



**BASIC ASSESSMENT FOR THE TLISITSENG
2 132KV SUBSTATION AND 132KV
POWERLINE NEAR LICHTENBURG, NORTH
WEST PROVINCE
SOCIO-ECONOMIC ASSESSMENT
FINAL REPORT**

MAY 2016



Celebrate Development Diversity

P.O. Box 13554, HATFIELD 0028

Tel: (012) 342-8686

Fax: (012) 342 8688

E-mail: pta@urban-econ.com

Celebrate **Development Diversity**.



Version:

Final version 3

3 May 2017

Project leader:

Elena Broughton

Cell: 082 463 2325

Email: elena@urban-econ.com

Report writer:

Mariette Steynberg

Cell: 079 029 5586

Email: mariette@urban-econ.com

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	5
1 INTRODUCTION	6
1.1 Brief Description of the Project	6
1.2 Scope and Purpose of the Study	7
1.3 Methodology	7
1.4 Data gathering and consultation process	8
1.5 Assumptions, limitations and gaps in knowledge	10
2 POLICY REVIEW	12
3 BASELINE INFORMATION	20
3.1 Study area's composition and locational factors	20
3.2 Demographic Profile	22
3.3 Economy	23
3.4 Labour Force and Employment Structure	25
3.5 Income.....	26
3.6 Access to services and state of local built environment	27
3.6.1 Access to Housing and Basic Services.....	27
3.6.2 Social and Recreational Infrastructure	30
3.7 Site-related information.....	32
3.7.1 Land-use profile.....	32
3.7.2 Access to infrastructure	34
4 IMPACT ANALYSIS.....	36
4.1 Impact on employment creation.....	36
4.2 Impact on economic production	36
4.3 Impact on service infrastructure.....	37
4.4 Impact on existing land uses and change in sense of place.....	37
4.5 Cumulative effects	39
4.5.1 Literature Review of socio-economic studies for existing and planned renewable energy projects 39	
4.5.2 Summary of potential cumulative effects.....	45
5 IMPACT EVALUATION AND PROPOSED MITIGATION MEASURES	48
5.1 Potential cumulative effects	53

6 CONCLUSION..... 56

REFERENCES 57

ANNEXURE A: IMPACT RATING CRITERIA AND METHODOOGY..... 58

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST 62

CV: ELENA BROUGHTON (SR PROFESSIONAL) 64

REPORT SIGN OFF 65

ACRONYMS AND ABBREVIATIONS

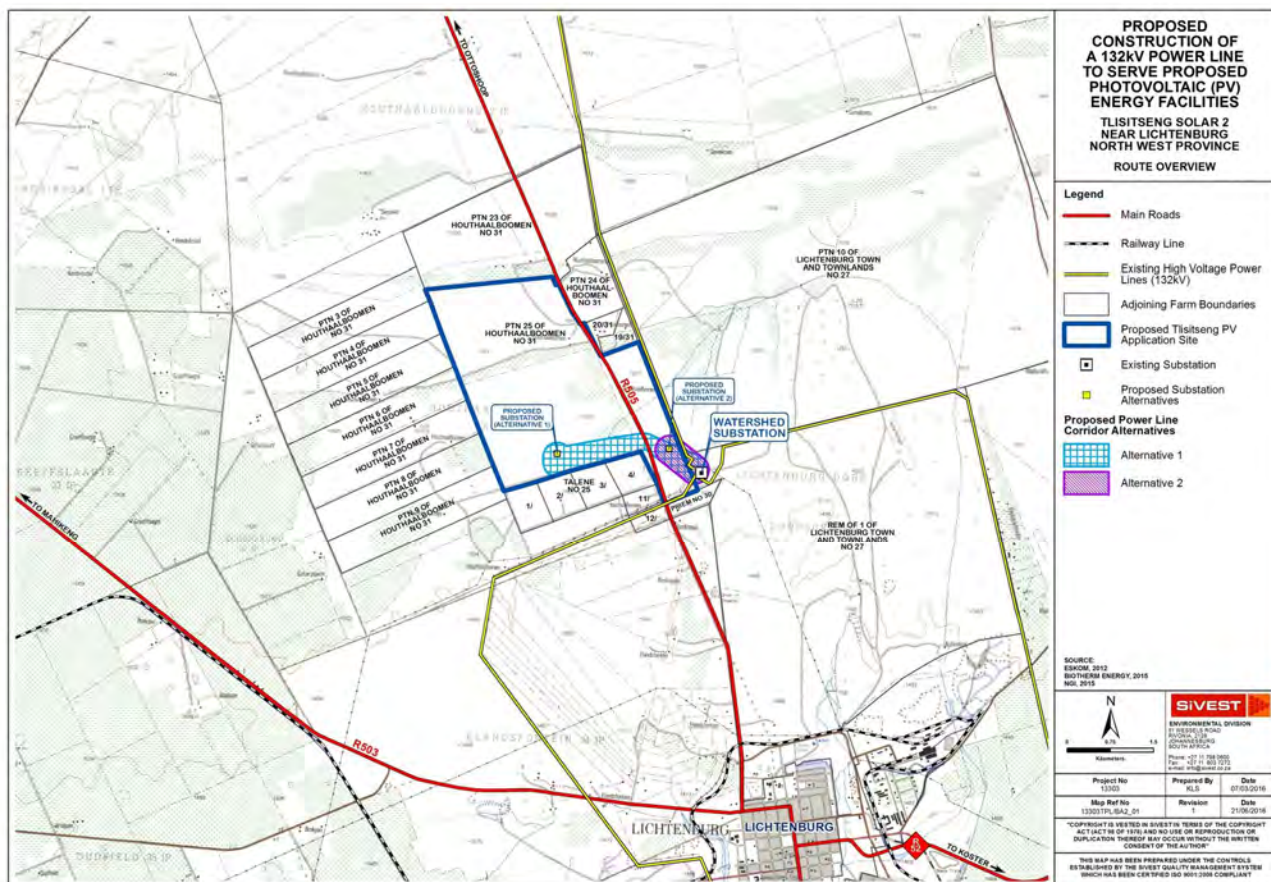
CAGR	Compounded Annual Growth Rate
CAPEX	Capital Expenditure
CBD	Central Business District
CSP	Concentrated Solar Power
DC	Direct Current
DoE	Department of Energy
DM	District Municipality
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ha	Hectare
GDP	Gross Domestic Product
IDP	Integrated Development Plan
IEA	International Energy Agency
IRP	Integrated Resource Plan
kV	kilovolts
LM	Local Municipality
m	Metre
m ²	Square metre
mm	Millimetre
MTS	Main Transmission Substation
MW	Megawhatt
NDP	National Development Plan
NGPF	New Growth Path Framework
NSDP	National Spatial Development Perspective
OHL	Over Head Lines
OPEX	Operational Expenditure
PDP	Provincial Development Plan
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
R&D	Research and Development
RE	Renewable Energy
REIPPP	Renewable Energy Independent Power Producer Procurement
SDF	Spatial Development Framework
SETRM	Solar Energy Technology Roadmap
SMMEs	Small, Medium, and Micro Enterprises
Stats SA	Statistics South Africa
UCT	University of Cape Town

1 INTRODUCTION

This document is prepared by **Urban-Econ Development Economists** in request by **SiVEST Environmental Division** on behalf of **BioTherm Energy (Pty) Ltd** to undertake a Socio-Economic Basic Assessment for the development of the **Tlisitseng 2 132 kV Substation and 132 kV powerline** near Lichtenburg in the North West Province. The socio-economic impact study is done in accordance with the Basic Assessment Report Guidelines, prepared by the Department of Environmental Affairs.

1.1 Brief Description of the Project

BioTherm proposes the development of the Tlisitseng 2 Solar PV energy facility near Lichtenburg in the North West Province. It is intended that the PV facility, with a 75 MW export capacity and its associated infrastructure will be established on Portion 25 of Farm Houthaalboomen 31. The PV facility will have an on-site 132 kV substation and powerline. Connection to the grid will be via the existing Eskom Watershed Main Transmission Substation (MTS). Map 1-1 indicates the proposed location of the substation alternatives and the powerline.



Map 1-1: Proposed location of Tlisitseng 2 132 kV substation and powerline on Portion 25 of Farm Houthaalboomen 31

1.2 Scope and Purpose of the Study

The purpose of the socio-economic basic assessment is to determine the potential socio-economic implications of the proposed project activities at each of the proposed three possible locations, and to compare their effects with the “no-go” alternative. The “no go” alternative assumes that the proposed Tlisitseng 2 substation and associated powerline are not established at any of the sites, which means that it represents the status of the environment, including the socio-economic situation.

The basic assessment report addresses the impacts as set out in the guidelines in terms of the Environmental Impact Assessment Regulations of 2014. The purpose of the socio-economic basic assessment report is as follows:

- Undertake a policy review and assess the alignment of the proposed project with the national, provincial and local socio-economic policies, with a focus on the compatibility of the project with the spatial planning, development objectives, and land use management plans of the respective authorities.
- Create a socio-economic profile for the study area using secondary data. The guidelines for Basic Assessment specifically call for information on the level of unemployment and skills available in the local community, as well as the economic profile of the local municipality.
- Identify and analyse the potential socio-economic value of the proposed project and recommend the preferred site alternative considering the socio-economic characteristics of the proposed locations and their surrounding environments.
- Evaluate the potential positive impacts versus any negative socio-economic effects that may ensue as a result of the change in status quo of the affected and benefiting communities and economies.

1.3 Methodology

The methodology employed in conducting the study comprised of three steps as illustrated in Figure 1-1.



Figure 1-1: Methodology

The following paragraphs briefly describe each step.

Step 1: Data gathering

Impact assessment requires the knowledge of the socio-economic environment that will be affected by the proposed project and envisaged expenditure on the project during both the construction and operational phases. In order to create a comprehensive understanding of the socio-economic environment that might be affected by the proposed developments, a socio-economic profile of the study areas as well as the zone of influence was developed. The following information sources were used in gathering the data:

- Stats SA Census 2011
- Quantec Research database
- National, provincial, and local policy documents and plans
- Interviews with the land owners of the directly and indirectly affected farms in the areas that took place during 1 and 2 December 2015

Step 2: Data analysis

A description of the study area and the zone of influence is given in terms of selected socio-economic variables. The developed profile is used to interpret the impacts and measure the extent of socio-economic impacts that could be derived from the proposed activities in the context of the local, provincial and national economies. It includes the analysis of parameters such as population size and household numbers; structure and growth of the economy; and labour force and the employment situation.

Step 3: Impact identification and evaluation

This step includes the description and evaluation of socio-economic impacts that could be expected during the construction and maintenance phases of the proposed substation and powerlines. Where applicable, the anticipated impacts were analysed in the context in of site alternative.

1.4 Data gathering and consultation process

The project made use of both secondary and primary data.

Secondary data gathering

Secondary data was sourced from the following databases and documents:

- Stats SA Census, 2011
- Quantec Research Standardised Regional Data, 1995-2013
- Integrated Development Plans (IDP)
 - Ngaka Modiri Molema District Municipality (DM) Integrated Development Plan (IDP) (2012 – 2016)
 - Ditsobotla Local Municipality Integrated Development Plan (IDP) (2011/12 – 2015/16)
- Spatial Development Frameworks
 - National Spatial Development Perspective (2006)
 - North West Provincial Spatial Development Framework (PSDF) (2008)
- Provincial strategic documents
 - Renewable Energy Strategy for the North West Province (2012)
 - North West Provincial Development Plan (PDP) (2030)
 - North West Province Growth and Development Strategy (2004 – 2014)

- National strategic documents
 - National Energy Act (2008)
 - National White Paper on Renewable Energy (2003)
 - National Integrated Resource Plan for Electricity (2010 - 2030)
 - Overview of Renewable Energy Roadmap – the workshop on the Draft Integrated Energy Planning Report
 - Comment on the national Solar Energy Roadmap (in the process of being developed)
 - The National Development Plan (NDP) (2030)
 - New Growth Path Framework (NGPF) (2011)

Primary data gathering

The primary data gathering was done by in-person interviews with the identified interested and affected individuals. Where in-person interviews were not possible, all efforts were made to communicate with the specific individuals either telephonically or via electronic correspondence.

The in-person interviews were undertaken during a site visit that took place between 1 December 2015 and 2 December 2015. During this time, a total of nine interviews were completed. Seven of these interviews related to the directly and indirectly affected parcels, one was with the library assistant in the Lichtenburg public library and the final with the chairperson of the Community Policing Forum. The last two interviews were done to triangulate the information gathered from secondary data sources on the socio-economic status quo of the wider community that may be affected by the proposed development.

Below is a list of all of the stakeholders that were consulted by means of in-person interviews during site visit, which took place in the beginning of December 2015.

- Directly or indirectly affected land owners/residents:
 - Mr Ferdi Hertenberg – Directly affected land owner Portion 25 of Farm Houthaalboomen 31
 - Mr Henry Nel – Portions 23 and 24 of Farm Houthaalboomen 31
 - Mr Gert Pieterse – Portion 19 of Houthaalboomen 31
 - Mr Gysbert Goedhals – Portion 3 of Farm Talene 25
 - Mark & Jackie Hechter – Portion 1 of Farm Talene 25
 - Mr Wessel Wessels Portions 3, 4, 5, 6, and 7 of Farm Houthaalboomen 31
 - Mr Jan Steinman – Portion 10 of Lichtenburg town and townlands 27
- Members of the wider community:
 - Library assistant at Lichtenburg Public Library
 - Mr. Godfrey Samore Ditsobotla – LM Chairperson of the Community Policing Forum

Consultation with the owners of the following indirectly affected farm portions did not take place due to various reasons as indicated:

- Portion 20 of Farm Houthaalboomen 31: The land owner has shown negligible interest in being consulted on the project.

- Portion 2 of Farm Talene 25: The land owner has shown negligible interest in being consulted on the project at the time of the site visit (December 2015). However, due cognisance was given to the comments submitted by the owner in the letter dated 24 June 2016.
- Portion 4 of Talene 25: During a telephonic conversation with the owner, which took place during the site visit, it was indicated that he had no interest in consultation until a community meeting with all of the interested and affected parties have taken place. Comments received in a letter dated 22 June 2016 were considered in the assessment.
- Portions 8 and 9 of Farm Houthaalboomen 31: At the first consultation meeting that took place in December 2015, it was revealed that the land owner of this property did not have any concerns or objections to the project. No further consultation was required.

