- Aiding the beneficiation of mineral and natural resources
- Making use of existing industrial and technological capacity, championing integration with local industry and increasing value-added production
- Endorsing regional development
- "Creating decent work and other economic and socia benefits in the region in which it is located, including the broadening of economic participation by promoting small, micro and medium enterprises and co-operatives, and promoting skills and technology transfer" (Republic of South Africa, 2014:30)
- The establishment of new and innocatve economic activities (Republic of South Africa, 2014).

The Musina-Makhado SEZ is specifically designated to focus on energy and metallurgical processing, agroprocessing, petrochemicals and logistics and comprises of a pipeline of a minimum of eight catalytic projects. The energy and metallurgical complex will initially comprise of a power plant, steel plant, stainless steel plant, coking plant, ferrochrome plant, ferromanganese plant, ferrosilicon plant, pig iron metallurgy plant and a lime plant (Creamer Media Report, 2017).

Local policy echoes socio-economic development sentiments from national and provincial policy. Service delivery is a priority in the Musina Local Municipality. The proposed project in conjunction with the SEZ is set to improve the current limitations in energy provision and the socio-economic conditions in the municipality.

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3. BASELINE PROFILE

This chapter examines key socio-economic characteristics of the study area. This is essential, as it provides both qualitative and quantitative data relevant to the communities and economies under observation, creating a baseline that will assist in identifying the sensitive receptors and potential impacts.

The following socio-economic indicators are analysed in this chapter:

» Spatial Compositions and Land-Use
» Demographic Profiling
» The Economy and its Structure
» The Labour Force and Employment Structure
» Status of Infrastructure

3.1 Composition and locational factors of the study area

a) <u>Spatial context and regional linkages</u>

The proposed Mutsho Power Project is planned to be located in the Musina LM within the Vhembe DM in the Limpopo Province. The Limpopo Province is located in the north-east of South Africa and has a land area of 125 755km² which constitutes just over 10.3% of South Africa's land area (Stats SA, 2011). This makes it the fifth largest province in South Africa. promote

The Limpopo Province is considered to be the gateway to Africa as it shares borders with Botswana, Zimbabwe and Mozambique, placing it in a favourable position for economic collaboration with other parts of Africa (Department of Government Communications and Information System, 2014). Most of the trans-South African freight headed to / from landlocked Zimbabwe, Zambia, and Malawi is already transported through Limpopo. Furthermore, the Maputo Development Corridor links the province directly with the Port of Maputo in Mozambique, creating development and trade opportunities. Limpopo also connects to the corridor via the Phalaborwa Spatial Development Initiative, a network of rail and road corridors linked to major seaports. This is complemented by airports in centres such as Phalaborwa and Musina as well as Polokwane International Airport. It is evident that the province is well connected regionally and internationally.

The Vhembe District Municipality (DM) is a Category C municipality, which denotes that the municipality has a municipal executive and legislative authority in an area that includes more than one municipality (Statutes of Republic of South Africa, 1996). It was established in the year 2000 through the process of transformation of local government. The municipality is one of five district municipalities in the Limpopo Province. It is comprised of four local municipalities, namely Musina, Thulamela, Makhado, and Collins Chabane. The Vhembe DM is predominantly rural and is a cultural hub and a catalyst for agricultural and tourism development.

Figure 3-1: The four municipalities located in the Vhembe District Municipality (Local Government Handbook, 2017)

The Musina Local Municipality (LM) was merged with the Mutale LM on the 3rd of August 2016. The Musina LM is a Category B municipality, which means it shares municipal executive and legislative authority with a Category C municipality within whose area it falls (Statutes of Republic of South Africa, 1996). It is the largest LM of the four municipalities in the Vhembe DM in terms of land mass.

b) Major towns and settlements

The largest towns in close propinquity to the proposed project site are Musina, Makhado and Thohoyandou located in the Musina, Makhado and Thulamela local municipalities, respectively (Vhembe District Municipality, 2016). Makhado is located 42kms from the proposed project site. In 2003, the town was renamed Makhado from Louis Trichardt. However, in 2007 an appeal was made in South Africa's Supreme Court and was won resulting in the town being renamed to Louis Trichardt, once again (Footprint, 2017).

Musina is located 42kms from the proposed project site and is the northern most town in South Africa. The town was developed as a result of the region's abundant mineral wealth, which includes iron ore, graphite, coal, magnetite, diamonds, asbestos, and most notably copper (South Africa, 2017). The closest settlement to the project site is Mudimeli.

c) Locational factors and major tourism attractions

The terrain around Musina supports low-shrub and thorny tree vegetation and animal life. These features enabled a tourist attraction, where offerings such as lodges and safaris are prevalent. The Musina Nature Reserve is 38kms north from the planned Mutsho Power Project. It is characterised by its abundance of the oddly shaped baobab trees. In addition, the Limpopo Valley National Park is a tourist attraction in the Musina LM and is South Africa's youngest and northernmost park, declared around the historical archaeological site of Mapungubwe. Mapungubwe is located approximately 65kms north-west (birds eye) from the proposed project site and is said to be South Africa's first kingdom (South Africa, 2017).

d) <u>Sense of place, history and cultural aspects</u>

The principle languages in Musina are Venda and Sotho followed by Tsonga and Afrikaans. The extensive natural features and resources hold great sentiment to the locals and are embodied in the naming of the district and local municipalities.

* Vhembe is a Venda name for what is also known as the Limpopo River and is a symbol of a fountain of life (Vhembe District Municipality, 2016).
* Musina is a Venda word for 'spoiler' which expresses the disappointment of the settlers who were in search of minerals to trade and considered copper as a poor substitute for iron.

'Sense of place' is the distinctiveness of place resulting from cultural transformations and traditions associated with the historic use and habitation of the area (Stedman, 2003). Place attachment is the symbolic relationship formed by people attributing culturally shared emotional meanings to a particular piece of land. Many areas in the region under analysis have strong historical meanings. For instance, Mapungubwe is a protected site characterised by an extensive wilderness and extraordinary history. Thus, it can be suggested that the sense of place in the area is that of strong natural aesthetic and is dominantly rural, suggesting that the character of the place is associated with rural features.

3.2 Demographic profile

The population of any geographical area is the cornerstone of the development process, as it affects the economic growth through the provision of labour and entrepreneurial skills and determines the demand for the production output. Examining population dynamics is essential in gaining an accurate perspective of those who are likely to be affected by any prospective development or project. This sub-section describes the status quo of the study area's population.

a) <u>Population demographics</u>

The demographic profile reflects the amalgamation of Mutale LM with Musina LM that was effective from 3rd August 2016. The Musina LM has a population of approximately 172 932, with a total of 47 300 households (Quantec, 2015).

Figure 3-2: Snapshot of demographic profile of Musina LM (Quantec, 2015)

The Musina Municipality constitutes just over a tenth of the population of the Vhembe DM. Furthermore, similar to the population size, 13% of the total households in the Vhembe DM are located in the Musina LM. A large portion of 58% of the population resides in tribal areas, followed by 28% located in urban areas, and the remaining 13% resides on farm land. Of the population, 97% are Black, 2% are White, whilst Asian/Indian and Coloured constitute the remaining 1%. A slightly greater proportion of the population is comprised of females.

Close to two-thirds of the population are of working age (15-64), whereas a third are aged below 15. Just over 4% of the population in the Musina LM are aged over 65. Evidently, the majority of the population is of working age and the minority are senior citizens.

b) Income levels

The average monthly household income in the Musina LM was R4 991 in 2011, with 7% earning no income. Overall, 65% of the households within the Musina LM earn up to R3 200 per month. In the town of Musina, 7% of the households have no income and 55% earn up to R3 200. The closest settlement to the proposed project site is Mudimeli, which is not located within the Musina LM but is located in the Makhado Local Municipality. As the closest community and possible labour pool, it has also been analysed. A great proportion of the study areas observed earns between R1 – R3 200 per month, as indicated in Figure 3-3. The household incomes indicate that low-income earners dominate, and conversely high-income earners are a minority.

