ENVIRONMENTAL IMPACT ASSESSMENT FOR THE ALETTA 140 MW WIND FARM NEAR COPPERTON, NORTHERN CAPE

SOCIO-ECONOMIC IMPACT STUDY

FINAL REPORT

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URBAN-ECON
Development Economists

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.

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Project leader:

Elena Broughton

Cell: 082 463 2325

Email: elena@urban-econ.com

Report writer:

Memory Madondo

Cell: 073 936 2660

Email: memory@urban-econ.com

SPECIALISTS DETAILS

Elena Broughton

Cell: 082 463 2325

E-mail: elena@urban-econ.com

Position: Manager/Senior Economist

Qualifications: MSc Technology Management, BSC (Hon) Technology Management, BCom (Hon) Economics

Experience: 11 years

Brief profile: Elena Broughton is a senior professional and the manager of the Innovation & Sustainable Development Unit at Urban-Econ. She has extensive knowledge in various fields of economic development that includes 11 years of experience in undertaking socio-economic impact assessment studies for a variety of private clients spanning the mining, manufacturing, energy, infrastructure, and retail sectors. She also acted as a peer reviewer in a number of socio-economic impact assessment studies and completed a few strategic socio-economic impact assessments. Her involvement in the field allowed her to develop a sound understanding of the South African environmental legislation and developmental policies and equipped her with a widespread knowledge of socio-economic implications and benefits of various new developments.

Memory Madondo

Cell: 073 936 2660

E-mail: memory@urban-econ.com

Position: Development economist

Qualifications: BSc Mathematical Statistics, BCom Statistics

Experience: 5 years

Brief profile: **Memory Madondo** is a seasoned social and economic development practitioner. Her special fields of interest include sustainable development, community and enterprise development. She has successfully conducted and coordinated research activities in South Africa, including data collection, stakeholder interviews, and community needs assessments. As a Development Economist specialising in Innovation & Sustainable Development at Urban-Econ Development Economists (Pty) Ltd, she has gained experience in several economic arenas such as collation and analytic processing of economic data, trend analysis, forecasting and economic development amongst others. She has also carried out a number of socio-economic impact assessments of varying magnitude and has in turn gained good skill in report writing and presentation. She continues to gain further knowledge as well as expertise in the economic field.

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ACRONYMS AND ABBREVIATIONS

ACIP	Accelerated Community Infrastructure Programme
CAGR	Compounded Annual Growth Rate
CAPEX	Capital Expenditure
COGHSTA	Co-operative Governance, Human Settlements and Traditional Affairs
CSP	Concentrated Solar Power
DoE	Department of Energy
DM	District Municipality
EIA	Environmental Impact Assessment
ha	Hectare
GDP	Gross Domestic Product
GDP-R	Gross Domestic Product per Region
GDS	Growth and Development Strategy
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEA	International Energy Agency
IRP	Integrated Resource Plan
IPAP	Industrial Policy Action Plan
km	Kilometre
km^2	Square kilometre
kV	kilovolts
LED	Local Economic Development
LM	Local Municipality
MW	Megawatt
NDP	National Development Plan
NEA	Not Economically Active

NGPF	New Growth Path Framework
NSDP	National Spatial Development Perspective
OPEX	Operational Expenditure
PDP	Provincial Development Plan
p/m	Per month
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
RE	Renewable Energy
REIPPP	Renewable Energy Independent Power Producer Procurement
SDF	Spatial Development Framework
Stats SA	Statistics South Africa

1 INTRODUCTION

This document is prepared by **Urban-Econ Development Economists** in request by **SiVEST Environmental Division** on behalf of **BioTherm Energy (Pty) Ltd** (hereafter referred to as BioTherm) to undertake a Socio-Economic Impact Study for the **proposed construction of the 140 MW Aletta Wind Facility** near Copperton in the Northern Cape province. The socio-economic impact study is conducted as part of the Environmental Impact Assessment (EIA) process managed by SiVEST Environmental Division.

1.1 Brief Description of the Project

BioTherm is proposing the construction of the Aletta 140 MW Wind Facility about 6km north-east of Copperton in the Northern Cape province. In addition, a 132 kV power line and substation will be required to connect the wind facility to the Eskom grid; a separate assessment is undertaken for these two components of the project. It is proposed that the wind facility will be located on the Portion 1,2,3 and the remainder of the farm Drielingspan No. 101 situated in the Siyathemba LM. Figure 1-1 illustrates the extent of the project within these farm boundaries.

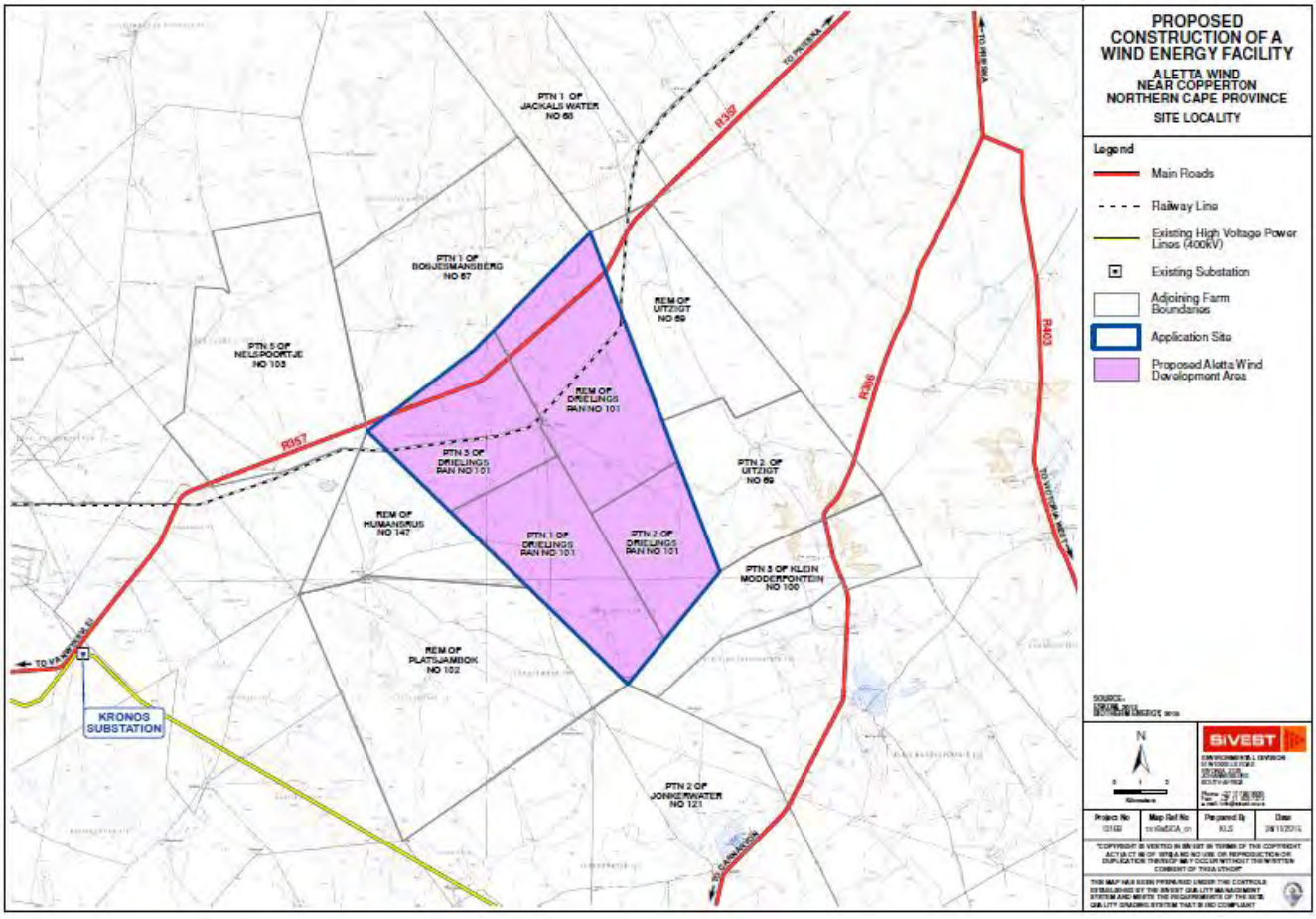


Figure 1-1: Proposed location of the Aletta Wind Facility (SiVest, 2016)

1.2 Scope and Purpose of the Study

The socio-economic impact assessment contains information that together with other specialists allows assessment of the project from a sustainable development perspective and assists in identifying "the most practicable environmental option" that provides the "most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society", in the long-term and the short-term. In light of the above and in line with the Environmental Impact Assessment (EIA) Regulations of 2010, the purpose of the socio-economic impact assessment is to assess the need and desirability of the project. It specifically aims to ensure that the project, if approved, provides for justifiable social and economic development outcomes. As such, it aims to:

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

The specific objectives of the study include:

- Engage with the environmental practitioner, other specialists on the team and the client to gain necessary background on the project
- Delineate the zone of influence in consultation with other specialists on the team
- Determine the affected communities and economies located in the zone of influence and identify sensitive receptors within the delineated study area, i.e. communities, land uses and economic activities that could be directly or indirectly negatively affected by the proposed project or benefit from it
- Determine the data required to assess potential impacts and respond to the questions outlined in the guidelines related to needs and desirability assessment
- Review secondary data and assess data gaps
- Collect primary social and economic data of the parties that may be directly or indirectly be affected (positively or negatively) by the proposed project to address data gaps
- Create profiles for the communities and economies representing the study areas and the environmentally affected zone
- Assess the need a desirability of the project and its alternatives in line with the specified guidelines
- Identify, predict and evaluate the potential positive and negative impacts associated with the project following the environmental specialist's methodology
- Advise on the most suitable alternative, inclusive of the "no-go" option
- Develop a mitigation plan by proposing mitigation measures for negative effects and enhancement measures for positive impacts

1.3 Methodology

The following methodology was followed in completing the study:

1. **Orientation:** The study started with gaining an understanding of the proposed project during various stages of its lifecycle and potentially affected environment. A review of various data and maps provided for the project, as well as discussions with the project team, informed the delineation of the potential zone of influence associated with each component of the project. The delineated zone of influence defined the spatial boundaries of the area to be included in the assessment and assisted in identifying likely impacted and beneficiary communities and economic activities, as well as other stakeholders of the project.
2. **Policy alignment review:** Relevant government policies and other strategic documents were gathered and reviewed to determine the alignment of the proposed project with the strategic plans of various government spheres and highlight ay potential red flags, if such exist.
3. **Baseline profiling:** Following policy review, primary and secondary data were gathered to create the socio-economic profile of the delineated zone of influence. The baseline profile assisted in gaining an understanding of the communities and economic activities to be likely affected or benefit from the proposed project. This included description of the study area's composition and locational factors, economic and labour profiles, way of life of communities located within the zone of influence, their demographic trends and cultural references, their health and wellbeing, and their living environment. Specific attention was paid to the socio-economic composition of the area affected by the project's footprint and its potential environmental effects, i.e. visual, noise, air pollution, etc.
4. **Impact analysis and evaluation:** Derived from the review of the project and the feedback received from various parties during data collection, the list of various negative and positive socio-economic impacts that can ensure as a result of the proposed activity during various stages of its life cycle was drawn and analysed. All identified socio-economic impacts were assessed and categorised in line with the rating provided by the environmental specialist (refer to Annexure A).
5. **Need and desirability assessment:** Given the knowledge of the project and the profile of the area where it is proposed to be located, the need and desirability thereof from a locational perspective was investigated. It involved the assessment of the project's alignment with the interests and needs of the broader public and the suitability and necessity of the project considering the chosen time and place.
6. **Formulation of mitigation and enhancement measures:** Following the analysis and ranking of impact, mitigation and enhancement measures, where applicable, were formulated whereby recommendations to reduce or eliminate the potential negative effects on the affected parties and enhance positive impacts were provided.