Further to the above, comments from the following parties submitted by form of a letter were considered:

- Mark Hechter, the owner of Portion 1 of Farm Talene 25: Letter dated 25 July 2011 and e-mail sent on 30 June 2016
- Mr Gysbert Goedhals, the owner of Portion 3 of Farm Talene 25: Letter dated 25 June 2016
- Mr Andries van Rooyen, the owner of Portion 2 of Farm Talene 25: Letter dated 24 June 2016
- Mr Fazel VarVariawa, the owner of Portion 4 of Talene 25: Letter dated 22 June 2016

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 circumstance 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.
- It is assumed that the project description and infrastructure components as discussed above are reasonably accurate. These details were used to assess the potential impacts.
- With regard to the in-person interviews undertaken the following assumptions are made:
 - Questions asked during the interviews were answered accurately and truthfully.

- That the attitudes of the respondents towards the project will remain reasonably stable over the short- to medium-term.
- The assumption is that no significant concern exists for those land owners who have not provided comments on the project either through personal interviews or through e-mail/letter. Where applicable, Google Earth imagery was used to attempt to determine the current level of economic activity taking place on the relevant farm portions to aid in assessment of any potential impact and its extent on the specific land owner.
- At the same time, it is assumed that the general concerns and opinions raised by all other land owners interviewed, such as security concerns, would also apply to the land owners who did not provide their feedback for whatever reasons.

2 POLICY REVIEW

A policy review plays an integral role in the early stages of a project. The review provides a high level indication of whether a project is aligned with the goals and aspirations of the developmental policy within a country and at local level. Furthermore, the analysis signposts any red-flag or developmental concerns that could jeopardise the development of the project and assist in amending it preventing costly and unnecessary delays.

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

- National (South Africa) and provincial (North West) level Renewable Energy (RE) policy:
 - National Energy Act (2008),
 - National White Paper on Renewable Energy (2003),
 - National Integrated Resource Plan for Electricity (2010 – 2030),
 - Renewable Energy Strategy for the North West Province (2012)
 - Overview of RE Roadmap – the workshop on the Draft Integrated Energy Planning Report,
 - Comment on the National Solar Energy Roadmap, due for release in October 2016
- National, provincial, and local level spatial policy:
 - National Spatial Development Perspective (2006)
 - North West Provincial Spatial Development Framework (PSDF) (2008)
- National, provincial, and local level socio-economic development policy
 - National Development Plan (NDP) (2030)
 - New Growth Path Framework (NGPF) (2011)
 - North West Provincial Development Plan (PDP) (2030)
 - North West Province Growth and Development Strategy (2004 – 2014)
 - Ngaka Modiri Molema DM Integrated Development Plan (IDP) (2012 – 2016), and
 - Ditsobotla LM Integrated Development Plan (IDP) (2011/12 – 2015/16).

Renewable Energy (RE) policy

The **National Energy Act** (Act no, 34 of 2008), promulgated in 2008, has, as one of its key objectives, the promotion of diversity of supply of energy and its sources. From this standpoint, the Act directly references the importance of the RE sector, with a mention of the solar energy sector included. The aim is to ensure that the South African economy is able to grow and develop, fast tracking poverty alleviation, through the availability of a sustainable, diverse energy mix. Moreover, the goal is to provide for the increased generation and consumption of RE (Republic of South Africa, 2008).

The 2003 **White Paper on Renewable Energy** elaborates on the South African Government's policy principles, and strategic goals and objectives for promotion and implementation of the RE sector in the country. The White Paper, which acts as a supplement to the White Paper on Energy Policy, identifies the long- and medium-term potential of RE in South Africa.

As a signatory to the Kyoto Protocol, the country has made commitments to achieve greenhouse gas emissions reduction targets. Considering the high reliance of South Africa on coal-fired power stations for electricity generation, the government's commitment to the development of a framework for the establishment and operation of a national RE framework is vital to the achievement of the emission reduction targets. Moreover, the development of a national RE framework will aid in increasing energy security in South Africa over time, through the diversification of supply. In this regard, the government's long-term goal is the establishment of a renewable energy industry, with RE energy carriers that are capable of offering a sustainable, non-subsidised alternative to fossil fuels (Department of Minerals and Energy, 2003).

The **Integrated Resource Plan (IRP), for Electricity** (2010 – 2030) final report provides for the disaggregation of RE technologies to differentiate and display solar photovoltaic (PV), concentrated solar power (CSP), and wind options clearly. The following policy considerations assisted in arriving at this version of the IRP:

- The installation of RE technologies brought forward in order to accelerate a local industry.
- To provide for the uncertainties associated with the cost of renewables and fuels, a nuclear fleet was included.
- The emissions constraint of 275 million tons of carbon dioxide per year after 2024 was maintained.
- Energy efficiency demand side management measures were maintained.

The key conclusions from a review of the IRP, relevant to the RE sector, is that the accelerated roll out of RE technologies must be allowed and promoted in order to derive the benefits of localisation in these RE technologies. Moreover, it places emphasis on the establishment of a Solar PV programme (Republic of South Africa, 2011).

An overview of the **Renewable Energy Roadmap** states that the mandate of the Department of Energy (DoE) is the provision of secure and sustainable sources of electricity to stimulate economic development. The aim is to improve South Africa's energy mix by 2025, by having 30% clean energy generation. The Renewable Energy Roadmap elaborates by saying that four focus areas are key to achieving the Government's RE objectives; financial instruments, legal instruments, technology development, and awareness building, capacity building, and education (Modise, 2013).

The South African **Solar Energy Technology Roadmap (SETRM)** is being developed following collaboration between the DoE and the International Energy Agency (IEA), the GIZ, and the Department of Science and Technology (Modise, 2013). The objective of the SETRM is stated as "To develop a clear, comprehensive, and prioritised implementation plan (i.e. roadmap) for the development and diffusion of concentrated solar power; solar photovoltaic technology; solar heating and cooling technologies; and related R&D in South Africa toward reduced energy use, carbon emissions reduction; distributed electricity generation, expanded independent power production and electricity supply to the national grid, as well as the reduction of reliance on carbon fuels" on the DoE's website. The SETRM is set for release at the end of 2015.

According to the **Renewable Energy Policy for the North West Province**, the region is the fourth largest electricity consumer in the country (12%), with the bulk of this electricity requirement being supplied by coal-fired power stations in Mpumalanga. It furthermore states that roughly 63% of the electricity usage takes place in the mining sector, with the rural communities suffering from energy

poverty in many cases. In communities, where electricity is not accessible, the households make use of wood for cooking and lighting; this is impacting negatively on the environment and the health of these communities. The RE Policy simultaneously recognises the potential for economic development and job creation that could ensue from the RE sector in the Province. Based on these aspects, the key objectives of the policy are set out as:

- Reduction of the Province's contribution to climate change.
- Alleviation of energy poverty.
- The promotion of economic development and job creation by developing a green economy.

With regard to solar energy generation, the Province's RE Policy notes that the North West Province has very good potential as a location for these projects – with average daily solar radiation rates of greater than 8 000 MJ/m²; only the Northern Cape Province receives more solar radiation than the North West Province. The Dr. Ruth Segomotsi Mompati DM receives on average only 5% less solar radiation than Upington (an area that is considered a prime location for solar PV projects); the study area, therefore, shows high potential for solar energy application. The RE Policy subsequently proposes the following actions for the development of the Solar PV industry in the North West Province, and moreover, the areas identified as having a high potential:

- Identification of a suitable entity linked to the North West Province Government to drive the opportunities associated with Solar PV project under the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme.
- The Province should initiate a project as part of the implementation plan to identify suitable areas with the following requirements:
 - Suitable and proven measured level of solar radiation.
 - Possibility of long-term lease or option on property.
 - Good grid infrastructure in close proximity.
 - Suitable connection point into the grid.
 - Low impact on agriculture and the environment.
 - Suitable access to and around the site to aid effective execution.
 - Close proximity to communities that could benefit from local economic development and job creation.
- The Province should also explore the likelihood of attracting PV project developers by packaging the most suitable and viable land areas for PV projects.
- The Province should focus on the development of local content for the manufacturing of components for the PV industry. As risk and uncertainty is associated with PV projects, long-term procurement programmes are needed to stimulate investment in local manufacturing, ensuring the future of the Solar PV industry (Department of Economic Development, Environment, Conservation, and Tourism, 2012).

Spatial planning policy

In the **National Spatial Development Perspective (NSDP)** (2006), the Mafikeng-Lichtenburg area is highlighted as one of South Africa's key economic centres, and classed as an undiversified economy, comprising of the public services and administration, retail, and private services sectors predominantly. The National Spatial Development Perspective furthermore states that, the relatively large population consists of a large percentage living in poverty. It recommends a proactive approach, to address the

issue of migration towards areas with high economic potential and subsequent undesirable settlement patterns and marginalisation of the poor. The previous NSDP describes the country's spatial vision as follows (The Presidency of the Republic of South Africa, 2006):

- Focussing of economic growth stimulants and employment creation in areas where it is most effective and sustainable.
- The support of restricting where feasible to ensure greater economic competitiveness.
- Fostering development based on local potential.
- Ensuring that development institutions are able to provide basic needs throughout the country.

This vision is advanced by the 2006 NSDP by ensuring that a systematic overview and framework for the understanding of the national spatial economy is provided, and aims to be used as a means for dialogue between the various spheres of government for deciding where to focus infrastructure investment and development spending for example. The 2006 NSDP furthermore states that, certain opportunities and challenges exist for the local and district municipalities to ensure that coordinated government action is implemented. Actions with reference to the current project include (The Presidency of the Republic of South Africa, 2006):

- Decisively dealing with poverty, social and economic exclusion, and spatial fragmentation.
- Exploring and addressing the implication of natural resource potential and use for growing the economy and addressing poverty.
- Seeking out new areas of comparative advantage to identify and develop clusters of specialisation in collaboration with, especially, the provincial and national departments of trade and industry, labour, and economic affairs.

The **North West Provincial Spatial Development Framework and Environmental Management Plan** (PSDF – EMP) of 2008, is closely aligned to the NSDP, and as such places key importance on economic growth and poverty eradication. The spatial rationale is centred on the need to address issues related to; spatial planning, socio-economic development, infrastructure, and the sustainable and conservative use of natural resources. The PSDF – EMP highlights the fact that the legacy of the Apartheid-era policy is the key issue, with parts of the Province being significantly underdeveloped.

Although the PSDF – EMP does not include any land use or bioregional mapping, it does provide information on the required natural resources and socio-economic issues that must be addressed. The most prominent natural resource problems include; inadequate water resources (impacting future development), bush encroachment and alien invasive species, land and soil degradation, and overgrazing. The most significant socio-economic issues highlighted in the PSDF – EMP are as follows (Department of Economic Development, Environment, Conservation, and Tourism, 2008):

- The creation of employment opportunities - including increased economic opportunities for the youth and women.
- The eradication of poverty.
- Attraction investment into the Province.
- Achieving sustainable economic growth.
- The fight against, and prevention of HIV/Aids and other diseases.
- Achieving food security.
- Improved physical infrastructure, including the availability of industrial land.

- Decreasing the Province's illiteracy levels.
- Development of the Province's tourism potential.
- Managing population growth, urbanisation, and migration.

Socio-economic development policy

The **National Development Plan 2010 – 2030** (NDP 2030) aims to eliminate poverty and reduce inequality by 2030. At the same time it is geared towards achieving economic growth by expanding opportunities, building capabilities, reducing poverty, and involving communities in their own development, all leading to an increase in living standards of these communities. The NDP 2030 recognises nine key challenges that need to be addressed. Although all challenges are seen to be important, the priority areas can be identified as job creation and improvement of the quality of national education. Managing the transition towards a low carbon economy is also one of the nine key national challenges; in line with this, the expansion and acceleration of a commercial RE sector is seen as a key intervention strategy. The NDP 2030 seeks to ensure that half of all electricity generation capacity is provided by renewable resources (National Planning Commission, 2011).

The **New Growth Path Framework** (NGPF) of 2011 states that the achievement of decent work creation, reducing inequality, and poverty eradication, can only take place if the South African economy is restructured. It is required that the economy improves its rate of labour absorption, as well as composition and rate of growth. To aid in this goal, five key job drivers were identified, and according to the NGPF, one of these job drivers is "Seizing the potential of new economies" (Department of Economic Development, 2010)

The NGPF states that technology innovation is capable of significant employment creation, with the potential to achieve a target of 300 000 jobs by 2020, and 400 000 jobs by 2030 that could be directly attributed to the Green Economy. One of the main strategies to achieve this job creation target is the comprehensive support required by the energy efficiency and RE sectors. Programmes aimed at encouraging the local production of inputs, (with solar water heaters as a starting point), and appropriate pricing policies will form a part of the strategy (Department of Economic Development, 2010).

The **North West Provincial Development Plan** (2030) is shaped from the NDP and attempts to align with the NDP's vision, objectives and priorities for a united South Africa in 2030. The key focus areas of the PDP are based on the main challenges hampering growth in the North West Province, and are similar to that of the NDP, with a focus on the rural economy, and the upgrading, provision, and maintenance of economic infrastructure in the Province. Furthermore, the Province is focused on the transformation of human settlements and the eradication of corruption. The PDP states that RE, especially solar, and waste/biomass initiatives, is seen as being increasingly important in the Province, as its contribution to provincial energy consumption is envisaged to increase over the next two decades (North West Planning Commission, 2013).

The North West **Provincial Growth and Development Strategy** (PGDS) (2004 – 2014) identifies a small private sector as one of the key developmental challenges in the Province. Other challenges include low population densities, inadequate infrastructure and service delivery backlogs, a predominantly poor population with low literacy levels, substantial inequalities between rich and poor,

as well as disparities between urban and rural communities, and the HIV/Aids pandemic. Considering this, the objectives of the PGDS are addressing poverty and unemployment, and simultaneously improving the low level of skills and expertise in the Province (North West Province: Office of the Premier, 2004).

The PGDS identifies the following pillars of economic development:

- Growth and Investment,
- Agricultural and Rural Development,
- Mining and Energy,
- Manufacturing,
- Tourism,
- Construction and Infrastructure,
- Small Medium and Micro Enterprises (SMMEs), and
- Training and Skills Development.

Importantly, RE and Solar technologies are not addressed within the Mining and Energy pillar, or in the PGDS. Focus is, however, on provision for a more diversified future economy.

The **Ngaka Modiri Molema DM's Integrated Development Plan (IDP) 2012 – 2016**, states its mission as providing a developmental municipal governance system for a better life for all in the Ngaka Modiri Molema DM, with the following listed as priorities for the IDP (Ngaka Modiri Molema District Municipality):

- Provision of water and sanitation.
- Improvement of local road infrastructure.
- Local economic development and job creation.
- Environmental health management.
- Promote integration of services.
- Promote intergovernmental coordination and relations.
- Support local municipalities.

