ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED TSHIVHASO COAL-FIRED POWER PLANT NEAR LEPHALALE, LIMPOPO

Socio-Economic Impact Assessment

Draft

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ABBREVIATIONS

CAGR	Compounded Average Growth Rate
CFPP	Coal-Fired Power Plant
DM	District Municipality
DoE	Department of Energy
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
GDP	Gross Domestic Product
I&P	Interested and Affected Parties
IPP	Independent Power Producer
IRP	Integrated Resource Plan
LM	Local Municipality
MCWAP	Mokolo-Crocodile Water Augmentation Project
NDP	National Development Plan
NGPF	New Growth Path 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 Tshivhaso Coal-Fired Power Plant near the town of Lephalale in the Limpopo Province. The study is conducted as part of the Environment Impact Assessment (EIA) process managed by Savannah Environmental.

1.1 Brief description of the project

South Africa's indigenous energy-resource base is dominated by coal. Coal provides for about 65% of South Africa's primary energy needs and according to the South Africa Yearbook 2013/14, this is unlikely to change significantly in the next 20 years due to the relative lack of suitable alternatives to coal as an energy source. Owing to the relatively favourable cost at which most of the deposits can be exploited, a large coal mining industry has developed in the country. About two thirds of South Africa's coal reserves and resources are in the Waterberg area, which is the driving force behind the development of Lephalale.

The promulgated Integrated Resource Plan (IRP) 2010 assumes that South Africa has a total installed capacity of 48 220 MW, of which approximately 88% is generated by Eskom and specifically, about three quarters is generated from Eskom-owned coal power stations. The IRP2010 also recognises that electricity generation needs to increase to 89 532 MW capacity by 2030, of which just over half will need to comprise of coal-fired power stations. Furthermore, the IRP 2010 assumes that 6 250 MW of coal-fired power stations will be added by independent producers by 2030.

In support of the need to increase electricity generation, Cennergi is proposing the construction of a coal-fired power station on a site near Lephalale in the Limpopo Province. The project is to be known as the Tshivhaso Coal-Fired Power Plant (CFPP). Once built, the power station will have a capacity of up to 600 MW. Various options regarding the siting of the power station and associated infrastructure are being investigated. It is envisaged that coal will be sourced from Exxaro Coal's Thabametsi Coal-Mine development, which is to be located in the vicinity of the sites under investigation. The electricity generated from the power station will be fed into the national electricity grid. Two options in this regard are being considered.

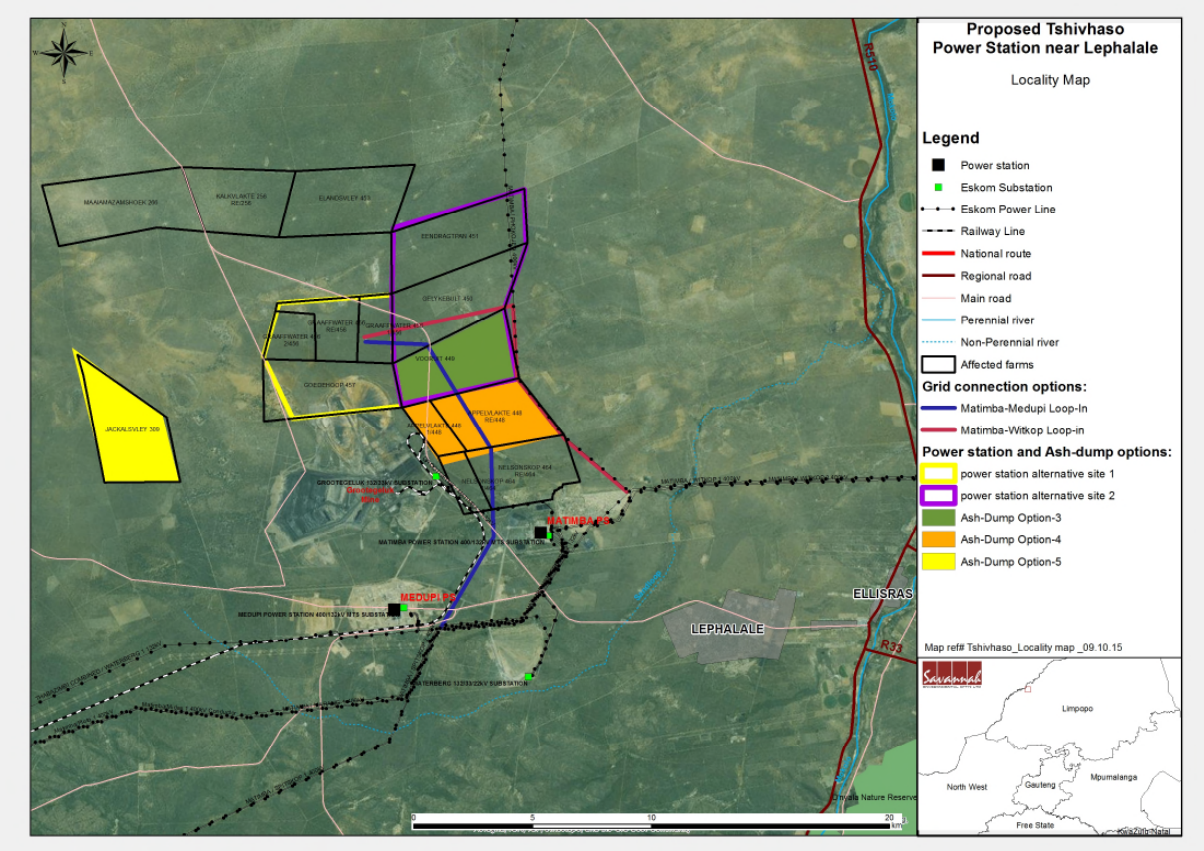
The main infrastructure being proposed includes (specifications will be decided based on the technology selected):

- Access roads;
- Coal storage areas and bunkers;
- Coal mill (for grinding the coal into fine material);
- Pipeline for water supply (Water is expected to be available from the allocation to Exxaro Coal from the Mokolo-Crocodile Water Augmentation Project (MCWAP) Phase 2);

- Coal loading and offloading areas, as well as conveyor belts;
- Power plant production unit/s (boilers / furnaces, turbines, generator and associated equipment, control room);
- Ash dump;
- Water infrastructure such as Raw-Water Storage Dam, purification works and reservoirs;
- A substation;
- An overhead power line to connect into the Eskom grid; and
- Office and maintenance area/s.

The closest town to the project site is Lephalale, which is situated about 25km from the project site within the Lephalale Local Municipality (LM). Also in close proximity is the Marapong township, which is located about 12km south-east of the project site.

The following map shows that there are two potential sites for the power station, three potential sites for the ash dump, and two grid connection options. Graaffwater 456 and Goedehoop 457 are the proposed portions for power station alternative 1; Eendragtpan 451, Gelykebul 450 and Vooruit 449 are the proposed portions for power station alternative 2; Vooruit 449, Appelvlakte 448 and Jackalsvley 309 are ash dumps 1, 2, and 3 respectively.



Map 1-1: Location of the proposed development

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;
- Determine the data required to assess potential impacts and respond to the questions outlined in the guidelines related to needs and desirability assessment;
- 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 areas 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 the environmental specialist'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.
- **Need and desirability assessment**: Given the knowledge of the project and the profile of the area where it is proposed to be located, the need and desirability thereof was investigated. This involved the assessment of the project's alignment with the interests and needs of the broader public, the relevant policy plans for the area, as well as the suitability and necessity of the project considering the chosen time and place. Ultimately, the need and desirability analysis assisted in determining whether it is the right time and the right place for locating the proposed project.
- **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 the environmental specialist (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.

1.4.1 Secondary data analysed

* Stats SA Census, 2011
* Quantec Research Standardised Regional Data, 1995-2013
* New Growth Path Framework (NGPF)
* National Development Plan (NDP) 2030
* Integrated Resource Plan (IRP) 2010 – 2030

- IRP 2010-2030 Update Report
- Industrial Policy Action Plan (IPAP) 2014/2015 – 2016/2017
- Limpopo Employment Growth and Development Plan (2009 – 2014)
- Waterberg Environmental Management Framework (EMF) (2010)
- Waterberg DM IDP (2015/16)
- Lephalale LM IDP (2014/2015)
- Lephalale LED (2008)
- Wildlife Ranching South Africa (WRSA) (2010)

1.4.2 Primary data collected

The primary data gathering for this project was done via in-person interviews, telephonic interviews, and self-completion questionnaires. Although the intention was to engage in-person with each affected party, some respondents chose to complete the questionnaire remotely and email it.

- Telephonic correspondence took place from 17th March to 22nd March 2016
- Follow-ups with each affected party took place at least weekly
- The site visits took place from the 29th March to the 30th March 2016

a) In-person interviews (29 March 2016)

- The owner of portion Massenberg 305
- Just Property
- Re-Max
- Local government representative

b) Telephonic interviews

The owner of portion Ganzeban 446 completed the survey telephonically

c) Electronic self-completion (telephonic correspondence 17 March to 22 March 2016)

The majority of affected parties responded to the questionnaire electronically

- **Exxaro** (Gelykebult 450, Eendragtpan 451, Graaffwater 456, Goedehoop 457, Vooruit 449, Jackalsvley 309, Appelvlakte 448, Mc Cabesvley 311) as well as indirectly affected portions (Enkelbult 462, Nelsonskop 464, Leuuwdrift 312, Van der Waltspan 310, Vaalpensloop 313, Daarby 458, Grootgeluk 459, Zaagput 307, Gelykebult 455, Onbelyk 257) as well as Ferroland Maketti Lodge
- **Eskom** (Zongezien 467)
- **Anglo American** (Grootpan 452, Welgevonden 444, Elandsvley 453, Schrikvoorby 445)

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 in-person interviews undertaken the following assumptions are made:
    - Questions asked during the interviews were answered accurately.
    - The project drivers and land owners for the Thabametsi IPP power station (to be located in close proximity to the proposed project site) chose not to participate in the study. The assumption is that no significant concern exists or it can be reasonably assumed that consultation would have been sought.
    - Sekoko Coal, owners of land portions Smitspan 306 and Hoiikraal 315, chose not to participate in the study. It is therefore, assumed that they have no concerns regarding the proposed development.
    - Given the fact that these land owners did not participate in the study, and their respective portions of land are not directly affected, it is assumed that there are no serious impacts related to those properties.

2. POLICY REVIEW

The **New Growth Path Framework (NGPF)** (Department of Economic Development, 2010) and the **National Development Plan (NDP) 2030** (National Planning Commission, 2011) confer that all regions are to seize the advantages of the natural resources endowed to them towards achieving accelerated economic growth, poverty alleviation and job creation. This however, needs to be done in a sustainable and equitable manner. The NGPF identifies infrastructure development, including energy infrastructure as one of the key sectors for job creation that can be achieved through construction works, operations, maintenance and manufacturing of inputs. The NDP in particular recognises the economy as "electricity intensive", and given the effect of the 2008 energy crisis observed in the country the importance of adequate and uninterrupted supply of electricity is evident.

The **Integrated Resource Plan (IRP) 2010 – 2030** (Department of Energy , 2011) explicitly spells out the need to support the development of the electricity generation sector to support the growth of the national economy. The IRP 2010 provides for a diversified energy mix, in terms of new generation capacity, which includes coal at 14.7% of the total capacity. It was indicated at the time of promulgation that the IRP should be a "living plan", which would be revised by the Department of Energy (DoE) every two years. To this end, the updated report was formulated in 2013; however, it is yet to be promulgated.

In 2012, the Minister of Energy has 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) 2014/2015 – 2016/2017** represents the sixth annual iteration of the first IPAP launched in the 2007/8 financial year. It represents a significant step forward in scaling up the country's efforts to promote long-term industrialisation and industrial diversification beyond the current reliance on traditional commodities and non-tradable services, and to promote sustainable development. The IPAP identifies mineral beneficiation as one of the key sectors in which to strengthen industrial policy interventions. Given that coal is currently the most abundant and affordable of all fossil fuels, it is perceived that it will continue to play a vital role in meeting energy demand worldwide and in South Africa. However, the IPAP also identifies promotion of the green industries to further the country's development of the green economy and transition to a low carbon economy.

Echoing the need to reduce poverty, create employment and increase economic growth is the **Limpopo Employment Growth and Development Plan (2009 – 2014)** (Limpopo Provincial Government, 2009). The plan recognises a number of planned and anticipated consequential developments in the Lephalale area associated with the rich coal reserves in the Waterberg coal field. However, this plan emphasises that additional water will be

required for these projects and highlights the strategic initiatives planned to mitigate the water challenge, including the Mokolo Crocodile Water Augmentation Project (MCWAP).