1.4 Data gathering and consultation process

The project made use of both 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)
    - Pixley Ka Seme District Municipality Integrated Development Plan (Pixley Ka Seme IDP) (2014/2015-2016/2017)
    - Siyathemba Local Municipality Integrated Development Plan (Siyathemba IDP) (2015/16)
- Spatial Development Frameworks
    - Northern Cape Provincial Spatial Development Framework (NC PSDF) (2012)
    - Pixley Ka Seme DM Spatial Development Framework (Pixley Ka Seme SDF) (2013-2018)
- Provincial strategic documents
    - Northern Cape Provincial Growth and Development Strategy (NC PGDS) (2008)
    - Northern Cape Local Economic Development Strategy (NC LEDS) (2011)
- National strategic documents
    - New Growth Path Framework (NGPF) (2010)
    - National Development Plan (NDP) 2030 (2011 – 2030)
    - Integrated Resource Plan (IRP) 2010-2030 promulgated in 2011
    - Industrial Policy Action Plan (IPAP2) (2014/2015 – 2016/2017)

Primary data gathering

The main purpose of the primary data collection exercise was to gain an insight into the socio-economic characteristics of the zone of influence. Therefore, the primary data gathering exercise focused on engaging with interested and affected parties (I&APs) through telephonic interviews and e-mail communication. Initial contact was done through telephonic communications, which took place between the 20th and 25th of January 2016.

The following table outlines the parties that were successfully engaged with during the course of the study.

Table 1-1: Information on contacted interested and affected parties (I&APs)

Farm	Contact person	Position	Means and date of data collection (2016)
Portion 1,2,3 and Rem of Drielingspan no. 101	Sanda De Jager	Farm owner	Telephonic interview 20/01/2016
Remainder of Uitzigt no. 69	Sanda De Jager	Farm owner	Telephonic interview 20/01/2016
Remainder of Platsjambok no. 102	Wynand Jacobus	Farm owner	Telephone interview 20/01/2016
Portion 5 of Nelspoortjie	Wilhette Fourie	Farm owner	Telephonic interview 25/01/2016
Seef Properties (Prieska)	Koba Fourie	Manager	Telephonic interview

The following table outlines the I&APs that were not possible to engage with.

Table 1-2: I&APs that could not be contacted

I&AP	Reason for non-engagement
Portion 1 of Bosjesmansberg no. 67	Contact details not available
Portion 2 of Uitzigt no. 69	No answer on given contact details
Portion 3 of Klein Modderfontein no. 100	Contact details not available
Portion 2 of Jonkerwater no. 121	No answer on given contact details
Remainder of Humansrus no. 147	No answer on given contact details
Portion 1 of Jackals Water no. 68	No answer on given contact details

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 as well as the budget specified.
- Possible impacts and stakeholder responses to these impacts cannot be predicted with complete accuracy, even when circumstances are similar and these predictions are based on research and years of experience, taking the specific set of circumstances into account.
- It is assumed that the motivation, and ensuing planning and feasibility studies for the project, were done with integrity and that all information provided to the specialist by the project proponent and its consultants to date is accurate.
- It is assumed that the project description and infrastructure components as discussed in this report are reasonably accurate. These details were used to assess the potential impacts.
- With regard to the interviews undertaken the following assumptions are made:
    - Questions asked during the interviews were answered accurately.
    - The degree of the perceived possible significance of concerns raised by some of the respondents were rated by them truthfully.
    - The attitudes of the respondents towards the project will remain reasonably stable over the short- to medium- terms.

2 POLICY REVIEW

A policy review plays an integral role in the early stages of a project. The review provides an indication of whether a project is aligned with the goals and aspirations of the developmental vision in South Africa 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):
    - New Growth Path Framework (NGPF) (2010)
    - National Development Plan (NDP) 2030 (2011 – 2030)
    - Integrated Resource Plan (IRP) 2010-2030 promulgated in 2011
    - Industrial Policy Action Plan (IPAP2) (2014/2015 – 2016/2017)
- Regional (Northern Cape province):
    - Northern Cape Provincial Spatial Development Framework (NC PSDF) (2012)
    - Northern Cape Provincial Growth and Development Strategy (NC PGDS) (2008)
    - Northern Cape Local Economic Development Strategy (NC LEDS) (2011)
- Local (Pixley ka Seme district Municipality and Siyathemba LM):
    - Pixley Ka Seme District Municipality Integrated Development Plan (Pixley Ka Seme IDP) (2014/2015-2016/2017)
    - Pixley Ka Seme DM Growth and Development Strategy (Pixley Ka Seme GDS) (2006-2016)
    - Pixley Ka Seme DM Spatial Development Framework (Pixley Ka Seme SDF) (2013-2018)
    - Siyathemba Local Municipality Integrated Development Plan (Siyathemba IDP) (2014/2015)
    - Siyathemba Local Municipality Local Economic Development (Siyathemba LED) Strategy (2012)

National policy alignment

South Africa suffers from a high level of poverty and inequality, which influence developmental objectives set by government. Greater inclusivity, faster growth (i.e. 5.4% by 2030), servicing the needs of all South Africans, equipping people with skills, and achieving close to full employment (i.e. 11 million new jobs by 2030) are among the key priorities for the country for the next fifteen years (National Planning Commission, 2011).

Investment in infrastructure, including expansion of electricity generation capacities, is acknowledged to be an important prerequisite for achieving the targeted economic growth rates and employment creation (National Planning Comission , 2011). Considering that the **NDP 2030** also calls for a more sustainable use of natural resources and transition to a low-carbon economy, it is clear that reliance on carbon fuels to generate electricity is not a desirable future. Therefore, the development of new electricity generation

capacities is planned through diversification of the current electricity generation mix, which involves among others harnessing of renewable energy sources.

Through the **Integrated Resource Plan (IRP) 2010 – 2030** (Department of Energy , 2011), government has committed to produce 8 400 MW from Photovoltaic (PV), 8 400 MW from Wind and 1 000 MW from Concentrated Solar Power (CSP) by 2030. In order to achieve this, the Renewable Energy Independent Power Producer Procurement Programme (RE IPPPP) was launched. To this date, three ministerial determinations have been made that called for the procurement of 13 125 MW (out of envisaged 17 800 MW) of renewable energy from IPPs, of which 6 360 MW were allocated for wind energy projects. Considering the four bidding windows that have been completed so far, 2 660 MW have already been awarded to wind energy projects. This means that 3 700 MW are still available for allocation in the future bidding rounds, creating opportunities for establishment of new wind energy projects similar to the one under analysis.

All of the above suggests that the proposed project is in alignment with the national developmental priorities and programmes aimed at increasing domestic electricity generational capacity. Furthermore, the proposed project, if approved, would allow sustaining "a competitive renewable energy manufacturing sector and related support industries" that would have been established in the country by that time, on the backbone of the RE IPPPP. This means that the project also falls in line with the **IPAP 2014/2015 – 2016/2017**, which focuses on strengthening the capacity of solar and wind energy generation in the country and subsequently increasing the local content of renewable energy projects in South Africa.

Regional policy alignment

The Northern Cape Province faces numerous socio-economic and developmental challenges, which are not unique to the Province and are observed throughout the country. Reducing poverty through social development and achieving a sustainable economic growth in the Province through diversification and transformation of its economy are at the forefront of the provincial government's developmental objectives (Northern Cape Government, 2008; Office of the Premier of the Northern Cape, 2012).

The Northern Cape Province is endowed with biological diversity, mineral resources, and renewable energy sources such as solar and wind. Therefore, the achievement of its developmental objectives is envisaged to be done by capitalising on the local resources and specifically, the development of the agriculture and agro-processing, mineral extraction and mineral beneficiation, fishing and aquaculture, manufacturing, and tourism industries (Northern Cape Government, 2008; Office of the Premier of the Northern Cape, 2012).

Ensuring availability of inexpensive energy is seen to be fundamental to growing competitive industries in the Province (Northern Cape Government, 2008). However, the provincial government advocates the development of the energy sector in the Province through "the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments" (Northern Cape Government, 2008). This implies the use of renewable energy sources and natural gas fields that the Province enjoys (Northern Cape Government, 2008). Provincial strategic documents specifically promote the development of large-scale renewable energy projects, similar to the one under analysis, which among others, would contribute to renewable energy targets set by national government and allow to secure supply, tackle climate change and address the needs of the Province (Office of the Premier of the Northern Cape, 2012).

Harnessing renewables is also seen to contribute towards alleviation and reduction of poverty in the Province. One of the interventions that underpins the provincial approach to poverty eradication is the "utilisation of natural resources in a sustainable manner", which in turn implies the transition to greater exploitation of renewables, including wind (Northern Cape Government, 2008).

Considering the above, it can be concluded that **the development of the proposed project follows the provincial priorities and developmental objectives**. From a spatial perspective, **the project also does not appear to raise any red flags**. As illustrated in **Figure 2-1**, the area where the project is proposed to be located is designated for agricultural land use. The review of the vision for the development of the agricultural sector in the Province further suggests that the area is suitable for forestry or grazing, where development of non-agricultural activities is not prohibited but should follow sustainable development principles.

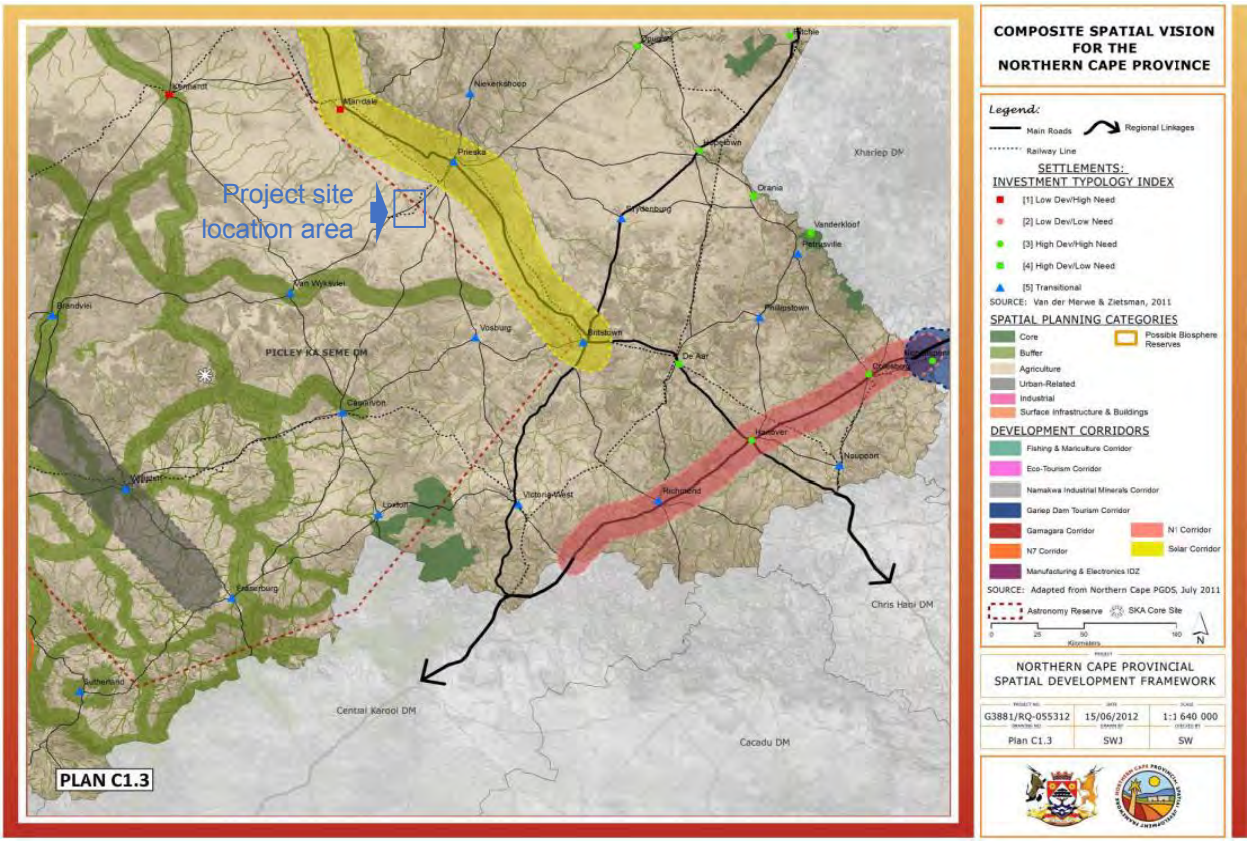


Figure 2-1: Spatial vision for the south-eastern part of the Northern Cape (Office of the Premier of the Northern Cape, 2012)