The IDP finds that the following are the DM's most prominent development challenges:

- In general, the DM is significantly under-serviced in terms of social as well economic infrastructure.
- The area is large, with respect to, any settlements across various municipalities.
- Such dispersed settlement patterns impact on the cost of erecting, operating, and maintaining infrastructure.
- The affordability of infrastructure is further impacted by the level of poverty and human development issues.
- The most economically active and productive individuals are drawn away from the DM.
- The structure of the economy requires an overhaul through targeted and accelerated interventions.
- Diversification of the economy, while maintaining the triple bottom-line principle, is critical.

In the 2015 adaption of the IDP, the Environmental Management Framework and State of the Environment Report is discussed briefly. The adapted 2015 – 2016 IDP states that the plan is currently under review but will include a comprehensive analysis of key emerging issues, such as the opportunity for alternative energy in the DM, as these issues will impact on the future state of the environment. Also related to the proposed project is the discussion around the DM's Rural Development Strategy, with the objective of facilitating integrated development and social cohesion through participatory approaches in partnership with all sectors of society. The strategy aims to stimulate rural development and food security by creating vibrant, equitable, and sustainable rural communities. Some of the measures that could be used to achieve this may include (Ngaka Modiri Molema District Municipality):

- Contributing to the redistribution of agricultural land – improving food security of the rural poor.
- Creating business opportunities.
- Decongestion and rehabilitation of overcrowded rural areas.
- Expanding opportunities for youth, women, people with disabilities, and older people from rural areas.
- Addressing issues such as; access to health care, decent housing, creation of decent jobs, as well as the development of road infrastructure. All key factors in achieving economic growth and development.

According to the **Ditsobotla LM Integrated Development Plan (IDP)** (2011/12 – 2015/16), the municipality's electricity provision is a joint function of the Ditsobotla LM and Eskom, with the DM being licensed to provide electricity to Lichtenburg, Blydeville, and Coligny. It furthermore states that areas without access to electricity is mostly located in the rural regions, such as Grasfontein and Bakerville, and that universal electrification will be addressed by a joint planning programme between the LM and Eskom. The IDP also states that there is a need for renovation and/or replacement of the electrical infrastructure in the Lichtenburg CBD as this infrastructure is old. There is also a requirement for the provision of the expansion of the current load supply to the CBD in order to aid the expansion of the property and business markets. Aligned with this is the identification of "low energy resources" as a critical economic factor impacting on the municipality's ability to achieve its growth and development objectives (Ditsobotla LM, 2011).

The LM's **Spatial Development Framework (SDF)** is not available from its website. The IDP though, includes a summary of this SDF, of 2006. If required, attempts will be made during the EIA-phase of the project to obtain the full SDF document. Regardless, the IDP does provide some insight into the LM's spatial goals and objectives.

The SDF takes the approach of developmental clusters, referring to a grouping of more than one settlement within the LM. One such cluster is the Lichtenburg cluster, which includes the settlements of Lichtenburg, Boikhutso, and Blydeville. The relatively high percentage of the population residing in rural areas, as well as various land claims is likely to cause a unique service delivery scenario for the LM and all of its developmental clusters, not least the Lichtenburg cluster (Ditsobotla LM, 2011).

Directly north of Lichtenburg, (the proposed project location is located north-west of Lichtenburg), lies the Lichtenburg Game Breeding Centre. The SDF has identified this area as an ideal location for the potential development of the Open Space System in the LM; however, the extensive diamond mining located north of the Lichtenburg Game Breeding Centre in Bakerville, Grasfontein, and Carlsonia, go against this proposal. Similarly the area south west of Lichtenburg, where the upper catchment area of

the Hartriver is located, has also been earmarked as important for protection as it is the origin of the Hartsriver, traversing a number of other municipalities in the western parts of the North West Province. Moreover, the Hartsriver feeds into Barperspan – an international RAMSAR site (wetlands of international importance). It is therefore, important that this catchment area, the river, and adjacent areas are protected from undesirable developments. The north western parts of the LM is characterised by abandoned, un-rehabilitated diamond mining activities, or extensive farming activities focused predominantly on cattle and grazing activities. (Ditsobotla LM, 2011).

The IDP also provides some feedback on the spatial development strategies set out in the 2006 SDF. Urban integration is an important strategy, aimed at moving away from the fragmented urban structure currently prevalent within the Ditsobotla LM. The vision is that a more compact system will lead to more cost-effective municipal services and public transportation infrastructure. It goes on to state that an important factor in achieving a more desirable urban settlement pattern is the provision of bulk infrastructure development in a rationalised manner. Just as important as the extension of the network, is ensuring that the existing infrastructure has sufficient capacity to deal with expected future development pressures. Upgrading of the existing electricity network in Lichtenburg, as the economic core of the municipality, is required to ensure that the expected residential and economic growth can be accommodated.

Although no mention is made of the potential for RE projects in the Ditsobotla LM, the inference is that the implementation and operation of the proposed Tlisitseng Solar PV project will assist in the extension and strengthening of the electrical network in the region and beyond, thereby aiding in ensuring that the LM is able to accommodate the envisioned growth and development.

3 BASELINE INFORMATION

This chapter examines key socio-economic characteristics of the study area, as per delineation provided in the previous chapter. This is essential as it provides both qualitative and quantitative data related to the communities and economies under observation, creating a baseline against, which the impacts can be assessed.

3.1 Study area's composition and locational factors

Spatial context and regional linkages

The proposed Tlisitseng Solar PV plant project is located close to Lichtenburg, which is the administrative centre and economic hub of the Ditsobotla LM. The Ditsobotla LM is one of five local municipalities comprising the Ngaka Modiri Molema DM, one of the four districts of the North West Province. Map 3-1 indicates the locality of the LM in relation to the other four LMs as well as key regional linkages.

The North West Province is mostly rural in nature, comprising 9.7% of the total surface area of South Africa. Four of Botswana's districts border the Province. Domestically, the Provinces of Limpopo, Gauteng, Free State, and the Northern Cape border the North West Province. Also located within the Ngaka Modiri Molema DM, is the Mafikeng LM, capital of the district and Province.



Map 3-1: Locality of the Ditsobotla LM (Ngaka Modiri Molema District Municipality)

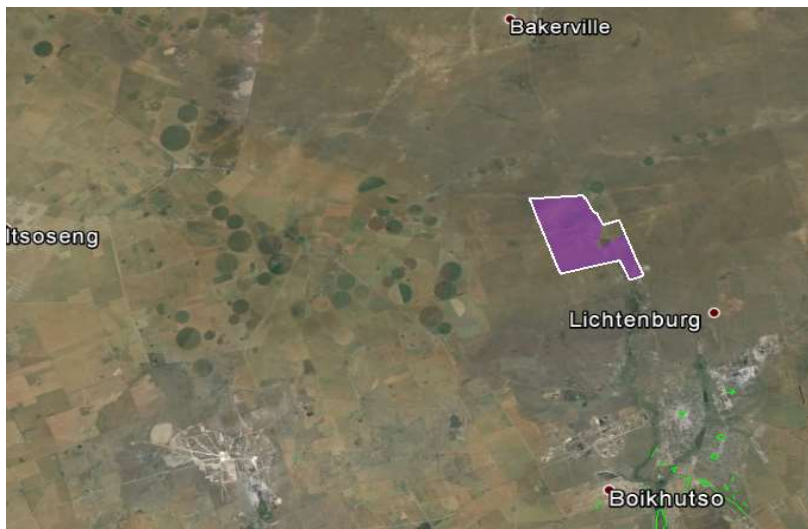
As can be seen from Map 3-1, one national road, the N14, traverses the primary study area. A section of the N14, which connects the western parts of Gauteng with the central parts of the North West

Province, passes through the south eastern parts of the Ditsobotla LM, through the towns of Coligny and Biesiesvlei. Other important main roads linking the Ditsobotla LM with surrounding LMs include (Ditsobotla LM, 2011):

- Road 52 from Koster to Lichtenburg, and further westwards from Lichtenburg to Mafikeng (R503). This road carries high traffic volumes, and traverses the municipality in an east-west direction.
- The R503 connects Lichtenburg in a south eastern direction with Coligny and ultimately Klerksdorp.
- The R505, traversing the LM in a north-south direction, connects Lichtenburg to Ottoshoop when travelling north and Gerdau and Ottosdal when travelling south.
- The R52 connects Lichtenburg with Itekeng and Biesiesvlei.
- Parts of Route R53, the road that connects Ventersdorp and Swartruggens, transverses the eastern parts of the Ditsobotla LM.

Towns and settlements

The closest major town to the proposed project site is Lichtenburg, the administrative hub of the Ditsobotla LM. Other settlements in close proximity include Bakerville, Boikhutso, and Itsoseng.



Map 3-2: Towns and settlements close to the proposed project site.

Lichtenburg is situated approximately 230 kms from Johannesburg and is located in the middle of the maize triangle, South Africa's main maize growing area. The production of cement is also another main economic activity taking place in close proximity, with three major cement producers operating within an 80 km radius of the town.

As seen on Map 3-2, Bakerville is located approximately 20 kms north of Lichtenburg. The settlement is a world-renowned diamond site, covering an area of roughly 35 km

from east to west. The town originated due to the significant diamond deposit that was found there, and grew at a rate that eventually meant Bakerville was larger than Cape Town at the time. As previously mentioned, today the diamond mining activities are mostly abandoned, leaving the land on which it took place largely un-rehabilitated.

The Ditsobotla LM's SDF groups towns within the LM according to certain specific geographical locations. These clusters of towns and settlements are (Ditsobotla LM, 2011):

- The Lichtenburg cluster: including Lichtenburg, Boikhutso, and Blydeville.
- The Coligny cluster: includes Coligny and Tlhabologang.

- The Itsoseng cluster: Comprising of Sheila, Verdwaal 1 and 2, and Itsoseng.
- The Bodibe cluster: Includes Bodipe, Springbokpan, Welverdiend, and Matile / Meetmekaar.

The Lichtenburg cluster is not only considered the core area of the municipality, but is also spatially located in the centre of the Ditsobotla LM. It is within the area between the Lichtenburg and Itsoseng clusters that approximately 60% of the population is located. However, the fact that 28% of the population reside on farms within the LM, comparatively more than other LMs in the district, means that service delivery is required to take consideration of the rural areas.

Resources and land capability

According to the Ditsobotla LM's 2006 SDF, the area of the project site is dominated by agriculture activities. More specifically, cattle and grazing. The entire southern part of the Ditsobotla LM is focused on commercial dry land and irrigated agricultural activities.

The LM has a number of mining and quarrying activities taking place in proximity to Lichtenburg:

- The limestone quarries and operations of Afrisam around Dudfield.
- The limestone quarry of Lafarge between Bodipe and Springbokpan.
- The quarrying areas of Lafarge immediately west of Lichtenburg and in the area north east of the main Lafarge plant situated at the Lichtenburg industrial area.
- The extensive diamond mining activities occurring in the north western parts of the LM, specifically Bakersville, Grasfontein, and Welverdiend.
- The state quarries found in the northern parts of the LM.

Apart from the agricultural, and mining and quarrying activities taking place in the LM, there exists an opportunity for conservation and tourism, with Lichtenburg considered arguably the prettiest town in the North West based on the rich diamond mining history of the area. Aligned with this aim of conservation is the LM's SDF goal of creating an Open Space System by linking all natural elements of value and the "High Environmental Control Zones" in the LM. Elements that may be included into this system in close proximity to the proposed project site include: Molope Eye conservancy and nature reserve, the Malmanies Eye Natural Reserve, the Lichtenburg Game Breeding Centre, and the upper catchment areas of the Hartsriver. The SDF states that the linking of these natural resources in an Open Space System, will create an environment where conservation and environmental protection is considered as a primary factor, making sure no undesirable developments take place there (Ditsobotla LM, 2011).

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.

The Ngaka Modiri Molema DM is home to 842 702 people residing in 227 003 households, with 20% of the DM's total population residing in the Ditsobotla LM. At the same time Lichtenburg's population is estimated as 26 337 (7 540 households), 15.6% and 3.1% of the populations of the LM and DM respectively (Stats SA, 2012).

According to the National Census of 2011, 99.99% of Lichtenburg's population is settled in urban areas, with the remaining 0.01% (3 persons) living on farms. This is markedly different from the scenario in the study area's DM and LM where 61.5% and 24.1% of the respective populations reside on tribal or traditional land; this signifies the relative rural nature of the municipalities being studied. The Ditsobotla LM's IDP, as well as the Ngaka Modiri Molema DM's IDP, takes cognisance of the fact that the high number of its population residing in rural or tribal areas increases the complexity of adequate service delivery, and that service delivery backlogs in the economic as well as social services sphere are present for these rural communities. The fact that nearly all of Lichtenburg's population is staying in the urban area can thus be seen as an indication that this population group enjoys relatively better service delivery; although, the LM's IDP does state that the infrastructure in Lichtenburg, especially the electrical infrastructure, is in need of maintenance or replacement (Ditsobotla LM, 2011).

The majority of the DM's population is African, (94%), with Whites being the next biggest population group at 3.6%; 89% of the LM's population is African, with the African population in Lichtenburg being the smallest of the respective study areas at 60%. Within the LM, 8% of the population is White with a further 1.9% being Coloured. In Lichtenburg the White population is slightly bigger at 30%, with a Coloured population of 7.7% (Stats SA, 2012). According to the 2011 Census, the most prominent home language spoken across all of the study areas is Setswana, with Afrikaans and English the preferred home language of the next biggest groups of the population.

Within Lichtenburg the male to female ratio is virtually 1:1, with 49.97% of the town's population being male and 50.03% female. The situation is slightly different in the LM and DM, where the respective populations have slightly more females than males (Stats SA, 2012). In all of the areas being studied, the majority of the population is of working age (15 – 64); however, in some cases the dependency ratio is relatively high when compared to that of the country (Stats SA, 2012):

- In the Ngaka Modiri Molema DM, 60.8% of the population is of working age, with 39.2% being aged 0 – 14 or older than 65. This means that the dependency ratio for the DM is higher than the average for the country (34.5%).
- The Ditsobotla LM's population consists of a slightly higher percentage of working aged individuals – 61.9%, regardless the number of individuals who would be dependent on those of working age is still higher than the country average at 38.1%.
- Lichtenburg is the only study area where the dependency ratio is smaller than that of the country. With a dependency ratio of 33.8%, and 66.2% of the population aged 15 – 64, Lichtenburg has a slightly higher proportion of individuals being economically active than the rest of the study areas. This could be seen as a driver for growth if employment creation is able to provide sufficient opportunities and the work force is suitably skilled.

3.3 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.

Based on current prices, the economy of the North West Province is valued at R199 551 million. This is the equivalent of a 6.5% contribution to the national GDP. At the same time, the economy of the Ngaka Modiri Molema DM was valued at R31 007 million in current prices, while the economy of the Ditsobotla LM was estimated to have a GDP of R8 122 million in current prices. The LM comprises more than a quarter (26.2%) of the GDP of the DM, and 4.1% of the North West Province's GDP is attributable to Ditsobotla LM (Quantec, 2014).