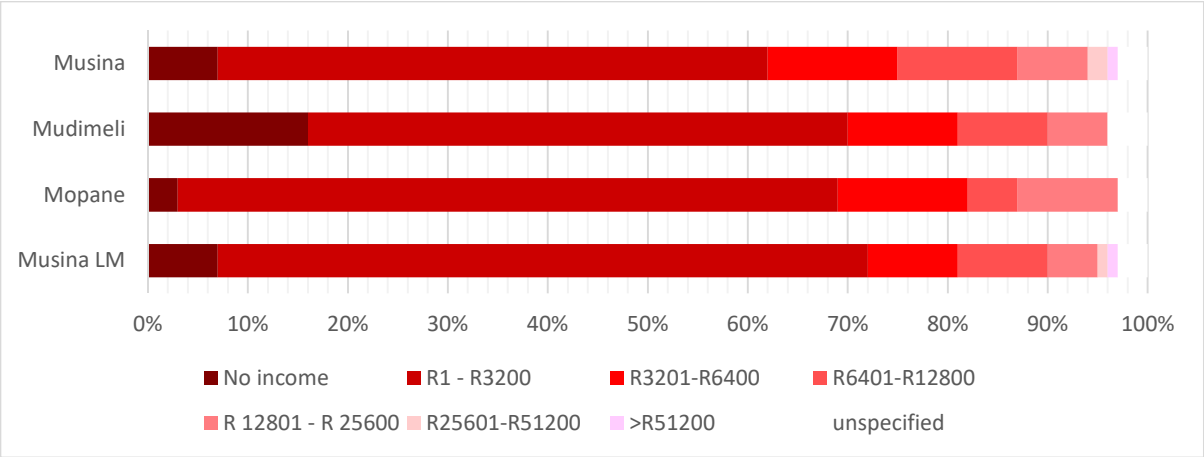


Figure 3-3: Income Levels across study areas (Quantec, 2016)

c) Education levels

Of the adult population (+20 years), 15% do not have schooling. In the Musina LM, 71% of the adult population do not hold a Matric certificate. The remaining 29% have obtained a Matric certificate of which 8% have also attained a higher qualification.

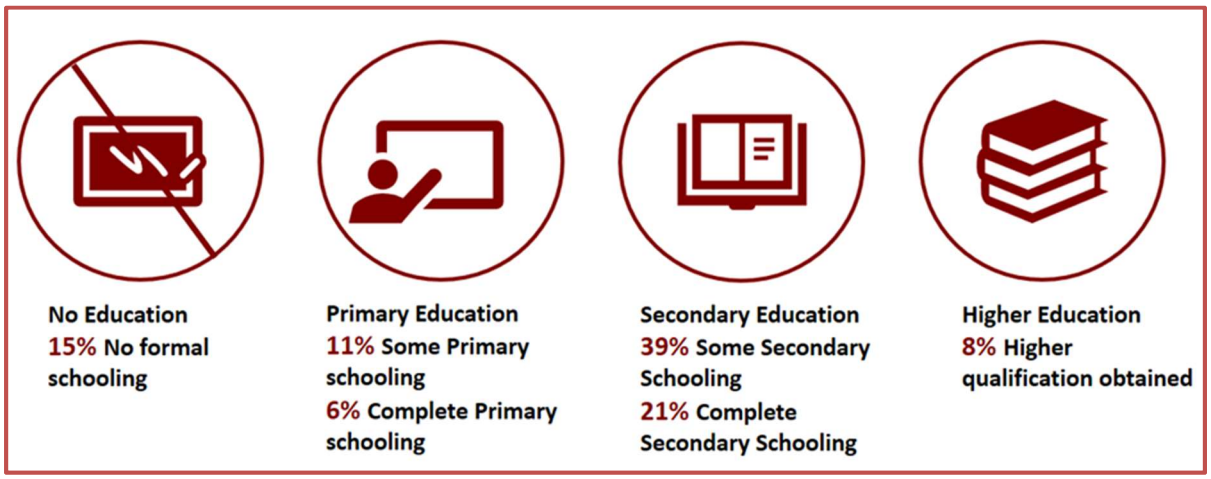


Figure 3-4: Education Levels in Musina LM (Quantec, 2015)

The education levels are indicative of an education completion problem. In addition, these education levels may correlate with the dominant low-income earned in the municipality as most of the adult population do not have qualifications to attain better earning jobs.

3.3 The economy

In 2016, The Musina Local Municipality's economy was valued at R7 405 million in current prices. The Musina LM contributes 16% to the economy of the Vhembe DM and 3% to the economy of Limpopo. Over a period of 10 years (2005-2015), the municipality's economy grew at a positive Compounded Annual Growth Rate (CAGR) of 1.6% per year. This is similar to the district and provincial growth rates, but suggest a stagnating economy.

Table 3-1: Limpopo and Musina LM structure of economies (2016, nominal)

Economic Sector	Limpopo			Musina LM		
	GDP (R'mil)	% of GDP	CAGR (2005-2015)	GDP (R'mil)	% of GDP	CAGR (2005-2015)
Agriculture, forestry and fishing	6 458	7.3%	1.8%	452	6.1%	2.6%
Mining and quarrying	76 354	9.5%	0.0%	1 645	22.2%	-6.9%
Manufacturing	8 794	10.1%	0.8%	127	1.7%	1.8%
Electricity, gas and water	12 216	17.0%	-0.8%	236	3.2%	1.0%
Construction	8 886	14.3%	4.4%	197	2.7%	4.1%
Trade	43 162	10.8%	2.0%	1 508	20.4%	5.0%
Transport and communication	14 756	7.3%	2.1%	468	6.3%	2.8%
Finance and business services	39 652	8.2%	2.3%	894	12.1%	4.0%
General government	55 269	10.7%	2.9%	1 586	21.4%	3.9%
Personal services	11 857	7.6%	1.6%	293	4.0%	2.0%
TOTAL	277 404	100%	1.5%	7 405	100%	1.6%

Urban-Econ Calculations based on Quantec, 2017

The economic sectors with the greatest contribution to the GDP-R of the Limpopo Province are mining and general government. Similarly, the mining sector and general government are among the highest contributing economic sectors in the Musina LM. The wholesale and trade sector closely follow and contribute a fifth to the Musina LM economy. The manufacturing and construction sectors make the least contribution to the GDP-R of the municipality.

Over the years, the mining industry has been declining, which considering its large contribution to the local economy has had a negative effect on the Musina LM. This negative impact was possibly offset by the above-average growth rate observed among the tertiary industries and specifically the trade and general government sectors, which as mentioned previously are among the top three contributing industries to the local municipality's economy.

3.4 Labour force and employment structure

Employment is the primary means by which individuals who are of working age may earn an income that will enable them to provide for their basic needs and improve their standard of living. As such, employment and unemployment rates are important indicators of socio-economic well-being. The following paragraphs examine the study area's labour market from a number of perspectives, including the employment rate and sectoral employment patterns.

a) Labour force composition

According to Census 2011 data, the working age population of the Musina LM was about 105 884. Amongst these, 50 624 were economically active. Not economically active (NEA) persons are those who were neither employed nor unemployed, including discouraged job seekers. The Musina LM had 46 992 NEA persons in 2011. The employed labour in the LM was estimated at 35 576, whilst the unemployed labour was about 15 048. This results in an unemployment rate of 30%.

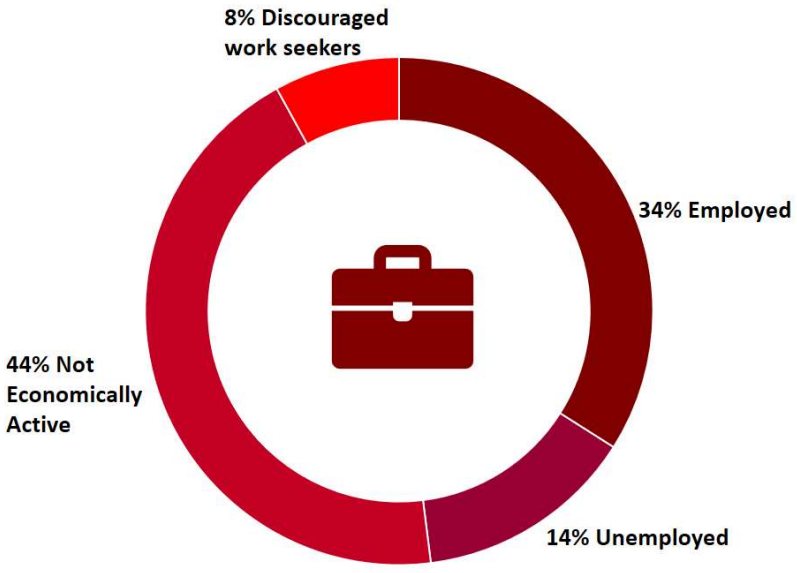


Figure 3-5: Labour Force Statistics for Musina LM2011 (Stats SA, 2011)

In the town of Musina, 13 484 of the working age population are employed, whereas 4 760 are unemployed. This indicates a 26% unemployment rate. In the case of Mopane, the unemployment rate (7%) is significantly lower than that of the municipality and closest town due to the small population size. Conversely, Mudimeli has the highest unemployment rate of 33%.

In terms of skills levels, the largest proportion of the labour force is semi-skilled in the Limpopo Province and the Vhembe DM. In the Musina LM, the labour force is dominantly low-skilled.

b) Employment structure

In the Vhembe DM, the wholesale and trade sector employed the most people whereas the mining sector employed the least. A decline in employment across all sectors of the economy took place between 2008 and 2010. The manufacturing sector particularly experienced a decline in employment numbers from 2007 to 2012 in the Vhembe DM. The exception has been the general government sector, which has consistently experienced growth in employment over the past 10 years.

Close to a third of the Musina LM labour force are informally employed. Just over two-thirds of the employed individuals are employed in the formal sector. As indicated in the diagram below, the agricultural sector employed the largest number of people in the Musina LM in 2015, whereas the electricity, gas and water sector employed the least (Quantec, 2017). Observing 2010 and 2015 employment figures, it is evident that most economic sectors have increased their labour absorption during this period. Only the mining sector employed fewer individuals in 2015 than in 2010.