One of the objectives of government that need to be considered in the context of the proposed project, and that are iterated in the key strategic documents mentioned earlier (i.e. NGPF, NDP, and IRP), is sustainable development through job creation as well as the reduction of carbon emissions associated with electricity generation. This is because the project holds the potential to both create jobs and to contribute towards the release of harmful emissions. The **Waterberg Environmental Management Framework (EMF) (2010)** notes that power stations are the largest contributors to SO_2 and NO_2 emissions within the district, 95% and 93% respectively. Furthermore, coal mining and power station operations rely heavily on water consumption, a resource in high demand in Lephalale. The Waterberg EMF (2010) estimates that rural communities use ground water as their main source of water, while surface water is used when available. The percentage of households within the municipality that rely on boreholes, wells, rivers and springs as a water source equates to about to 22.6% (Statistics South Africa, 2015). Increased mining and energy-generating activities making use of non-renewable energy sources could potentially pollute these water sources (Waterberg EMF, 2010).

The development of additional coal-fired power stations within the surrounds of the Grootgeluk Coal Mine, the Matimba Power Station and the soon-to-be-commissioned Medupi Coal-Fired Power Station are referred to in the **Waterberg DM IDP (2015/16)**. The district municipality's IDP highlights that the development of the Medupi Power Station presents an opportunity for future development of the region. The **Lephalale LM IDP (2014/2015)** reiterates this, stating, "Lephalale is destined to become a major growth point and preferred investment destination in the future and the potential for future investment is bountiful." The LM's IDP further highlights that the influx of construction staff will have a huge impact on the town in both social and economic terms over the medium-term.

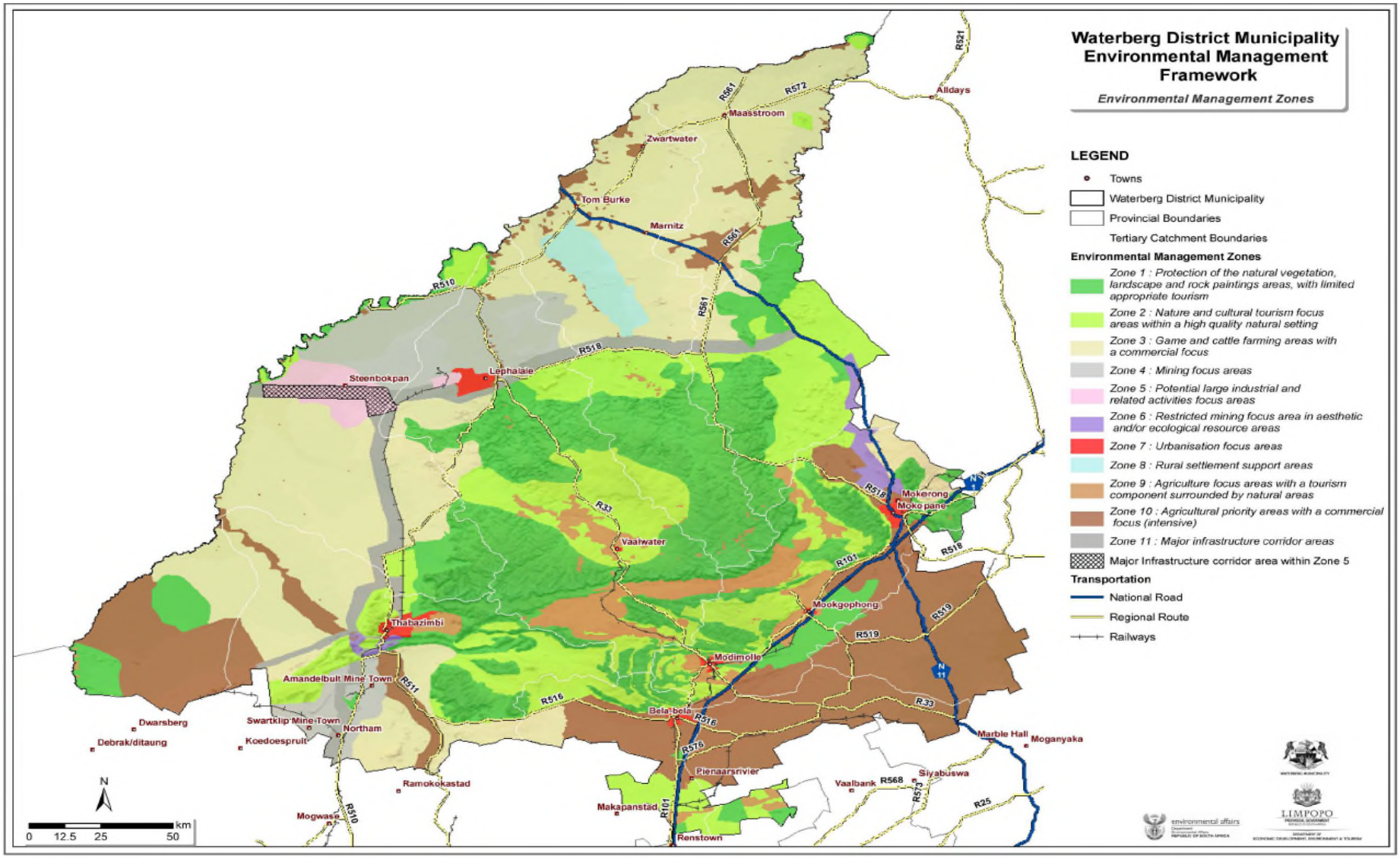
The Lephalale LM is acknowledged to be on the verge of major economic development within the mining and power production industries as government policy assigns the Limpopo Coal, Energy and Petrochemical Cluster as a means of utilising the potential of the Waterberg Coal Field to produce energy for the national economy (Lephalale LED, 2008). Most applications will fall into the electricity generation and coal liquefaction fields (Lephalale LED, 2008). The use of these resources, which will contribute to job creation and the development of the economy in an equitable manner, is a cornerstone of the municipality's development objectives (Lephalale LED, 2008).

The Limpopo Coal, Energy and Petrochemical cluster consists of four phases of development. Phase Two (2008-2013) began upon the development of the Medupi Power Station ending phase one (1980-2007). Phase Three (2014-2020) will commence with the completion of Phase Two projects and supporting infrastructure. The main components of Phase Three are a coal mine, a coal–to-liquids manufacturing plant, a new power station, and a new town. The exact details of new projects in the Limpopo Coal and Petrochemical Cluster in Phase Four (2021- beyond) are not yet publicly available but it is estimated that a total of 8 400 jobs can be expected to be created within Phase Four. Employment achieved in Phase Two is anticipated to reach 10 800 while employment during Phase Three could reach beyond 10 000 if expansion is approved.

(Lephalale LED, 2008)

In addition to the mining activities, game farms and other agricultural activities are an important part of the local economy and specifically the eco-tourism sector. According to the Lephalale LM LED (2008), hunting is the predominant draw card to the region, and accounts for 31% of visitors to the municipality. However, industrial development puts pressure on these activities, and the industry players have indicated their concern that the game farming and eco-tourism sectors are not taken into consideration when developments are planned (Waterberg EMF, 2010).

The Waterberg EMF (2010) has developed a spatial framework (refer to Map 2-1) to guide sustainable development in the district.



Map 2-1: Spatial composition of the Lephalale LM, Source: Waterberg EMF (2010)

The framework presents eleven environmental management zones. The primary study area falls within Zone 5, Zone 7 and Zone 11. All zones are aligned with industrial development and urbanisation. The town of Lephalale falls within Zone 7, which is a verified urbanisation focus area; as well as Zone 5, which is spatially delineated as a large industrial cluster. Zone 11 indicates the defined Industrial Corridor. Zone 5, wherein the project will be located, is spatially approved as a high-intensity activity zone. The framework confers that tourism within the zone does not apply and cattle and game farming are recognised as default activities. Agriculture is not desired within Zone 5, yet it is stipulated that activities which already exist may continue.

The untouched environs, which cover 78.6% of the Waterberg DM, are a strong selling-point for the local tourism industry, specifically due to its close proximity to the business hub of Gauteng, the UNESCO Waterberg Biosphere Reserve (south of Lephalale town), and the extensive commercial game farms. Eco-tourism is currently the largest sector within the tourism industry in the Waterberg DM, with business tourism growing rapidly due to the developments taking place in the area.

Wildlife Ranching South Africa (WRSA) (2010) stated that Limpopo holds more than half of South Africa's commercial game farms, of which there are more than 9 600 in South Africa with a coverage of 20 500 000ha and a realised gross income of R7.7 billion in 2009.

Given reviewed documentation, it is evident that the proposed project is in line with the national and local government priorities and spatial frameworks. Importantly, no conflicts from a socio-economic policy perspective exist.

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 then 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 Study area's composition and locational factors

a) Spatial context and regional linkages

The proposed Tshivhaso Coal-Fired Power Station is to be located in the Lephalale Local Municipality which is one of the municipalities making up the Waterberg District Municipality in the Limpopo Province.

The **Limpopo Province** (Limpopo) is located in the north-east corner of South Africa and accounts for approximately 10.4% of the South African population. It is considered the gateway to Africa as it shares borders with Botswana, Zimbabwe and Mozambique, placing it in a favourable position for economic co-operation with other parts of Africa (Department of Government Communications and Information System, 2014). Mining is a significant economic activity in Limpopo as the province is rich in mineral deposits such as platinum-group metals, coal, diamonds and iron ore among others. Tourism is an established and growing sector in Limpopo, based primarily on existing state-owned and private game and nature reserves.

The **Waterberg DM** is the largest district in the Province (by area) with a geographical area of 49 518.81km^2. However, this region only accounts for 12.6% of the total population of Limpopo, and is chiefly characterised by dispersed and fragmented urban areas. The Waterberg area experienced a 12.3% increase in population during the period 2001 to 2011. Estimated land use values for the Waterberg area reveal that 0.2% of the total land area is allocated to mining, while 6.6% of the total area is under conservation (Waterberg IDP, 2010/2011). Table 3-1 presents the spatial distribution of the Waterberg DM. It illustrates the predominant land-uses of the district.

Table 3-1: Land Distribution of Waterberg District

Land type	Hectares	% share
Commercial/ Industrial	622	0.0%
Conservation	324 468	6.6%
Cultivated Land	607 946	12.3%
Forestry	1 138	0.0%

Land type	Hectares	% share
Mining	7 658	0.2%
Residential	26 615	0.5%
Subsistence Farming	90 503	1.8%
Vacant/ Unspecified	3 886 598	78.6%
TOTAL ha	4 945 548	100.0%

The **Lephalale LM** is located in the Waterberg DM and is the largest local municipality within the Limpopo Province, covering 19 605km². Low rainfall within the primary study area is the cause for land-use conflict between low-intensity uses (game farming, agronomy and conservation) and high-intensity uses (urban development and mining) (Waterberg EMF, 2010). Some of the major businesses and industries within the Lephalale LM include, inter alia (Waterberg EMF, 2010):

* Grootgeluk Mine
* Matimba Power Station
* Soon-to-be-commissioned Medupi Power Station
* Tobacco (agriculture)
* Ellisras Dairy Farm
* Livestock farming
* Hangklip Brickworks
* Veterinary Laboratory
* Hunting and Eco-Tourism
* Witpoort Hospital