Over a ten-year period ranging from 2003 to 2013, the Ditsobotla LM's economy grew by a Compounded Average Growth Rate (CAGR) of 5%. The growth recorded in the LM is higher than the rate at which the DM and Province's respective economies grew. It is estimated that these economies grew by 3.2% and 22% in the DM and Province respectively, over the same five-year period. In turn, the growth of 2.2% recorded in the Province is below that of the country, which was estimated at 3.3% for the same ten-year period (Quantec, 2014).

The comparatively high growth rate in the LM can be attributed to the growth recorded in the Wholesale, trade, and accommodation, and Finance, insurance, and real estate sectors. Based on current prices, the Wholesale, trade, and accommodation sector comprises 23.9% of the Ditsobotla economy, with the Finance, insurance, and real estate sector accounting for a further 23% of the LM's GDP in current prices (Quantec, 2014). Thus a CAGR of 6.5% in the Wholesale, trade, and accommodation sector, and 8.5% in the Finance, insurance, and real estate sector is likely to have driven the bulk of the LM's economic growth based on the importance and contribution of these sectors to its economy.

In terms of the structure of the economies being studied, and the most significant economic activities taking place within these, the economy of the Ditsobotla LM is not unlike that of the country. Based on current prices, the economy of South Africa is a service economy with the tertiary sector contributing 70.5% of the national GDP. The importance of tertiary activities increases slightly in the LM – here the tertiary sector comprises 77% of the economy's GDP. It can furthermore be stated that wholesale, trade, and accommodation industries are contributing more to the LM's economy when comparing the proportionate contribution to that in the country's economy (16.6%). Other significant structural differences between the Ditsobotla and the South African economy relate to manufacturing industries being a slightly more important contributor to the national GDP. This sector contributes 11.3% to South Africa's economy and 9.4% to the economy of the LM. The importance of the primary economy is also lower in the LM (8%), versus the 11.5% that the primary sector contributes to the country's GDP. In addition, the primary sector is structured differently in the LM, here agriculture is more important (6.8% of the LM's GDP), compared to the 1.2% contribution of the mining sector. In the country, the mining sector contributes 9.2% to the national GDP.

The structure of the Province's economy as seen in **Table 3-1**, is remarkably different to that of the country and LM, whereas the DM's economy is structured similarly to that of the LM. In the Province the importance of the primary sector increases significantly due to the mining activities that have been so prevalent in this Province, with 30.8% of the Province's GDP being generated by mining activities. The reliance of the North West Province's economy on tertiary industries is also significantly below that of the other economies being studied. It is estimated that the tertiary sector contributes 58.1% to the Province's GDP. In contrast to this is the importance of the tertiary sector in the DM, here service activities are the most important contributor, generating 81.9% of the Ngaka Modiri Molema DM's GDP. This comparatively high reliance is mostly due to the higher than average importance of the general government services sector – 22.7% of the DM's GDP is generated by government services.

Table 3-1: Economic structure of the various delineated study areas

Economic Sector	Ngaka Modiri Molema DM		Ditsobotla LM	
	GDP in current prices (R'm)	% of GDP	GDP in current prices (R'm)	% of GDP
Agriculture	R1 361	4.4%	R553	6.8%
Mining and quarrying	R683	2.2%	R97	1.2%
Manufacturing	R1 871	6.0%	R761	9.4%
Electricity, gas and water	R689	2.2%	R158	1.9%
Construction	R1 005	3.2%	R287	3.5%
Trade	R6 388	20.6%	R1 938	23.9%
Transport and communication	R2 403	7.7%	R649	8.0%
Finance and business services	R6 373	20.6%	R1 867	23.0%
Personal services	R3 187	10.3%	R767	9.4%
General government	R7 045	22.7%	R1 045	12.9%
TOTAL	R31 007	100%	R8 122	100%
Economic Sector	South Africa		North West Province	
	GDP in current prices (R'm)	% of GDP	GDP in current prices (R'm)	% of GDP
Agriculture	R72 202	2.3%	R4 815	2.4%
Mining and quarrying	R282 366	9.2%	R61 478	30.8%
Manufacturing	R349 066	11.3%	R9 580	4.8%
Electricity, gas and water	R91 201	3.0%	R2 642	1.3%
Construction	R114 754	3.7%	R5 065	2.5%
Trade	R510 666	16.6%	R24 937	12.5%
Transport and communication	R272 303	8.8%	R15 383	7.7%
Finance and business services	R680 443	22.1%	R30 209	15.1%
Personal services	R182 795	5.9%	R16 588	8.3%
General government	R524 716	17.0%	R28 855	14.5%
TOTAL	R3 080 513	100%	R199 551	100%

(Quantec, 2014)

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.

Table 3-2: labour force of the delineated study areas

Indicator	South Africa	North West Province	Ngaka Modiri Molema DM	Ditsobotla LM	Lichtenburg
Working age population	33 928 806	2 273 362	512 630	104 628	17 407
Non-economically active population	13 238 633	907 948	243 945	44 487	6 169
Labour force	18 841 453	1 236 786	226 903	53 005	10 683
Employed	13 254 829	848 107	150 683	37 933	8 495
Unemployed	5 586 624	388 679	76 220	15 072	2 188
Unemployment rate	29.7%	31.4%	33.6%	28.4%	20.5%
Labour force participation rate	55.5%	54.4%	44.3%	50.7%	61.4%
Discouraged work seekers	5.4%	5.7%	8.2%	6.8%	3.2%

(Stats SA, 2012)

The Ngaka Modiri Molema DM has a working age population (15 – 64 years of age) of 512 630 individuals – 60.8% of its total population. According to South Africa's official unemployment definition, it is estimated that 33.6% of the DM's labour force is unemployed, while 8.2% can be classified as discouraged work seekers (Stats SA, 2012). Within the Ditsobotla LM the situation improves slightly since here, according to the Census 2011, there is a working age population of 104 623. Furthermore, the LM has an approximate unemployment rate of 28.4%, while 6.8% of the population are discouraged work seekers.

As expected in the previous section, where it was revealed that the household income levels in Lichtenburg are comparatively, significantly higher than that of the municipalities being studied, and the employment situation in the town is noticeably more positive than that of the DM or LM. In Lichtenburg, where 66% of the population is of working age, unemployment is estimated at 20.5% and discouraged work seekers comprise 3.2% of the town's 17 407 working age population. It follows that Lichtenburg's labour force participation rate is also significantly higher at 61.4%, compared to the 44.3% and 50.7% in the DM and LM.

In the Ditsobotla LM 11.3% of all employment is created by the agriculture sector - more than the 7.7% in the DM created by the same sector. Nationally the agriculture sector creates an even smaller proportion of total employment opportunities – 5.8%. The economy is predominantly, still a service economy, though, with practically three quarters of all jobs, in all of the respective study areas, generated by the tertiary sector (Quantec, 2014). More specifically, the tertiary sector created 74.6% of all employment opportunities in the LM. The biggest contributors to this job creation is the wholesale and retail trade sector (38.6%), and the community, social and personal services sector (25.6%) (Quantec, 2014).

3.5 Income

According to the 2011 Census, literacy levels in Lichtenburg are relatively on par with the level of literacy recorded in South Africa. The literacy levels in the municipalities being studied are below that of the country though, indicating a community that is relatively less employable than the Lichtenburg community or the broader South Africa. Approximately 17% and 15% of the DM and LM's respective populations, aged 20 years and older, have had no access to formal education, while 8.7% of the population of Lichtenburg has had no schooling. In the DM, only 20.3% of the population aged 20 years and older successfully completed matric, with 8.1% achieving a higher education. The situation is even worse in the LM, where only 19.7% of the population, aged 20 and older, has obtained a matric certificate. In Lichtenburg, 27.7% of the population has completed matric, while 12% successfully completed tertiary studies.

In Lichtenburg the average monthly household income is R12 194, which is significantly more than the average national household income of R9 235 per month. The broader population of the study area is earning considerably less, with the average monthly income for the DM and LM at R5 772 and R6 004, respectively, per household (Stats SA). The lower than average national income levels could be indicative of a limited number of job opportunities available, which in turn is associated with a smaller than average economic base.

Easier access to employment opportunities can be viewed as the reason why Lichtenburg has a smaller proportion of households living with no income (10.2%), compared to the 15.3% and 12.5% of

households in the DM and LM not receiving any monthly income. Furthermore, the fact that fewer (39%) of Lichtenburg's households, versus 58.6% and 59.3% of the households in the DM and LM, earn an income of R3 200 or less per month can be seen as an indication of the relative quality of the employment opportunities offered in Lichtenburg compared to that of the DM and LM

3.6 Access to services and state of local built environment

Access to shelter, water, electricity, sanitation, and other services are indicators that assist to determine the standard of living of the people in the area under investigation. Infrastructure and the state of local infrastructure is another indicator to contemplate when considering living standards. The availability of social and economic infrastructure including roads, educational facilities, and health facilities further indicates the nature of the study area, which is valuable in developing a complete profile of the circumstances in which communities are living. These measurements create a baseline against, which the potential impacts of the proposed project can be assessed.

3.6.1 Access to Housing and Basic Services

- **Housing:** It is estimated that 86.7% of households in Lichtenburg reside in formal brick structures, be it stand-alone houses, complexes, in a block of flats, or as a second building in a yard. A further 12.6% of Lichtenburg's households reside in informal dwellings, with only 0.1% of the town's households living on tribal or traditional land. Within the Ditsobotla LM the proportions vary significantly, with only 74% of the households of this municipality living in formal brick structures. Proportionally more of the DM's population is living on tribal land, in traditional structures such as huts (8%), with 16.8% living in some kind of informal structure. The situation in the Ngaka Modiri Molema DM mirrors that of Lichtenburg more closely, here 82.7% of households reside in brick structures of some sort, with 12.7% living in informal structures. The number of traditional dwellings is proportionally more however, at 3.5%.

It must be noted that the LM is in the process of implementing a housing programme, specifically in the towns of Tlhabologang and Boikhutso (Ditsobotla LM, 2011). The objective of the housing programme is to address the sanitation backlog; regardless, the result will be that fewer households will reside in informal settlements in the LM.

- **Access to water:** It is estimated that 91% of all households in Lichtenburg have access to piped water either inside the dwelling or in the yard. The situation is markedly worse in the LM and DM where only 65.9% and 51% of the respective households have access to piped water in the dwelling or yard. This statistic for access to piped water is worse than the national average, where 73% of households have access to piped water in their dwelling or yard. The dire situation in these municipalities is further reflected in the fact that 14% of households in the DM, and 10.9% of households in the LM, have no access to water. According to the Ngaka Modiri Molema DM's IDP, the proportion of households with no access to water have declined from 2000 to 2010. This backlog remains a service delivery issue in the DM however (Ngaka Modiri Molema District Municipality).

The 205/2016 revision of the DM's IDP states that the DM was declared a Water Services Authority (WSA) in 2003, giving the district authority to perform water and sanitation services in its jurisdiction. The Department of Water Affairs bulk infrastructure systems operational within

the DM, are concentrated in the Mafikeng, Ditsobotla, and Ramotshere Moiloa LMs. Other infrastructure systems in the DM include (Ngaka Modiri Molema District Municipality):

- 30 reservoirs,
- Five pump stations and eight water purification works, and
- 12 waste water treatment works.

The revised IDP also states that the surface water in the area is generally insufficient, leading to rural water supply often relying on ground water sources, and that the WSA is in the process of developing a Water Services Development Plan (WSDP) and Water Services Master Plan. The WSDP will provide a backlog study and identify projects that need to be implemented, while the master plan will reconcile the available water sources with the demand for water supply (Ngaka Modiri Molema District Municipality).

The Ditsobeng LM's IDP (2011/12 – 2015/16), states that a services backlog study commissioned in 2007 by the Department of Developmental Local Government, revealed that 18 023 households receive water connection services below RDP standards, while a further 20 559 of the municipality's households receive services within the RDP standards. It was estimated that upgrades for these households, to either be within the RDP standards or for yard connection, would require a total budget of R214 million. The IDP furthermore makes mention of the fact that two major bulk water infrastructure projects, aimed at addressing water shortages in Tlhabologang and Itsoseng were being implemented (Ditsobotla LM, 2011).

As far as water infrastructure is concerned, the IDP states that; the Lichtenburg water treatment plant is more than fifty years old, but well maintained, and the pump station in Itsoseng requires overhaul maintenance. Of the 30 reservoirs within the DM, 16 are located within the LM's boundaries. According to the IDP, the municipal infrastructure audit revealed that 9 of these reservoirs are in good condition, while one is in average condition, and three more in poor condition. The reservoirs in poor condition provide bulk water to Itsoseng and Verdwaal (Ditsobotla LM, 2011).

- **Access to sanitation:** If not managed and provided adequately, the basic need of sewerage and sanitation can pose serious health and safety risks to the communities not receiving these basic services. In Lichtenburg, 90% of the households had access to a flushing toilet, while almost 2% of the households had no access to toilet facilities. At the same time, 4% of the town's households were using pit latrines while 0.12% were still reliant on the bucket system.

The situation is markedly worse in the municipalities being studied. In the Ngaka Modiri Molema DM only 38.5% of households had access to a flushing toilet, while 7.5% of the households had no access. The bulk of the households (57%) in the DM were using pit latrine systems, with 1.2% of households using the bucket system. More households had access to a flushing toilet in the LM (47%); however, 4.9% of the Ditsobotla LM's households were still using the bucket system. A situation that is in stark contrast to the government's determination to eradicate all bucket toilet systems by 2007. 35% Of households in the LM were using pit latrines while 0.3% had no access to toilet facilities.

As mentioned in the previous section, the Ngaka Modiri Molema DM has been awarded WSA status. The WSA is in the process of developing the WSDP and master plan, which will provide guidance on addressing these services backlogs with the limited water resources in the DM.

The findings discussed here can be somewhat verified by the fact that the Ditsobotla LM's IDP states that the largest sanitation backlogs are prevalent in rural areas and urban based informal settlements, explaining the comparatively high level of sanitation in Lichtenburg when compared to the rest of the LM. The IDP estimated that it would cost R80.9 million to upgrade the 10 274 households in the municipality (with sanitation systems below RDP standard), to pit latrine systems. To address the large number of households still making use of the bucket toilet system, the LM has implemented a housing programme involving the construction of low cost houses in Tlhabologang and Boikhutso (Ditsobotla LM, 2011).

- **Access to electricity:** The indicator "electricity for lighting", was used as a proxy for measuring households' access to electricity. In Lichtenburg 86% of households had access to electricity; this is only slightly more than the national average proportion with access of 84.8%. The situation is somewhat worse in the municipalities studied, with 80.5% and 74% of households in the DM and LM respectively having access to the grid.