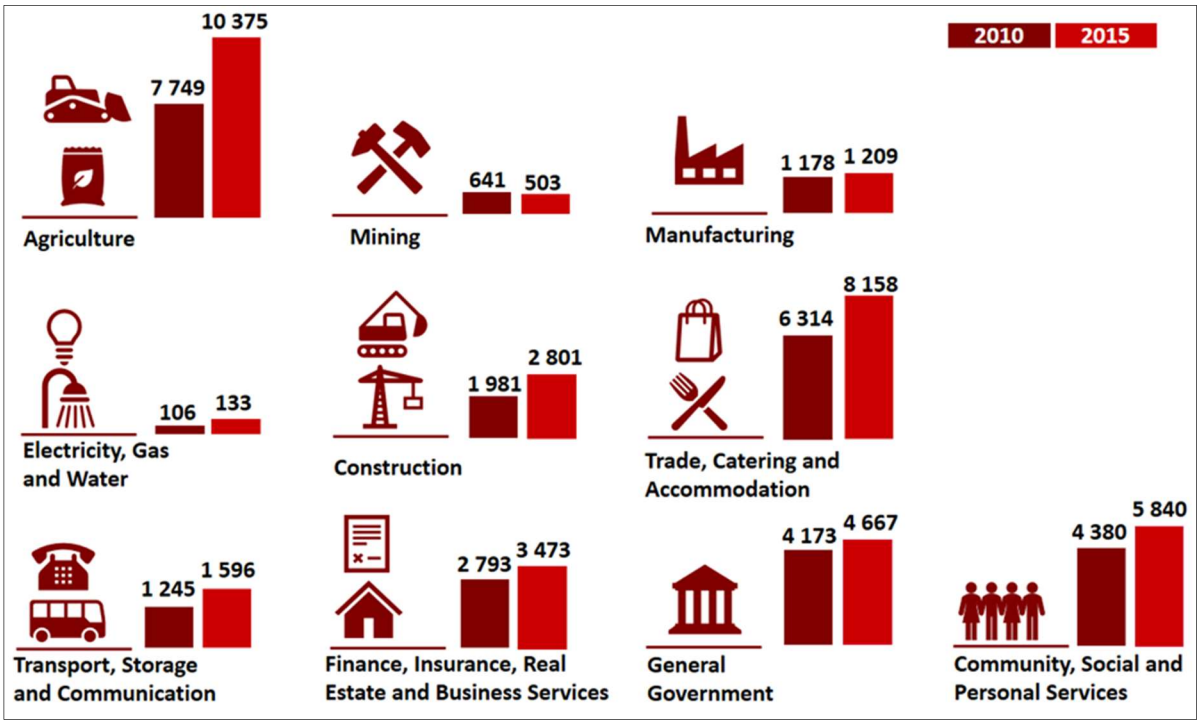


Figure 3-6: Employment Figures per Economic Sector for 2010 and 2015 in the Musina LM (Quantec, 2017)

3.5 Status of infrastructure and basic service delivery

Access to basic service delivery and infrastructure such as shelter and transport are indicators that assist in understanding the standard of living of the households residing in the study area. Comprehension of the extent to which households in the area have access to water, sanitation, and electricity assists in the understanding of communities' living standards and their needs. The availability of service infrastructure such as roads,

educational and health facilities, etc., further indicates the nature of the study area, which is valuable in developing a complete profile of the circumstances in which communities are living.

a) Basic service delivery

According to the Musina LM IDP (2016), **housing** development has reached crisis levels due to the ever-increasing demand. The challenge to supply housing at required quantities is the shortage of land for human settlement. In addition, the majority of people do not qualify to receive government subsidy houses. The backlog in 2016 was 3 200 houses.

The Vhembe DM is both a **water** authority and water provider. The Musina LM then reticulates water to households through household water tap connections and standpipes. In the urban area of Musina, 8 108 households have metered connections and 2 811 households receive free basic water. A large number of households have access to water; however, upgrading, resource extension, operation, and maintenance as well as refurbishment needs are immense.

In 2014, the district managed to complete 3 950 Ventilated Improved Pit latrines (VIP). Nonetheless, a backlog of 87 658 remained. The challenges in **sanitation** are the bucket system and the lack of policy clarity (Musina LM, 2016).

There is no backlog in **electricity** in the municipal areas, whereas the total backlog in electricity in the villages is 1 013. The main source of energy used in the Musina LM is electricity, followed by wood. The key challenges are energy supply, energy interruption, cable theft, illegal connections, poor project management, and the slow rate of construction (Musina LM, 2016).

In terms of **road infrastructure**, the Musina LM has one cost centre maintaining 413km surfaced and 650km unsurfaced roads. Roads in the LM are generally in bad condition and many are not numbered. Roads that need to be tarred and re-surfaced are 20kms in distance (Musina LM, 2016).

b) Status of social facilities

With regard to **healthcare**, there is a shortage of healthcare facilities in the Musina LM resulting in overcrowding in all health centres. In addition, residents travel long distances for healthcare as certain areas do not have health care facilities and are remotely located.

The Musina LM IDP (2016) states that community **safety** is a matter of concern as crime is a problem across the municipal area. It attributes this to, amongst others, the high unemployment level and alcohol and drug abuse. There are three police stations and one magisterial district court in the Musina LM (Musina LM, 2016).

Regarding **education**, there are nine secondary schools, 29 primary schools, and no tertiary institutions in the Musina LM. In addition, some educational facilities do not meet required norms and standards. The vast backlog of classrooms and learner support material, particularly in rural areas, impedes adequate teaching and learning. As indicated

in Section 3.2, the education levels in the LM are dire. Moreover, older persons are not actively participating in Adult Basic Education and Training (ABET) programmes (Musina LM, 2016).

The provision of libraries is a key instrument for social and educational upliftment, specifically in areas where low literacy levels prevail. The current library provision is inadequate to serve the community, in both size per service point and location. Moreover, the lack of technical skills institutions to support mining operations, amongst others, leads companies to source the skills from other towns. The lack of educational facilities will exacerbate the negative culture of learning and prolong the high illiteracy rate of the Musina LM.

Sport is perceived as an avenue to enable residents, particularly children, to keep away from negative influences such as crime and drugs and provides the prospect for future opportunities in sport. **Sport and recreation facilities** provision is very low and there is a demand for new and upgraded facilities.

Improvement across all service delivery departments is required. Of utmost importance is education as the high illiteracy rates have ripple effects of a dominantly non-participatory, unemployable and highly government dependent society. This is not progressive and also worsens social ills. With the merging of Musina and Mutale LMs, a positive result may prevail as the consolidated efforts may possibly assist in addressing experienced challenges more efficiently.

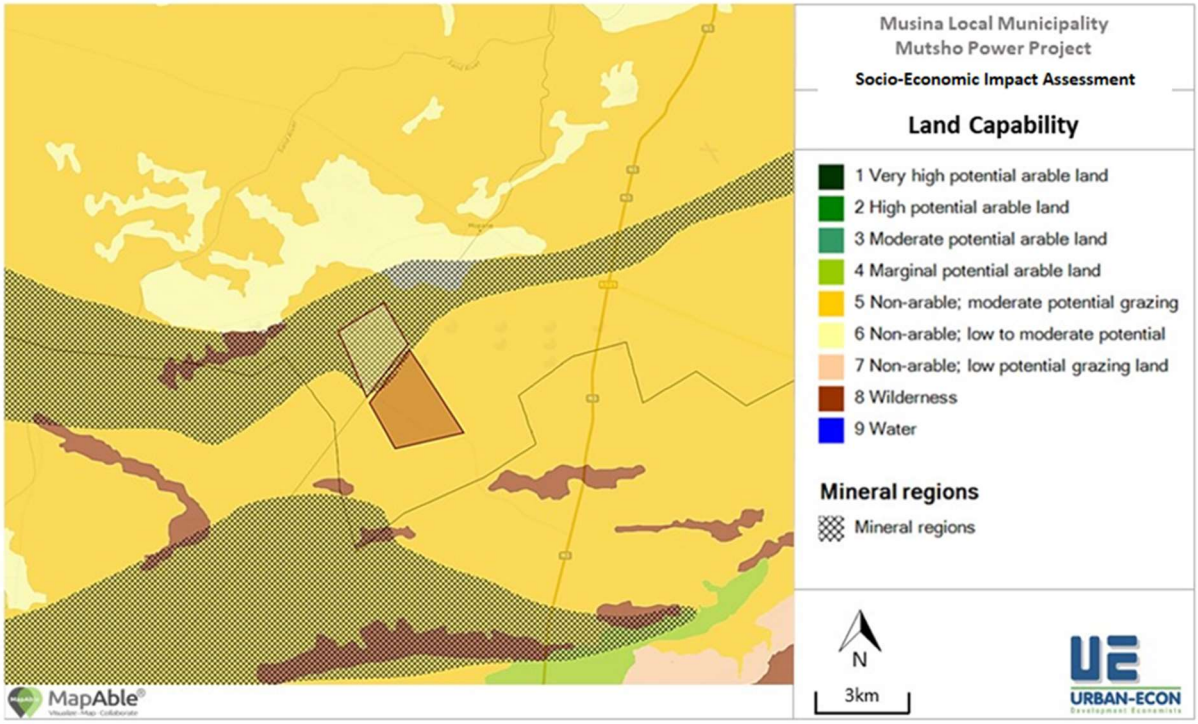
4. SITE RELATED INFORMATION: ZONE OF INFLUENCE BASELINE

The site-related information section investigates the various dynamics of the proposed site. Map 4-2 indicates the current land uses of the proposed project site and its surroundings.