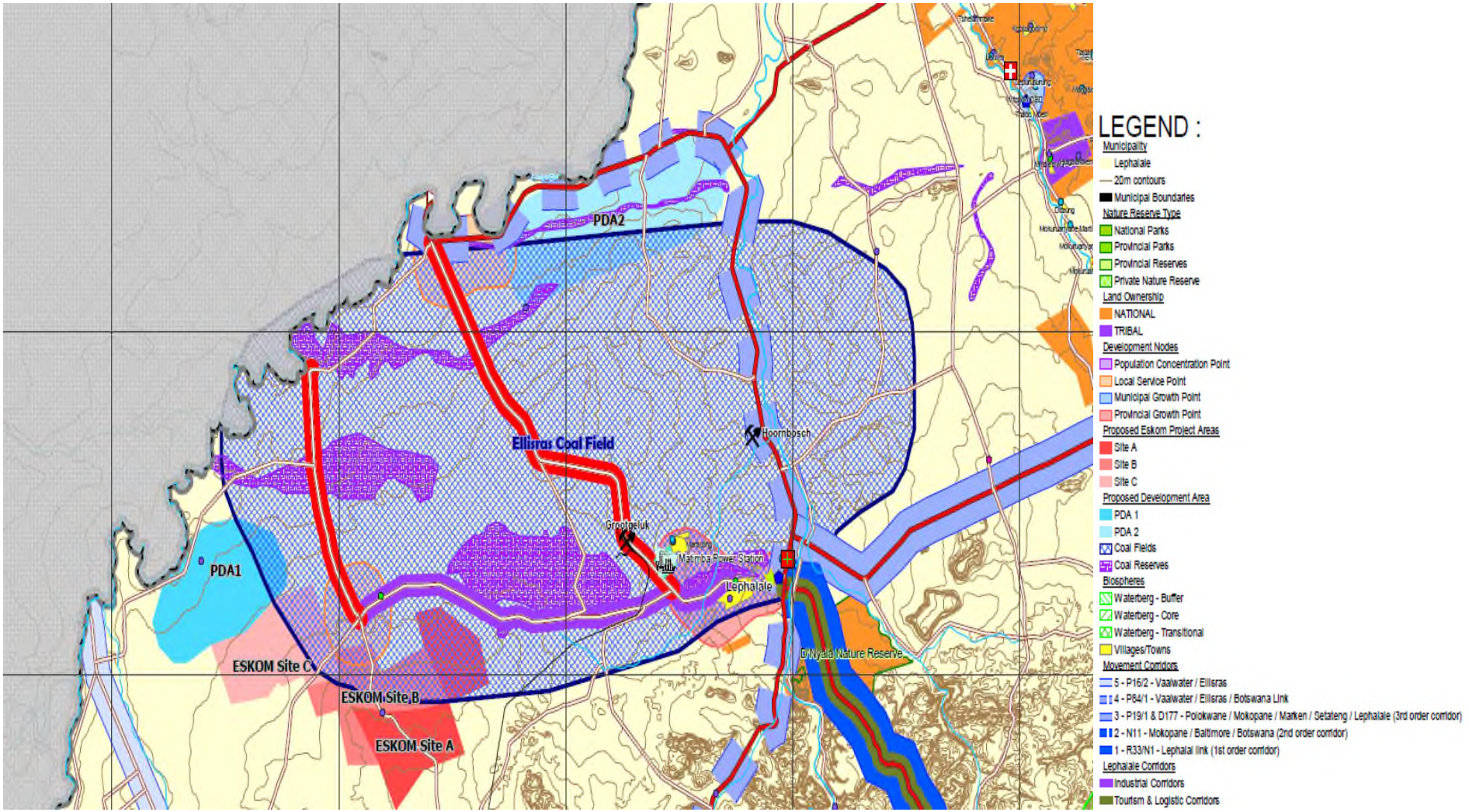
b) Major towns and settlements

The closest major town to the proposed site is **Lephalale**, which lies about 25km east of the site. Lephalale is considered as a Provincial Growth Point and a potential energy hub (Lephalale LM, 2014). The town is divided into three major extensions, namely Lephalale, Onverwacht, and Marapong.

A small industrial park, which caters mostly for motor vehicle repair services and depots of construction and transport, is located in Onverwacht. The Marapong township accommodates contractors from the Grootegeluk Mine and Matimba Power Station. There is a low level of business activity in the township, but it is foreseen that growth in the surrounding area in the short-to medium-term will have a significant impact on Marapong in terms of job opportunities and economic growth.

c) Resources and land capability

The area where the proposed Tshivhaso Power Station is to be established is set to become one of the country's coal and energy centres due to the large coal deposits still available. As shown on Map 3-1, most of the land in the vicinity of the proposed project site is earmarked as either an Industrial Development Zone, a Mining Zone, or an Extensive Mining and Energy Concentration Zone. It can therefore be concluded that the proposed project location poses no land use conflict at a broad scale.



Map 3-1: Lephalale LM zoning

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 at its current state.

a) Population size

Spatially, Lephalale is the largest municipality within the Waterberg DM, yet the total population of 115 766 accounts for only 17% of the District's population and 16.6% (equivalently 29 881 households) of its household numbers (Quantec, 2015). The population has increased by 26.3% from 85 272 in 2001, implying an average annual population growth rate of 2.6% over the ten-year period. Approximately 22.7% (26 228 people) of the municipality's population resides in Marapong, while 15.2% (17 638) resides in Lephalale town and the remaining population resides in the rest of the municipality. However, according to the Lephalale LM's IDP, the population growth within Lephalale Town node is among the highest in Limpopo and reflects the influx of people to work on the construction of the Medupi Power Station and the local coal mine expansion projects. A large portion (45.2%) of the population in the LM resides in tribal areas, while 39.8% resides in urban areas, and the rest (15%) lives in on farms. This depicts the rural nature of the Lephalale LM.

b) Race, gender and language spoken

The majority (90.1%) of the people in the municipality are Black African; 7.9% of the population is White, with other population groups making up the remaining 2%. Sepedi is the language most spoken in the LM. The male population (54.3%) exceeds the female population (45.7%). According to the Lephalale LM IDP, this can be attributed to the high incidence of contract workers and male professionals coming into the municipality in pursuit of employment opportunities.

c) Age profile

The youth (aged between 15 and 34 years) make up the majority of the people living in the Lephalale LM (43.4%), followed by the group between the ages of 35 and 64 years with 26.4%. Considering the working age group that is between the ages of 15 and 64 years, the municipality has a slightly bigger percentage of working age males than females, which is again attributed to the influx of male workers and job seekers to the area.

The population in the area is characterised by a high dependency ratio (43.2%) with 26.1% of the population within the ages of 0 to 14 and over 65 years old (4.1%). The implications of this population structure are a higher demand for the provision of social and physical facilities, like schools, primary health care centres, etc.

d) Education

In terms of education levels in the LM, 8.6% of the adult population (over 20 years of age) have no education at all, while 49.5% have primary or secondary education (Stats SA, 2015). Those with higher educational qualifications accounted for 10.4% of the population. In Lephalale, a much lower percentage (1.9%) of individuals older than 20 has no formal schooling, while in Marapong, 2.9% has no formal schooling. Over half of the individuals (58%) aged 20 and older within Lephalale town have completed Matric or have a higher education qualification. Within Marapong, only 28% of the individuals aged 20 and older have completed Matric or have a higher education qualification

e) Income levels

The average household income in the Lephalale LM is about R10 052 (2015 current prices), with 12% of the households earning no income at all. Overall, 46.2% of the households within the local municipality earns up to R3 200 per month. In Lephalale, 12.5% of households have no income, and only 12.7% earns between R1 and R3 200 per month. The town has an average household income of R28 425 per month. This clearly illustrates the increase in welfare of the local households, which could be attributed to the creation of employment opportunities in specific sectors stimulated by the development in the area. On the other hand, 16.4% of the households in Marapong earns no income while about four in every ten households earns up to R3 200 per month.

Table 3-2: Household income

Area	No income	<R3 200 per month	Weighted average monthly HH income (2015 prices)
Lephalale LM	12.0%	46.2%	R 10,052
Lephalale	12.5%	12.7%	R 28,425
Marapong	16.4%	37.8%	R 6,817

Source: Urban-Econ calculation based on Quantec data, 2015

3.3 The economy

The structure of the economy and the composition of its employment provide valuable insight into the dependency of an area on specific sectors and its sensitivity to fluctuations of global and regional markets. Knowledge of the structure and the size of each sector are also important for the economic impact results' interpretation, as it allows the assessment of the extent to which the proposed activity would change the economy, its structure and trends of specific sectors.

The Limpopo Province contributes about 7.1% to the country's Gross Domestic Product (GDP). In 2013, the economy of the Lephalale LM was valued at R6 161 million in current prices (Quantec, 2014). The LM contributed 12.2% to the economy of the Waterberg District and made a contribution of 2.9% to the Province's economy. Over a period of ten years (2003-2013), the municipality's economy grew at a negative Compounded Average Growth Rate (CAGR) of 1.9% per year. This was lower than the district and provincial average growth rates of 0.8% and 2.6%, respectively.

The growth of the Lephalale economy in the past few years was largely stimulated by the primary sector, particularly mining. More than 60% of the local economy is derived from the mining activities, and specifically coal mining. These activities are directly dependent on the demand for coal created by the local energy generating sector, thus it can be suggested that the sustainability of the existing local employment opportunities are indirectly reliant on the future growth of the local electricity generating industry and other industries that use coal as production inputs.

Mining has shown significant growth in contribution to the GDP-R over the past decade, from 37.9% in 2003 to 62.6% in 2013. Agricultural contribution on the other hand, has declined from 6.5% in 2003 to 5.0% in 2013. The propelled growth of the mining sector is primarily due to the advance in development of the Limpopo Coal, Energy and Petrochemical Cluster. Based on the statistics provided by Quantec Research (2015), the mining sector was the only industry that increased in real size between 2003 and 2013.

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.

The composition of the labour force in the primary study area is detailed in Table 3-3.

Table 3-3: Labour force statistics

Indicators	Lephalale LM	Lephalale	Marapong
Working-age population	80 753	14 449	21 440
Non-economically active	35 289	4 819	9 519
Labour force	45 464	9 630	11 921
Employed	35 386	8 967	8 772
Unemployed	10 078	663	3 149
Unemployment rate	22.2%	6.9%	26.4%
Labour participation rate	56.3%	66.6%	55.6%

Source: Quantec Research (2015)

The Census 2011 data indicates that the Lephalale LM had about 80 753 people within the working-age population. Of these, 45 464 people were economically active; while roughly 44% of the working age population were not economically active (NEA), that is, persons aged 15–64 years who were neither employed nor unemployed at the time of the survey, including discouraged job seekers. The employed labour in the LM was estimated at 35 386, while the unemployed population was estimated at 10 078, reflecting an unemployment rate of 22.2%. This was lower than the country's unemployment rate of 29.7%.

In comparison, in the town of Lephalale, 8 967 of the working age population was employed, with only 663 of them unemployed. This means that 6.9% of the labour force in Lephalale was unemployed. On the other hand, 4 819 of the working age population was not economically active. In Marapong, the unemployment situation was worse, with an unemployment rate of 26.4%.

More than two thirds of the employed individuals in the Lephalale LM were employed in the formal sector, and only 13% were employed in the informal sector. Private households provided for 13.8% of the employment opportunities in the municipality. In Lephalale, 84% of the employment opportunities were provided by the formal sector and only 6.2% came from the informal sector. In Marapong, 80.5% of the population was employed in the formal sector while only 6.3% was employed in the informal sector; 11.8% of the employed people residing in Marapong worked for private households.

In terms of the structure of employment, the agricultural sector was the most important economic sector in the LM, contributing 24.5% of the total employment opportunities. This was followed by the trade and mining sectors, which made contributions of 20.3% and 16.9% to the total employment, respectively. Considering the above, it is clear that four out of ten jobs in the local area are created by the primary sector. One of the goals outlined in the NDP (2011-2030) is to ensure development of a stable economy. Essentially, a stable economy is less reliant on the primary and secondary sectors than the tertiary sector, as an economy easily affected by trade and global economic spin-offs is unstable. Therefore, an economy dominated by the tertiary or services sector is more desirable as it reduces the risks associated with fluctuations in demand for commodities.

Over the period between 2003 and 2013, the mining and transport sectors were the only sectors that showed significant growth in employment, while the other sectors fluctuated between periods of growth and decline. The sector showing the largest loss of employment within the period was the agricultural sector. Agricultural activities are labour-intensive; therefore, a small decline in the size of that sector would generally lead to greater losses of jobs. Agriculture is historically one of the building blocks of the Lephalale economy. A decline in this sector would most definitely worsen the quality of lives and welfare of the affected households, which would force them to move to areas that offer greater potential to find employment.

It is envisaged that the development of the Limpopo Coal, Energy and Petrochemical cluster (Lephalale LED, 2008) in the Lephalale LM is expected to reverse the trends observed in the area in the past few years. With the expected development of the mining industry in the area and establishment of new associated industries, employment opportunities within both the mining and secondary industry are expected to grow. These developments are expected to maximise local economic spin-offs leading to the creation of new employment opportunities in the services sector, thus contributing to the sustainable development of the local economy.

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 areas. 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.

3.5.1 Basic service delivery

a) Access to water

It has been widely recognised by numerous local, district and regional government policies and frameworks that the limited water supply within the Lephalale LM has and is currently hindering development (Waterberg IDP, 2011/2012). **Water** within the municipality and for the Lephalale town, and for all industrial projects within the area and agriculture activities is currently received from the Mokolo Dam. The supply and maintenance of the dam is done by the Grootegeluk Coal Mine.

In terms of access to piped water, 67.3% of the households in the municipality have access to piped water either inside the dwelling or in the yard. The picture improves in Lephalale and Marapong, where 98.9% and 78.6% of the households have access to piped water inside their dwellings or yard, respectively. According to the Lephalale LM IDP, water service backlog is estimated at 3 280 units.

The Lephalale LM has identified the future water capacity of the area as a concern. Full capacity has almost been reached allowing for only limited spare yields for the anticipated swell in development. Future water demands cannot be supplied by the Mokolo Dam water management area; however, water transfer schemes such as the Mokolo-Crocodile River Water Augmentation Project have been planned to supplement local supply and provide for the anticipated development in the area (Lephalale LM IDP, 2013). However, if current development trends continue and water supply capacity is not increased, there will be a shortage of water in future affecting the lives of both people living and working in the area.

b) Sanitation

With regard to **sanitation**, 46.3% of the households have access to a flush toilet, while 46.8% of the households use pit latrines. Approximately 5.3% of families have no access to toilet facilities and 0.6% are still using the bucket system. According to the Lephalale LM IDP, sanitation backlog is estimated at 14 250 units mostly in the farms and rural village.

c) Access to electricity

Despite Lephalale being declared the Limpopo Coal and Energy Petrochemical Cluster, an **electrical supply** deficit for the study areas is present. This is partially related to the challenges and costs associated with establishment of electricity transmission and distribution infrastructure in low population density areas that are dominant in Lephalale.