The main alternative source for lighting in the study areas was candles; 12% of households in Lichtenburg utilised this lighting method, while 17.7% of households in the DM did the same. In the Ditsobotla LM, nearly a quarter of all households were reliant on candles for lighting. Of interest to this project is the fact that 18 households in Lichtenburg (0.2% of all households), were using solar power for lighting.

According to the Ditsobotla LM's IDP, the LM is licensed to provide electricity to Lichtenburg, Blydeville and Coligny, with the remainder of the LM serviced by Eskom. The IDP furthermore reveals that areas without electricity are mainly located in rural areas such as Grasfontein and Bakerville for example. Based on the IDP, the electrical infrastructure in Lichtenburg is old, requires maintenance, and is in need of upgrades. Moreover, load supply to Lichtenburg needs to be increased to provide for the demand associated with the growing property and business markets in the town. The IDP states that, based on preliminary business plans and estimates, the cost of the new infrastructure is approximately R29 million.

- **Refuse removal service:** It is estimated that 62% of households nationally have their refuse removed by a local authority on a weekly basis. This national estimate is substantially below the number of households in Lichtenburg (87.8%), with regular weekly refuse removal services. At the same time, only slightly more than a third of households in both the LM and DM have regular refuse removal services. It is more common for households in these municipalities to have their own refuse dump, with 54% of homes in the DM, and 48.9% in the LM using this method of waste disposal. Also noteworthy is the fact that the LM has the highest proportion of households within the study areas with no means of refuse disposal (6.6%), compared to the DM (6.1%), and Lichtenburg where 2.7% of households have no access to refuse removal services.

Based on the findings of the Ditsobotla LM's IDP, the municipality recognises the serious health issues posed by the non-collection and improper disposal of refuse. However, in order for the LM to address these service backlogs it is required that the organisational structure of the LM

be reviewed in order to align with the challenges highlighted in the Strategic Environmental Assessment Report (Ditsobotla LM, 2011).

- **Internet access:** Internet access has become increasingly important for accessing economic opportunities. Although not a definitive measure, it could be argued that a lack of access to the knowledge readily available on the internet could negatively affect an individual's ability to access quality educational and economic opportunities.

In Lichtenburg 58.6% of households have no internet access. These are fewer households than the national average of 64.5%; regardless, it still excludes more than half of the town's population from the potential that could be associated with internet access. The situation is significantly worse in the studied municipalities, where almost three quarters of all households have no access. For those with access, a cell phone is the most common method of access, followed by home internet access or access at work.

3.6.2 Social and Recreational Infrastructure

The Ditsobotla LM's IDP (2011/12 – 2015/16) contains information on the following social and recreational infrastructure within the LM:

- **Health services** – There are two hospitals and nine clinics within the Ditsobotla jurisdiction.
 - General de la Rey Hospital: located on the Thabo Mbeki Drive. The hospital provides in-patient care and maternity services. The outpatient unit provides emergency care until a patient can be transferred to the Thusong Hospital.
 - Thusong Hospital: situated roughly 25 km from Lichtenburg, on the Mafikeng road at the turn off to Itsoseng. The hospital has the following facilities available: theatres, male and female medical wards, a gynaecology ward, a paediatric ward, a maternity ward, a tuberculosis ward, out-patients, and casualties.
 - Nine community clinics in the following towns: Lichtenburg, Boikhutso, Blydeville, Coligny, Tlhabologang, Itsekeng, Bodibe, and Itsoseng.
 - The IDP estimates that about 31 health facilities are required to provide adequately. However, considering the current population (168 904) and the planning norm of one clinic per 5 000 community members, the requirement is more likely to be approximately 20 clinics in the LM.
 - There is one formal old age home located in the LM, the Lichthuis Old Age Home, situated in Lichtenburg.
- **Community facilities and services (sport fields etc.)**
 - Most of the existing community facilities, including sports grounds, are located in urban areas, excluding most of the LM's rural population.
 - Facilities located in rural areas are of poor standards compared to the facilities available in Lichtenburg.
 - The challenge facing the LM in this regard is therefore, considered to be not only access to existing facilities, but also ensuring that available facilities are tailored to the social circumstances and conditions of the communities they target.

- According to the IDP, the sport fields in Ga-Motlatla, Verdwaal, and Bodibe are in various stages of completion. Projects were initiated to finalise them for handover to the respective communities for utilisation.
- **Cemeteries**
 - Additional land for cemeteries is required in the communities of Itekeng, Coligny, and Itsoseng.
 - Maintenance of cemetery yards in all areas of the LM remains a challenge. There is also a need for all cemeteries to be fenced, and ablution facilities to be constructed at all cemeteries in the LM.
 - The IDP believes that the challenges with regards to the provision of adequate cemeteries will rely on a focus on the following aspects:
 - Providing cemeteries that meet sustainable, technical, and environmental criteria.
 - Accommodating diverse cultural requirements and the function of cemeteries as public spaces in each to ensure a dignified municipality.
 - Fostering civil and private sector partnerships in cemetery development and management.
 - Special attention must be given to those in need, respecting the bereaved at burial. It is also important to protect and properly maintain cemeteries as public property and create a safe working space for cemetery employees.
- **Community halls**
 - All community halls within the LM require renovation. The towns in which these renovations will take place are: Lichtenburg, Boikhutso, Itekeng, Itsoseng, Sonop, and Tlhabologang.
 - Bakerville, Grasfontein, Bodibe, and Verdwaal are all areas that require new community hall facilities.
- **Traffic and licensing services**
 - Generally, traffic law enforcement is concentrated in urban areas such as Lichtenburg and Coligny.
 - This is mainly due to a lack of human resources as well as below par traffic infrastructure in rural or former township areas.
- **Disaster management**
 - An Emergency Services Unit exist within the Ditsobotla LM for fire and rescue services as well as disaster management.
 - The unit is functional; however, it is not up to standard and under-resourced, with only temporary employees and insufficient equipment.
 - The Ngaka Modiri Molema DM commissioned the drafting of a Disaster Management Framework and Disaster Risk Management Plan. The Draft Gap Analysis Report found that the LM does not conform to legislative requirements. The DM will address these gaps through a comprehensive disaster management plan incorporating the needs of category-B municipalities.

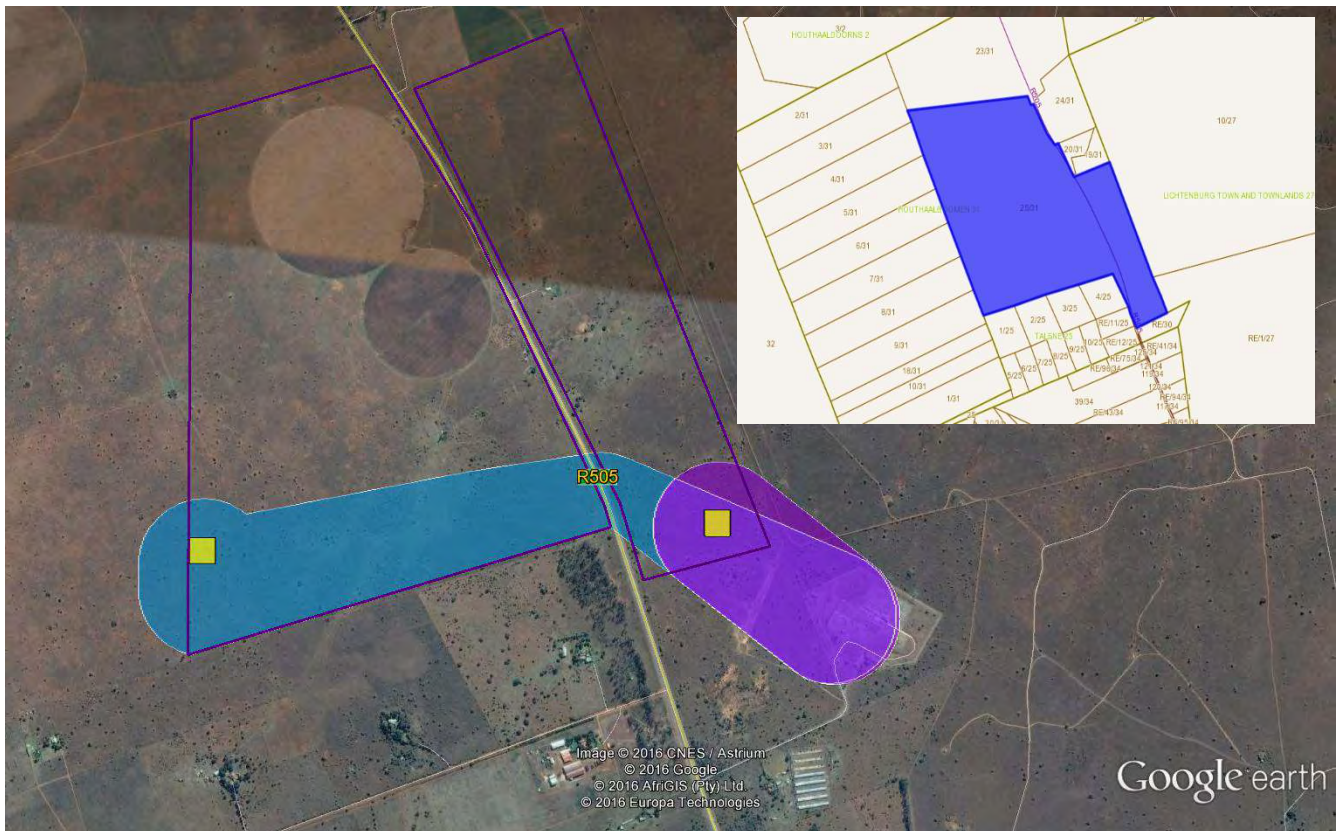
- Moreover, the provision of services in the LM is hampered by problems surrounding powers and functions. According to the IDP, the LM has not yet entered into a service level agreement with the DM for provision of these services.

3.7 Site-related information

The following paragraphs provide the socio-economic profiles of the farm portions where the proposed project is planned to be constructed.

3.7.1 Land-use profile

Map 3-3 indicates the substation site alternatives on Portion 25 of Farm Houthaalboomen 31 together with the proposed powerline corridor.



Map 3-3: Farms directly and indirectly impacted by

The following farm portions will be directly affected by the proposed location of the substation and/or powerlines:

- 132 kV Substation alternative 1 and 2: Portion 25 of Farm Houthaalboomen 31
- 132 kV powerline corridor: Portion 25 of Farm Houthaalboomen 31 and Portion 10 and Remainder of 1 of Lichtenburg town and townlands (municipal land).

The primary data gathered with respect to the above-mentioned farm portions during the site visit are discussed below along with all indirectly affected land owners. From the information gathered it is

apparent that none of the land owners that may be directly impacted by the proposed Tlisitseng 2 substation and powerline has expressed any concern or objection to the proposed development.

Portion 25 of Farm Houthaalboomen 31

Mr Hertenberg is the owner of the directly impacted farm, i.e. Portion 25 of Farm Houthaalboomen 31. He views the commercial agriculture activities taking place on the farm as “up and coming”, indicating that the operations are not yet well established. He has indicated that the rental income that he would derive from leasing the land for the proposed PV facility will be used to acquire land to continue the operations elsewhere in the area.

- **Economic activities:**
 - Roughly 86 ha is currently under irrigation, producing maize. This will not be affected by the Tlisitseng PV facilities.
 - Grazing: 150 cows and 120 calves. These will have to be relocated to a different farm to make way for the project.
 - Estimated profit for the total operations on Portion 25 of Farm Houthaalboomen is R5 000 per ha.
 - The rental received from the PV project will be used to lease land, where commercial farming can be continued.
 - Four permanent workers are employed on the farm, who receive minimum wage.
- **Services:** The farm uses borehole water and has a grid connection.
- **Residency:** The land owner resides in town. Four workers have lodging on the farm but go home over weekends. The workers therefore, are not perceived to have a cultural connection with the boarding as they do not consider this their homes.
- **Concerns raised:** The land owner mentioned that he would require an advancement from the developer to ensure that he is able to acquire alternative farming land, from which to continue his livestock farming operations.
- **Community observations:** The land owner could make the following observations about the broader community:
 - High unemployment and related to that high crime rate are the biggest socio-economic ills facing the broader community.

Portion 4 of Farm Talene 25

The owner of the property, Mr Fazel VarVariawa, stated in the letter submitted on 22 June 2016 that he objects to the development of power lines that would traverse his property. No other issues were raised.

It should be emphasised, that the proposed power line corridor does not traverse the property.

Portion 3 of Farm Talene 25

The farm portion (locally referred to as plots) is owned by Mr. Goedhals. The land owner and his wife have been living on the farm for 32 years. The farm is not used for any commercial activity; it is used as a residence by the land owner. The land owner expressed his objections for the establishment of the power line through the property and raised concerns that it would impact on the sense of place, personal security and privacy, property loss, and possible impact on property values.

The proposed power line corridor will not traverse the property.

Portion 1 of Farm Talene 25

The portion of land is owned by Mr. and Mrs. Hechter. They have been owners of the land for roughly eight years. The Rafters Pub have been operating on the farm portion (referred to as plots locally) for the same number of years.

- **Economic activities:**
 - Rafters pub is the main economic activity on the farm. It is estimated that the pub receives between 300 and 340 visitors per month. When special events (i.e. pool tournaments etc.) are hosted, the visitor numbers are higher.
 - The owner is actively involved in the management of the pub; two more full time workers are employed at the pub.
 - The land also has some sheep for subsistence farming. The land owner did however, explain that they want to create a petting zoo for the children of the pub patrons.
 - As a side venture, paintball is offered on the farm. This however, makes a very small contribution to the overall business revenue.
 - Future tourism/economic potential:
 - The land owner indicated that they plan to start a bird breeding programme focussed on African Greys. Further information provided suggested that as of July 2016, four cages for the birds were built and were planned to be expanded to eight cages. Two African Gey have already been ordered.
 - They plan to start offering overnight accommodation and want to start off by building four chalets on the property.
 - No sign of the commencement of these activities were present during the site visit in December 2015, even though the land owner stated that they want to begin with the breeding programme early in the same month.
- **Services:** The farm uses borehole water; electricity is supplied by Eskom.
- **Residency:** The land owners live on the property and plan to use it for retirement. Consultation revealed that peaceful retirement planning was the reason for purchasing the property in the first place. No workers reside on the farm.
- **Concerns raised:**
 - The land owners are most concerned about the possible negative visual impact of the solar PV plant but has not raised specific issues related to the power lines.
 - The land owner raised some concern about the influx of workers and the impact this may have on crime in the area, including potential loss of livestock due to theft and security risk for visitors of the pub. Unwanted visitors to the pub may also become a problem.
 - A concern was raised over the effect of construction impacts such as dust, noise, etc., on the proposed African Grey breeding programme.