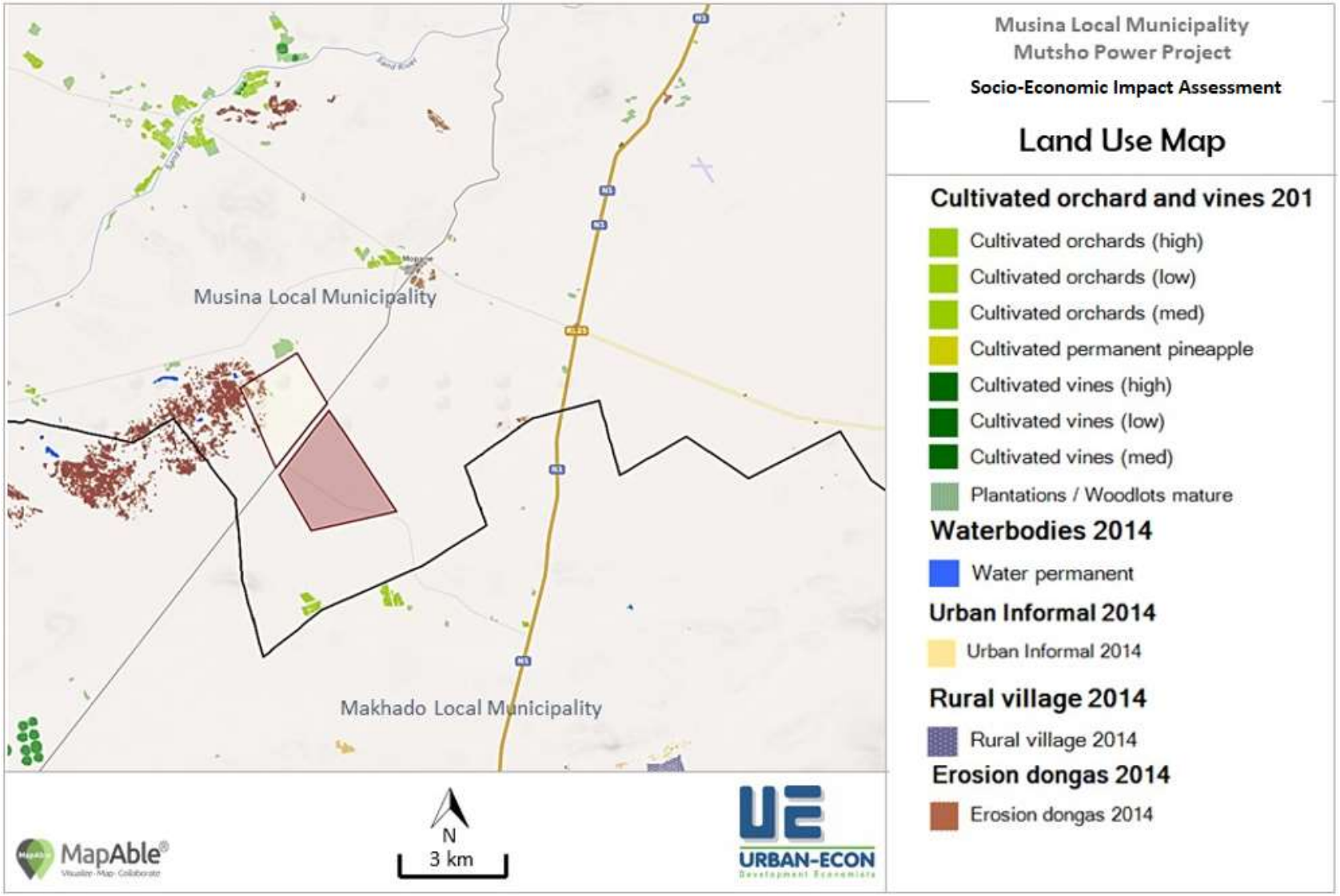
The north-western portion of the proposed project site has erosion dongas. Directly south and north-west from the project site are cultivated orchards. In addition, north to the project site, erosion dongas and plantations are found. Furthermore, tourism offerings are prevalent in the region.

The Mopane area is located 7 km to the north-east of the project site. Here, a small residential area is located as well as mining activity. In addition, a residential settlement called Mudimeli is located 18 km south-east from the proposed project site.

In terms of land capability, the project site and its surroundings have largely non-arable land, with a low to moderate potential for grazing, which was also noted by landowners during interviews. In addition, there are portions of wilderness in the direct zone of influence. Directly south from the project site is arable land with marginal potential. Farm Du Toit 563 is located in a mineral region, which expands from the west to the east of the farm.



Map 4-1: Land Capability on project site and surrounding areas



Map 4-2: Land Use Map of project site and surrounding areas

The following table summarises the existing socio-economic activities observed on the farms that may directly or indirectly be impacted by the proposed project, based on the responses received during the initial engagement with the stakeholders. As indicated earlier in the report, nine of thirteen adjacent land owners could not be contacted due to no response to email questionnaires and telephones. Two repeat attempts were made to follow up on emailed questionnaires with no success. Therefore, their views are not represented in this study.

During the engagement with the landowners, the following concerns were also raised with respect to the proposed project:

» Disturbance of daily activities: increased crime, air pollution and noise pollution
» Losses to be incurred: income loss, loss of tranquillity, loss of habitat, loss of flora and fauna and job losses
» Drought: increase in livestock mortality, further strain on scarce water resource
» Visual impact: visual change in a tourism rich and dependent area

Table 4-1: Economic activity information per farm portion

Farm Portion and size	**Agricultural/Economic activity**	**Yield/ Number**	**Number of employees**
Farm Du Toit 563 0/563	Game Farm: Kudus, impalas, waterbucks, roes, blue wildebeest, eland Livestock farming: Cattle	No accurate figure Approximately 40 cattle	1 permanent employee
Farm Vrienden 589 0/589	No data is available.	No data is available.	No data is available.
Farm Verdun 535 RE/535	Crop farming: Lucerne Bale Game Farm: Kudus, impalas, waterbucks, roes, blue wildebeest and eland	18 ha/month 120 bales/ha/month 180 animals	5 permanent employees
Farm Hermanus 533 0/533	Game farm: Kudus, impalas, waterbucks, roes, blue wildebeest, eland and giraffes	1 000 animals	3 permanent employees
Farm Goosen 530, 1/539 (2 000ha)	Tourist attraction: Lodge Game farm:	No accurate figure	3 permanent employees

Farm Portion and size	**Agricultural/Economic activity**	**Yield/ Number**	**Number of employees**
	Kudu, eland, waterbuck, gemsbuck, impala, zebra, giraffe, steenbuck, grey duiker, klipspringer, sharpe's honeycomb, bushbuck, warthog, bush pig, brown hyena, civit, genet, caracal, honey badger, aardwolf, banded mongoose, leopard, baboon, vervet monkey, lynx, guinea fowl, crested guinea fowl, pheasant, partridge, eagles, birds of prey, 250+ recorded species of birds, various snakes and other reptiles <u>Livestock farming:</u> Bonsmara cattle Donkeys Goats	 120 heads 7 heads 15 heads	3 temporary (5 months) employees
Farm Vrienden 589, 5/589	<u>Game farm:</u> 15 species of plain game <u>Tourist attraction</u> <u>Mopane worm farming</u> <u>Livestock farming:</u> Boer goats <u>Crop farming:</u> Lucerne	 6 ha 2-3 tonnes/ha	7 permanent employees

5. POTENTIAL SOCIO-ECONOMIC IMPACTS

5.1 Introduction

This chapter presents the analysis of the socio-economic impacts that are expected to ensue as a result of the development of the proposed project and an evaluation of these impacts according to the predefined criteria outlined in Annexure A. The potential socio-economic impacts identified arise as a consequence of construction, operation, and closure of the Proposed Mutsho Power Project and the issues raised by affected landowners.

5.2 Impacts expected during construction

5.2.1 Increase in production and GDP-R

Economic production is defined as any activity that uses inputs such as labour and capital to produce outputs in the form of services or goods. The construction phase of the project will involve activities such as engineering and design, site and infrastructure development, construction of buildings and facilities, civil engineering works, and other business activities related to the construction of the power station.