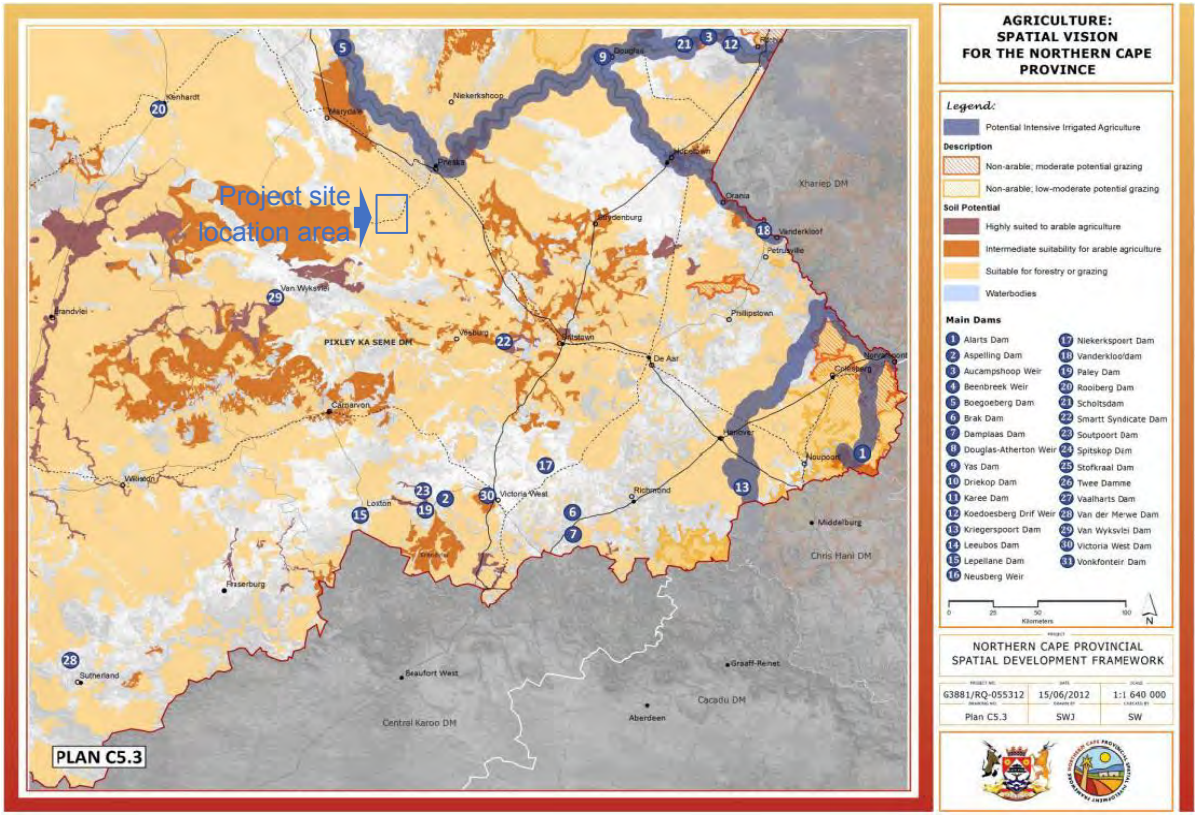


Figure 2-2: Spatial vision for agriculture for the south-eastern part of the Northern Cape (Office of the Premier of the Northern Cape, 2012)

Local policy alignment

Similar to the Province, the district and local municipalities where the proposed project is to be established, also face challenges of poverty, unemployment, and income inequality. Therefore, the municipalities' developmental priorities largely coincide:

- In order to optimise the resources directed at addressing these challenges, the Pixley ka Seme District set eight development priorities for the municipality (Pixley ka Seme District Municipality, 2014). These priorities are envisaged to be achieved through, among others, good service delivery, human and natural resource development, integrated rural and urban planning, employment creation and the development of a vibrant tourism industry (Pixley ka Seme DM, 2014, Pixley Ka Seme DM, 2013).
- The Siyathemba LM also prioritises an optimal distribution of resources, economic development through job creation and poverty reduction strategies, and effective and efficient service delivery to propel the development in the municipality (Siyathemba LM, 2015). Economic development is envisaged to be achieved through the support and growth of the priority sectors such as the agricultural, mining, manufacturing, tourism and retail sectors. Alternative energy sources have also been identified to be anchor economic activities in the municipality, which could propel local economic development through its linkages with other sectors.

It is clear that the proposed project is in line with the overall objectives of sustainable resource usage and economic development in the area.

When it comes to renewable energy development, both the Pixley ka Seme and Siyathemba municipalities' strategic documents largely focus on solar energy projects. The Siyathemba LM, and specifically the area outside Prieska, has already been designated for the establishment of a solar park (1 GW) and the municipality has already allocated communal land for this project (Siyathemba LM, 2015). The focus on solar energy projects is most probably attributed to the limited knowledge of the wind resource potential in the Northern Cape at the time of the formulation of the Provincial SDF, which informed local strategic documents and specifically the location of the renewable energy corridor area and its focus on solar energy projects.

Notably, limited reference to wind energy projects in the strategic documents of the local government do not in any way reduce the importance of wind energy project developments in the municipalities of Pixley ka Seme and Siyathemba. As mentioned earlier, such projects seem to be in support of the government's objective to exploit renewable energy sources for the purpose of developing the local economies and assist the district municipality in entrenching its position as a renewable energy hub. This is also confirmed by the fact that a number of wind energy facilities have already been approved for the development in the area under the RE IPPPP.

From a spatial framework perspective, the local municipality does not have an approved SDF. Therefore, assessing whether the proposed project is in contradiction with the spatial vision for the area where it is proposed to be developed is not possible. It should be mentioned though, that agriculture and tourism are considered by local government to be important contributors to the future growth and development of the local economy as well as towards achieving sustainable use of resources. This means that a land use analysis will need to be undertaken to determine whether the proposed project would limit the growth potential for the above-mentioned two sectors.

After considering the reviewed documentation, it can be concluded that the proposed wind facility is in alignment with national, provincial and local objectives, plans, and strategies relating to the socio-economic development of the areas under analysis. There were no fatal flaws or contraventions identified as all spheres of government prioritise the development of renewable energy projects. The proposed project fits well with the plans to diversify the provincial, district and local economies through investment in renewable energy projects. However, considering the importance of the agricultural and tourism industries in the development of local economies, an investigation into the current land uses in the zone of influence of the proposed project will need to be undertaken. This will be required to determine if the proposed project will have any negative impact on the growth and development of these sectors.

3 BASELINE INFORMATION

This chapter examines key socio-economic characteristics of the study area, as per delineation provided. This information 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 **Northern Cape Province** is geographically the largest province in South Africa, covering an area of 372 889 km^2, which constitutes approximately 30% of the country's total area. Despite having the largest surface area, the Northern Cape Province is the least populated of all nine provinces. According to Census 2011, the Province's population was 1 145 859, or 2.2%, of the national population. The Province is bordered by Namibia and Botswana in the north, while domestically, the North West Province borders it in the north-east, the Free State Province in the east, the Eastern Cape Province in the south-east, and the Western Cape Province to the south and south-west. The Northern Cape consists of five districts, namely Frances Baard, Pixley ka Seme, Namakwa, ZF Mgcawu (previously known as Siyanda) and John Taolo Gaetsewe.

The Pixley ka Seme DM, which lies in the south-east of the Northern Cape Province, is geographically the second largest of the five district municipalities in the Province and covers a surface area of 103 410 km². It is bordered by the Free State in the east, the ZF Mgcawu District in the north, the Eastern Cape Province to the south, and the Namakwa District in the west. The total population of the district according to the 2011 Census, was approximately 186 349, making it the municipality with the second lowest population in the Northern Cape.

The Siyathemba LM is located within the central eastern parts of the Northern Cape Province and is traversed from the east to west by the Orange River, South Africa's largest river. The municipality covers a geographic area of 14 725 km^2. Prieska functions as the administrative seat of the local municipality. Other settlements include Marydale, Nierkerkshoop, and Copperton.

Spatially, Siyathemba is very distant from South Africa's largest consumer markets. The nearest major town to the site is Prieska, which has easy access to the main railway line running to Namibia and good tarred road connections to Upington, Kimberly, and De Aar.

Towns and Settlements

Copperton is the town located closest to the proposed project site. It was once a very populated area that housed nearly 3 000 miners and their families. As a result of the closure of the Copperton Mine, the population of the town dropped to 55 individuals (33 households) by 2011 (Stats SA, 2015). A few of the unoccupied houses are currently used by Denel SOC Ltd, which operates a missile testing centre in the area (Wikipedia, 2014).

The closest major town to Copperton is **Prieska**, which is situated approximately 50 km away. Prieska was originally named Prieskap, a Khoisan word meaning, “lace of the lost she-goat”. Prieska is the administrative seat of the Siyathemba LM. It is located on the southern bank of the Orange River and is home to 14 248 people (Stats SA, 2015). While relatively isolated, Prieska has good access to the main railway line leading to Namibia, good tarred road connections to Upington, Kimberley and De Aar, and two landing strips for light aircrafts.

Figure 3-1: Settlements and towns near the project site
(Siyathemba LM, 2015)

Marydale, situated 60km north-west of Copperton, is a rural service centre. **Nierkerkshoop**, another rural service centre, is located approximately 80km north-east of Copperton. Both of these settlements are largely underdeveloped and sparsely populated.

Locational factors and major tourism attractions

Copperton can be accessed through the R357 from Prieska, which is a tarred road, as well as various dirt roads that stem from a north-westerly direction near the project site itself. These dirt roads lead to Marydale, but are not suitable for large traffic volumes; most motorists choose the tarred roads leading from Marydale to Prieska and then to Copperton. There are also tarred roads that lead to the military testing facility known as Alkantpan. From the aforementioned, it can be seen that access to the proposed location is limited to very few quality tarred roads and may need to be addressed when considering any further developments in the said area.

Generally, the area does not have any significant mineral deposits. To the south of Prieska, on the farm Doornfontein, a medium-sized mineral deposit of Phosphate can be found. Various small mineral deposits can be found near Niekerkshoop. These include Tiger’s-eye and Crocidolite (i.e. asbestos). Small deposits of Alluvial Diamonds can be found in the Orange River. Other small mineral deposits within the municipal boundary include Salt, Gypsum, Iron and Uranium (Siyathemba LM, 2015).

The Orange River runs through the municipality and provides ideal conditions for irrigation farming and cultivation of grains and vegetables.

The following are the main tourism attractions in the region (Siyathemba LM, 2015):

- Die Bos Nature Reserve
- British Fort
- Green Valley Nuts
- The Oranjezicht and Keikamspoort Hiking Trails
- Khoisan Rock Art

- Memorial Garden
- Prieska Museum
- Ria Huysamen Aloe Garden Schumann Rock Collection
- Wonderdraai Island

3.2 Sense of place, history and cultural aspects

Copperton was once a populated town, providing accommodation for the mine workers and their families during the period from 1970 to the end of the 20th century. It was then sold to a private owner after the closure of the Copperton Mine and is currently on a long-term lease by the Request Trust. Some of the houses were initially demolished, but after the lease agreement was signed with the Request Trust, an agreement was reached that the rest of the houses could be retained and used for accommodation of occasional visitors that may visit the Alkantpan testing facility (Siyathemba LM, 2014).

The preferred language in the Copperton area is Afrikaans, followed by English. The immediate surroundings can be described as a sparsely populated, semi-desert natural region with little to no noise or visual pollution.

Prieska is a far more densely populated area than Copperton, and has its origins in the early 1800s when farmers used it as a place to stay when the nearby dry riverbeds were full. It was administered by a village management board from 1882 and attained municipal status in 1892 (Siyathemba LM, 2016).

The preferred language in the Prieska area is Afrikaans (Stats SA, 2015). The sense of place is again defined as a semi-desert, natural region but more densely populated with small levels of visual and noise pollution. Prieska also has rich heritage and memorial sites that include the Khoisan rock art, the British Fort and the Boss Nature Reserve that are all near the town.

Marydale was established by the Dutch Reformed Church in 1903, and named after the wife of Mr. GP Snyman who owned the farm on which the town was built (Siyathemba LM, 2016). The preferred language in the area is Afrikaans, with 96% of the population stating that it is their first language (Stats SA, 2015). The sense of place of the Marydale area and its immediate surroundings can again be defined as a sparsely populated, semi-desert natural region with little to no noise or visual pollution.