3.7.2 Access to infrastructure

Consultation with the land owner revealed that Portion 25 of Farm Houthaalboomen 31 is connected to the national Eskom grid and makes use of borehole water for its irrigation. A concern has been raised by most of the indirectly affected land owners of the possibility of disruption to their own borehole water supply as a result of the needs of the proposed development. These concerns though are not related to

the power line but rather refer to the development of the solar PV plant, which is discussed in another report.

4 IMPACT ANALYSIS

The following sections discuss the socio-economic impacts that the proposed substation and associated power lines are envisaged to create considering the knowledge of the potentially affected socio-economic environment.

4.1 Impact on employment creation

The project proponent estimates that the construction period of the proposed Tlisitseng 2 132 kV substation and the powerline will create six employment opportunities, with 70% of these opportunities being made available to previously disadvantaged individuals. The project proponent furthermore, estimates that the total labour cost for the construction period of the proposed Tlisitseng 2 132 kV substation and powerline will be R1 044 000 (2015 prices).

The demand for materials and services needed during the construction phase will contribute to the creation of additional Full-Time Equivalent (FTE) employment positions among supplying businesses. Both direct and indirect employment opportunities created during construction will increase household consumption expenditure; thus, further stimulating demand for household goods and services, and creating FTE employment in the respective sectors (i.e. mainly tertiary industries).

In addition to the construction phase labour requirement, it is estimated that the proposed 132 kV substation and powerline will support about 1.5 FTE opportunities for maintenance associated with this aspect of the Tlisitseng 2 development. The cost of this, over the first ten years of operation of the power facility is estimated at R3 960 000 in 2015 prices. It is estimated that R2 613 600 (66%) of this labour cost will accrue to previously disadvantaged individuals.

The impact on employment creation will be the same for all site alternatives considered as outlined below. Therefore, both of the substations represent the preferred choices from this perspective.

Alternative	Preference	Reasons
Tlisitseng 2 Substation Option 1	No preference	Employment creation will be the same regardless of site alternative chosen.
Tlisitseng 2 Substation Option 2	No preference	

4.2 Impact on economic production

The construction of the Tlisitseng 2 132 kV substation and powerline will involve capital expenditure on construction activities and input materials such as steel structures, cables, concrete, etc. This will directly and indirectly contribute to the revenue generation of those industries related to this sector by increasing the demand for goods and services for respective businesses.

Consultation with the project proponent revealed that the 132 kV substation and powerlines will require an initial investment of R79.6 million in capital expenditure. It is unlikely that this economic stimulation will be confined to the primary study area, or even the Province, only. The fact that the direct investment will also create indirect and induced multiplier effects, ensures that the positive impact, albeit small, will likely be a positive impact of national extent. On average, for every R1 million spent on civil engineering activities, the economy will benefit by an additional R2.01 million. Therefore, it can be estimated that provided that the total capital expenditure mentioned above is spent in South Africa, the economy of the country will experience a total increase in production of R239.6 million.

The impact on production will be the same for all site alternatives considered as outlined below. Therefore, both of the substations represent the preferred choices from this perspective.

Alternative	Preference	Reasons
Tlitseng 2 Substation Option 1	No preference	The impact on production will be the same regardless of site alternative chosen.
Tlitseng 2 Substation Option 2	No preference	

4.3 Impact on service infrastructure

The proposed Tlitseng 2 132 kV substation and powerline will assist in increasing the national grid capacity since it will be utilised for connection of the Tlitseng 2 PV facility to the Watershed MTS. Connection of the Tlitseng 2 PV facility to the national grid will contribute towards the strengthening of the national electricity supply and greening of the economy.

The impact will be the same for all site alternatives considered as outlined below. Therefore, both of the substations represent the preferred choices from this perspective.

Alternative	Preference	Reasons
Tlitseng 2 Substation Option 1	No preference	The impact will be the same regardless of site alternative chosen.
Tlitseng 2 Substation Option 2	No preference	

4.4 Impact on existing land uses and change in sense of place

Regardless of the substation site alternative chosen, the substation is proposed to be located on Portion 25 of Farm Houthaalboomen 31. The farm is used for maize farming, using irrigation and commercial livestock farming. Consultation with the directly impacted land owner revealed that the maize production will not be impacted by any of the components of the Tlitseng development. The land owner plans to acquire alternative land to continue the current level of commercial livestock farming activities.

Construction activities can be expected to be accompanied by noise and visual disturbance created by the construction activities themselves, as well as the presence and movement of construction workers on the impacted farms. This could potentially cause a change in the sense of place for workers and residents located in the immediate zone of influence (i.e. affected farm and directly adjacent farms). Once operational, the visible substation and powerline will further negatively impact the sense of place for residents, farm employees, as well as any potential visitors to the area.

The specific route that the powerlines will follow is not yet determined; however, the corridor for the envisaged power lines whether starting at Substation site alternative 1 or 2 will be confined to the Portion 25 of Farm Houthaalboomen 31 and municipal land. None of the other properties will be impacted by the footprint of the power line, which means that no workers should infringe on the privacy or property of the owners of any farm but Portion 25 of Farm Houthaalboomen 31. However, since the proposed corridor is located along the boundary of the above-mentioned property with Portion 4, Portion 2, and Portion 3 of Farm Talene 25, some visual impact may still be exerted on these properties and some other nearby properties. Furthermore, the presence of construction workers on the nearby farm may still negatively impact on the way the residents of Portion 2, Portion 3, and Portion 4 of Farm Talene 25 and other farm portions adjacent to the project site perceive their safety and security.

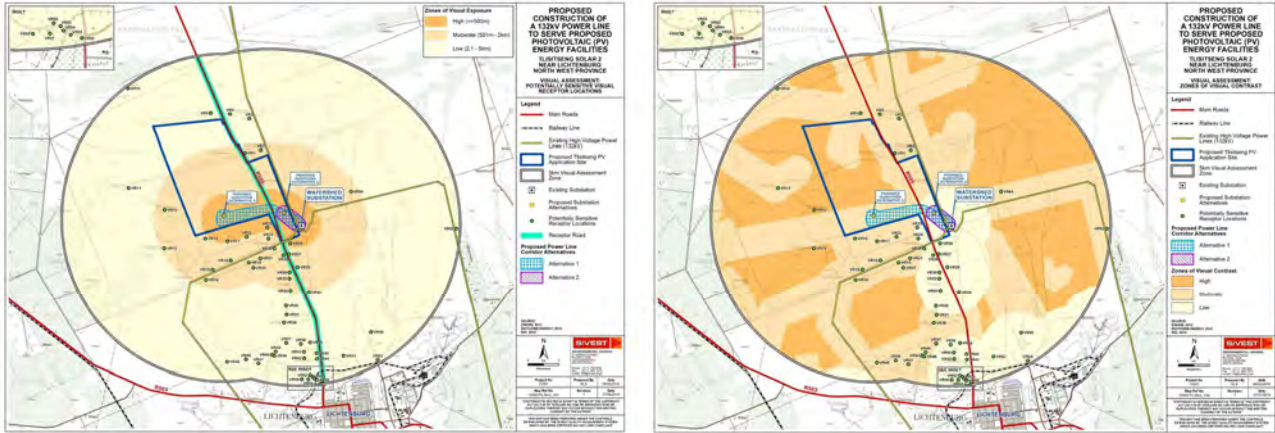


Figure 4-1: Visual exposure zone (left) and visual impact (right) of the 132kV power line for Tlisitseng 2 Solar PV facility (SiVEST, 2016)

The preferred substation site alternative is dependent on the following factors:

- **Land use:** The impact on the current land use will be the same for both site alternatives being considered. Regardless of the site alternative chosen, the commercial livestock activities on Portion 25 of Farm Houthaalboomen will be negatively impacted. The land owner will however, acquire alternative land where the activities can be continued; thus, no permanent decrease in agricultural production can be expected directly as a result of the construction of the substation and powerline.
- **Change in sense of place:** As discussed, the land owner of Portion 1 of Farm Talene 25 has expressed unhappiness over the potential visual impact that could ensue from the proposed infrastructure developments. Currently, the farm hosts a local entertainment spot (Rafter Pub) with plans to start offering accommodation facilities in the future. The land owner also resides on the farm and plans to retire on the same farm. Furthermore, the land owner of Portion 3 of Farm Talene 25 objects to the project in general and also raised concerns over the change in the sense of place.

Considering the above, it is recommended that when selecting the specific route for the power line, it should be chosen in such a way as to choose the shortest route with the smallest visual impact and to locate further away from the boundary of Portion 25 of Farm Houthaalboomen with Portion 2, Portion 3, and Portion 4 of Farm Talene 25. Then, considering the fact that the consultation revealed that the potentially visually sensitive land owners are located south of the proposed Tlisiseng PV array, the substation site alternative 2 may be associated with a smaller visual effect due to its being located further away from these sensitive receptors, compared to substation site alternative 1.

Alternative	Preference	Reasons
Tlisiseng 1 Substation Option 1	Not preferred	The alternative will have the largest impact on sensitive receptors due to the proximity to them and the longer route.
Tlisiseng 1 Substation Option 2	Preferred	The alternative is associated with a smaller visual impact on the sensitive receptor due to being located further away from them and a shorter route.

4.5 Cumulative effects

Power lines, as discussed in this report, are intrinsically connected to an electricity generating facility. Therefore, when reviewing the cumulative effects of the project, the assessment took into account other solar PV developments within the proximity of the site. This ensured that the assessment of the possible future cumulative effects is done following a conservative approach Principle.

4.5.1 Literature Review of socio-economic studies for existing and planned renewable energy projects

Based on the DEA's acceptance of the Final Scoping Report (FSR), the DEA requested that a cumulative environmental impact assessment be conducted including a literature review of other specialist assessments/studies on the neighbouring adjacent properties in order to ascertain any additional cumulative impacts that should be taken into consideration.

In an effort to meet this requirement, SiVEST undertook every effort to obtain the information (including specialist studies, BA/EIA/Scoping and EMPr Reports) for the respective developments.

Some of the projects that are planned to be built in the surrounding environment are at a very advanced stage, and the initial studies were undertaken in 2012. As a result, many of the documents are not currently publicly available to download. Nonetheless, SiVEST was able to source some of information that was available. The steps taken to acquire relevant documents and the documents gathered for these projects are listed below.

Table 4-1: Proposed renewable energy projects in the area, steps taken to obtain the relevant information and documents obtained

Proposed Development	EAP	Steps taken to gather information	Documents Obtained
Tlisitseng 2	SiVEST SA (Pty) Ltd	SiVEST is the EAP for the proposed development. The proposed development Final Scoping Report (FSR) has been accepted by the DEA. Additionally, the specialist impact assessments have been conducted to form part of the Draft Environmental Impact Assessment Report (DEIAR). All the relevant documents were therefore available for the cumulative assessment.	<ul style="list-style-type: none"> • Biodiversity Impact Assessment Report; • Avifaunal Impact Assessment Report; • Surface Water Impact Assessment Report; • Soils and Agricultural Potential Impact Assessment Report; • Visual Impact Assessment Report; • Heritage Impact Assessment Report;

Proposed Development	EAP	Steps taken to gather information	Documents Obtained
			<ul style="list-style-type: none"> • Socio-economic Impact Assessment Report; • Geotechnical Impact Assessment Report; and • Traffic Impact Assessment Report
Lichtenburg Solar Park	Africa Geo-Environmental Services (AGES)	<ul style="list-style-type: none"> ▪ Google Search for PV facilities near Lichtenberg North West Province; ▪ Proposed Development was found on Leads 2 Business website (www.l2b.co.za/project-region/North-West). ▪ Google search of the proposed development project name was undertaken. ▪ Consulted the SAHRA Website for Heritage and PIA Report (http://sahra.org.za/sahris/cases/lichtenburg-solar-park). ▪ Attempted to download reports from the AGES Website (http://ages-group.com/) <ul style="list-style-type: none"> ○ Reports were not available for publically available to download ▪ Contacted AGES in an effort to obtain outstanding specialist reports that were not available for public download. <ul style="list-style-type: none"> ○ AGES responded to SiVEST request for the FBAR and specialist reports noting that the proposed development has not been awarded preferred Bidder Status in terms on the DoE's IPP programme. ○ AGES further stated that they are not in a position to send any of the reports through to SiVEST. However, they were able to provide SiVEST with the locality map for the proposed Lichtenburg Solar Park as well as layout plans. ▪ Additionally, SiVEST attempted to contact the developers of the proposed development, 	<ul style="list-style-type: none"> • Archaeological Impact Assessment Report • Heritage Impact Assessment Report

Proposed Development	EAP	Steps taken to gather information	Documents Obtained
		however contact details were not publically available.	
Watershed Solar Energy Facility Phase 1	Savannah Environmental (Pty) Ltd	<ul style="list-style-type: none"> ▪ Google Search for PV facilities near Lichtenberg North West Province; ▪ The proposed Development was found on Leads 2 Business website (www.l2b.co.za/project-region/North-West). ▪ Google search of the proposed development project name was undertaken. FEIR (excluding appendices) was able to be downloaded as a PDF. ▪ Consulted the SAHRA Website for Heritage Report (http://sahra.org.za/sahris/heritage-reports/heritage-report-watershed-solar-facility). 	<ul style="list-style-type: none"> ▪ Watershed PV (phase I and II) FEIR ▪ Visual Scoping Report ▪ Social Scoping report ▪ Draft EMPr (Phase 1) ▪ Draft EMPr (Phase 2) ▪ Archaeological Impact Assessment Report ▪ Background Information Documents ▪ EAs
Watershed Solar Energy Facility Phase 2	Savannah Environmental (Pty) Ltd	<ul style="list-style-type: none"> ▪ From the SAHRA website other documents were available to be downloaded. (http://sahra.org.za/sahris/cases/watershed-solar-energy-facilities-556-557). ▪ Attempted to download reports from the Savannah Environmental Website <ul style="list-style-type: none"> ○ Reports were not publically available to download. ▪ Contacted Savannah Environmental in an effort to obtain outstanding specialist reports that we not available for public download. <ul style="list-style-type: none"> ○ Savannah Environmental noted that the project has already been archived and handed over to the developers. ○ Savannah Environmental noted that it is against their company policy to give out developers contact details. However, they were able to provide SiVEST with the EA's for the proposed development. 	
Hibernia PV Solar Energy Facility	Savannah Environmental (Pty) Ltd	<ul style="list-style-type: none"> ▪ Google Search for PV facilities near Lichtenberg North West Province; ▪ The proposed Development was found on Leads 2 Business website (www.l2b.co.za/project-region/North-West). 	<ul style="list-style-type: none"> ▪ Heritage Assessment Report ▪ Final BAR ▪ BID

Proposed Development	EAP	Steps taken to gather information	Documents Obtained
		<ul style="list-style-type: none"> ▪ Google search of the proposed development project name was undertaken. BID was able to be downloaded as a PDF. ▪ Consulted the SAHRA Website for Heritage Report (http://sahra.org.za/sahris/heritage-reports/aia-paleo-reports-hibernia). ▪ From the SAHRA website other documents were available to be downloaded. FEIR (excluding appendices) was able to be downloaded as a PDF. http://sahra.org.za/sahris/cases/hibernia-solar-facility-1062). ▪ Attempted to download reports from the Savannah Environmental Website <ul style="list-style-type: none"> ○ Reports were not publically available to download ▪ Contacted Savannah Environmental in an effort to obtain outstanding specialist reports that we not available for public download. <ul style="list-style-type: none"> ○ Savannah Environmental noted that the project has already been archived and handed over to the developers. ○ Savannah Environmental noted that it is against their company policy to give out developers contact details. However, they were able to provide SiVEST with the EA's for the proposed development. ▪ Additionally, SiVEST attempted to contact the developers of the proposed development, however contact details were not publicly available. 	