The economic impact arising from the initial investment will be felt throughout the national economy with windfall effects benefitting related sectors. These various impacts or spill-over effects will contribute to heightened production levels at local, provincial and national levels. The initial investment will give rise to a production effect where manufacturers and suppliers of goods and services would experience the need to expand current production levels by ramping up employee numbers and operations. Down-the-line effects will produce a consumption-induced effect on the wider economy - as total salaries paid-out rises, consumer expenditure will lift, thereby raising the sales of goods and services in the surrounding economy.

The Musina Local Municipality's economy was valued at R7 405 million in 2016 (current prices). About R15 billion could be expected to be invested during the construction phase. Considering the requirement stipulated by the Department of Energy, at least 40% of capital expenditure (CAPEX) on the proposed power station will need to be localised. This includes among others, procurement of the majority of steel power pylons, electrical and telecom cables, as well as valves and actuators from within South Africa. While it will not be possible to source all materials locally, if effort is made to use local suppliers as far as possible, the positive impact on the local economy will be enhanced. Given that numerous similar projects have been established in the province, a possibility of up-stream businesses may have proliferated in support of the industry.

Nature: **Expenditure associated with the construction of the proposed development will impact on the production of the local economy.**		
	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)

Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	**Medium (52)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» The project developer should use locally sourced inputs where feasible in order to maximize the benefit to the local economy.

» Sub-contracting local construction companies should occur, where possible.

» Local Small and Medium Enterprises should be approached to investigate the opportunities for supplying inputs required for the construction of the facility, as far as feasible.

Residual impacts

Production in the economy will continue.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Increase in production and GDP-R will ensue.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Increase in production and GDP-R will ensue.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Increase in production and GDP-R will ensue.	No fatal flaws have been identified.

5.2.2 Employment creation

A third of the working age population in the Musina LM are unemployed. The development of the Mutsho Power Project will improve this situation and positively impact the community by creating a number of temporary job opportunities. An estimated 3 500 job opportunities could be created for the construction of the coal-fired power station. This will improve the socio-economic well-being of the benefitting population, albeit for a temporary period.

Nature:

The construction of the Mutsho Power Project will positively impact on the community by creating a number of job opportunities (albeit temporary).

	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Definite (5)
Significance	**High (75)**	**High (75)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for and establish information desk at local municipality offices.

» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual impacts:

No residual impacts are applicable.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Job opportunities will be created.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Job opportunities will be created.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Job opportunities will be created.	No fatal flaws have been identified.

5.2.3 Positive impact on skills development

Skills are imperative for satisfying job requirements and adequately performing tasks that ultimately boost the economy. The construction of the coal-fired power station requires a variation of skill sets ranging from semi-skilled construction workers to highly skilled engineers. Employees who are new to the market will develop and attain new skills, whilst workers adept in particular skills will sharpen their abilities. In addition, the employees will improve their marketability for future employment and will be perceived positively by future employers. The plant construction will improve the current status of 46% low-skilled employees and 15% skilled employees in the Musina Local Municipality. Although the construction phase will be temporary, the impact on skills is sustainable and notable.

Nature:
Employees will develop and enhance skills thereby increasing experience and knowledge.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (70)**	**High (70)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees notably gain from the work experience.
» Facilitation of the transfer of knowledge between experienced employees and lower-skilled staff is recommended.
» Performance of a skills audit to determine the potential skills that could be sourced in the area is proposed during the planning phase.

Residual Impacts:

The skills obtained by the employed labour force are permanent and will thus be retained.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Skills development will take place.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Skills development will take place.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Skills development will take place.	No fatal flaws have been identified.

5.2.4 Positive impact on household income

Over half of the population of the Musina LM are classified as low-income earners. An increase in disposable income often means that benefiting households (who are also consumers) have the opportunity to make a wider variety of lifestyle choices. In the context of the proposed power station, workers employed in the construction as well as their households can expect an improvement in their quality of life and standard of living. The increase in income will assist in access to health care, recreational facilities and leisure.

Nature:

Employed individuals will increase the income of their respective households and therefore improve their standard of living.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (52)**	**Medium (52)**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		

» Local employment will benefit local households and the local area. Therefore, preference should be given to employment of local community members as far as possible.
Residual Impacts: No residual impacts are applicable.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Standard of living will improve.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Standard of living will improve.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Standard of living will improve.	No fatal flaws have been identified.

5.2.5 Demographic shifts due to influx of migrant labour

The current population size in the Musina Local Municipality is over 172 000, and the population growth has been gradually growing at an average of close to 2% over the past five years. The job opportunities will most likely trigger in-migration and, therefore, it can be suggested that a slight positive shift in the demographics will ensue as a result of the proposed project. Resultantly, migrant workers and job seekers will increase the current population size and possibly increase the male population if an expected male-dominated influx occurs. Furthermore, the municipality currently draws in numerous people; thus, the proposed project will exacerbate this status.

This change in demographics can bring about social ills such as increased alcoholism, but can also stimulate the economy due to increased purchasing power from migrant labour. In the advent that unemployment increases due to unfulfilled hopes of migrant job seekers, criminal incidents may proliferate.

Nature:
An impact on the demographics of the area as a result of in-migration in response to job opportunities will occur.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Medium term (3)	Medium term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Medium (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.
» Provide training for unemployed local community members with insufficient skills and thus increase absorption of local labour thereby decreasing in-migration.
» In collaboration with the local municipality, manage recruitment and marketing for vacancies with a preference of residents within the municipality.

Residual impacts:

A negligible amount of migrant job seekers will not be employed by the proposed project.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	An increase in population size could occur.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	An increase in population size could occur.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	An increase in population size could occur.	No fatal flaws have been identified.

5.2.6 Change in sense of place

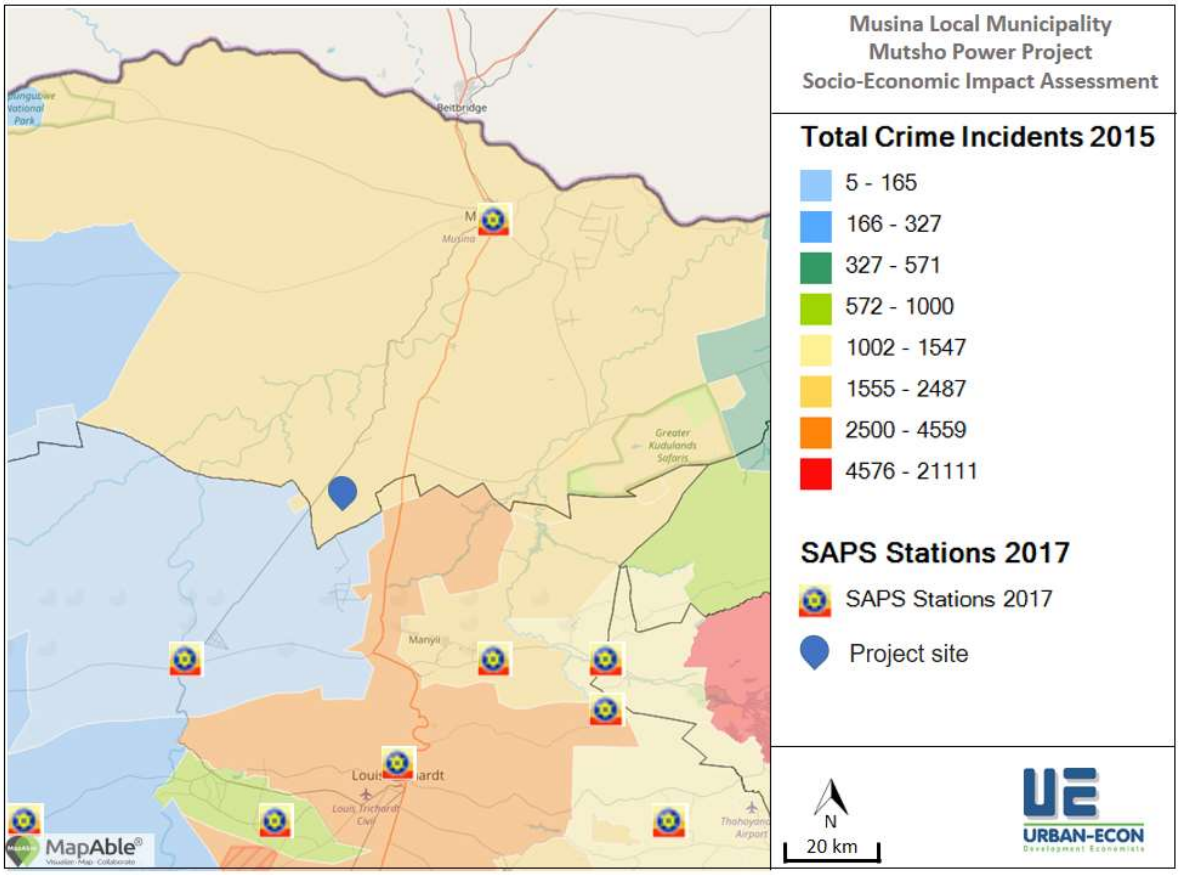
According to Relph (2001), a place is a territory of meanings. Therefore, a sense of place is the distinctiveness of place embedded with the cultural transformations and traditions associated with the historic use and habitation of the area (Young & Martin, 2016). Place attachment is the symbolic relationship formed by people attributing culturally shared emotional meanings to a particular piece of land. It is thus an affective bond between people and place. This personal orientation towards place assists in understanding a place, which informs environmental meaning. It is a subjective matter and is dependent on the perceptions of the user and viewer of an area.