Niekerkshoop was laid out on the farm Modderfontein in 1902 as an Asbestos mining centre. The village management board has administered it since 1904 (Siyathemba LM, 2016). The preferred language in the area is Afrikaans, with 95.8% of the population stating that it is their first language (Stats SA, 2015). The sense of place of the Niekerkshoop area and its immediate surroundings can again be defined as a sparsely populated, semi-desert natural region with little to no noise or visual pollution.

3.3 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.

Population demographics

The Siyathemba LM is home to approximately 21 593 people, with a total of 5 830 households (Stats SA). The population has increased by 14.9% from 18 376 in 2001. A large portion (87.2%) of the

population in the LM resides in urban areas, while the rest (12.8%) lives on farms. Both urban to urban migration and rural to urban migration are relevant in the Pixley ka Seme region, including the Siyathemba LM. Rural to urban migration is perceived as the dominant migration type at present (Pixley ka Seme District Municipality, 2014/15). The large proportion of people living in the urban area can be explained by the ease of access to opportunities and services within the larger urban centres, in this case Prieska. The majority (72.2%) of the people in the municipality are Coloured with 18.5% of the population being Black, followed by White 8.4%), and Indians/Asians (0.5%). Afrikaans is the language most spoken in the LM. The municipality's sex ratios are just slightly skewed, the female population (50.1%) accounts for slightly more of the LM's population compared to the male population (49.9%).

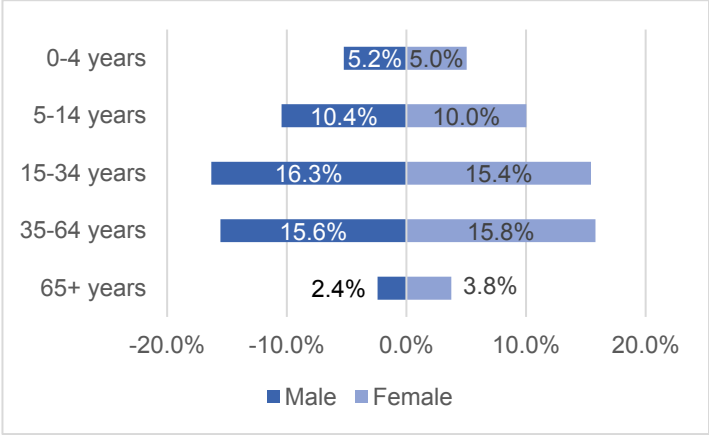


Figure 3-2: Age and gender profile

The youth (age 15-34) make up the majority of the people living in the Siyathemba LM with 31.7%, followed by the group between the ages of 35 and 64 with 31.4%. Considering the working age group that is between the ages of 15 and 64, the municipality has a slightly bigger percentage of working age males than females (refer to Figure 3-2). The population in the area is characterised by a high dependency ratio (58.5%) with a total of 36.8% of the population within the ages of 0 to 14 (30.6%) and over 65 years old (6.2%). According to the district municipality's IDP, the implications of this population structure are a higher demand on the provision of social and physical facilities, like schools, primary health care centres, etc.

At community level, Prieska has a population of 14 248 people with 3 462 households. As mentioned previously, Afrikaans is the preferred language, with 92.6% of the population using it as their First Language. Additionally, 4.4% of the population speaks Xhosa while only 1% speaks English. As is the case at municipal level, the majority (67.7%) of the people in Prieska are Coloured with 23.4% of the population being Black and 8% being White. There are slightly more females (51.2%), than males (48.8%) in the Prieska community. The community's dependency ratio (59%) is on par with that of the LM.

Health demographics

The effect that the HIV virus has had on the DM and LM is less profound than in the rest of South Africa and the Northern Cape Province, but the number of HIV cases and AIDS-related deaths have increased more rapidly in the last 15 years when compared to national and provincial averages.

Table 3-1: Population, HIV positive, AIDS and other deaths (2015)

Indicator	South Africa	Northern Cape	Pixley ka Seme DM	Siyathemba LM
Population	54 956 509	1 175 780	192 549	22 448
HIV positive	6 248 908	86 146	11 517	1 204
AIDS deaths	206 761	2 360	227	26
Other deaths	444 866	9 729	1 581	186

(Quantec, 2016)

The Siyathemba LM had a reported 1 204 individuals that were HIV positive in 2015, which equates to 5.3% of the total LM population. The percentage is far less than the National and Provincial levels at 11.3% and 7.3% for both provincial and national population, respectively. Total AIDS-related deaths equated to 26 individuals in the LM, or 0.1% of the LM population, which is again below the National and Provincial averages of 0.3% and 0.2% respectively. The AIDS-related LM deaths also equate to 12.2% of total deaths in the LM, which is lower than the national and provincial figures of 31.7% and 19.5%, respectively.

Since the year 2000, the number of people living with HIV has increased from 350 individuals in 2000 to just over 1 200 people in 2015. This indicates a near 250% increase in ten years, which is far more when compared to national and provincial averages (Siyathemba LM, 2015).

Crime demographics

Table 3-2: Crimes reported by crime type (2015)

Crime types	South Africa	Northern Cape	Pixley ka Seme DM	Siyathemba LM
Serious crimes	2 209 068	57 817	9 720	1 146
✓ **Community reported crimes**	2 068 261	54 724	8 952	1 052
✓ **Crimes dependent on police action for detection**	140 807	3 093	768	94

(Quantec, 2016)

The Siyathemba LM recorded 1 146 cases of serious crimes in 2015, of which 1 052 were reported by the community and 94 identified by police. Assault with the intent to inflict grievous bodily harm was the most common reported crime with 253 cases, followed by common assault with 112 cases and finally burglary at residential premises with 54 cases reported. Furthermore, 53 cases of stock theft were recorded in the LM, which can be attributed to the large number of stock farming occurring in the area. Drug-related cases were less prevalent in the LM, with only 4% of reported cases being drug-related. This figure is 5% less than the District figure and 3% less than the provincial figure.

3.4 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.

Size and contribution of local economy

The local economy is analysed at the municipal level as this is the lowest level to which economic data is available. In 2013, the Siyathemba LM economy was valued at R 796 million in current prices. The LM contributed 10.9% to the economy of the Pixley ka Seme District and made a contribution of 1.2% to the province's economy.

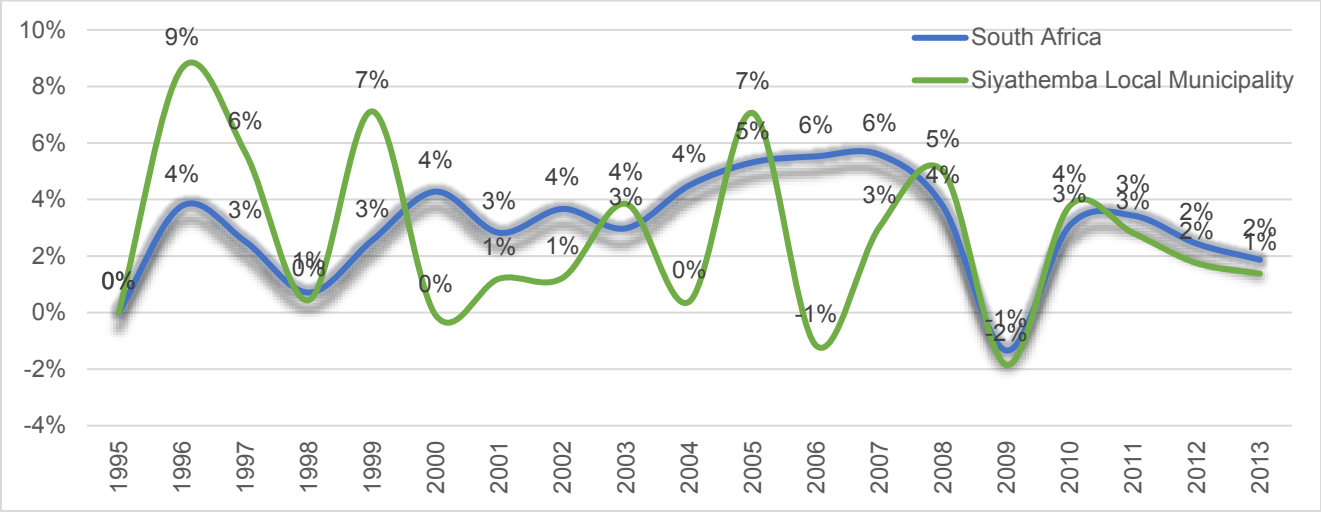


Figure 3-3: Growth rates for SA and Siyathemba LM (1995 – 2013) (Quantec, 2016)

High dependence of the LM on mining activities in the late 1990s and early 2000s, whilst targeting international commodity markets, resulted in the local economy being highly susceptible to economic dynamics globally. Figure 3-3 illustrates that the Siyathemba economy is significantly more volatile than that of South Africa. This is largely due to the dependency of the local economy on the global demand for commodities as well as the stability of the industry internally (i.e. from a labour issue perspective).

The mining sector historically played a major role in the local economy, with asbestos and copper mining the key activities. Currently, mining activities are mainly related to alluvial diamond mining activities along the Orange River. The closure of the asbestos mines as well as the Copperton mine has had a major lasting negative impact on the Siyathemba LM economy, reducing the size of the mining industry from R47 million in 2003 to R9 million in 2013.

In 2009, as a result of the financial crisis globally, the economy contracted by 2%, but was able to recover somewhat in the following year. Sectors most heavily affected but the crisis included the wholesale and retail trade as well as the mining sectors.

Structure of the economy and dynamics

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 is 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.

Table 3-1: The Northern Cape and Siyathemba LM structure of economies (2013)

Economic Sector	Northern Cape (GDP in 2013 prices)			Siyathemba LM (GDP in 2013 prices)		
	GDP (R'ml)	% of GDP	CAGR (2004 - 2013)	GDP (R'ml)	% of GDP	CAGR (2004 - 2013)
Agriculture	3 674	5,4%	2,5%	132	16.7%	6.3%
Mining and quarrying	21 399	31,2%	-1,2%	25	3.1%	-15.3%

Economic Sector	Northern Cape (GDP in 2013 prices)			Siyathemba LM (GDP in 2013 prices)		
	GDP (R'ml)	% of GDP	CAGR (2004 - 2013)	GDP (R'ml)	% of GDP	CAGR (2004 - 2013)
Manufacturing	1 676	2,4%	3,7%	29	3.6%	8.0%
Electricity, gas and water	1 708	2,5%	1,0%	18	2.3%	-2.8%
Construction	1 183	1,7%	5,9%	34	4.3%	6.7%
Trade	8 600	12,5%	2,7%	119	14.9%	-0.7%
Transport and communication	5 393	7,9%	3,0%	27	3.4%	-1.8%
Finance and business services	8 406	12,2%	4,4%	178	22.4%	5.2%
Personal services	6 195	9,0%	3,3%	113	14.2%	3.7%
General government	1 0423	15,2%	3,4%	63	15%	2.8%
TOTAL	**68 656**	**100,0%**	**2,1%**	**119**	**100,0%**	**12%**

(Quantec, 2016)

In terms of economic activities, the economy of the Northern Cape Province depends heavily on the primary sectors of the economy (agriculture and mining), which made up 31.2% of GDP-R in 2013. The largest sector is mining, which has been fluctuating between periods of growth and decline in contribution to the GDP-R. Agriculture, on the other hand, has declined in contribution from 8.7% in 2002 to 5.4% in 2013. Over a period of ten years (2003-2013), the LM's economy grew at a Compounded Average Growth Rate (CAGR) of 2.4% per year. This was slightly higher than the district and provincial average growth rates of 1.8% and 2.3%, respectively.

Contrary to the Province's economy, mining and quarrying continues to be a small contributor to the economy of the LM, making a meagre 3.1% contribution compared to the Province's 31.2%. This is a result of the decline in the mining industry mentioned above, and is further illustrated by a negative CAGR of 15% in the last ten years (see Table 3-3). On the other hand, the agricultural sector makes a significant contribution of 16.7%; making it the second largest single contributor after finance and business services (22.4%).