Currently, Eskom supplies all electricity to rural areas within the municipality. In 2011, 85% of the households in the Lephalale LM had access to electricity for lighting.

d) Access to housing

Due to increased industrial development and population growth, there is an increased demand for **housing** in the area. According to municipal officials, the demand for housing since the start of construction of the Medupi Power Station has increased dramatically. However, officials have noted that there has been an oversupply of upper income housing and a deficit in the supply of lower income and affordable housing. Proposed developments such as Thabametsi coal mine and Thabametsi Power Station, as well as other potential developments such as the Sekoko mine and the Energy, Coal and Petrochemical facilities in the area will increase the demand for low-cost and affordable accommodation in the area. Due to the aggregated effects on the local accommodation industry, realtors have indicated that they anticipate the market for low-medium cost buy-to-rent properties to increase in the future.

Recent statistics suggest that approximately 82.3% of the households in the Lephalale LM reside in formal housing units in the form of a house or other brick structures on a separate stand or yard. There is currently a housing backlog of 15 153 units in the Lephalale LM. The backlog of housing and the increased population because of a migrant influx puts pressure on service delivery, particularly with the growth of informal settlements, which are found adjacent to nodes – most of these being mining developments.

e) Access to refuse removal

Only 41% of the households in the Lephalale LM have access to refuse removal services at least once a week, while 43% depend mainly on backyard dumping sites. The provision of the service is limited in rural areas. According to the LM's IDP, the municipality is still faced with the challenge of illegal waste dumping in Marapong, especially next to illegal settlement areas and parts of Onverwacht as well rural areas.

3.5.2 Status of infrastructure

a) Road infrastructure and public transport

Vehicle ownership in the area is limited; thus, the majority of people walk or use public transport. Public transport in the form of buses and taxis is available, yet they do not meet the requirements of the current working population. There are twelve taxi routes in Lephalale serviced by five taxi associations. Of the five, only three provide a local service, while the other two offer long-distance travel. The fleet consists of 566 vehicles. The bus service provides the Lephalale Municipality with a fleet of 155 vehicles at three terminals, one of which is informal.

Roads in the Municipality are adequately connected with district, provincial, and national roads. However, most road systems in the area are in disrepair and eroded, being insufficient to handle the increased traffic that was created by the new developments in the area. This especially relates to the R33, which runs through the Lephalale town. It is the busiest route in the District, and could be eroded as a result. However, due to the

recent upgrading of the road, it should be in good enough condition to support the transportation of construction equipment etc.

Overall, the majority of roads used by public transport services are gravel and below standard, requiring upgrading, improved storm water management, lighting, parking and general road infrastructure (Waterberg IDP, 2011/2012). The continuous construction activities in the area put extreme pressure on road infrastructure and contribute to dilapidation of road surfaces, with the LM being unable to maintain them in time.

There are no passenger trains available in Lephalale. However, major towns in the district (i.e. Thabazimbi, Bela-Bela, Modimolle, Mokopane and Lephalale) have airfields that accommodate light aircraft (Waterberg EMF, 2010).

b) Social infrastructure

Access to **social infrastructure** is indicative of a community's development. Social infrastructure inclusive of educational, social and health facilities, police stations, and recreational and sports facilities are determining factors with regard to a community's welfare and ability to develop sustainably. The existence of a platform for dialogue between communities and local government is equally indicative of a community's social development.

As far as **educational facilities** are concerned, there are 75 primary schools, five combined schools, 22 secondary schools, and one FET college in the Lephalale LM (Waterberg IDP, 2015/2016). According to the Lephalale LM IDP, although the facility template depicts a ratio of 1:26 in terms of classroom allocation (26 869 learners with 1 146 classrooms), the reality is that there is an influx of pupils into urban areas and this scenario changes significantly when head count is done. The situation in Marapong primary and secondary schools portrays a record of 60 students to a classroom. Some of the education-related challenges within the municipality include (Lephalale LM IDP, 2014/15):

» High level of illiteracy, which makes it difficult for local communities to enter skilled and semi-skilled employment markets.
» Most of the secondary schools in the rural areas do not have enough teachers to offer maths and science subjects, which is a requirement for entry into engineering career.
» Lack of technical high schools limits career path for students at an early stage.

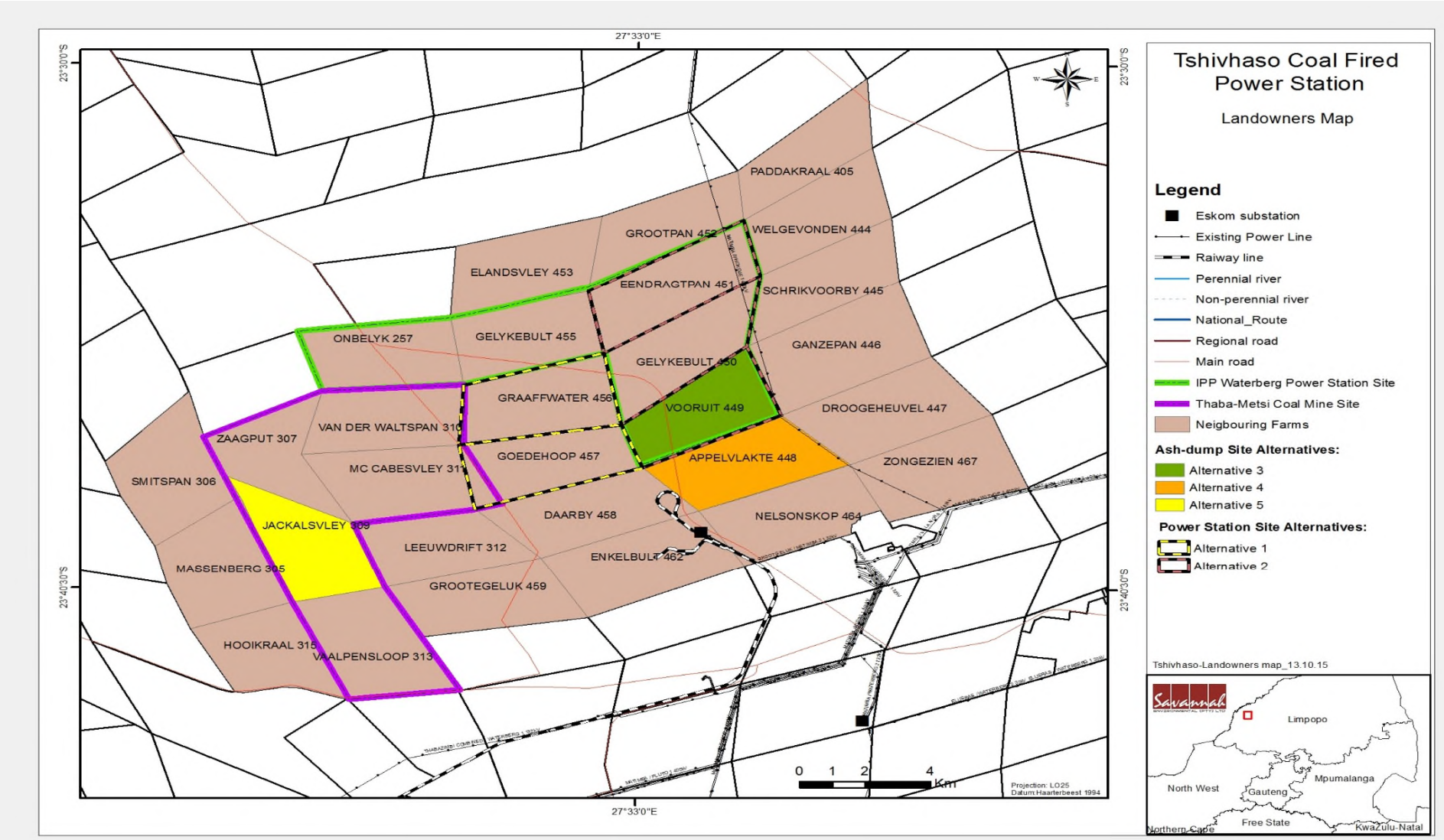
Health care and social welfare within the municipality is provided for by three hospitals, seven clinics, and three mobile clinics (Lephalale LM IDP, 2014/2015). There is no indication of community health centres and day care centres offering care to disabled community members. Six police stations (24% of the District) serve the municipality.

The **sports and recreational facilities** that are available to the community consist of only two enclosed soccer fields. Mogol sport centre and Marapong stadium are the two facilities, which are available to the community in the urban area. There are public parks with children's play equipment in the urban areas. Some of these parks are maintained although the standard in Marapong is lower as compared to the one in Onverwacht and the main town. There are only two parks and the third is nearing completion in rural villages, where a big part of the population resides. There are two enclosed sports fields

at Ga-Monyeki village and Thabo-Mbeki Township, which cater for sporting activities for the community in rural areas. The district IDP cites that these facilities were erected some years ago and their standard has dropped since then (Waterberg IDP, 2015/2016).

3.6 Zone of influence

The following map illustrates the farm portions that may either directly or indirectly be affected by the proposed project and that comprise the immediate zone of influence.



Map 3-2: Map of farm portions within the immediate zone of influence

Map 3-2 shows the options for the power station, ash dump and transmission line. It was decided that power station 1, ash dump 2, and transmission line 2 would be subject to the EIA for implementation. Table 3-3 shows the directly affected portions for the relevant developments.

Table 3-3: Directly affected farm portions for various alternatives

Farm portion	Land use	Power station (Graafwater)	Ash dump (Appelvlakte)	Transmission line (Matimba)
Gelykebult 450	Commercial farming			
Eendragtpan 451	Commercial farming			
Graafwater 456	Commercial farming			
Goedehoop 457	Mining and farming			
Voorhuit 449	Commercial farming			
Jackalsvley 309	Commercial farming			
Appelvlakte 448	Mining and farming			
Mc Cabesvley 311	Commercial farming			
Nelsonskop 464	Mining and industry			

Note: Alt 1 for power lines: Matimba-Medupi loop in; Alt 2 for power lines: Matimba-Witkop loop in

The predominant land use in the directly affected areas of the proposed development is commercial farming and mining. Areas that are indirectly affected by the proposed project are displayed in the following table.

Table 3-4: Indirectly affected land portions

Farm portion	Land use	Power station (Graafwater)	Ash dump (Appelvlakte)	Transmission line (Matimba)
Hooikraal 315	Mining			
Vaalpensloop 313	Mining and industry			
Grootgeluk 459	Mining and industry			
Enkelbult 462	Mining and industry			
Nelsonskop 464	Mining and industry			
Zongezien 467	Organs of state			
Massenberg 305	Agriculture and farming			
Leeuwdrift 312	Mining and industry			
Daarby 458	Mining and industry			
Droogheuvel 447	Agriculture and farming			
Smitspan 306	Mining			
Zaagput 307	Mining and industry			
Ganzepan 446	Game farming			
Van der waltspan 310	Mining and industry			
Shrikvoorby 445	Mining and industry			
Onbelyk 257	Mining and industry			
Gelykebult 455	Mining and industry			

It is clear from the above information that the proposed project is to be located in the area that is already characterised by mining and industrial land uses such as existing and proposed power stations. The fact that the area already has coal mining activity means that the power station will have a secure source of coal. More specifically:

» The site for the proposed power station is situated to the east from the farm where Thabametsi Coal-Fired Power Station is to be located and to the north of the existing Grootegeluk mine.
» ash dump 2 is located adjacent adjacent to the power station site
» The transmission lines (connection to Matimba-Witkop line) will follow the route of the already existing power lines.

Table 3-5 reports on any sensitive issues raised by the landowners of affected or indirectly affected areas within the zone of influence.