The following sections summarise the socio-economic impacts and mitigation measures proposed in the reviewed specialist reports. It should be noted that the literature review for the Lichtenburg Solar Park was not included in this study, as the only available documents for this project were the Palaeontological and Heritage Impact Assessment reports, which are considered in the literature review of the other specialists.

Watershed Solar Energy Facility Phase 1 & 2 (Savannah Environmental (Pty) Ltd., 2014

Identified Impact	Type	Impact description and proposed mitigation
Construction phase		

Identified Impact	Type	Impact description and proposed mitigation
Generation of multiple land use income	Positive	<ul style="list-style-type: none"> Multiple land use of solar energy facility has the potential to provide landowners with an alternative source of income from rentals. <p>Mitigation:</p> <ul style="list-style-type: none"> Continue utilisation of the additional parts of the farm for stock farming during the operation of the solar energy facility.
Creation of employment and business opportunities	Positive	<p>Enhancement measure:</p> <ul style="list-style-type: none"> Where reasonable and practical, contractors employed by the project proponent must implement a 'locals first' policy, especially for semi and low-skilled individuals. Where possible, efforts should be made to employ local contractors that are compliant with the Broad Based Black Economic Empowerment (BBBEE) criteria. Local authorities and community representatives, and organisations of the I&APs should be informed about the final decision regarding the project and potential job opportunities for locals as well as the employment procedures.
Potential impact on family structure and social networks associated with the presence of construction workers	Negative	<p>Mitigation:</p> <ul style="list-style-type: none"> Where reasonable and practical, contractors employed by the project proponent must implement a 'locals first' policy, especially for semi- and low-skilled individuals. This will reduce the potential impact that this category of workers could have on local family and social networks. The movement of construction workers on and off the site, should be monitored by the contractors, in this regard contractors should be responsible making necessary transportation arrangements for workers on a daily basis.
Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site.	Negative	<p>Mitigation:</p> <ul style="list-style-type: none"> The proponent should enter into an agreement with the affected landowners whereby the company will compensate for damages to farm property and disruptions to farming activities. The Proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers.
Potential noise, dust and safety impacts associated with the movement of construction related traffic to and from the site.	Negative	<p>Mitigation:</p> <ul style="list-style-type: none"> Movement of construction vehicles should be confined to period between 07h30 and 18h00 on weekdays and between 08h00 and 13h00 on Saturdays. Abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher. Dust suppression measures should be implemented for heavy vehicles

Identified Impact	Type	Impact description and proposed mitigation
		<ul style="list-style-type: none"> All vehicles must be roadworthy and drivers must be qualified, made aware of potential road safety issues, and need for strict speed limits
Operational Phase		
Promotion of clean, renewable energy through reduced carbon emissions and associated benefits in terms of global warming and climate change.	Positive	<p>Enhancement measure:</p> <ul style="list-style-type: none"> Use the project to promote and increase the contribution of renewable energy to the national energy supply. Implement a training and skills development programme for locals during the first 5 years of the operational phase with the aim of maximising the number of South African's employed during the operational phase of the project.

Hibernia Solar energy PV facility (Savannah Environmental (Pty) Ltd., 2013)

Identified Impact	Type	Impact description and proposed mitigation
Construction phase		
Creation of employment and business opportunities.	Positive	<ul style="list-style-type: none"> Locals employed during the construction phase may learn new skills, thereby making them more employable in the future. <p>Mitigation:</p> <ul style="list-style-type: none"> Where possible, the developer should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled categories. Maximise the use of local labour for low- and semi-skilled jobs as far as possible.
	Negative	<ul style="list-style-type: none"> Influx of construction workers employed on project Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction related activities Impact of heavy vehicles, including damage to road, safety, noise, and dust Loss of agricultural land associated with construction related activities An increase in the incidence of social ills such as the spread of HIV/AIDS, unwanted pregnancies, etc. <p>Mitigation:</p> <ul style="list-style-type: none"> Attention should be given to the extension and improvement of existing HIV/AIDS awareness programmes in the area.
Operation phase		
Change in the aesthetics of the surrounding	Negative	<ul style="list-style-type: none"> Effect on people living and working locally, change of local site character from agriculture to industrial.

Identified Impact	Type	Impact description and proposed mitigation
environment as a result of the operation of PV array and associated infrastructure (access roads etc.)		<ul style="list-style-type: none"> Impact from irregular maintenance visits to clean the planes, etc. <p>Mitigation:</p> <ul style="list-style-type: none"> Protection afforded to shielding objects such as trees.
Creation of employment and business operations.	Positive	<ul style="list-style-type: none"> Benefits associated with the establishment of local community trust and strong social ties. <p>Mitigation:</p> <ul style="list-style-type: none"> Where possible, the developer must employ locals.
	Negative	<ul style="list-style-type: none"> Visual impacts and associated impacts on sense of place <p>Mitigation:</p> <ul style="list-style-type: none"> No mitigation measures exist.

4.5.2 Summary of potential cumulative effects

The following table summarises the social and socio-economic impacts identified during the literature review of social and socio-economic studies referred to earlier in this section. However, it is important to note that not all socio-economic studies reviewed, included quantitative data; therefore, the summary of the cumulative effects is limited to the data available for each project reviewed and the information contained in the reviewed documents.

Table 4-2: Summarised projected cumulative effects

Impact	Details/Recommendations
Watershed Solar PV phase 1 & 2 energy facilities	
Construction phase:	
<ul style="list-style-type: none"> Generation of multiple land use income 	<ul style="list-style-type: none"> The multiple land use income is a result of the potential alternative income that may be sourced from renting out land by current landowners so as to create more sustainable farming practices <i>Continual utilisation of additional parts of the farm for stock farming during the operation of the solar energy facility is thus recommended so as to optimise economic productivity of land.</i>
<ul style="list-style-type: none"> Creation of employment and business opportunities 	<ul style="list-style-type: none"> The creation of employment and business activities in the area has the potential to result in a positive cumulative impact for local workers, as it is a chance to improve and enhance the skills of the people in the area <i>In order to enhance this impact, it is recommended that the developer should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi- and low-skilled categories.</i>
<ul style="list-style-type: none"> Potential impact on family structure and social networks associated with the 	<ul style="list-style-type: none"> Impacts on family and community relations that may, in some cases, persist for a long period. Also in cases where unplanned/unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or

Impact	Details/Recommendations
presence of construction workers	<p>AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community. The development of other solar energy projects in the area may exacerbate these impacts.</p> <ul style="list-style-type: none"> • <i>The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.</i> • <i>The establishment of a Monitoring Forum prior to the commencement of the construction phase, is especially important as it may possibly play the role of monitoring the implementation of proposed mitigation measures. The project proponent would also be responsible for making the MF aware of the risks associated with the presence of construction workers.</i>
<ul style="list-style-type: none"> • Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site. 	<ul style="list-style-type: none"> • <i>The proponent should enter into an agreement with the affected, whereby the company will compensate for damages to farm property and disruptions to farming activities.</i> • <i>The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers.</i>
<ul style="list-style-type: none"> • Potential noise, dust and safety impacts associated with the movement of construction related traffic to and from the site. 	<ul style="list-style-type: none"> • Increased traffic congestion • Increases in dust and noise nuisance • <i>The contractor must ensure that all damage caused to the Elandsfontein Road by construction-related activities, including heavy vehicles, is repaired before the completion of the construction phase.</i> • <i>Dust suppression methods should be implemented.</i>
Operation Phase:	
<ul style="list-style-type: none"> • Promotion of clean, renewable energy through reduced carbon emissions and associated benefits in terms of global warming and climate change. 	<ul style="list-style-type: none"> • The promotion of clean renewable energy is expected to result in reduced carbon emissions via the use of numerous other renewable energy projects and associated benefits in terms of climate change and global warming. • <i>The cumulative impact can be enhanced through using the proposed project to promote and increase the contribution of renewable energy to the national energy supply.</i> • <i>Implement a training and skills development programme for locals during the first 5 years of the operational phase with the aim of maximising the number of South Africans employed during the operational phase.</i>
Hibernia Solar PV energy facility	
Construction phase:	
<ul style="list-style-type: none"> • Creation of employment and business opportunities. 	<p>Positive cumulative impact- employment creation:</p> <ul style="list-style-type: none"> • Locals will be able to benefit from the direct and indirect cumulative impacts of the created employment opportunities.

Impact	Details/Recommendations
	<ul style="list-style-type: none"> • <i>Where possible, the project proponent should make it a requirement for contractors to implement a “locals first” policy for construction jobs, specifically semi- and low-skilled job categories; thus, reducing the potential impact that this category of worker could have on local family and social networks.</i> • <i>Maximise the use of local labour for low and semi-skilled far as possible.</i> <p>Negative cumulative impact due to influx of workers:</p> <ul style="list-style-type: none"> • Impacts on family and community relations that may, persist for a long period of time. Also in cases where unplanned/unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV/AIDS, the impacts may be permanent cumulative impacts on the affected individuals and/or families and the community. • <i>Attention should be given to the extension and improvement of existing HIV/AIDS awareness programmes in the area.</i>

5 IMPACT EVALUATION AND PROPOSED MITIGATION MEASURES

Based on the impact analysis discussed in the previous section, the impact evaluation can be applied to any one of the substation alternatives being considered.

Table 5-1: Impact Table

Impact on employment creation		
Environmental Parameter	Construction, and to some degree maintenance, of the proposed substation and powerline will create or support employment in the relevant sectors as a result of direct, indirect, and induced effects.	
Issue/Impact/Environmental Effect/Nature	It is estimated that the project will create six temporary employment positions during the construction phase and 1.5 FTE sustainable annual positions for servitude maintenance and maintenance of the substation thereafter.	
<i>Extent</i>	Impact will affect the entire country.	
<i>Probability</i>	The impact will certainly occur (greater than 75% chance).	
<i>Reversibility</i>	The impact is completely reversible.	
<i>Irreplaceable loss of resources</i>	The impact will not result in any loss of resources.	
<i>Duration</i>	The impact and its effects is predominantly short term	
<i>Cumulative effect</i>	No cumulative effect	
<i>Intensity/magnitude</i>	Impact affects the quality, use, and integrity of the system component in a way that is barely perceptible.	
<i>Significance rating</i>	<p>Prior to mitigation measures:</p> <p>Positive low: The anticipated impact will have minor positive effects.</p> <p>After mitigation measures:</p> <p>The proposed mitigation measures will increase the benefit but will not increase the magnitude of the impact.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	4	4
Reversibility	1	1

Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	12	12
Mitigation measures	Where possible and feasible, local labour procurement should be practised. In addition, if feasible, goods and services should be procured from local small businesses. This will increase the benefit to the local community.	
Impact on economic production		
Environmental Parameter	The proposed substation and powerline will require capital expenditure for goods and services during its construction. This will directly and indirectly contribute to revenue generation of those industries related to this sector by increasing the demand for goods and services for respective businesses	
Issue/Impact/Environmental Effect/Nature	The project requires a direct CAPEX investment of R79.6 million, provided that the total CAPEX is spent in South Africa, the economy of the country will experience a total increase in production of R239.6 million.	
<i>Extent</i>	The impact will affect the national economy	
<i>Probability</i>	The impact will certainly occur (greater than 75% chance of occurrence)	
<i>Reversibility</i>	The impact is completely reversible.	
<i>Irreplaceable loss of resources</i>	The impact will not result in any loss of resources	
<i>Duration</i>	Short-term – the impact and its effects will disappear once the construction period is over.	
<i>Cumulative effect</i>	The impact does not have any cumulative effects.	
<i>Intensity/magnitude</i>	Impact alters the quality, use, and integrity of the system/component but the system/component still continues to function in a moderately modified way.	
<i>Significance rating</i>	Prior to mitigation measures:	

	<p>Positive medium impact: the anticipated impact will have moderate positive effects.</p> <p>After mitigation measures:</p> <p>Proposed mitigation measures will increase the benefit to the local community member, but the national impact will remain positive medium.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	4	4
Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	2	2
Significance rating	24	24
Mitigation measures	<p>If possible, goods and services should be procured from local small businesses and local contractors should be utilised to maximise the benefit to the local community.</p>	
Impact on service infrastructure		
Environmental Parameter	The proposed development requires access to the Watershed MTS.	
Issue/Impact/Environmental Effect/Nature	The proposed 132 kV substation and powerline will provide the required access for the proposed Tlisitseng 2 PV facility to the national grid.	
<i>Extent</i>	The impact will affect the country	
<i>Probability</i>	The impact will certainly occur (greater than 75% chance of occurrence)	
<i>Reversibility</i>	The impact is partly reversible	
<i>Irreplaceable loss of resources</i>	The impact will not result in any loss of resources	
<i>Duration</i>	Permanent	

<i>Cumulative effect</i>	The impact will not have any cumulative effects.	
<i>Intensity/magnitude</i>	Impact alters the quality, use, and integrity of the system/component but the system/component still continues to function in a moderately modified way.	
<i>Significance rating</i>	<p>Prior to mitigation measures: Positive medium impact: the anticipated impact will have moderate positive effects.</p> <p>After mitigation measures: Positive medium impact.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	4	4
Reversibility	2	2
Irreplaceable loss	1	1
Duration	4	4
Cumulative effect	1	1
Intensity/magnitude	2	2
Significance rating	32	32
Mitigation measures	No mitigation measures exist.	
Impact on current land uses and change in sense of place		
Environmental Parameter	The directly impacted land is used for commercial maize and livestock farming, while the adjacent or indirectly affected farm portions are predominantly used for a mix of commercial farming activities, catering, and residential purposes.	
Issue/Impact/Environmental Effect/Nature	The construction of the proposed substation will neutralise the land for agricultural purposes. At the same time, the construction activities and corresponding influx of construction workers to the sight will result in a change of sense of place for the local community; once completed, the physical presence of the electrical infrastructure constructed will contribute towards this change.	