The agricultural sector has also shown steady growth in the last ten years with a CAGR of 6.3%, while finance and business services showed a 5.2% CAGR for the same period. The most extensively cultivated crops in the municipality are maize, wheat, peanuts, lucerne and table grapes. Stock farming activities are mainly based on sheep and goats. Another sector that has shown noteworthy growth is manufacturing with a CAGR of 8% over the last ten years, which is the highest of all the sectors. It also contributes 4.8% to the LM's GDP. Overall, the economy of the Siyathemba LM is a service economy with the tertiary sector contributing 70% to the municipality's GDP-R.

3.5 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.

Labour force composition

The labour force consists of employed and unemployed persons. The Not Economically Active (NEA) portion of the population includes people that are not working as a result of choice, age or other circumstances. The unemployment rate indicates the percentage of unemployed individuals that form part of the labour force. It does not include discouraged job seekers, though this group of people will also be mentioned later in this section.

The Census 2011 data indicates that the Siyathemba LM had about 13 656 people in the working-age population. This amounts to 63% of the total population. Of these, 7 113 people were economically active, while roughly 48% of the working age population were not economically active (NEA); that is, persons aged 15–64 years who are neither employed nor unemployed at the time of the survey, including discouraged job seekers. The employed labour in the LM was estimated at 5 356, while the unemployed population was estimated at 1 757, reflecting an unemployment rate of 24.7%. This was lower than the country's unemployment rate of 29.7% and lower than the provincial unemployment rate that was recorded at 27.4%.

As indicated in Table 3-4, the town of Prieska had 3 094 of the working age population employed, with 1 212 of them unemployed. This means that 28.1% of the labour force in Prieska was unemployed. On the other hand, 4 672 of the working age population was not economically active. In the smaller towns, the unemployment situation was worse, with unemployment rates of 41% and 33.6% in Marydale and Nierkerkshoop, respectively (Stats SA, 2014). The Copperton community is very small and isolated from employment opportunities and amenities, but shows a 0% unemployment rate that can be attributed to the extremely small labour force and working age population in the area.

Table 3-4: Labour profile of the Siyathemba LM (2011)

Town/settlement	Working age	Labour force			Discouraged job seekers	Unemployment rate
		Employed	Unemployed	Total		
Copperton	40	16	-	16	7	0%
Marydale	1 507	297	207	504	100	41.1%
Niekerkshoop	1 115	472	239	711	12	33.6%
Prieska	8 978	3 094	1 212	4 306	578	28.1%
Siyathemba NU	1 972	1 463	81	1 544	77	5.2%
Westerberg	44	14	18	32	0	56.3%
TOTAL	**13 656**	**5 356**	**1 757**	**7 113**	**774**	**24.7%**

(Stats SA, 2015)

Employment structure

More than three quarters of the employed individuals in the Siyathemba LM were employed in the formal sector, and only 10.8% were employed in the informal sector. Private households provided for 11.8% of the employment opportunities in the municipality.

In Prieska, 76.7% of the employment opportunities were provided by the formal sector, and only 10.8% came from the informal sector (see Figure 3-4). In Marydale, 71.4% of the employed population is employed in the formal sector, while only 66.2% of the Nierkerkshoop employment opportunities come from the formal sector. A significant percentage (18.9%) of Nierkerkshoop's employment opportunities come from the informal sector, while the same sector contributes only 15.3% towards employment in Marydale (Stats SA, 2015). In Copperton, 73.7% of the employment opportunities were provided by the formal sector, with 12.4% coming from the informal sector and 11.5% being private households.

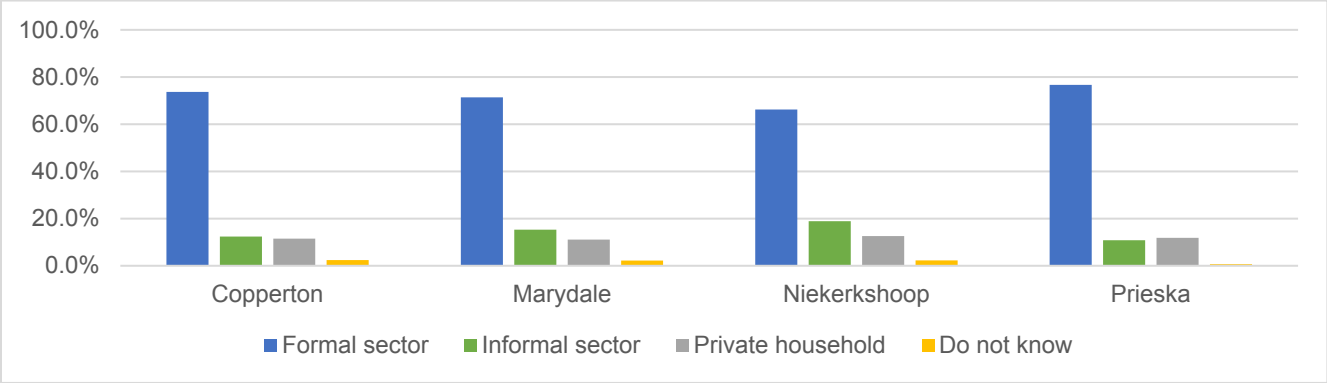


Figure 3-4: Regional employment by sector (Stats SA, 2015)

The tertiary sector is the largest contributor to formal and informal sector employment with 57.4% of opportunities offered by said sector. This is followed by the Primary sector with 28.3% and the secondary sector with 14.2%. The high tertiary sector figure is somewhat inflated by the community, social and personal services; and the general government industries that make up half of the tertiary sector. Considering the aforementioned, the main contributor to employment becomes the primary sector.

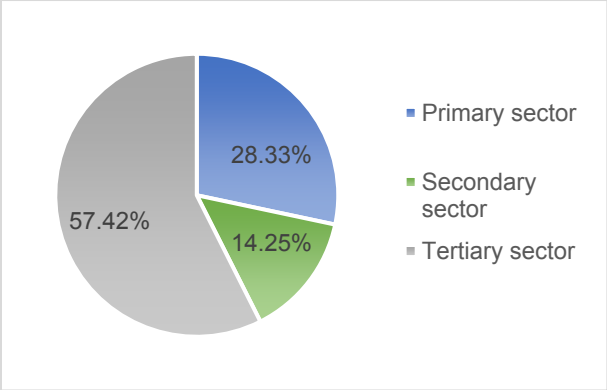


Figure 3-5: Siyathemba LM sectoral employment (Quantec, 2016).

In terms of the structure of employment, the agricultural sector was the most important economic sector not only in the LM but in the district as well. In the Siyathemba LM, the sector contributed 27.8% of the total employment opportunities, while creating 27.1% of employment opportunities in the Pixley ka Seme District. This was followed by personal services and general government. These figures are almost similar to those of the province but general government is the largest contributor to employment in the Northern Cape Province. Table 3--5 below indicates the contribution of economic sectors to employment in the district and the LM.

Table 3-5: Employment by economic sectors in Pixley ka Seme DM and Siyathemba LM

Economic Sector	Pixley ka Seme DM Employment		Siyathemba LM Employment	
	Employment	%	Employment	%
Agriculture	12 587	27.1%	1 637	27.8%
Mining and quarrying	342	0.7%	32	0.6%
Manufacturing	1 354	2.9%	219	3.7%
Electricity, gas and water	358	0.8%	24	0.4%
Construction	2 813	6.1%	596	10.1%
Trade	6 491	14.0%	774	13.1%
Transport and communication	839	1.8%	50	0.8%
Finance and business services	5 357	11.6%	751	12.8%
Personal services	8 489	18.3%	921	15.6%
General government	7 756	16.7%	888	15.1%
TOTAL	**46 387**	**100%**	**5 892**	**100%**

(Quantec, 2016)

Formal sector employment for the LM consists of mainly semi- and unskilled workers, with 82.9%, followed by skilled workers with 17.1%. This is in alignment with the district averages that show almost the same figures for each skill level (see Table 3-6).

Table 3-6: Employment by skill level and occupation in Pixley ka Seme and Siyathemba

Skills	Pixley ka Seme DM Employment		Siyathemba LM Employment	
	Employment	%	Employment	%
Skilled	**7 950**	**18.2%**	**923**	**17.1%**
• Legislators, senior officers and managers	2 782	6.3%	338	6.3%
• Professionals	1 733	4%	241	4.5%
• Technicians and associate professionals	3 435	7.9%	344	6.4%
Semi-skilled	**19 734**	**45.1%**	**2 371**	**43.92%**
• Clerks	4 557	10.4%	395	7.3%
• Service workers and shop and market sales workers	6 103	14%	775	14.4%
• Skilled agricultural and fishery workers	2 459	5.6%	309	5.7%
• Craft and related trades workers	4 258	9.7%	498	9.2%
• Plant and machine operators and assemblers	2 354	5.4%	394	7.3%
Unskilled	**16 086**	**36.8%**	**2 105**	**39%**
• Elementary occupations	16 086	36.8%	2 105	39%
TOTAL	**43 770**	**100%**	**5 398**	**100%**

(Stats SA, 2015)

Table 3-6 illustrates that elementary occupations represent the biggest single group of skills observed in the municipality, which is in line with the formal employment and economic profile of the area requiring labourers in the agriculture, mining and other industries. Services workers and shop sales workers, as well as craft and related trade workers represent the second and the third largest group of formal occupation in the area. This again fits the profile of the local economy, where the former is largely engaged in the trade and personal services sector, while the latter is involved in the agricultural and mining industries.

3.6 Income

The average monthly household income in the Siyathemba LM was R6 858 in 2014 prices. This was less than the national, provincial and district levels, which had average household incomes of R9 743, R8 116 and R7 030, respectively. Overall, approximately two thirds of the population in the Siyathemba LM earns up to R3 200 a month; this is larger than the same group at district and provincial level. According to the Pixley ka Seme IDP, the cut-off monthly household income for indigence in the Siyathemba LM is R1 500. This refers to those households who, due to a number of socio-economic factors, are unable to afford basic services such as water, basic sanitation, basic energy, health care, housing, food and clothing. From income data obtained in the 2011 Census, approximately 39.4% of the households would qualify as indigent in the local municipality.

Table 3-7: Household per monthly income groups (2011)

Indicator	Siyathemba LM	Towns/main places in the Siyathemba LM					
		Copperton	Marydale	Niekerkshoop	Prieska	Siyathemba NU	Westerberg
No income	7.1%	25%	9.1%	10.6%	8%	3.8%	0%
R1 – R3 200	62.9%	25%	49.5%	76.1%	55.56%	77%	100%
R3 201 – R6 400	10.9%	0%	18.5%	3.8%	14.6%	4.3%	0%
R6 401– R12 800	9.1%	25%	12.1%	3.3%	12.3%	3.7%	0%
R12 801– R25 600	5.9%	25%	4.7%	3.8%	6.4%	5.8%	0%
R25 601– R51 200	1.3%	0%	0%	0%	1.7%	1.5%	0%
>R51 200	0.3%	0%	0%	0.8%	0.2%	0.5%	0%

(Stats SA, 2015)

Table 3-7 shows the income spread for the various settlements/towns in the Siyathemba LM. Niekerkshoop is by far the poorest community of the delineated areas, with nearly 87% of its population earning less than R3 200 a month. This is followed by Prieska with 64% and Marydale 58.6% for the same income spread. Copperton shows that 50% of its population lives below the R3 200 income level, which is far less than other delineated areas. This can be attributed to the small population size that exists in Copperton.

In terms of education levels in the LM, 11.5% of the adult population (over 20 years of age) had no education at all, while 64% have primary or secondary education (Stats SA, 2015).Those with higher educational qualifications accounted for 5.5% of the population. These figures indicate an increase in all categories since 2001, except for the no schooling, some primary and some secondary categories. In general, there has been an improvement in the educational qualifications of the labour force in the local municipality. The “no schooling” category decreased by 10%, indicating a higher percentage of people attending school. While the share of people with no schooling at district level is 14.1%, the percentage of people with no schooling is notably lower at provincial (11.1%) and LM (11.5%) level. Additionally, the number of people who have completed matric in Siyathemba is 17.3%, which is lower than the 20% and 22.1% at district and provincial levels, respectively.

The relatively low level of education in the LM is supported by the economic profile that exists in the region. The dependence of household income on the Agricultural, and Wholesale and retail trade sectors would act as a disincentive for further higher education studies, as sectors that support such employment are not well developed in the area.

3.7 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.