Table 3-5: Land owner concerns and comments

Farm portion	Farm Owner	Comment
Enkelbult 462	Exxaro	Exxaro (who owns all directly affected farm portions) did not express any concerns or issues with the development. Information regarding the land use and type of activity on the affected portions was provided in order to assess the impact that the proposed development could have on each portion.
Daarby 458		
Grootgeluk 459		
Leeuwdrift 312		
Appelvlakte 448		
Goedehoop 457		
Van der Waltspan 310		
Vaalpensloop 313		
Zaagput 307		
Jackalsvley 309		
Mc Cabesvley 311		
Graafwater 456		
Nelsonskop 464		
Vooruit 449		
Eendragtpan 451		
Gelykebult 450		
Gelykebult 455		
Paddakraal 405		
Onbelyk 257		
Grootpan 452	Anglo American	The human intervention and clearing of natural habitat for unnatural constructions will negatively impact the attractiveness of lodges in the surrounding area. Furthermore, the construction of the power station will reduce the potential for gas exploration and mining on affected land for which Anglo has prospecting rights.
Welgevonden 444		
Elandsvley 453		
Schrikvoorby 445		
Nooitgedacht 403		
Smitspan 306	Sekoko	Did not participate (no comment)
Hooikraal 315		
Ganzepan 446	Private	Did not participate (no comment)
Massenberg 305		
Zongezien 467	Eskom	Eskom opposes any development which may negatively interfere with Medupi such as activities causing air pollution up wind from the power station

The majority of directly and indirectly affected land is owned by Exxaro, who will be supplying coal to the power station. There are no comments/issues with the project from their side regarding the impact on any of the aforementioned land. The major concern raised by the interviewed parties relates to the loss of land, over which Anglo America holds a gas prospecting permit. If the project is developed on these portions of land, it may sterilise coal-bed methane resources that are found in the ground. Discussions between the developer and Anglo are ongoing regarding this constraint.

In addition, the Lephalale area where the proposed project is to be located is also characterised by an established and growing eco-tourism industry. The following map illustrates commercial game farming activities that were noted in the area during a 2012 survey. It clearly illustrates that the area where the proposed project is to be located is endowed with private commercial game reserves. A big portion of the game farms in the area are owned by Exxaro, Anglo, or Sasol (Urban-Econ, 2012). The majority of these farms form part of the Manketti Reserve owned by Exxaro (Urban-Econ, 2012). Importantly, revenue by these farms is earned from international tourists who are highly susceptible to changes in the sense of place, aesthetics, and general "wild Africa" experience that they seek (Urban-Econ, 2012).

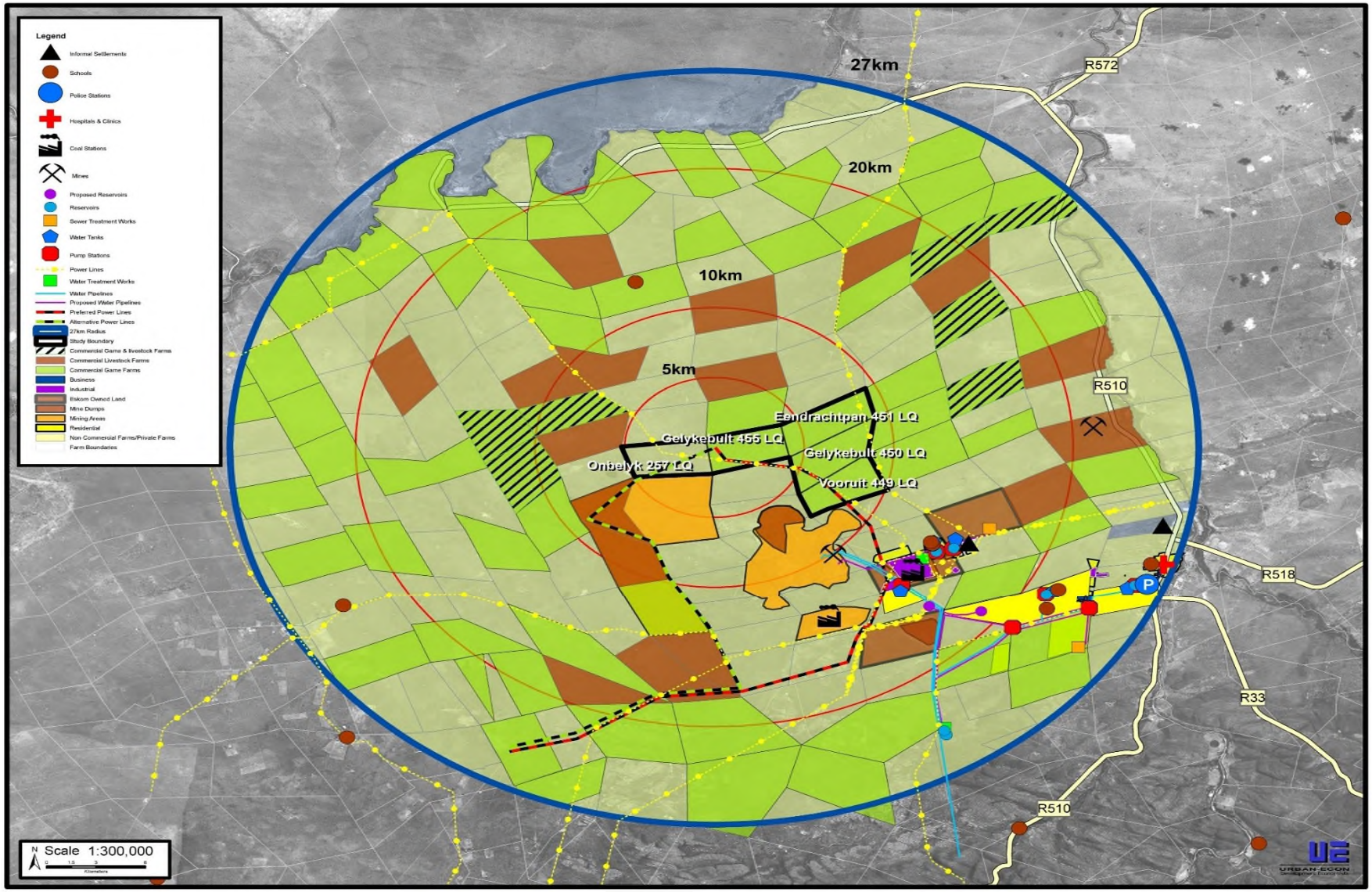


Table 3-6: Study area and land-uses

3.7 Existing and planned developments

The Medupi power station is currently being constructed in Lephalale. It is expected that construction on the proposed development will commence shortly after the construction on Medupi ends. Socio-economic impacts of the Medupi power station are expected to extend or accumulate into the impacts of the proposed development. In addition, the Tshivhaso power station will likely be developed in close proximity to the proposed Thabametsi power station (authorised project) and Thaba-Metsi coal mine (authorised new coal mine).

4 IMPACT ANALYSIS

4.1 Impact on natural capital

4.1.1 Impact on mineral resources

The power plant, due to the nature of the footprint created by the facility and its infrastructure, will reduce or remove the availability of the natural resources beneath the surface of the land. The immediate area surrounding the proposed development, as well as the greater Limpopo area, is rich in mineral resources – particularly coal and coalbed methane. The construction of a power plant on the surface of the land could prevent these minerals from being explored on the same properties in the future. The impact is long term and will start with construction of the power station until its eventual decommissioning.

During construction and operations, i.e. once the power station is developed, the minerals beneath the ground cannot be extracted for economic use. Engagement with Anglo American (March 2016) revealed that this impact cannot be mitigated because it is not possible to drill horizontally in the affected areas. As such, vertical drilling is required, meaning that there cannot be any developments on the land if gas is to be extracted from beneath the surface. However, there is not permanent loss of resources since the minerals can be extracted after decommissioning of the plant.

Having said the above, the impact on sterilisation of mineral reserves is rated as improbable because of the uncertainty regarding the volume and economic value of reserves located on the affected sites. It should be noted, that initial coal bed methane projects planned to be undertaken by Anglo were located north of the area where the proposed power station is located, i.e. on Farm Nooitgedacht 403.

Nature: **Construction phase: The power plant will reduce or remove the availability of energy resources beneath the surface of the land during construction**		
	Without mitigation	**With mitigation**
Extent	(Local) 1	(Local) 1
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(High) 8	(High) 8
Probability	(Probable) 3	(Improbable) 2
Significance	**(Medium) 33**	**(Low) 22**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Mitigation: » The impact cannot be mitigated because it will not be possible to extract minerals beneath the development during the time of construction » The developer should engage with Anglo American to discuss and align the future development plans		

Nature: **Operational phase: The power plant will reduce or remove the availability of energy resources beneath the surface of the land during operation**		
	Without mitigation	**With mitigation**
Extent	(Local) 1	(Local) 1
Duration	(Long-term) 4	(Long-term) 4
Magnitude	(High) 8	(High) 8
Probability	(Probable) 3	(Improbable) 2
Significance	**(Medium) 39**	**(Low) 26**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Mitigation: » The impact cannot be mitigated because it will not be possible to extract minerals beneath the development during the time of construction » The developer should engage with Anglo American to discuss and align the future development plans		

4.1.2 Impact on water supply

The large quantities of water required to construct and operate a coal-fired power station will have an impact on the water supply in Lephalale and the broader Waterberg Municipality. According to the Waterberg IDP (2011/2012) water supply is a major challenge for the municipality, with water service backlog estimated at 3 280 units (Lephalale LM IDP). The proposed development will put extra stress on an already constrained water supply system. Although the Waterberg Municipality has systems in place to increase the supply of water to the area in the future, the proposed development will impact on water supply regardless – but will be particularly significant if water supply in the area does not improve. If there is not supplementation from MCWAP, then the project cannot proceed. Moreover, the percentage of households within the municipality that rely on boreholes, wells, rivers, and springs as a water source equates to about to 22.6% (Statistics South Africa, 2015). If these sources of water are polluted as a result of the construction and/or operation of the power plant, it will have a severe impact on the communities that rely on this water. Strict mitigation is therefore required to minimise this risk.

The impact in terms of water supply is long term in nature as the power station will require water to operate throughout its lifespan. After decommissioning, the power station will no longer require water and as such, the impact is reversible in the long-term. The impacts can be mitigated through utilisation of water from the MCWAP and by ensuring that ground water is not polluted during construction or operation phase through the implementation of appropriate mitigation and quality control measures. If measures are taken to minimise the impact on water supply, then the significance of the impact decreases.

Nature:
Construction phase: The construction will impact on the demand for water and the quality of ground water.

	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(High) 8	(Moderate) 6
Probability	(Definite) 5	(Highly Probable) 4
Significance	**(High) 65**	**(Medium) 44**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» All effort must be made to ensure that the ground water is not contaminated because many households use ground water as a primary source of water.

» Water must be provided by the MCWAP system to absorb the additional demand. The municipality must also be clearly informed of the potential impact on demand for water so that there is sufficient time to plan for and mitigate this impact.

Nature:
Operational phase: The development will impact on the demand for water and the quality of ground water over the course of operation

	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3
Duration	(Short-term) 4	(Short-term) 4
Magnitude	(High) 8	(Moderate) 6
Probability	(Definite) 5	(Highly Probable) 4
Significance	**(High) 75**	**(Medium) 52**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» All effort must be made to ensure that the ground water is not contaminated because many households use ground water as a primary source of water.

» Water must be provided by the MCWAP system to absorb the additional demand. The municipality must also be clearly informed of the potential impact on demand for water so that there is sufficient time to plan for and mitigate this impact.

4.1.3 Loss of commercial farming activity

All directly affected portions for the proposed development currently have some form of farming on site. This is predominantly in the form of game farming and breeding. The development will sterilise the land on-site meaning that any farming activity currently present will have to cease. In the case of the game farming and breeding, it is possible to relocate the animals, which will minimise the negative impact; however, it is still impossible to engage in other agricultural practices on the farm until decommissioning of the plant. It is expected that this impact will occur during construction and continue throughout operation.

Nature: **Construction phase: Loss of commercial farming activity during construction**		
	Without mitigation	**With mitigation**
Extent	(Local) 1	(Local) 1
Duration	(Long-term) 2	(Long-term) 2
Magnitude	(Minor) 2	(Small) 1
Probability	(Definite) 5	(Highly Probable) 4
Significance	**(Low) 25**	**(Low) 16**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Relocating the animals to alternative land can mitigate against the overall economic loss		

Nature: **Operational phase: Loss of commercial farming activity throughout operation**		
	Without mitigation	**With mitigation**
Extent	(Local) 1	(Local) 1
Duration	(Long-term) 4	(Long-term) 4
Magnitude	(Minor) 2	(Small) 1
Probability	(Definite) 5	(Highly Probable) 4
Significance	**(Medium) 35**	**(Low) 24**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Relocating the animals to alternative land can mitigate against the overall economic loss

4.2 Impact on human capital

4.2.1 Impact on employment

The development of the Tshivhaso power station will positively impact on the community by creating a number of temporary and permanent job opportunities. It is estimated that up to 3 500 temporary jobs will be created on site during the construction phase and approximately 200 jobs during the operational phase. Considering the requirements for IPP projects, the following can be expected:

» At least 55% of the construction jobs will be filled by South African citizens, of which about a third will need to come from the local communities. Therefore, it can be deduced that potentially 1 925 employment opportunities will be created for South African citizens during construction and 630 of these will be made available for local communities.

» During operations, 85% of all permanent positions will need to be filled by South African citizens and 20% will need to be filled by those coming from the local community. This suggests that up to 40 permanent employment positions will be created for the local labour.