The proposed coal-fired power station will lead to the transformation of land use and subsequently the economic activities on the affected property. These changes bring new opportunities and resources but also shift the sense of place. The current sense of place, as attested by locals, is a tourism region with commercial farming and is thus rural and tranquil. It is envisaged that the possible noise and visual impacts during construction will alter the sense of place and negatively impact on the living conditions of the people residing and working on the neighbouring land.

A noise impact is expected. Perhaps the most significant source of noise during the construction phase is the increase in traffic on local roads due to the need for transportation of construction materials and workers. The increase in road traffic will affect the local communities and tourism facilities by adding to the number of vehicles utilising the local road network on a daily basis, thus disrupting movement patterns.

A negative visual impact will result. Given the current natural aesthetic, a change will result as clearance of trees and shrubs take place. This changes the original pictorial essence of a place, which may negatively or positively affect an individual's sense of place.

According to the interviewed landowners, the current state of safety in the study area is a concern. Consistent with crime statistics, the most reported incidents include burglary at residential premises, commercial crimes, assault and culpable homicide. Map 5-1 below demonstrates the number of incidents reported in the year 2015. Evidently, between 1 002 and 1 547 incidents were reported in the zone of influence. In addition, the closest police station is about 30 km south-west from the project area.



Map 5-1: Crime statistics for broader region (Mapable, 2017)

These impacts are not fatal flaws but are more of a nuisance to the individuals experiencing them.

Nature: **A change in the sense of place will take place due to the construction of the coal-fired power station.**		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (32)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	Yes	Yes

Can impacts be mitigated?	Yes	Yes

Mitigation:

» Implement mitigation measures proposed by the various specialists, including traffic, visual, and noise specialists.
» The provision of public transport alternatives for workers so as to decrease the number of vehicles on the road during peak hours is recommended.
» Partner with local municipal authorities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the construction of this component of the proposed project.
» Ensure strict security checks to and from the construction site, as well as proper fencing around the site to deter illegal entry.

Residual impacts:

No residual risks are applicable.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	A change in the sense of place will take place.	No fatal flaws have been identified.
Option 2	**LEAST PREFERRED**	A change in the sense of place will take place. Highest visual impact on tourism offering.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	A change in the sense of place will take place.	No fatal flaws have been identified.

5.2.7 Increased demand for housing

The construction of the coal-fired power station is expected to draw migrant workers and job seekers into the area. Therefore, an increase in the demand for housing may follow. However, the current challenge in the supply of housing at required quantities due to the shortage of available land for human settlement is a grave concern. This was iterated in the Musina LM IDP 2017-2021, which stated that one of the major challenges in the local municipality is the "land availability for new developments" and specifically land for housing development (Musina LM, 2016). Therefore, additional strain will be placed on the housing market. This denotes further strain on the local authorities.

Nature:

The construction of the coal-fired power station may have a negative impact on the physical capital of the area by placing strain on the housing market.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Medium term (3)	Medium term (3)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (40)**	**Low (24)**
Status (positive or negative)	Negative	Negative

Reversibility	Medium	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» The recruitment of people who reside within the area will decrease demand for new houses by migrant labour.

» The utilisation of existing housing from the completion of other construction in the area (The greater Soutpansberg Project) would minimise the impact.

» The SEZ development, Musina Local Municipality, and Mutsho Power Company could in collaboration, construct temporary housing for migrant workers for both projects given the close proximity of both projects.

Residual impact

Additional housing will be supplied in the municipality.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Increase in the demand for housing.	Insufficient land available for human settlement development.
Option 2	**NO PREFERENCE**	Increase in the demand for housing.	Insufficient land available for human settlement development.
Option 3	**NO PREFERENCE**	Increase in the demand for housing.	Insufficient land available for human settlement development.

5.2.8 Pressure on basic services, social facilities and economic infrastructure

The state of service delivery is moderate with notable backlogs in the Musina LM. Secondary data indicates that the key issues include access to sanitation and electricity. Furthermore, landowners assert that water scarcity is a momentous concern and that there is a lack of groundwater. They further argue that the drought has affected their livestock and their ability to farm as they did previously. It is perceived that the construction of the power plant will intensify the strain on the water reserves if it is source by the local water supply.

Key challenges revealed in the secondary data are access to health care facilities and crime. Moreover, inadequate education facilities and resultant low levels of education in the area impair socio-economic development in the region. Given this context, the influx of migrant labour and job seekers will evidently place further pressure on the demand for basic services and social services. Thus, should the expectation of job creation not be adequately managed, the development will increase current backlogs for local government and service providers.

With regard to economic infrastructure, it is known that large-scale projects such as power plants require the movement of significant volumes of construction material as well as machinery and equipment. The transportation of these items places stress on road infrastructure – potentially causing roads to deteriorate. The current state of roads in the area is poor. Consequently, the construction phase activities will contribute to the further deterioration of roads should the roads not receive the required maintenance. It is noted that the access roads to the proposed project site are gravel roads.

Nature:
Pressure on basic services, social facilities and economic infrastructure may occur due to construction activities.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» The local municipality should be informed of the potential impact of the proposed project on services in order for the necessary preparations to take place in a timely manner.
» Provision of public transportation service for workers in order to reduce congestion on roads is recommended.
» A partnership with local municipalities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the planned construction activities is recommended.

Residual Impacts:
Improved state of services in the municipality.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Increased pressure on basic services, social facilities and economic infrastructure is expected.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Increased pressure on basic services, social facilities and economic infrastructure is expected.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Increased pressure on basic services, social facilities and economic	No fatal flaws have been identified.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
		infrastructure is expected.	

5.3 Impacts expected during operation

5.3.1 Impact on production and GDP-R

During operation, the constant demand for services and products which the power station requires will continuously have a positive impact on the local economy. Furthermore, the operations of the proposed power station will increase the value of the utility sector in the local municipality, positively affecting its growth. Since the project is remotely located it is likely that much of the supporting services will need to be established within the local areas. Therefore, demand for transport services, catering, accommodation, personal services, and some construction-related activities is likely to ensue as a result of both indirect and induced effects, which would result in the establishment of new businesses and expansion of existing activities. Considering the existing stagnating state of the local municipality this project could be highly beneficial for the local economy.

Nature:
Expenditure associated with the operation of the proposed development will impact on the production of the local economy.

	Without enhancement	With enhancement
Extent	National (5)	National (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	High (8)
Probability	Definite (5)	Definite (5)
Significance	**High (75)**	**High (85)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» The project developer should make effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.

» Local Small and Medium Enterprises should be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.

Residual Impacts:
Developed business will continue to operate.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Increase in production and GDP-R will ensue.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Increase in production and GDP-R will ensue.	No fatal flaws have been identified.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 3	**NO PREFERENCE**	Increase in production and GDP-R will ensue.	No fatal flaws have been identified.

5.3.2 Employment creation

The energy sector currently employs the least number of people in the Musina LM. The operation of the coal-fired power station will improve this situation as about 300 to 350 jobs may be created for a long-term period (i.e. more than 25 years). Further, employment opportunities will be created within the local municipality and across South Africa as a result of the project's multipliers and the additional electricity supply to the national grid. Considering that there are currently about 15 000 unemployed people in the municipality, the created sustainable employment opportunities may reduce this number and improve the employment statistics. The demand for supporting services and other goods and services to be created as a result of multiplier effects will also lead to the creation of additional indirect jobs of up to 500 to 1 000, increasing the positive effect on employment in the region.

Nature:
The operation of the Mutsho Power Project will positively impact on the community by creating a number of job opportunities.

	Without enhancement	With enhancement
Extent	National (5)	National (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (75)**	**High (75)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual Impacts:
The indirect and induced employment created will possibly continue post the project operations period.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Long-term job opportunities will be created.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Long-term job opportunities will be created.	No fatal flaws have been identified.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 3	**NO PREFERENCE**	Long-term job opportunities will be created.	No fatal flaws have been identified.

5.3.3 Positive impact on skills development

The employment opportunities are for a long-term period and are thus sustainable and will have a positive impact on skills for benefitting employees. Furthermore, as production and consumption effects filter through the economy creating a demand for additional labour, human resources will be trained and skilled within aligned industries. Ultimately, the power station's operation will lead to enhanced skills through training and experience in the wider national economy.

Nature:
Employees will develop and enhance skills thereby increasing experience and knowledge.

	Without enhancement	With enhancement
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	High (8)
Probability	Definite (5)	Definite (5)
Significance	**High (70)**	**High (80)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.
» The transfer of knowledge between experienced employees and the local staff should be facilitated.
» A skills audit to determine the potential skills that could be sourced in the area should be performed during the planning phase.
» Where possible, training and empowerment of local communities for employment in the operations of the power plant should occur.