3.7.1 Settlement profile

The Siyathemba LM is characterised by a low population density when compared to the national level (about 42 people/km^2). However, the municipal population density is half that of the Province but nearly the same as the district.

Table 4-1: Population density of Siyathemba LM (2011)

Indicator	Siyathemba LM	Towns/main places in the Siyathemba LM					
		Copperton	Marydale	Niekerkshoop	Prieska	Siyathemba NU	Westerberg
Population total	21 593	55	2 622	1 829	14 248	2 765	74
Area (Sq. Km)	14 725	71	63	31	196	14 355	9
Population density	1.5	0.8	41.4	59	72.9	0.2	8

(Stats SA, 2015)

Population densities for the entire LM are extremely low, showing 1.5 individuals for every square kilometre. When focusing on the towns, it can be seen that Copperton is one of the most sparsely populated towns in the entire LM, showing 0.8 individuals for each square kilometre. Prieska is by far the most densely populated town in the LM, showing nearly 73 individuals for every square kilometre. This fact, coupled with its high population, indicates that it is the commercial hub for the LM. The large agriculture sector that exists in the LM supports the low population densities in the settlements, as large portions of land are used for sheep farming.

3.7.2 Access to Housing and Basic Services

Housing

Approximately 85% of the households in the Siyathemba LM reside in formal housing in the form of a house or other brick structures on a separate stand or yard. 14.3% of the households live in informal dwellings. Furthermore, 0.7% of the municipality's households live in traditional dwellings. These numbers are similar to those of Prieska, with about 85.3% households living in formal dwellings, while 14.5% live in informal structures.

The allocation of funds for the Siyathemba Municipality is relatively small. The Municipality is therefore, struggling to address the housing need in the area. With the Housing Allocation to date, the LM managed to build 223 new RDP housing units in Prieska. New applications have been submitted to COGHSTA (Co-operative Governance, Human Settlements and Traditional Affairs) for 310 RDP units in Prieska, 55 in Marydale, and 54 in Niekerkshoop (Siyathemba LM, 2015).

Access to water

In terms of access to piped water, 88.7% of the households in the municipality have access to piped water either inside the dwelling or in the yard. The picture improves in Prieska, where 94.9% of the households have access to piped water inside their dwellings or yard. Only 1.2% of the households in the town do not have access to piped water at all. In terms of the supply, the bulk of the water in the LM is supplied by the municipality or other service providers. In Prieska, close to 97% of the households' water is supplied by the municipality or other water service providers, while in the non-urban areas of the municipality only 1.1% of water is supplied by bulk water infrastructure connections. Two thirds of the households in non-urban areas used boreholes (Stats SA, 2014). The district's IDP notes that water provision and availability is one of the issues that will have to be addressed in order to improve the

economic activity in most towns situated within the Pixley ka Seme District Municipal area (Pixley ka Seme District Municipality, 2014/15).

Bulk water supply for Prieska is sustainable, while bulk water supply for Marydale and Niekerkshoop is expected to become a problem within the next 15- 18 years. Therefore, new bulk water supply studies have been commissioned for Niekerkshoop, which is expected to experience water shortages first (Siyathemba LM, 2015).

Access to sanitation

If not properly managed and monitored, sewerage and sanitation are basic needs of communities that can pose serious health and hygiene risks. 71.2% of the households in the Siyathemba LM had access to a flushing toilet, while 16.8% of the households used pit latrines. Approximately 7.7% of families have no access to toilet facilities and 3.8% is still using the bucket system. According to the Siyathemba LM IDP, the municipality has a sanitation backlog of 470 households.

During the 2011/12 financial year, the Municipality received funds from DWA through the Accelerated Community Infrastructure Programme (ACIP). This grant was utilised to refurbish sanitation infrastructure and equipment. The following projects were set in motion but no information was available on which had been completed:

- Prieska:
    - Purchase of two standby sewer pumps
    - Refurbishment of sewer tank intake
    - Replacement of manhole covers at main sewer pump sets
- Marydale:
    - Refurbishment of sewer tank intake
    - Refurbishment/ replacement of night soil suction tanker
    - Fence oxidation pond area
- Niekerkshoop:
    - Refurbishment of sewer tank intake into oxidation ponds
    - Refurbishment/ replacement of sewer tanker

Access to electricity

The indicator “energy for lighting” was used as a proxy for measuring households’ access to electricity. The majority of households (86.3%) in the municipality have access to electricity, while 13.7% use alternative forms of energy for lighting; mainly candles (11%).

The Municipality has developed an Electricity Master Plan in the early 2000s. The Municipality works according to this plan to upgrade electricity infrastructure, as well as to develop new infrastructure (Siyathemba LM, 2015).

3.7.3 Transport infrastructure

Spatially, Siyathemba is very distant from South Africa's largest consumer markets. It is located some 182km from De Aar (administrative seat of the Pixley ka Seme DM) and 236km from Kimberley. The area is traversed by the R357, which links the site to Prieska. Prieska has easy access to the main railway line en route to Namibia, and good tarred road connections to Upington, Kimberly and De Aar.

Copperton can be accessed through the R357 from Prieska, which is a tarred road, as well as various unnamed dirt roads that stem from a North Westerly direction near Aletta itself. These dirt roads lead to Marydale but are not adequate for large traffic volumes and many vehicle drivers choose the tarred roads from Marydale to Prieska and then to Copperton. There are also tarred roads that lead to the Alkantpan military testing facility. From the aforementioned it can be seen that access to the proposed location is limited to very few quality tarred road and may need to be improved when considering any further developments in said area.

The rural nature of the area impacts on the modes of transport relied on by local population for travelling from and to work. The Northern Cape Province has the largest percentage of people compared to other Provinces who "walk" to and from work (Department of Transport, 2013). Those who rely on some mode of transportation for travelling to and from work mainly make use of private transport. Public transport is the mode of choice among a relatively small percentage of people living in the Province. All of the above suggests that the local area is likely to have limited access to public transport due to relatively low population densities.

3.7.4 Social and Recreational Infrastructure

The Siyathemba LM has the following social and recreational infrastructure available:

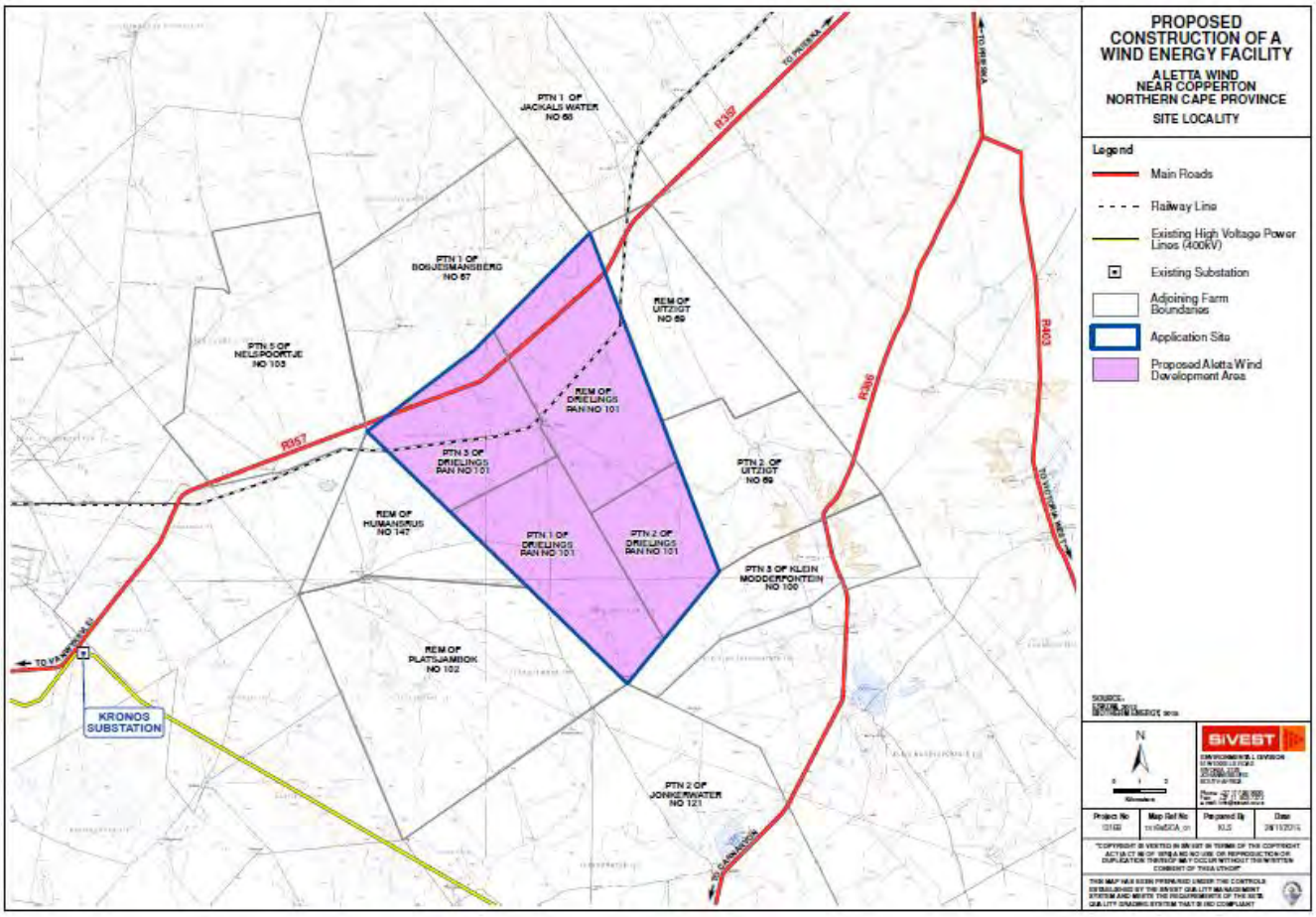
- Where education facilities are concerned, the municipality has one crèche, 6 primary schools and 3 combined schools, and one secondary school.
- The municipality has five community halls.
- There are four libraries in the municipality.
- Recreational facilities are available in each of the three towns
- There is a police station in each of the three towns (Marydale, Prieska and Nierkerkshoop)
- There are five health facilities in the municipality, i.e. one hospital, three clinics and a mobile clinic. It is indicated that the main challenge is the lack of ambulance services in Nierkerkshoop (Siyathemba Local Municipality, 2014).

3.8 Site-related information

The site-related information section will investigate the various dynamics of the proposed site to ensure that the current land use activity does not conflict with the establishment of the proposed facility. If there are any conflicts identified, then they will be investigated further in the next phase.

3.8.1 Land-use profile

Figure 5-1 illustrates the proposed site (purple region) for the Aletta wind facility near Copperton. The planned wind facility is proposed to be located on Portion 1,2,3 and the remainder of the farm Drielingspan No. 101 situated in the Siyathemba LM (refer to Map 3.1) The proposed site lies on the urban edge of Copperton, approximately 7km away from the city centre and is easily accessed by the R357 main road.



Map 3-1: Aletta proposed site and land portions (SiVest, 2016)

The area surrounding the proposed Aletta wind facility is, to a large extent, used for commercial sheep farming. In order to determine the impact that the proposed development may have on the existing land use, telephonic interviews were conducted with property owners situated in close proximity to the proposed development site. The property owners were asked a series of questions regarding basic demographics and general operational information about the respective property, the number of labourers employed on the property and economic information regarding their agricultural operations. The information obtained during these interviews is summarised in **Table 3-2**.