The development of other power and mining-related activity in Lephalale, specifically the Medupi power station, means that many workers in the area are dependent on the mining and utility sector's jobs as a source of income. The Tshivhaso power station will assist with providing cumulative job opportunities once the Medupi power station and other constructions are complete.

As mentioned in the NGPF, sustainable development through job creation is a key national development goal. This development achieves that goal by creating temporary jobs during the period of construction and long term jobs during operation. These jobs are not permanent because the operational jobs will cease upon decommissioning of the project - but operational jobs are long-term employment opportunities as opposed to the construction jobs which are short-term.

As there is currently commercial farming activity occurring on the directly affected farm portions, the jobs associated with these activities will be lost as a result of the development unless these jobs are moved to another property where the activity is required. While it is indicated that there is some mining activity planned for two of the directly affected portions, the predominant current use is game farming. According to the land owners, 18 people are employed on the directly affected portions, meaning that these employees will lose their jobs unless they are relocated to resume similar work on other portions. Overall, the potential loss of employment is negligible when compared with the potential gains from constructing and operating a coal-fired power station on the land.

In order to maximise the potential benefit from the impact, it is suggested that every effort is made to employ locally, where feasible.

Nature:
Construction phase; The construction of the Tshivhaso power station will positively impact on the community by creating a number of job opportunities (albeit temporary)

	Without enhancement	**With enhancement**
Extent	(National) 4	(National) 4
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(Moderate) 6	(Moderate) 8
Probability	(Definite) 5	(Definite) 5
Significance	**(Medium) 60**	**(High) 70**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

Mitigation:

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

Nature:
Operational phase: The operation of the Tshivhaso power station will positively impact on the community by creating a number of sustainable job opportunities.

	Without enhancement	**With enhancement**
Extent	(National) 4	(National) 4
Duration	(Long-term) 4	(Long-term) 4
Magnitude	(Low) 4	(Moderate) 6
Probability	(definite) 5	(definite) 5
Significance	**(Medium) 60**	**(High) 70**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

Mitigation:

» The operator of the power station should be encouraged to procure materials, goods and services required for the operation of the facility from local suppliers to increase the positive impact in the local economy as far as possible

» Where possible, local labour should be considered for employment to increase the positive impact on the local economy

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

4.2.2 Impact on skills and knowledge

During this period, construction and operation employees will gain experience, knowledge and skills. The Lephalale and Waterberg Municipality areas have a large supply of low-skilled labour meaning that the power station is well suited to take advantage of this supply and assist in developing the skills of the employed individuals. Some of the currently employed individuals in the area may assume work at the proposed development after working on constructing the Medupi power station, which will extend their opportunity to become experienced in the industry. The impact is long term and irreversible as skills and knowledge are permanent impacts on individuals.

Jobs that require a high level of skill may require employees who do not currently reside within the local municipality. As such, some of the long-term employment opportunities will be taken up by skilled individuals from outside of the area.

The Lephalale IDP (2014/2015) states that Lephalale is considered as a Provincial Growth Point and a potential energy hub. The proposed development is therefore well suited to increase the skills of the population in line with the developmental direction of the area in order to sustain this development.

In order to maximise the positive impact, it is suggested that Cennergi provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.

Nature:
Construction phase: during the construction period employees will gain experience, knowledge and skills.

	Without enhancement	**With enhancement**
Extent	(Regional) 3	(Regional) 3
Duration	(Permanent) 5	(Permanent) 5
Magnitude	(Low) 4	(Low) 5
Probability	(Definite) 5	(definite) 5
Significance	**(Medium) 60**	**(High) 65**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

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

» Facilitate the transfer of knowledge between experienced (particularly international) employees and the local staff

» Perform a skills audit to determine the potential skills that could be sourced in the area

Nature:
Operational phase: During the operation period employees will gain experience, knowledge and skills.

	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 (enhance)

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.

» Facilitate the transfer of knowledge between experienced (particularly international) employees and the local staff

» Perform a skills audit to determine the potential skills that could be sourced in the area

» Where possible train and empower local communities for employment in the operations of the power plant

4.3 Impact on social capital

4.3.1 Change in the demographics of the area due to potential influx of workers and job seekers

Recent migration trends in the Lephalale LM suggest that workers are migrating into the municipality in response to the increased demand for construction workers. A change of demographics can bring about social ills. If jobs are taken up by immigrants then local communities might become upset and resort to violence. Increase in crime and social conflict incidents due to the influx of construction workers and job seekers into the area, property damages, theft and losses of assets on the nearby farms, including poaching, are all potential negative impacts associated with the change in demographic make-up of the area.

The proposed development will sustain this trend by further increasing the demand for workers to construct a power station. However, the demographics of the area have already

significantly changed as a result of the other developments in the area to such a degree that the proposed development is not expected to have a significant impact, but rather extend the impact created by other projects. As mentioned above, many of the construction jobs created by the power station will be taken up by people previously working on Medupi and other projects. As such, fewer of the jobs will be available to individuals migrating into the area in search of work. The impact on the demographics of the area is a cumulative short-term impact of low significance and will be mitigated by prioritising local employment.

Nature:
construction phase: The proposed development will impact on the demographics of the area as a result of in-migration in response to job opportunities

	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(Low) 3	(Low) 3
Probability	(Highly Probable) 4	(Improbable) 2
Significance	**(Medium) 32**	**(Low) 16**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» The impact can be somewhat mitigated by employing individuals who were working on previous projects in the area so as to decrease the reliance on employees who in-migrate in search of work
» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities and limiting in-migration.

4.3.2 Improved standard of living for households

Employed individuals will increase the income of their respective households and therefore improve their standards of living. During construction and operational phases, the power station will employ local as well as external individuals. This employment will bring income into the households, which will increase the standard of living of these households and also increase the amount of money in the area stimulating further economic development. Individuals who *retain* employment through the new power station rather than gaining new employment will sustain the increased standard of living provided to their household and continue to generate savings as a result. While the construction benefits associated with this impact are short-term, the operational impacts are long-term. It is envisaged that many employment opportunities in high-skilled positions will be taken up by employees who are not from Lephalale LM; however, some of them will – and these individuals will increase the standard of living of their household for longer periods of time.

This impact is maximised by, where feasible, employing locally and ensuring that individuals who were working on other developments such as the Medupi power station,

where they would have obtained necessary skills, are employed at the Tshivhaso power station.

The decommissioning phase will also increase the standard of living of households due to the income gained during this period. The procurement of services and goods required for decommissioning and spending of the income earned by people directly or indirectly benefiting from the project will contribute to the creation of multiple jobs. The impact will be relatively short-term, and not as significant as during the construction phase. Operational jobs will be lost during the decommissioning phase, highlighting the temporary nature of the jobs created.

Nature: **construction phase: Employed individuals will increase the income of their respective households and therefore improve their standard of living**		
	Without enhancement	**With enhancement**
Extent	(Limited) 2	(Limited) 2
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(High) 8	(High) 8
Probability	(Highly Probable) 4	(Definite) 5
Significance	**(Medium) 48**	**(Medium) 60**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)
Mitigation: » Employing locally will increase benefit to local households and the local area.		

Nature: **Operational phase: Employed individuals will increase the income of their respective households and therefore improve their standard of living**		
	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3
Duration	(Long-term) 4	(long-term) 4
Magnitude	(Low) 2	(Low) 2
Probability	(Probable) 3	(Probable) 4
Significance	**(Low) 27**	**(Medium) 36**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

Mitigation:

» Employing locally will increase benefit to local households and the local area.

Nature:

Decommissioning phase: Temporary increase in standard of living during decommissioning

	Without mitigation	With mitigation
Extent	(Regional) 3	(Regional) 3
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(Low) 4	(Low) 4
Probability	(Highly Probable) 4	(Highly Probable) 4
Significance	**(Medium) 36**	**(Medium) 36**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

Mitigation:

» Employ locally as far as feasibly possible

4.4 Impact on cultural and spiritual capital

4.4.1 Impact on Tourism within the affected and indirectly affected areas.

The development of a coal-fired power station will add to the change of the spiritual and cultural feeling of the surrounding area, which will reduce its attractiveness as a tourist destination. This impact is envisaged to be relatively minor within the context of the area, because the surrounding area has already transformed significantly in recent years with new mining facilities and power stations being constructed. Tourists looking for an escape from modern cities and human intervention are less likely to want to visit areas with major industrial developments such as power stations, mines or other industrial developments close by as these developments take away from the experience. While the proposed development will add to this negative impact in the Lephalale LM, it is a long-term cumulative impact which will further extend the impact of other developments of a similar nature. It is therefore not envisaged to be a highly significant impact. However, it is still important to mitigate against these impacts through various measures. Adherence to mitigations measures proposed by the visual specialist and routine inspection of the lighting conditions.

Nature: **Construction phase: The construction of a coal-fired power station will change the spiritual and cultural feeling of the surrounding area which will reduce its attractiveness as a tourist destination**		
	Without mitigation	**With mitigation**
Extent	(Limited) 2	(Limited) 2
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(Minor) 4	(Minor) 2
Probability	(Highly Probable) 4	(Highly Probable) 4
Significance	**(Low) 32**	**(Low) 24**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	No
Mitigation: » Mitigation proposed by visual and noise experts should be implemented as far as feasibly possible		

4.5 Impact on physical capital

4.5.1 Increased demand for housing

The proposed facility will increase the demand for housing to accommodate the employees. The interviews conducted with estate agents (2016/06/30) revealed that there is a shortfall of low- to middle-income houses. As a result of the influx of people seeking work at the energy-related developments in the area, demand for low income housing has increased at a faster rate than the local area's capacity to supply. As such, there is an immediate need for more low- and middle-low income housing units. The construction phase of the proposed development is therefore deemed to have a negative impact on the physical capital of the area by placing extra strain on an already strained housing market. However, in the long-term, the increased demand for housing is positive for the economy. The increased demand for housing from operation is perceived to be positive as it reflects improvement in the local economy, but in the short-term the construction phase is perceived as negative because of issues of undersupply. This impact could be partially mitigated if houses currently utilised for construction at Medupi and other developments in the area become available.

Nature: **Construction phase: The proposed facility will increase the demand for housing to accommodate the employees**		
	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3

Duration	(Short-term) 2	(Short-term) 2
Magnitude	(Moderate) 7	(Low) 5
Probability	(Highly Probable) 4	(Highly Probable) 4
Significance	**(Medium) 48**	**(Medium) 40**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Informing the municipality of the proposed development's potential impact on demand for housing is necessary in ensuring that more housing is planned in areas that are accessible from the project site

» Hiring people who already reside within the area will decrease demand for new houses

» Utilising housing which comes available from the completion of other construction in the area would minimise the impact.

4.5.2 Added pressure on basic services and social and economic infrastructure

According to information supplied from municipal officials during interviews in 2016, the rapid development in the area as a result of Medupi and similar developments is creating difficulty in supplying basic services within the region. As already mentioned, the lack of low cost housing and water is a growing concern, which will increase if not addressed.

Large-scale projects such as power stations 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 degrade. According to Waterberg IDP (2011/2012) the state of the road infrastructure in Lephalale is poor. This is because of the stress placed on these roads from the transportation of materials to Medupi and other developments. Particularly, the R33 which runs through Lephalale is in need of a repair, as this road would be used by the proposed development. The impact on the road infrastructure in the Lephalale area will be short-term and will end when construction is complete. Upgrading of the roads could assist in mitigating these impacts.

The development will also place extra demand on social services. An already constrained health care system may face a challenge of needing to service a larger population as more people move into the area. While it is expected that many of the employment opportunities will be taken up by individuals currently working on construction projects in the Lephalale area, it may not be the case that all employees were already in the area as construction of the development may commence before Medupi is fully completed or when other coal-fired power stations (such as Thabametsi coal-fired power station) or other coal mines are being developed.

Nature:
Construction phase: Added pressure on basic services as a result of construction

	Without mitigation	**With mitigation**

Extent	(Regional) 3	(Regional) 3
Duration	(Short-term) 2	(Short-term) 2
Magnitude	(Moderate) 6	(Low) 5
Probability	(Highly Probable) 4	(Highly Probable) 4
Significance	**(Medium) 44**	**(Medium) 40**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Clearly inform the local municipality of the potential impact of the proposed project in order for the necessary preparations to take place

» Provide public transportation service for workers in order to reduce congestion on roads

» Partner with the 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 construction of the Thsivhaso Coal-Fired Power Station

Nature:

Operational phase: Added pressure on basic services during operation

	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3
Duration	(Long-term) 4	(Long-term) 4
Magnitude	(Moderate) 6	(Low) 4
Probability	(Highly Probable) 4	(Highly Probable) 4
Significance	**(Medium) 52**	**(Medium) 44**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Clearly inform the local municipality of the potential impact of the proposed project in order for the necessary preparations to take place.