<i>Extent</i>	The impact will affect the local community	
<i>Probability</i>	The impact will certainly occur (greater than 75% chance of occurrence)	
<i>Reversibility</i>	The impact is unlikely to be reversed, even with intense mitigation measures.	
<i>Irreplaceable loss of resources</i>	The impact will result in marginal loss of resources.	
<i>Duration</i>	Permanent	
<i>Cumulative effect</i>	The impact would result in a significant cumulative effect since it will coincide with the development of the PV facility, the result being that the entire area affected by the footprint of Tlisitseng 2 PV array will be neutralised for agriculture production while the change in sense of place will be magnified for the community as a result of additional structures being developed.	
<i>Intensity/magnitude</i>	Impact alters the quality, use, and integrity of the system/component but the system/component still continues to function in a moderately modified way.	
<i>Significance rating</i>	<p>Prior to mitigation measures:</p> <p>Negative medium impact: the anticipated impact will have moderate negative effects and will require moderate mitigation measures.</p> <p>After mitigation measures:</p> <p>Implementation of the proposed mitigation measures will achieve the desired significance rating of Negative low.</p>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	4
Reversibility	3	3
Irreplaceable loss	2	2
Duration	4	4
Cumulative effect	4	4
Intensity/magnitude	2	1

Significance rating	36	18
Mitigation measures	<ul style="list-style-type: none"> • The conditions set and requested by the directly affected land owner should be adhered to in order to limit the interruption to agricultural production. • Implement the mitigation measures recommended by the other relevant specialist (visual, noise), where feasible to limit negative impacts and their effect on the community's sense of place. • Implement public consultation and information sessions to limit the influx of migrant job seekers. • Strict rules of conduct and access control procedures should be enforced at all times to ensure that the personal property of the land owners on and surrounding the site is respected by all workers/contractors of the project proponent. 	

5.1 Potential cumulative effects

The following table assesses the significance of all the socio-economic cumulative impacts mentioned above, divided into the negative and positive groups.

Negative socio-economic cumulative impacts	
Environmental Parameter	A number of negative socio-economic cumulative effects are expected as a result of multiple developments in the area in addition to the project in question
Issue/Impact/Environmental Effect/Nature	<ul style="list-style-type: none"> • Potential impact on family structure and social networks associated with the presence of construction workers • Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site • Potential noise, dust and safety impacts associated with the movement of construction related traffic to and from the site.
Extent	All of the potential negative socio-economic cumulative effects will mainly be site specific and will not extend beyond the local area
Probability	The impacts will likely occur (Between a 50% to 75% chance of occurrence)
Reversibility	Most of the impacts are completely reversible.
Irreplaceable loss of resources	The impacts will not result in the loss of any resources.
Duration	The impacts will be short-term.
Cumulative effect	The impacts will result in insignificant cumulative impacts.
Intensity/magnitude	The impacts will possibly alter the quality, use and integrity of the system but the system will continue to function in a

	moderately modified way and will still maintain the general integrity.	
Significance rating	The impact will be negative low during both before and after mitigations.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	2	2
Intensity/magnitude	2	2
Significance rating	-20 (Negative Low)	-18 (Negative Low)
Mitigation measures	<ul style="list-style-type: none"> • Devise and implement, preferably with other developers in the area, an HIV/AIDS, drug abuse, and sexual health awareness programme in the local community prior the start of the construction, if possible, or during the construction phase • Educate the construction workers on the HIV/AIDS, drug abuse, and sexual health issues • Hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers' activities during and after work hours 	

Positive socio-economic cumulative impacts	
Environmental Parameter	The proposed project together with other planned developments will result in a number of positive cumulative effects on the socio-economic environment
Issue/Impact/Environmental Effect/Nature	<ul style="list-style-type: none"> • Creation of employment and business opportunities
Extent	The proposed positive cumulative effects will be largely concentrated in the local area but some will extend beyond its boundaries
Probability	The impacts will likely occur (Between a 50% to 75% chance of occurrence)
Reversibility	Impacts are completely reversible.
Irreplaceable loss of resources	The impacts will not result in the loss of any resources.
Duration	The impacts will be long-term.
Cumulative effect	The impacts will result in minor cumulative effects.
Intensity/magnitude	The impacts will possibly alter the quality, use and integrity of the system but the system will continue to function in a moderately modified way and will still maintain the general integrity.
Significance rating	The positive cumulative effects are expected to be of medium significance both before and after mitigations.

	Pre-mitigation impact rating	Post mitigation impact rating
Extent	3	3
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	2	2
Intensity/magnitude	3	3
Significance rating	+39 (Positive Medium)	+39 (Positive Medium)
Mitigation measures	<ul style="list-style-type: none"> • Implement the “locals first” policy • Aim to employ the people who have already worked on other similar projects in the area to provide them with an opportunity for long-term employment and to continue developing their skills • Here feasible, continue utilising parts of the farm for stock farming during the operation of the solar energy facility to optimise economic productivity of the land 	

6 CONCLUSION

BioTherm proposes the development of the Tlisitseng 2 Solar PV energy facility on Portion 25 of Farm Houthaalboomen 31 near Lichtenburg in the North West Province. It is intended that the PV facility will be connected to the national grid via the nearby Watershed MTS. To achieve this connection, the proposed 132 kV on-site substation and 132 kV powerline must be constructed.

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 impact the project from a policy perspective, although care will have to be taken to ensure that the establishment and growth of activities identified as drivers of economic development in the study area is not unduly negatively impacted by the establishment of the project in the proposed region.

The proposed construction of bulk infrastructure will not only assist by providing the infrastructure for the Tlisitseng 1 development to gain access to the national grid by improving electricity supply in the region. It also has the potential to stimulate the national economy through an increase in production to the value of R239.6 million. The construction will furthermore, create or support approximately six temporary jobs, while the maintenance will create 1.5 permanent FTE opportunities. The benefit to the local community is uncertain; however, certain mitigation measures can be implemented by the project proponent, which would maximise the benefit to the local community.

The directly impacted land owner of Portion 25 of Farm Houthaalboomen 31 has indicated that alternative land can be acquired, which would allow him to continue the current levels of agriculture production. This is however, dependent on the condition that he receives some rental income in advance. No loss in agricultural production is, therefore, expected as a direct result of the development.

At the same time, the adjacent land owners of Portion 1 of Farm Talene 25 and Portion 3 of Farm Talene 25 have objected to the project due to the possible visual impact and effects thereof on their sense of place.

Considering the location of the sensitive receptors identified from the consultation process suggest that substation site alternative 2 may be associated with a notably lower negative effect on the sensitive receptors than that of site alternative 1. This is mainly due to site alternative 2 being associated with a shorter power line route and located further away from the sensitive receptors observed on Portion 1 of Farm Talene 25 and Portion 3 of Farm Talene. Considering the fact that all other impacts evaluated will be the same regardless of the site alternative chosen, site alternative 2 is indeed the preferred alternative from a socio-economic perspective.

REFERENCES

- Chief Surveyor-General. (2016, February 11). Spatial Cadastral Data. Retrieved from Chief Surveyor-General.
- Department of Economic Development. (2010). The New Growth Path: The Framework.
- Department of Economic Development, Environment, Conservation, and Tourism. (2008). North West Provincial Spatial Development Framework and Environmental Management Plan . *Vol 7/8 of the North West Environmental Management Series*.
- Department of Economic Development, Environment, Conservation, and Tourism. (2012). Renewable Energy Strategy for the North West Province.
- Department of Minerals and Energy. (2003). White Paper on Renewable Energy.
- Ditsobotla LM. (2011). Integrated Development Plan 2011/12 - 2015/16.
- Modise, M. (2013). Overview of Renewable Energy Roadmap - Public workshop on Draft Integrated Energy Planning Report. Department of Energy.
- National Planning Commission. (2011). National Development Plan 2010 - 2030.
- Ngaka Modiri Molema District Municipality. (n.d.). Integrated Development Plan - Amendment 2015/2016 financial year.
- Ngaka Modiri Molema District Municipality. (n.d.). Integrated Development Plan 2012 - 2016.
- North West Planning Commission. (2013). North West Provincial Development Plan 2030.
- North West Province: Office of the Premier. (2004). North West Provincial Growth and Development Strategy (2004 - 2014).
- Quantec. (2014). Standard Regionalised Data Series.
- Republic of South Africa. (2008). National Energy Act.
- Republic of South Africa. (2011). Integrated Resource Plan for South Africa (2010 - 2030).
- Stats SA. (2012). National Census 2011.
- The Presidency of the Republic of South Africa. (2006). National Spatial Development Perspective.
- Urban-Econ . (2016). GIS Department.

ANNEXURE A: IMPACT RATING CRITERIA AND METHODOOGY

The rating system will be applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts will be consolidated into one rating. In assessing the significance of each issue the following criteria is used:

Table 1: Description of terms

Nature		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
Geographical Extent		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
Probability		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (less than 25% chance of occurrence).
2	Possible	The impact may occur (between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (greater than a 75% chance of occurrence).
Reversibility		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures

2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

Irreplaceable Loss of Resources

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resource	The impact will result in significant loss of resources.
4	Complete loss of resource	The impact results in a complete loss of all resources.

Duration

This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue and last for the entire operational life of the development, but will be mitigated by direct human action or natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (indefinite).

Cumulative Effect

This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to

other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects.
Intensity/Magnitude		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use, and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use, and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity, and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very High	Impact affects the continued viability of the system/component and the quality, use, integrity, and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation is often impossible. If possible rehabilitation and remediation is often unfeasible due to extremely high costs of rehabilitation and remediation.
Significance		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:		
(Extent + Probability + Reversibility + Irreplaceability + Duration + Cumulative Effect) x Magnitude/Intensity.		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 - 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 - 28	Positive low impact	The anticipated impact will have minor positive effects.
29 - 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 - 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 - 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 - 73	Positive high impact	The anticipated impact will have significant positive effects.
74 - 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 - 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

Table 2: Comparative assessment of alternatives: Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**environmental affairs**

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	To Be confirmed
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Proposed Construction of the Tlitseng 2 132Kv Substation and 132Kv powerline on Farm Houthaalboomen 31 near Litchenburg, North West Province

Specialist: Contact person: Postal address: Postal code: Telephone: E-mail: Professional affiliation(s) (if any)	Urban-Econ Elena Broughton 137 Muckleneuk Street, Brooklyn 0181 012 342 0332 elena@urban-econ.com SAPOA Urban-Econ Development Economists (Pty) Ltd	Cell: Fax:	082 463 2325 086 619 6911
Project Consultant: Contact person: Postal address: Postal code: Telephone: E-mail:	SiVEST Veronique Evans P O Box 2921, Rivonia, South Africa 2128 011 798 0633 veronique@sivest.co.za	Cell:	082 825 6069 011 803 7272

4.2 The specialist appointed in terms of the Regulations_

I, **Elena Broughton**, declare that--

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Urban-Econ

Name of company (if applicable):

03 May 2017

Date:

CV: ELENA BROUGHTON (SR PROFESSIONAL)

Name of firm:	Urban-Econ Development Economist Pty Ltd
Name of staff:	Elena Broughton
Date of Birth:	11 September 1980
Profession:	Development Economist
Position:	Unit Manager/Sr Economist
Years' Experience:	12 Years
Degrees:	MSc, BSc (Hon), BCom (Hon)

Elena Broughton completed her BCom (Hon) in Economics in Russia, at Nizhny Novgorod State University in 2002 specialising in regional economics. At the same time, she completed an additional degree as translator/Interpreter in Professional Orientated Communication. After completion of her Honours degree in Economics, Elena has moved to the USA and stayed there for 1.5 years. During her stay in the USA, she completed a number of Accounting and Business courses at Parkland College, Illinois. In 2007, she obtained her BSc (Hon) in Technology Management (Cum Laude) at the University of Pretoria and later received her MSc in Technology Management (2011) from the same university.

Elena Broughton is a senior professional at Urban-Econ and has an extensive knowledge in various fields of economic development, including impact assessments, investment strategy formulation, strategic decision analysis, and monitoring and evaluation. She is experienced in developing input-output and SAM-based models, as well as development and application of other econometric techniques. Over the past few years, she was able to extend her experience in these fields working on projects for both government and the private sector.

The following projects are some of the examples of economic and socio-economic impact studies that Elena completed:

- Thabametsi Coal Mine Sustainable Development Investigation and Economic Impact Assessment, Limpopo
- Mafube Nooitgedacht and Wildfontein EIA/EMP Sustainable Development Investigation Study, Mpumalanga
- Mooifontein Coal Mine Comparative Analysis, Mpumalanga
- Inyoni Colliery Mine, Mpumalanga
- Zandkopsdrift Rare Earth Elements (REE) Project Economic Impact Assessment
- Saldanha Bay Separation Plant Economic Impact Assessment
- Eskom CSP Macro-Economic Impact Assessment
- Proposed Exxaro IPP Coal-Powered Power Station near Lephallale
- Eskom Sere Wind (WEF1) Macro-Economic Impact Assessment
- Farm 198 PV Solar Energy Facility north of Kimberley in the Northern Cape (210 MW PV solar facility)
- Wag'nbiokiespan PV Solar Energy Facility near Boshof, the Free State Province (75 MW PV solar facility)
- Eskom Ariadne-Eros Power Lines Economic and Agricultural Impact Assessment
- Eskom Ingula Pumped Storage Scheme Regional Economic Impact Assessment
- N3 Highway Economic Impact Assessment
- The Mandela Bay Precinct Economic Impact Assessment
- Arriesfontein Solar Energy Park near Danielskuil in the Northern Cape (100 MW CSP-Tower facility and 225 MW PV solar facility)
- Humansrus Solar Energy Facility near Postmasburg in the Northern Cape (100 MW CSP-Tower facility)
- Rooipunt Solar Energy Park near Upington in the Northern Cape (100 MW CSP-Tower facility and 215 MW PV solar facility)
- Farm 198 PV Solar Energy Facility north of Kimberley in the Northern Cape (210 MW PV solar facility)
- Wag'nbiokiespan PV Solar Energy Facility near Boshof, the Free State Province (75 MW PV solar facility)

REPORT SIGN OFF

This report was prepared by Urban-Econ Development Economists and was checked and approved by Elena Broughton, a manager and senior economist at the company. To the best of our knowledge, the information contained in the report reflects the most recent data available at the time of the study; however, Urban-Econ Development Economists do not assume any liability whatsoever for the accuracy and completeness of the information which was used to inform the assessment.

Finalised and signed on 3 May 2017.



Elena Broughton

for Urban-Econ Development Economists

Cell: 082 463 2325

Email: elena@urban-econ.com