Table 3-2: Land uses in the zone of influence

Farm	Type of effect	Demographics	Economic activity	Concerns raised
Portion1,2,3 and Rem of Drielingspan no. 101	Directly affected (Wind facility site)	• 24 people live on the farm	• Farm size: 14 200 ha(11000+3200ha) • Commercial sheep farming	• Impact on property during construction • Environmental effects during construction

Farm	Type of effect	Demographics	Economic activity	Concerns raised
Remainder of Uitzigt no. 69			• Approximately 4 000 sheep • 7 people employed (5 males and 2 females) • Labourers paid above minimum wage	
Remainder of Platsjambok no. 102	Adjacent	• Two people live on the farm permanently	• Farm size: 7 000 ha • Commercial sheep farming • Approximately 500 sheep • No employees	• Concerned about the effect the facility might have on radio frequency and cell phone reception
Portion 5 of Nelspoortjie no. 103	Adjacent	• 15 people live on farm permanently	• Farm size: 5 500 ha • Commercial sheep farm and guest house • About 750 sheep • 10 people employed (5 on farm and 5 at the guest house)	• Security concerns – specifically access control • Livestock theft • Farming activities will be disrupted during construction • The owner's portion has been approved for another wind farm project (Garob Wind Farm)

3.8.2 Resources and land capability

Generally, the area does not have any significant mineral deposits. To the south of Prieska, on the farm Doornfontein, a medium-sized mineral deposit of Phosphate can be found. Various small mineral deposits can be found near Niekerkshoop. These include Tiger's-eye and Crocidolite (i.e. asbestos). Small deposits of Alluvial Diamonds can be found in the Orange River. Other small mineral deposits within the municipal boundary include Salt, Gypsum, Iron and Uranium (Siyathemba LM, 2014).

The arid nature of the associated farm portions creates difficulties for traditional irrigation farming; as a result, commercial farming in the area is limited to sheep/goat farming. These farming types require minimal inputs with respect to water and grazing capacities. Even so, the drought experienced over the last few years has resulted in reduced livestock capacities leading to many farmers downscaling their farming activities.

3.8.3 Access to infrastructure

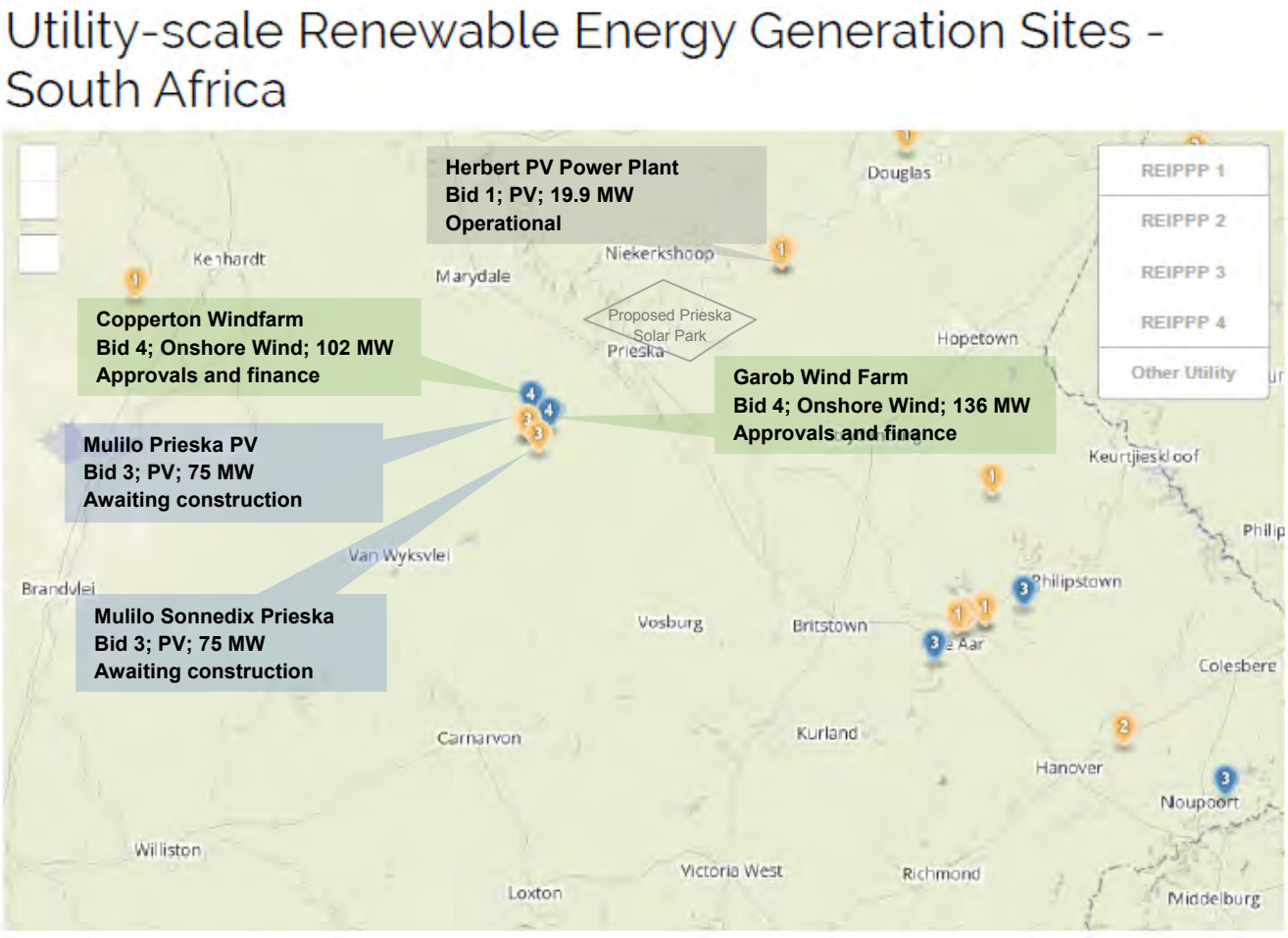
Bulk infrastructure on the affected farm portions is limited. The R357 is in close proximity to the new site, but other roads will have to be created for transport into the farthest reaches of the proposed site. Electricity supply is sufficient mainly due to existing substation located in Copperton, while access to water remains limited and many farmers have resorted to bore holes for their water supply. Copperton itself does have a water supply network but it is too far away and too expensive to be considered for everyday use by the affected farm portions. There is no existing infrastructure on the proposed site for stormwater pipes, which can be attributed to the arid nature of the region and the fact that it is farmlands, which do not require diversion of heavy rainfall associated water.

The LM has not made provision for improving infrastructure in the area due to low population densities and subsequently lower service delivery priority assigned for the area. This might indicate that the responsible company may have to fund the provision of necessary infrastructure.

3.9 Existing and planned developments in the area

The establishment of a number of renewable energy facilities in the area has the potential to result in positive cumulative socio-economic impacts which include creation of employment, skills development opportunities and creation of local business opportunities. However, negative cumulative impacts on the area's sense of place and the landscape cannot be ignored.

The proposed project is to be located in the area of notable activity when it comes to renewable energy projects. **Error! Reference source not found.** illustrates proposed developments that have already been approved under the RE IPPPP and their current project status.



Map 3-2: Map of approved for construction and/or operational renewable energy projects in the area as part of the RE IPPPP

Impacts, both positive and negative are, likely to be amplified in the event that more than one renewable energy facility is built in the immediate vicinity of the Aletta facility. As illustrated in **Error! Reference source not found.**, four of the projects approved under RE IPPPP are already known to be located in direct vicinity of the project site. In addition to these, numerous other projects are investigated for the

development in the area, although they are not yet authorised for implementation under the RE IPPPP or any other initiative. The likelihood of their construction is not high and will depend on the future bid rounds. These projects are listed in the next table.

Table 3-3: Projects under investigation or proposed for development but not yet authorized for the development under any government programme

Proposed Development	Current Status of EIA	Proponent	Capacity	Farm Details
The Badudex Solar Project	EIA underway	Budadex (Pty) Ltd	74 MW	Portion 1 of the Farm Volgelstruis Bult No 104
The Moiblox Solar Project	EIA underway	Moiblox (Pty) Ltd	75 MW	Remainder of the Farm Bosjesmansberg
Humansrus Solar PV Energy Facility 2 and 3	EIA underway	Humansrus Solar PV Energy Facility 3/4 (Pty) Ltd	75 MW	Remainder the Farm Humansrus No. 147
Helena Solar 1, 2, and 3 PV energy facility	EIA underway	BioTherm Energy (Pty) Ltd	75 MW	Portion 3 of the Farm Klipgats Pan No. 117
Renewable Energy Farm near Prieska	EIA underway	NK Energie (Pty) Ltd	UNKNOWN	Portion 3 of the Farm Hedley Plains No. 64 and Portion 5 of the Farm Doonies Pan No. 106
PV 2, PV 3, PV 4, PV 5 and PV 7 Energy Plants on the Farm Klipgats Pan	EIA underway	Mulilo Renewable Energy (Pty) Ltd	75 MW	Portion 4 of the Farm Klipgats Pan No. 117
PV 2, PV 3, PV 4, PV 6, PV 7, PV 11 and PV 12 Solar Energy Plants on the Farm Hoekplaas	EIA underway	Mulilo Renewable Energy (Pty) Ltd	75 MW	Remainder of the Farm Hoekplaas No. 146

When assessing the cumulative effect, it is best to consider the projects that are already approved as the consideration of the proposed projects that have not yet been authorised for the development may result in overestimation of potential positive and/or negative socio-economic impacts. Nonetheless, it is important to take note of all projects proposed to be built in the area.

3.9.1 Literature review of socio-economic studies for existing and planned renewable energy projects

A review of currently available studies was undertaken to determine the socio-economic impacts of the current and proposed renewable energy projects in the area.

Table 3-4: Approved for construction and/or operational renewable energy projects in the area

Project	Specialised Study	Year	Status
Herbert PV Power Plant	EIA	2011	Operational
Copperton Windfarm	Final Amendment Report	2016	Approvals and finance
Garob Wind Farm	Social Impact Assessment	2012	Approvals and finance
Mulilo Prieska PV	Final EIR	2013	Awaiting Construction
Mulilo Sonnedix Prieska	Final EIR	2013	Awaiting Construction

The following sections summarise the socio-economic impacts and mitigation measures proposed in the reviewed specialist reports.

Herbert PV Power Plant (Van Zyl Environmental Consultants cc, 2011)

Identified impact	Type	Impact description and proposed Mitigation
Construction Phase		
Degradation of roads (used by farmers) due to heavy construction vehicles	Negative	• Roads should be maintained regularly during the construction phase and any rehabilitation roads should be stored before the completion of the construction phase.
Increased heavy vehicle traffic due to construction	Negative	• Heavy machinery operators and truck drivers need to be informed of stock herders, pedestrians and stray animals on the road.
Utilisation of solar power	Positive	• Utilisation of solar technology increases the experience with renewables, in the long-run resulting in economic benefits that will translate into social impacts in the form of prosperity and human health.

Identified impact	Type	Impact description and proposed Mitigation
Loss of farm labour to construction	Negative	• Employment of farm labourers for construction purposes should be avoided. • Although one cannot prevent a farm labourer from applying, it should be explained that if they apply it will be leaving a permanent job for a temporary job due to the nature of the work.
Security risks	Negative	• Security measures need to be implemented to prevent construction workers entering the neighbouring farms. The proponent should be responsible for implementing.
Employment opportunities	Positive	• The project will result in short-term positive impacts as employment will be available for locals in the construction phase. The construction phase has an estimated duration of 6-9 months, there will still be a demand for labour in the operational phase, however the demand will decrease.
Unskilled labour force	Positive	• The local labour force is likely to be unskilled, this can be fixed through skills and training programmes. • The construction of Solar PV structures is relatively straightforward, therefore local labour force can be utilised and specialist staff and management can be outsourced from out of town. This will temporarily enhance surrounding communities through temporary job creation and social benefits.
Influx of employment seekers	Negative	• To prevent the influx of employment seekers, communication via local newspapers, local and district municipalities would keep the population informed on the number of available contracts and employment opportunities. In addition, it will inform them of the proceedings of the project.
Extra pressure on the local and district emergency and fire-fighting services	Negative	• The emergency and response plans will need to be amended by the district municipality to make provisions for the PV power station.

Identified impact	Type	Impact description and proposed Mitigation
Local resources	Positive	• The Tenesol factory in South Africa will provide the PV modules and the bulk of the steel for the trackers will be sourced from South African suppliers. • South African companies will supply civil/building works, security systems, electrical reticulation and perimeter fencing. • An estimated 75% (R1 650 000 000) of capital costs will remain in South Africa, thus increasing GDP and improving economic growth.
Traffic Impacts	Negative	• The highest impact would be on the R370 where trucks must travel frequently to transport material and equipment to the project construction area. The project manager will need to monitor and control trucks to ensure they do not cause traffic and congestion for long periods.
Operational Phase		
Degradation of roads (used by farmers) due to heavy construction vehicles	Negative	• Although the usage of roads decreases during the operational phase, regular maintenance of roads should be undertaken.
Employment opportunities	Positive	• Job creation will be in fields such as maintenance services and security.
Unskilled labour force	Positive	• Continued skills and training programme for locals.
Local procurement of goods, materials and services	Positive	• Positive indirect socio-economic impacts through the procurement of local goods, materials and services for the project.
Traffic Impacts	Negative	• Traffic is minimal during the operational stage as trucks will only be needed intermittently to transport infrastructure, this will only be in the maintenance and upgrade stage.
Influx of employment seekers	Negative	• Will mostly likely continue from the construction phase to the operational phase, continued communication via the channels indicated in the construction phase will mitigate the risk of employment seekers visiting the site and surrounding areas for jobs.