» Maintenance of local roads so that vehicles can utilise them safely and without causing further damage

» Hiring locally in order to minimise the increase in demand for basic services

4.6 Impacts on financial capital

4.6.1 Impact on production

The capital and operational expenditure of the proposed development will impact on the production of the local economy. The economy of the Lephalale LM is valued at R6 161 million in current prices according to (Quantec, 2014), and contributes significantly to the Lephalale LM economy. The proposed development will increase the relative contribution of the Lephalale economy to broader Waterberg Municipality. The positive growth trends

in the area are related to the advance in development of the Limpopo Coal, Energy and Petrochemical Cluster – whereby Limpopo is envisaged to develop extensively through investment into the above sectors. The Tshivhaso power plant is aligned with this developmental path by contributing to the development of the Limpopo Province through the construction of a coal-fired power plant.

In terms of construction, the establishment of the power station will involve activities such as site and infrastructure development, civil works, building construction, and other business activities related to the construction of the proposed development. This will create demand for products which will stimulate industries within the region as supplies are sourced throughout the construction period. Considering the requirement stipulated by the Department of Energy, at least 40% of capital expenditure 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 increased.

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.

Upon the expiry of the Tshivhaso Coal-Fired Power Station Facility's lifespan, the facility would need to be decommissioned, demolished or upgraded. If the facility is decommissioned, the land will be rehabilitated in attempt to return it to the pre-project conditions. Spending on the disassembly of the components and rehabilitation of land will increase the demand for construction services and other industries, thus stimulating economic activity in the local area, albeit over a temporary period. As such, there is a positive impact on the local economy during the period of decommissioning. However, the significance of the impacts on the economic components during this phase will be lower than in the previous phases due to the following:

» Expenditure during the closure phase will be significantly lower than that during the previous phases, which means that it will generate lower positive impact; therefore, their magnitude will be lower than that observed during the construction and operational phases.
» The impacts will be of a short duration.

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

	Without enhancement	**With enhancement**
Extent	(National) 4	(National) 4
Duration	(Short-term) 2	(Short-term,) 2
Magnitude	(Moderate) 7	(High) 8

Probability	(Definite) 5	(definite) 5
Significance	**(High) 65**	**(High) 70**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes

Mitigation:

» Closer to the construction period, investigate whether the gap in the rental market will be created linked to the completion of the construction of the Medupi Power Station and when other industrial and mining developments in the area are expected to be launched

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

» 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

» Sub-contract to local construction companies where possible

» 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

Nature:
Closure phase: Positive impact on the local economy during the period of decommissioning from spending on the disassembly of the components and rehabilitation of land

	Without enhancement	**With enhancement**
Extent	(Regional) 3	(Regional) 3
Duration	(Short-term) 2	(Long-term) 2
Magnitude	(Low) 4	(Low) 4
Probability	(Definite) 5	(Definite) 5
Significance	**(Medium) 40**	**(Medium) 50**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

Mitigation:

» Developers should make effort to use local inputs where ever feasible in order to maximize the benefit to the local economy and therefore the local municipality.

4.7 Impacts on political and institutional capital

4.7.1 Increased municipal revenue from the proposed development

The proposed development will provide much needed increased revenue to the municipality throughout construction and operation. This will include both the tax-related revenue collected by national government (i.e. VAT, payroll, and income taxes) and tax- and rates-related revenue collected by the local government (i.e. property rates, services rates, etc.).

As mentioned above, the social infrastructure in the Waterberg DM and Lephalale LM is in need of upgrading. The increased revenue from the proposed development will assist the municipality in providing sufficient housing, water, health services, etc. This impact is long term as it will continue until decommissioning of the power station. The impact may be limited is most of the employees come from Medupi as they will already be paying taxes in the area. However, where new employees are required, particularly in operation of the plant, they will provide new and additional revenue to the municipality.

Nature:
Construction phase: The proposed development will provide much needed increased revenue to the municipality throughout construction

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

Mitigation:

» None required

Nature:
Operation phase: The proposed development will provide much needed increased revenue to the municipality throughout operation

	Without enhancement	**With enhancement**
Extent	(Regional) 3	(Regional) 3
Duration	(Long-term) 4	(Long-term) 4
Magnitude	(Moderate) 5	(Moderate) 7
Probability	(Definite) 5	(Definite) 5
Significance	**(Medium) 60**	**(High) 70**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No

Mitigation:

» The project developer should make effort to use local inputs where ever feasible in order to maximise the benefit to the local economy and therefore the local municipality.

4.7.2 Investment in the local communities and economic development projects as part of a Social Economic Development and Enterprise Development plan

As part of the requirements imposed by the Department of Energy with respect to Social Economic Development and Enterprise Development plan, a portion of turnover generated by the facility during operations is encouraged to be invested into the development of the local area (i.e. up to 0.15% of operating revenue). This will have a positive impact on the standard of living, access to services, and enterprise development in the surrounding communities and broader municipal area.

In order to maximise this benefit, it is recommended that the plan be developed in consultation with local authorities and existing strategy documents to identify community projects that could be invested in and would result in the greatest social benefits. With regard to ED initiatives, focus should be on developing plans to support and create sustainable, self-sufficient enterprises. It is important that these plans be reviewed annually and where possible updated.

Nature:
Operation phase: Investment in the local communities and economic development projects as part of a Social Economic Development and Enterprise Development plan

	Without mitigation	**With mitigation**
Extent	(Regional) 3	(Regional) 3
Duration	(Medium-term) 3	(Medium-term) 3
Magnitude	(Low) 4	(Moderate) 6
Probability	(Definite) 5	(Definite) 5
Significance	**(Medium) 50**	**(Medium) 60**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes (enhance)

Mitigation:

» In order to maximise this benefit, it is recommended that the SED and ED plans be developed in consultation with local authorities and existing strategy documents to identify community projects that would result in the greatest social benefits. With regard to ED initiatives, focus should be on developing plans to support and create sustainable, self-sufficient enterprises. It is important that these plans be reviewed annually and where possible updated.

4.8 Provision of electricity into the national grid

The power station will provide the important national service of providing electricity into the national grid. Given the context of South Africa's current electricity needs, this is an important development. The New Growth Path Framework (NGPF) states that the lack of access to energy is identified as a major concern for the growth of the economy, and increased access to energy would have a profound effect on achieving the goals of poverty and unemployment reduction. This proposed development therefore aligns with national developmental goals by assisting with meeting electricity generation targets in order to create sustainable socio-economic growth.

Nature:
Operation phase: The power station will provide the important national service of providing electricity into the national grid

	Without mitigation	**With mitigation**
Extent	(National) 4	(National) 4
Duration	(Long-term) 4	(Long-term) 4
Magnitude	(Low) 4	(Low) 4
Probability	(Definite) 5	(Definite) 5
Significance	**(Medium) 50**	**(Medium) 50**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No

Mitigation:

» No mitigation required

5. NEEDS AND DESIRABILITY FROM A LOCATIONAL PERSPECTIVE

The following table outlines the need and desirability of the proposed project from a locational perspective. It informs the justification of the project to be built in the proposed time and location from a socio-economic perspective.

Table 5-1: Need and desirability assessment

Aspect	Comment
Creation of residential and employment opportunities in close proximity to or integrated with each other	The proposed development will create vital employment opportunities, particularly for those who need new work upon the completion of Medupi power station and other large-scale construction projects in the area. Being in close proximity to the town of Lephalale, the employment opportunities combined with demand for housing will create positive economic development within the area. The cumulative impact of providing further employment opportunities upon the completion of other major projects is vital to the continued socio-economic development of the area.
Complimenting other uses in the area	The area where the power station is to be developed is already utilised for mining and utilities purposes. It is therefore an ideal area to locate the power station because it suits the economic characteristics and development path of the local area. It is also in close proximity to coal, which is the primary resource that will be used to generate power.
Alignment with planning for the area	The review of applicable key policy documents revealed that all spheres of government support the establishment of the proposed project at the envisaged location. No red flags could be identified that could raise a concern over the project's development from a policy perspective. Moreover, the development is aligned with policy objectives for the area, which suggest that Limpopo and more specifically Lephalale are development nodes for the mining and industry sectors.
Contribution to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current need	The proposed development will assist in bringing employment opportunities closer to communities who were previously disadvantaged. This assists in correcting spatial disadvantages by creating development in more rural areas of South Africa.
Generation of the highest socio-economic returns	The power station will make better economic use of the land because it will provide relatively higher socio-economic returns than the current land use. While it could withhold the mining of energy resources (gas) beneath the surface, these have not yet been proven as economically feasible to extract. As the project does not permanently

Aspect	Comment
	remove these resources, these reserves can still be explored in the future. It is therefore considered that the proposed project is an optimal use of the land from a socio-economic perspective for the time-period of the development.
Promotion or contribution to create a more integrated settlement	The project will create employment opportunities for the local communities, which may reduce the need for some of the people to look for these in other more remote locations. It will also increase the number of middle to high and high income individuals in the area due to the demand for high skilled labour. This will contribute towards diversifying the socio-economic characteristics of the town and addressing past legacies of spatial segregation.
Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area	The cultural sense of place in the Lephalale area is changing rapidly as the area industrialises. The conflict between tourism and industry is evident and the proposed development adds to the growing change in cultural sense of the area by further industrialising the region, which detracts from tourism. However, considering that the project is to be located in the area that is already surrounding by industrial activities, the impact on the sense of history and place by the project in question is considered to be marginal.
Encouragement of environmentally sustainable land development practices and processes	The power station is part of the coal IPP national programme and will assist in supplying baseload electricity to the region and the country while providing renewable energies the time required to develop. It therefore assists in the national and regional developmental goals of supplying sufficient electricity to meet demand.

The proposed development is well positioned to contribute towards national development goals of social economic growth by providing necessary electricity into the national grid and stimulating economy activity within the local area. The development will generate the high socio-economic returns on the land and will contribute towards the correction of historically distorted settlement patterns by changing the socio-economic characteristics of the area. While its contributes towards the cumulative decrease in the area's attraction as a tourist attraction, the changes are in line with national and regional development plans, as well as other developments which came before it.

6. CONCLUSION

The proposed development of the coal-fired power station and associated infrastructure is to be located outside the town of Lephalale, which forms part of the Lephalale LM in the Limpopo Province. Overall, it is clear that the proposed project has the opportunity to bring much needed investment into the area to revitalise the local economies and provide the local residents with jobs and sustainable income. The unemployment in the area is relatively high, and developments such as the one proposed would bring sustainable jobs for the locals, which could assist in relieving the issue of unemployment. Together with other projects planned for the area, it will also lead to the development of the supporting industries in the local economy and create an opportunity to revitalise the nearby towns and improve the standards of living and livelihoods of the local people.

Upon examination of potential socio-economic impacts, it was found that the positive impacts of job creation, economic stimulation, and social development outweigh negative impacts such as the potential stress on social delivery and water infrastructure, increase in demand for housing, potential sterilisation of energy reserves, and others.

Overall, based on the current developmental path of the Limpopo and Lephalale area, the proposed development is well suited for the location. The myriad of positive benefits associated with the construction and operation of the facility ensure that socio-economic benefit will accrue to the residents of the local municipality and although some negative impacts are identified – appropriate mitigation can assist in minimising these impacts.