Residual Impacts:
The beneficiaries will retain the skills for periods beyond the project life.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Skills development will take place.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Skills development will take place.	No fatal flaws have been identified.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 3	**NO PREFERENCE**	Skills development will take place.	No fatal flaws have been identified.

5.3.4 Positive impact on household income

The new jobs that will be created as a result of the operation of the coal-fired power station will result in increased household income for benefitting individuals. Employed individuals will increase the income of their respective households and therefore improve their standards of living. It is likely that households benefitting from the increased income as a result of the multiplier effects which will be spread across South Africa will also experience this benefit; however, some of the benefits will be concentrated locally.

Nature: **Employed individuals will increase the income of their respective households and therefore improve their standard of living.**		
	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Definite (5)
Significance	**Medium (52)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Employing locally will increase benefit to local households and the local area.		
Residual impacts: No residual impacts are applicable.		

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Standard of living will improve.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Standard of living will improve.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Standard of living will improve.	No fatal flaws have been identified.

5.3.5 Negative impact on eco-tourism offering

The Volharding Game Ranch and Lodge is located on Farm Goosen, 14km in the northerly direction from the proposed project site. As a result of the operation of the coal-fired power station, this tourism offering will potentially no longer be as viable or will be strongly disrupted, however, the existence and operation of the nearby open-pit Mopane dolomite

mine and processing and beneficiation plant belonging to Syferfontein Carbonates (Pty) Ltd, has to date not shown this as occurring. The proposed project could thus result in a potential loss for the tourism industry directly linked to the operations at the lodge.

The eco-tourism offering includes hunting and accommodation. Due to the abundance of various flora and fauna, Farm Goosen attracts international and local hunters, photographers and nature lovers[1]. According to Environmental Planning and Design (2018), the proposed development could be visible from tourist routes in tha area and could negatively impact homesteads for tourism purposes. Therefore, a possible deterrence of said tourists may occur due to the changed sense of place that the coal-fired power station will develop. Tourists looking for an escape from modern cities and human intervention are less likely to visit areas with major industrial developments such as power stations, mines or other industrial developments close by as these developments alter the experience. A limestone mine, however is already present and also has a visual impact from the lodge.

Three people are permanently employed and might potentially lose their employment. This loss of income will further have an impact on their dependants. Nonetheless, this impact is envisaged to be moderate within the context of the area, due to the existing mining facility to the east of the proposed project site, which is located significantly closer than the proposed project. According to the Mutsho Power Company, an off-set to the potential loss of eco-tourists will be through booking the lodge for accommodation purposes during the construction phase and periodically during the operations phase.

Nature **The operation of a coal-fired power station will change the sense of place of the surrounding area which will reduce its attractiveness as a tourist destination.**		
	Without mitigation	**With mitigation**
Extent	Limited (2)	Limited (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	High (8)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Medium (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

[1] During the interview, information on the number of tourists visiting the farm was requested but was not supplied by the owner.

Mitigation:

» Mitigation proposed by visual and noise experts should be implemented as far as feasibly possible.
» Efforts should be made to minimise the negative impact on the eco-tourism operations, where feasible through the proposed project's use of the lodge for accommodation purposes.
» Increase communication to those in the zone of influence with regards to environmental management issues.

Residual impacts:

A reduced number of tourists visiting surrounding tourism offerings could be a persistent problem.

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**SLIGHTLY PREFERRED**	A potential reduction in the number of tourists may ensue due to proximity of project footprint.	No fatal flaws have been identified.
Option 2	**NOT PREFERRED**	A potential reduction in the number of tourists may ensue due to direct presence of project footprint.	No fatal flaws have been identified.
Option 3	**SLIGHTLY PREFERRED**	A potential reduction in the number of tourists may ensue due to proximity of project footprint.	No fatal flaws have been identified.

5.3.6 Loss of economic activity on directly impacted farm

Portion 0 of Farm Du Toit is one of the directly impacted farm portions, where the power station is proposed to be located (specifically Layout Option 2). The farm portion is located on non-arable land and therefore crop farming does not take place. It is however located on a mineral region, and is underlain by coal reserves. The status quo of the farm is as follows:

* Wild animals are prevalent on the farm
* Approximately 40 cattle are present on the farm
* The farm has one permanent employee (aged over 65)

Given the above status of economic activity on the farm, it is deduced that the farm is large in size but is a small-scale commercial farm. The landowner due to his age (80) prefers to sell the farm. The employee will not continue to work any longer due to his age. Therefore, the impact on the landowner is moderate.

Nature:

Loss of small-scale commercial farming activity on farm Du Toit.

	Without mitigation	**With mitigation**

Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**Medium (35)**	**Medium (55)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	Yes

Mitigation:

» The landowner prefers to sell the farm therefore relocating the animals to alternative land will aid the continuation of economic activities

Residual impacts:

Flora and fauna will be permanently removed on a portion of the farm (If option 2 is selected).

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**PREFERRED**	Footprint of new development will not be on farm Du Toit	No fatal flaws have been identified.
Option 2	**NOT PREFERRED**	A portion of Farm Du Toit will be taken up by the project footprint.	No fatal flaws have been identified.
Option 3	**SLIGHTLY PREFERRED**	The footprint of the new development will not be located on Farm Du Toit, but will be at a close proximity.	No fatal flaws have been identified.

5.3.7 Contribution towards increased government revenue

The proposed development will provide a sustainable increased revenue to the local government in the form of property rates and taxes. It will further supplement the revenue derived from national government. Moreover, national government will derive tax-related revenue such as Value-Added Tax (VAT), payroll and income taxes. This is as a result of the employment that will be created and the resultant income that will be earned, thus increasing spending power.

As stated previously, the housing backlog and service delivery require attention. Therefore, the increased revenue from the proposed project may assist the municipality, whereby constituencies may utilise it for public services. Overall, the allocation of government revenue should improve socio-economic conditions of the population.

Nature: **Government revenue will be derived from the proposed development.**		
	Without enhancement	**With enhancement**

Extent	Municipal (3)	Municipal (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (65)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Risks: No residual risks are applicable.		

Alternative	Preference	Concerns/Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	Government revenue will be accrued.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	Government revenue will be accrued.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	Government revenue will be accrued.	No fatal flaws have been identified.

5.3.8 Impact on energy security

The power station will provide the important national service of providing new electricity capacity into the national grid. Strategically, the proposed project will assist in ensuring electricity security in the long-term. Access to energy would have a profound effect on curbing poverty and unemployment, attracting investment such as the Musina and Makhado SEZs and essentially promoting socio-economic development.

The Mutsho Power Project could come on line around 2025/6 at the earliest, dependent on national policy and the timing of the IPP procurement programme. As such it will start to provide power when Eskom's current fleet of some 44 000MW has decreased to about half of its generating capacity. As such developing the proposed project will meet a future need for baseload power that cannot be met by intermittent renewable energy sources.

Nature: **Improved energy security and energy sector will result due to the development of the coal-fired power station.**		
	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (60)**	**High (60)**

Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Risks: No residual risks are applicable.		

Alternative	Preference	Concerns / Impact Summary	Fatal Flaws
Option 1	**NO PREFERENCE**	An improvement in the energy sector will occur.	No fatal flaws have been identified.
Option 2	**NO PREFERENCE**	An improvement in the energy sector will occur.	No fatal flaws have been identified.
Option 3	**NO PREFERENCE**	An improvement in the energy sector will occur.	No fatal flaws have been identified.

5.4 Cumulative Impact Analysis

The extent to which a proposed project will influence the zone of influence is based on the baseline conditions of that environment, which includes other proposed projects in the zone. Such projects, depending on their timing in relation to the project which is subject of this SEIA, may influence the manifestation and significance of socio-economic impacts that could result from the current project. As such, knowledge of such projects is required in order to accurately predict and rate socio-economic impacts.

Six developments have been identified in the District that might contribute to the accumulation of impacts in the region. These are the:

» Musina-Makhado Special Economic Zone
» Musina Copper Mine
» Limpopo Eco Industrial Park
» 440MT and 442MT Prospecting Right
» Venetia Mine
» Syerfontein Mine
» Makhado Colliery
» Additional coal fields in the larger area

The following table summarises the key economic impacts that were identified and analysed by other specialists for the above-mentioned projects. The table indicates the rating of the identified socio-economic impacts as proposed by the other specialists in their respective studies, and based on the combination of these ratings – indicates the importance of the socio-economic impact from a cumulative effect perspective.