6.1 Summary of construction impacts

Impact	Type	Before Mitigation	After mitigation
Impact on energy resources due to the sterilisation of land and minerals beneath the development	Negative	Medium - 33	Low - 22
Impact on water supply as a result of The large quantities of water required to construct a coal-fired power station	Negative	High - 65	Medium - 44
Loss of commercial farming activity due to the sterilisation of land on directly affected portions	Negative	Low - 25	Low - 16
The creation of temporary construction related jobs	Positive	Medium - 60	High - 70
Impact on skills and knowledge of employees during construction	Positive	Medium - 60	High - 65
The proposed development will impact on the demographics of the area as a result of in-migration in response to job opportunities	Negative	Medium - 32	Low - 16
Improved standard of living for households as a result of increased income and savings	Positive	Medium - 48	Medium - 60
Impact on tourism as a result of change in cultural and spiritual capital	Negative	Low - 32	Low - 24

Impact	Type	Before Mitigation	After mitigation
Increased demand for housing to accommodate the additional workers	Negative	Medium - 48	Medium - 40
Added pressure on basic services and infrastructure	Negative	Medium - 44	Medium - 40
Impact on production	Positive	High - 65	High - 70
Increased municipal revenue	Positive	Medium - 33	Medium - 33

6.2 Summary of operation impacts

Impact	Type	Before Mitigation	After mitigation
Impact on energy resources due to the sterilisation of land and minerals beneath the development	Negative	Medium - 39	Low - 26
Impact on water supply as a result of the large quantities of water required to operate a coal-fired power station	Negative	High - 75	Medium - 52
Loss of commercial farming activity due to the sterilisation of land on directly affected portions	Negative	Medium - 35	Low - 24
The creation of long-term operation related jobs	Positive	High - 60	High - 70
Impact on skills and knowledge of employees during operation	Positive	High - 70	High - 80
The proposed development will impact on the demographics of the area as a result of in-migration in response to job opportunities	Negative	Medium - 48	Low - 24
Improved standard of living for households as a result of increased income and savings	Positive	Medium - 27	Medium - 36
Added pressure on basic services and infrastructure	Negative	Medium - 52	Medium - 44
Impact on production	Positive	High - 70	High - 75
Increased municipal revenue	Positive	Medium - 60	High - 70
Investment in the local communities and economic development projects as part of a Social Economic Development and Enterprise Development plan	Positive	Medium - 50	Medium - 60
Increased provision of electricity to national grid	Positive	Medium - 50	Medium - 50

6.3 Summary of decommissioning impacts

Impact	Type	Before Mitigation	After mitigation
Temporary increase in production and GDP-R of the national and local economies	Positive	Medium - 40	Medium - 50
Temporary increase standards of living and employment	Positive	Medium - 36	Medium - 36

7. ENVIRONMENTAL MANAGEMENT PLAN

7.1 Construction phase

OBJECTIVE 1: Stimulate and enhance production impacts, employment impacts and benefits to households in the country and specifically the local economy during the construction phase

Project component/s	Construction of the Tshivhaso Coal-Fired Power Station and associated infrastructure
Potential Impact	High local economic benefits
Activity/risk sources	» Construction procurement practices » Developers investment plan
Mitigation target/objective	Increase the procurement of goods and services and create new employment opportunities within the national and local economy

Mitigation: Action/control	Responsibility	Timeframe
Increase the local procurement practices and employment of people from local communities as far as feasible to maximize the benefits to the local economies	**CENNERGI**	**Construction period**
The developer should engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and products from local suppliers where feasible	**CENNERGI**	**Construction period**
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	**CENNERGI**	**Construction period**
Employ labour-intensive methods in construction where feasible	**EPC contractor**	**Construction period**
Sub-contract to local construction companies where possible	**EPC contractor**	**Construction period**
Use local suppliers where feasible and arrange with the local Small and Medium Enterprises to provide transport, catering, and other services to the construction crew	**EPC contractor**	**Construction period**
Where possible, the local labour should be considered for employment to increase the positive impact on the local economy	**EPC contractor**	**Construction period**
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	**EPC contractor**	**Construction period**
Close to the construction period, investigate whether the gap in the rental market will be created linked to the completion of the construction of the Medupi Power Station and when other industrial and mining developments in the area are expected to be launched	**EPC contractor**	**Construction period**

Performance indicator	» Developer has engaged with local authorities and business organisations » Percentage of the expenditure spent on the project spent in the local communities versus the entire nation » Percentage of labour force employed from local community » Number of contracts signed between EPC contractor and the local construction companies and SME's to supply goods and services directly used in the construction and support of site activities
Monitoring	Checklists, quarterly reports, and post-construction final report

OBJECTIVE 2: Skills enhancement in the construction and manufacturing sectors in the country and in the local economy

Project component/s	Construction of the Tshivhaso Coal-Fired Power Station and localisation of the project's expenditure
Potential Impact	Moderate local expertise development
Activity/risk sources	» Construction procurement practice employed by the EPC contractor » Developer's investment plan » Willingness of foreign and local experts to share knowledge and expertise
Mitigation target/objective	Ensure knowledge transfer and skills development between the foreign and local experts involved in the development and local workforce involved in the project directly or indirectly

Mitigation: Action/control	**Responsibility**	**Timeframe**
Facilitate the transfer of knowledge between experienced (particularly international) employees and the local staff	**CENNERGI** **EPC contractor**	**Pre-construction & construction period**
Set up apprenticeship programmes to build onto existing or develop new skills of construction workers, especially those coming from the local communities	**CENNERGI** **EPC contractor**	**Pre-construction & construction period**
Perform a skills audit to determine the potential skills that could be sourced in the area	**CENNERGI** **EPC contractor**	**Pre-construction & construction period**

Performance indicator	» Man-hours spent by foreign and local experts on skills and knowledge transfer to unskilled workforce » Number of apprenticeships offered
Monitoring	Quarterly reports and post-construction final report

OBJECTIVE 3: Reduce the losses of revenue and production derived from the agricultural land as a result of the impact of the facility

Project component/s	Construction of the Tshivhaso Coal-Fired Power Station
Potential Impact	Decline in revenue and production associated with the sterilisation of land
Activity/risk sources	The Tshivhaso Coal-Fired Power Station site and associated infrastructure
Mitigation target/objective	Reduced revenue and production losses due to sterilisation of land affected by the footprint of the facility and associated infrastructure

Mitigation: Action/control	Responsibility	Timeframe
Explore the option of relocating the animals to alternative land	**CENNERGI & EPC contractor**	**Construction period**

Performance indicator	» Plausible solution for the land owners found
Monitoring	Post-construction report

OBJECTIVE 4: Reduce the possibility of the increase in crime and social conflicts in the area, and negate the impacts associated with property damages and losses of assets

Project component/s	Construction of Tshivhaso Coal-Fired Power Station and associated infrastructure
Potential Impact	Increase in crime and social conflict incidents due to the influx of construction workers and job seekers into the area; property damages, theft and losses of assets on the nearby farms including poaching
Activity/risk sources	» Construction of the IPP and associated infrastructure
Mitigation target/objective	Reduce the chances of crime increase and social conflicts in the area, as well as the incidence of property damages, theft, poaching and assets losses

Mitigation: Action/control	Responsibility	Timeframe
Anticipate the influx of workers	**CENNERGI & EPC contractor**	**Pre-construction and construction period**
The establishment of central recruitment offices in Lephalale and the enforcement of labour and recruitment legislation	**EPC contractor**	**Pre-construction and construction period**

Employ locals as far as feasibly possible	**EPC contractor**	**Construction period**
Provide transport for workers	**CENNERGI & EPC contractor**	**Construction period**
Where employment will be lost due to the effects of the IPP, try as far as feasibly possible to absorb retrenched labour from local activities before hiring new workers	**EPC contractor**	**Construction period**
Plan for the provision of affordable accommodation until the gap in the rental market is created and can be taped into	**CENNERGI, and government**	**Pre-construction & Construction period**
Clear communications of all positions available to minimise influx of workers	**CENNERGI, and government, EPC contractor**	**Pre-construction & Construction period**
Ensure that job seekers are not allowed to loiter around the gates or set up informal settlements in the vicinity of the site	**CENNERGI, and government, EPC contractor**	**Pre-construction & Construction period**
Reimburse any resident who can adequate prove that any loss, damage or theft was the result of employees associated with the construction of the IPP power plant	**CENNERGI**	**Construction period**

Performance indicator	» A recruitment office is set up prior the construction period » Percent of the workers employed in construction that come from local communities » Set up transportation services for the construction workers between the site and main towns of residence » Established area within the boundaries of the facility to provide services to the construction crew » Established gate and control system » Assignment of a dedicated person to deal with complaints of the affected land owners and resolve concerns including damages to property and losses of assets » Number of complaints regarding property damages and asset losses received from the affected and the percentage thereof that has been resolved » Agreement between the construction and property owners regarding access to properties, access routes, and compensation conditions if property is damaged or any assets lost that can be proven to result from the activity of the construction crew associated with the Thsivhaso Coal-Fired Power Station
Monitoring	Checklists and quarterly reports, as well as the post-construction report inclusive of other performance assessments

OBJECTIVE 5: Reduce the pressure on local social and economic infrastructure

Project component/s	Construction of the IPP power plant and associated infrastructure
Potential Impact	Dilapidation of local infrastructure, lack of deliverable capacity and decline in the quality of services offered
Activity/risk sources	» Movement of vehicles » Influx of migrant workers and job seekers » Effects of Tshivhaso Coal-Fired Power Station demand
Mitigation target/objective	Reduce the pressure on local social and economic infrastructure

Mitigation: Action/control	**Responsibility**	**Timeframe**
Upgrading of local roads to meet the required capacity and intensity of the vehicles related to the construction of the IPP	**CENNERGI, Government, & EPC contractor**	**Pre-construction & Construction period**
Provide public transport alternatives for workers so as to decrease the amount of vehicles on the road during peak hours	**CENNERGI, Government, & EPC contractor**	**Pre-construction & Construction period**
Partner with the 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 construction of the Thsivhaso Coal-Fired Power Station	**CENNERGI, Government, & EPC contractor**	**Pre-construction & Construction period**
Engage with local authorities and inform them of the development as well discuss with them the ability of the municipality to meet the demands for social and basic services created by the migrant construction workers	**CENNERGI, Government, & EPC contractor**	**Pre-construction & Construction period**

Performance indicator	» Adequate signage and traffic calming mechanisms along delineated construction routes » Established relationship with the local municipality and identification of areas of collaboration » Assistance provided to the local municipality with respect to the local infrastructure through the social responsibility programme » Upgraded local roads » Transportation provided to construction crews » Reduced incidents of accidents
Monitoring	Checklists and annual report inclusive of other performance assessments

7.2 Operation phase

OBJECTIVE 1: Maximise production, employment and local community benefits in the local economy

Project component/s	Operation and maintenance activities

Potential Impact	Loss of opportunities to stimulate production and employment of the local economy
Activity/risk sources	Labour and procurement practices employed during operations
Mitigation target/objective	Maximise the production, and local community employment benefits in the local economy

Mitigation: Action/control	Responsibility	Timeframe
The operator of the power station should be encouraged to procure materials, goods and services required for the operation of the facility from local suppliers to increase the positive impact in the local economy as far as possible	**CENNERGI**	**Operational period**
Where possible, the local labour should be considered for employment to increase the positive impact on the local economy	**CENNERGI**	**Operational period**
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	**CENNERGI**	**Operational period**

Performance indicator	» Number of contracts and percentage of contract values allocated to local SMEs and companies » Percentage of workers that were employed from local communities » A devised three-year social and economic development programme that takes into account local policies, priorities and needs » Consultation with local authorities and communities on the social and economic needs and priorities » Percentage of profits reinvested back into local communities » Number of successful SME's initiated by CSI programmes
Monitoring	Checklists and annual reports inclusive of other performance assessments

OBJECTIVE 2: Contribute to skills development in the area

Project component/s	Operation and maintenance activities
Potential Impact	Loss of opportunities for human capital development in maintaining and operating the power plant
Activity/risk sources	Operations and maintenance
Mitigation target/objective	Contribute to development of skills required to operate and maintain the Tshivhaso Coal-Fired Power Station

Mitigation: Action/control	Responsibility	Timeframe
Where possible train and empower local communities for employment in the operations of the power plant	**CENNERGI**	**Pre-operational & operational period**

Performance indicator	Number of people attending vocational training on an annual basis
Monitoring	Annual reports inclusive of other performance assessments

7.3 Decommissioning phase

OBJECTIVE 1: Stimulate and enhance production impacts, employment impacts and benefits to households in the country and specifically the local economy during the decommissioning phase

Project component/s	Decommissioning of the Tshivhaso Coal-Fired Power Station and associated infrastructure
Potential Impact	High local economic benefits
Activity/risk sources	» Procurement practices » Developers investment plan » Labour disputes
Mitigation target/objective	Increase the procurement of goods and services and create new employment opportunities within the national and local economy

Mitigation: Action/control	**Responsibility**	**Timeframe**
Increase the local procurement practices and employment of people from local communities as far as feasible to maximize the benefits to the local economies	**CENNERGI**	**Decommissioning period**
Employ labour-intensive methods in construction where feasible	**EPC contractor**	**Construction period**
Where possible, the local labour should be considered for employment to increase the positive impact on the local economy	**EPC contractor**	**Construction period**

Performance indicator	» Plant operator/owner has engaged with local authorities and business organisations » Percentage of the expenditure on the project spent in the local communities versus the entire nation » Percentage of labour force employed from local community » Number of contracts signed between EPC contractor and the local companies and SME's to supply goods and services directly used in the deconstruction and support of site activities
Monitoring	Checklists, quarterly reports, and post-construction final report

REFERENCES

Department of Energy . (2011). *Integrated Resource Plan 2010 - 2030.*

Department of Energy. (2013). *Draft 2012 Integrated Energy Plan.*

Department of Government Communications and Information System. (2014). *South Africa Yearbook 2013/14.*

Lephalale LM. (2013). Lephalale CBD Development Plan.

Lephalale LM. (2014). *Lephlale LM IDP 2014/15.*

Quantec. (2015). *Census 2011.*

Savannah Environmental. (2015). *Project location.*

Statistics South Africa. (2015). *Census 2011.*

Stats SA. (2015). *Census 2011.*

Urban-Econ. (2012). EIA for the proposed IPP Thabametsi Coal-Powered Power station near Lephalale, Limpopo: Land use study.