Table 5-1: Reviewed literature of existing and planned developments and impact rating

Economic Parameter	Description/Impact	Rating by Specialist	Identified Importance
Increase in production and GDP	**Musina-Makhado Special Economic Zone** GDP contribution expected to fluctuate between R308m and R709m (Limpopo Economic Development Agency, 2015).	-	High Positive
	Musina Copper Mine Positive production induced (Golder Associates, 2017).	Moderate positive	
	Limpopo Eco Industrial Park ± 20 billion per annum (Limpopo Eco Industrial Park, 2016)	-	
Employment creation	**Musina-Makhado Special Economic Zone** 172-345 direct jobs will be created.	-	Moderate Positive
	Musina Copper Mine Employment creation.	Moderate positive	
	Limpopo Eco Industrial Park 90 000 direct and indirect jobs to be created	High positive	
	440MT and 442MT Prospecting Right Increased noise levels (Naledzi Environmental Consultants, 2018)	-	
Change is sense of place: noise levels	**Venetia Mine** Noise generation expected (De Beers, 2015).	Low negative	Low Negative
	Musina Special Economic Zone Intensified shift to industrial sense of place.	-	
	Syerfontein Mine Existing mine contributing to shift to industrial sense of place from natural.	-	
	Musina Special Economic Zone Skills upgrading, and knowledge transfer will take place.	-	
Skills development	**Venetia Mine** Aesthetic changes will occur.	Low negative	Moderate Positive
Visual Impact	**Syerfontein Mine** Stacks visible.	Negative	Negative
Energy Security	**Musina Special Economic Zone** South African Energy Metallurgical Base	Positive	Positive

Additional impacts that were not covered in the literature reviewed but were thought to be of significance are the influx of migrant labour. Below are the cumulative impact tables of the positive and negative impacts.

Nature: **Increase in production and creation of employment opportunities.**		
	Cumulative Contribution of proposed project	**Cumulative Impact without proposed project**

Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (60)**	**Medium (52)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings	High	
Mitigation: No mitigation measures are required.		

Evidently, two strong positive impacts will ensue due to the joint employment and production.

Nature: Change in sense of place in the form of visual impact and noise.		
	Cumulative Contribution of proposed project	**Cumulative Impact without proposed project**
Extent	Local (1)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (39)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Unknown
Confidence in findings	High	
Mitigation: Adhere to noise and visual specialists' recommendations.		

Nature: Influx of migrant labour and job seekers due to job opportunities presented by numerous projects.		
	Cumulative Contribution of proposed project	**Cumulative Impact without proposed project**
Extent	Regional (3)	Regional (3)
Duration	Long Term (4)	Medium Term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)

Significance	**Medium (39)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown
Confidence in findings	High	

Mitigation:

» Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.

» Provide training for unemployed local community members with insufficient skills and thus increase absorption of local labour thereby decreasing in-migration.

» Manage recruitment and marketing for vacancies with a preference of residents within the municipality.

6. COMPARISON OF ALTERNATIVE OPTIONS

There is no differentiation between the three alternatives in terms of most socio-economic impacts considered. However, preference is given to option 1 with regard to the loss of economic activity as the footprint of the project will not affect the farm, compared to option 2 and 3 wherein the footprint proximity will most likely affect the economic activities. Similarly, the effect on eco-tourism will be most exacerbated by option 2, due to the project footprint on Farm Du Toit, where tourism activities take place. Option 2 is further least preferred due to the increased change in sense of place it presents.

Overall therefore, option 1 is preferred, followed by option 2 but option 3 is not preferred.

Table 6-1: Option comparison

Impact	Option 1	Option 2	Option 3
Construction Phase			
Increase in production and GDP-R	No Preference	No Preference	No Preference
Employment Creation	No Preference	No Preference	No Preference
Skills Development	No Preference	No Preference	No Preference
Household Income	No Preference	No Preference	No Preference
Influx of Migrant Labour	No Preference	No Preference	No Preference
Sense of Place	No Preference	Least Preferred	No Preference
Increased Demand for housing	No Preference	No Preference	No Preference
Pressure on services	No Preference	No Preference	No Preference
Operations Phase			
Increase in production and GDP-R	No Preference	No Preference	No Preference
Employment Creation	No Preference	No Preference	No Preference
Skills Development	No Preference	No Preference	No Preference
Household Income	No Preference	No Preference	No Preference
Negative impact on eco-tourism	Slightly Preferred	Least Preferred	Slightly Preferred
Loss of economic activity	Preferred	Least Preferred	Slightly Preferred
Government Revenue	No Preference	No Preference	No Preference
Energy Security	No Preference	No Preference	No Preference

7. CONCLUSION

Mutsho Power is proposing to develop a coal-fired power station with a generation capacity of up to 660 MW, and an export capacity of up to 600MW (as limited by the IPP programme). The project is planned be located in the Musina LM within the Limpopo Province. The proposed site includes Farm Du Toit 563 and Farm Vrienden 589, near Mopane if option 2 is selected.

The review of key national, provincial, and local policy documents indicates that the development of coal-fired power stations is supported at all levels, from a socio-economic perspective. The national policies are in sync with the view that coal dependence will continue in the long term; thus, the contribution of coal-fired power stations towards the energy mix in the country will remain. However, a proposal for research and development for cleaner coal technology with reduced emission rates is put forward (Department of Energy, 2016). In addition, at lower levels, service delivery is a key issue to be addressed, including electricity provision. After considering the reviewed documentation, no fatal flaws or contraventions from a socio-economic policy perspective exist for the implementation of the proposed project.

However, the need for additional baseload generation capacity needs to be assessed in the context of the current and envisaged future supply and demand of electricity. South Africa's electricity-intensity is declining, while new generating capacities are being developed. The country is already producing more electricity than it can currently consume; therefore, the need for new generating capacities in the near future is not as dire as it was experienced a few years back. The eagerly awaited updated IRP, hopefully to be released during 2018, will inform this path.

The Mutale LM was merged with the Musina LM in August 2016. This amalgamation has resulted in the GDP contribution of the Musina LM to Vhembe DM to be 16%. The municipality is well connected regionally and internationally. It is comprised mainly of mining activities, tourism, and largely undeveloped land. Overall, the economy has a small base despite its relatively large contribution to the district's economy, and in the past few years has been stagnating, showing a need for additional investment and diversification of its base.

Just over a third of the population in the local economy is employed and the unemployment rate is 26%. Key concerns are the low education levels and the skills shortage in the region. These are perpetuated by the vast backlog of classrooms and learner support material, particularly in rural areas. Furthermore, the communities where labour can potentially be sourced are not in close propinquity to the project site.

The above suggests that the economy can utilise the investment to diversify its economic base and lead to the improvement of standards of living among local households through the increased income levels and access to improved services, which can be achieved by raising the local municipality's revenue base through taxes and rates paid by new businesses. The proposed project is, therefore, likely to create a positive impact on the local economic development and the socio-economic environment in the municipality in

general; however, some negative effects associated with the influx of people and migrant workers can be expected. Of concern is the possible depreciation of the tourism offering in close proximity to the proposed site.

Table 7-1: Summary of impacts and expected significance

Impact	Status	Weight before mitigations
Construction Phase		
Increase in production and GDP-R	Positive	Medium (52)
Employment creation	Positive	**High (75)**
Skill development	Positive	**High (70)**
Increase in household income	Positive	Medium (52)
Demographic shifts due to influx of migrant labour	Negative	Medium (36)
Change in sense of place	Negative	Medium (40)
Increase in housing demand	Negative	Medium (40)
Pressure on basic services, social facilities and economic infrastructure	Negative	Medium (33)
Operation Phase		
Increase in production and GDP-R	Positive	**High (75)**
Employment creation	Positive	**High (75)**
Skill development	Positive	**High (70)**
Increase in household income	Positive	Medium (52)
Negative impact on eco-tourism	Negative	Medium (36)
Loss of small-scale commercial activity	Negative	Medium (35)
Increase in government revenue	Positive	**High (65)**
Energy Security	Positive	**High (60)**

Overall, it is clear that the local economy is in need of an investment that will provide for a long-term growth and development of the economy. The proposed project is likely to contribute to positive economic development, particularly considering the fact that there are also a number of other mining and industrial developments planned for the region, which may likely lead to the development of a new economic node similar to Lephalale. However, the proposed project without doubt will forever change the aesthetics and tranquil sense of the area, which could negatively impact on some other economic activities in the region such as tourism and agriculture.

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ANNEXURE A: IMPACT EVALUATION METHODOLOGY

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).
- The **duration**, wherein it will be indicated whether:
  - The lifetime of the impact will be of a very short duration (0 – 1 years) – assigned a score of 1.
  - The lifetime of the impact will be of a short duration (2 – 5 years) - assigned a score of 2.
  - Medium-term (5 – 15 years) – assigned a score of 3.
  - Long term (> 15 years) - assigned a score of 4.
  - Permanent - assigned a score of 5.

Example of Impact table summarising the significance of impacts (with and without mitigation)

Nature: [Outline and describe fully the impact anticipated as per the assessment undertaken]		
	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind.		
Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).		

- The **consequences (magnitude)**, quantified on a scale from 0 – 10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1 – 5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- The **status**, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:
S = (E + D + M)P
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area).
- 30 – 60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated).
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included. Complete a table and associated ratings for **each** impact identified during the assessment.

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[1].

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

The specialist is required to conclude if the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area.

Nature: Complete or whole-scale changes to the environment or sense of place (example)		
	Cumulative Contribution of Proposed Project	**Cumulative Impact without Proposed Project**
Extent	Low (1)	Low (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (27)**	**Low (12)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown
Confidence in findings: High.		
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind.		