Copperton Windfarm (Aurecon South Africa (Pty) Ltd, 2016)

Impact	Type	Impact description and proposed Mitigation
Construction Phase		
Impacts on local economy (employment) and social conditions	Positive	• A medium local content is said to be employed with 40% of the expenditure within South Africa. • Construction, installation and direct manufacturing jobs could be created from the project, up to 548 local jobs and an additional 250 manufacturing jobs will be generated from the project with the construction duration lasting up to 3 years. • The labourers will be accommodated in Prieska, thus increasing spending and stimulating the local economy. • The Local Municipality will benefit from increased revenue through increased taxes and rates arising from the project, therefore the municipality will have more money to spend on social programmes. • Preference for employment should be given to local communities and a list of locally available skills and labour should be obtained. • Recruitment should consider gender equality. • Training should be provided so labourers can utilise their skills in other construction and development projects within the region upon the completion of the project.
Operational Phase		
Impact on local economy (employment) and social conditions	Positive	• No material changes identified, accept the job opportunities are seen to be long-term opposed to short-term in the construction phase.

Garob Wind Farm (Barbour, 2012)

Identified impact	Type	Impact description and proposed Mitigation
Construction Phase		

Creation of employment and business activities	Positive	• The project will run for approximately 18 months and there will be approximately 266 construction related jobs created. 25% (67 jobs) to skilled personnel (engineers, management, technicians and super advisory), 35% (93 jobs) to semi-skilled personnel (drivers and equipment operators), 40% (106 jobs) to low-skill personnel (construction labours and security staff). • The total wage bill is estimated to be around R66 million, and the low-skill and semi-skill worker's average salary is between R5 000 - R30 000 respectively. • Local community members form Prieska and Marydale will be likely to be eligible for low-skilled and semi-skilled positions. • Most job opportunities will be made available to the historically disadvantaged within the local community. • The project will propose a social benefit for the community given the high unemployment levels and limited job opportunities. • To mitigate the risk of locals not qualifying for jobs within the project due to the potential mismatch of skills and low education levels, the recruitment process and the implementation of a training and skills development programmes need to address this. • The recruitment process should also promote gender equality. • In addition, a database should be created with local companies and they should be notified of the tender process.
Presence of construction workers and potential impacts on family structures and social networks	Negative	• Local farmers in the area are against construction workers being accommodated on site. • Employment of local labourers will avoid the accommodation of workers from outside the area. • The establishment of a Monitoring Forum (MF) including stakeholders, representatives from the local community, local community, local farmers, local councillors and the contractor to monitor the risks and develop a Code of Conduct. • In addition, the implementation of a HIV/AIDS awareness programme should be implemented. • The contractor should be responsible for managing construction workers and the times they are permitted to be onsite.

Influx of job seekers	Negative	• Employment should favour the locals. • The MF should monitor and identify problems in the area due to the influx of job seekers. • Implementation of a 'no employment policy' at the gate will reduce the risk of job seekers hanging around and making the locals uncomfortable.
Loss of farm labour	Negative	• Liaising with local farmers in the area to prevent the employment of local farm workers for the project. • Farm workers need to be made aware that the nature of the work is temporary and only for the duration of the project as well as making them aware that the negative consequences from applying will be losing their permanent job.
Risk of stock theft, poaching and damage to farm infrastructure	Negative	• An agreement should be drawn up between the proponent and the affected landowners to ensure stock theft, poaching and damage to farm infrastructure is compensated by the proponent. • The Code of Conduct developed but by the MF should be drawn up prior to commencement of the project and signed by all contractors. • With the enforcement of the Code of Conduct, proponents should hold contractors liable to pay damages. • Any charges made for theft, poaching and damage should be per the Code of Conduct and in accordance to the South African labour legislation.
Risk of veld fires	Negative	• The contractor needs to ensure that open fires are only allowed in designated areas for cooking or heating and nowhere else. • Smoking should only be allowed in designated areas and nowhere else. • Construction related activities should be properly managed and confined to specific areas where there is a reduced risk of fire. • It is the contractor's responsibility to provide adequate fire-fighting equipment onsite and training for selected construction staff. • In a case where the fire is caused by a construction worker, the contractor, as per Code of Conduct, shall be liable to compensate the farmers for damages caused on their farms. • The contractor should also take responsibility for the firefighting costs incurred by the farmers.

Impact of heavy vehicles and construction activities	Negative	• To avoid times of the year when traffic is heavy, abnormal loads should be timed. • The contractor shall be responsible for all costs related to damage on the local farm roads caused by vehicle and construction activities and liable to repair all damages before the construction phase is completed. • Dust suppression measures should be implemented for heavy vehicles on a regular basis and vehicles used to transport sand and building materials should be fitted with tarpaulins or covers. • Drivers should be qualified, made aware of potential road safety issues, speed limits and vehicles should be road-worthy.
Operational Phase		
Creation of employment and business opportunities	Positive	• Job opportunities drastically reduced to 16 jobs required, 7 full-time positions and 9 part-time positions. • A training and skills development programme will be implemented as proposed by the proponent to compensate for limited jobs required. This should be done for the locals during the first 5 years of the operational phase.
Establishment of community trust	Positive	• Criteria should be established for the identifying and funding community projects and it should be focused on the community and not an individual. • Controls should be in place to ensure the trust benefits the community and not an individual. • The trust will support healthcare, education, training and skills development and support for SMME's.
Influx of job seekers	Negative	• Due to Prieska attracting several renewable energy projects, the influx of job seekers will be high in the area. • As discussed in the construction phase, the developed MF should manage these risks and implement a no employment at the gate policy, instead job seekers should go to employment offices in the area.
Loss of farm labour	Negative	• Liaising with local farmers in the area to prevent the employment of local farm workers for the project. • Farm workers need to be made aware that the nature of the work is temporary and only for the duration of the project as well as making them aware that the negative consequences as a result of applying will be losing their permanent job.

Visual impact on sense of place	Negative	• This impact for this is very low and minimal.
Impact on tourism	Positive	• The proponent should initiate interaction with the representatives from the SLM and the local tourism representatives to raise awareness of the proposed facility. • The proponent should look at establishing a renewable energy interpretation centre at the entrance of the site, which should include a viewing area where passing visitors can view the site.
Human Health	Positive	• Wind energy is associated with fewer health effects than traditional energy generation, it is said to be better for the health.

Mulilo Prieska PV and Mulilo Sonnedix Prieska (Savannah Environmental (Pty) Ltd, 2013)

Identified impact	Type	Impact description and proposed Mitigation
Construction Phase		
Creation of employment and business opportunities during construction	Positive	• The construction phase of the project is expected to be between 18-24 months and create 291 jobs. 25% (73 jobs) will be available for skilled personnel (project managers, land surveyors, engineers etc.), 15% (43 jobs) to semi-skilled workers (drivers, equipment operators etc.) and 60% (175 jobs) to low-skilled workers (drivers, equipment operators etc.). • The total wage bill is estimated to be around R60 million, and the low-skill and semi-skill worker's average salary is between R5 000 – R25 000 respectively for a period of 20 months. • The proponent should implement a "locals first" policy and should appoint local contractors, particularly for the semi and low skilled jobs. • A risk is the low-skill level in the area, which will result in the proponent being forced to fill positions from outside the area. • The proponent and their contractors should meet with the Siyathemba local municipality to establish the skills database of the area and made available to the contractors who are appointed for the construction phase.

Identified impact	Type	Impact description and proposed Mitigation
		• The organisations, community representatives and local authorities should be informed of the employment procedures and final decisions regarding the project and potential job opportunities the proponent has undertaken in the construction phase. • Prior to the initiation of the construction phase, training and skills development programmes should be initiated. • The employment of women where possible and gender equality should be considered in the recruitment selection process. • A database for local companies, specifically BEE companies should be created and the companies should be informed of the tender process along with an invitation to bid for project-related work.
Potential impacts of family and structures and social networks associated with the presence of construction workers	Negative	• The promotion of the 'locals first policy' will reduce the impact of workers affecting local families and social networks. • A Monitoring Forum (MF) should be created including stakeholders, representatives from the local community, local community, local farmers, local councillors and the contractor to monitor the risks and develop a Code of Conduct. • An HIV/AIDS awareness programme should be implemented. • Management from the contractor is essential to manage construction workers and the times they are permitted to be onsite.
Potential impacts of family and structures and social networks associated with the influx of job seekers	Negative	• The established MF should establish a 'no job at the gate policy', instead job seekers should visit employment offices in Prieska.
Potential impact on local farmers associated with loss of farm labour to the construction phase	Negative	• It should be emphasised that the construction work is temporary and the farm labourer will be giving up a permanent job for a temporary job. • Liaison with local farmers is necessary.

Identified impact	Type	Impact description and proposed Mitigation
Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers onsite	Negative	• Prior to the commencement of construction, an agreement should be reached between the landowners and the proponent to ensure that the company will compensate the landowner for any damage and losses. • Before the contractors are deployed on site, a Code of Conduct should be developed and signed by the landowners, proponent and contractor. • Contractors should be held liable by the proponent to losses and damages of farm infrastructure. • Contractors should be made aware of the consequences of stock theft, damage and losses and if found guilty of an offense as per Code of Conduct breach, dismissal should follow South Africa labour legislation.
Operational Phase		
Creation of employment and business opportunities associated with the operational phase	Positive	• Sixty permanent jobs will be created during the 20-year operational phase. • Skilled employees will equate to 33% (20 jobs), semi-skilled 17% (10 jobs) and low-skilled 50% (30 jobs). • The local community will qualify for low-skilled and some semi-skilled jobs available. • Preference will be given to Historically Disadvantaged members of the local community. • During the first 5 years of the operational phase, a training and skills development programme should be implemented for the locals to maximise the number of locals that are employed within the operational phase.
Establishment of a Community Trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development	Positive	• Local and economic community development can be stimulated from the trust over a 20-year timeframe. • The trust will support healthcare, education, training and skills development and support for SMME's. • A criterion should be established by the Siyathemba Local Municipality and the proponent to ensure the benefits are for the community and not for individuals within the community. • Financial controls and audits should be in place by the Siyathemba Local Municipality and the proponent to ensure the benefits are for the community and not for individuals within the community.

Identified impact	Type	Impact description and proposed Mitigation
Potential impact on family structures, social networks and community services associated with the influx of job seekers	Negative	• Same as construction phase except influx may reduce due to the operational phase requiring less jobs than the construction phase. • The 'no employment at the gate' policy should still be emphasized even in the operational phase and job seekers should be redirected to employment offices in Prieska.
Potential impact on local farmers associated with loss of farm labour	Negative	• Although farm labour can be replaced, loss of farm labour will impact farm operations in the time between replacement of worker, however this will be temporary.

3.9.2 Summary of the projects 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. The table also summarises the potential cumulative effects that could be generated by all projects together within the construction and operational phases, which is then taken into account when assessing cumulative effects of the project under review. 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; thus, some of the cumulative effects may be underestimated.

Construction Phase:

Impact	Details
• Temporary job creation	A total of 1 105 direct jobs will be created over 6 and a half years during the construction phase of the projects.
	250 indirect jobs will be created in manufacturing and other indirect job opportunities will be created in hospitality, tourism and security as a result of the projects.
	140 of the jobs will be offered to the skilled labour force. 136 of the jobs will be offered to the semi-skilled labour force. 281 of the jobs will be offered to the low-skilled labour force.
	Majority of the local labourers residing in the Prieska vicinity will qualify for the semi-skilled and low-skilled positions

	The wage-bill will be R126 million and the salary of low-skilled to semi-skilled workers will range from R5 000 to R30 000, respectively. A database should be created for local companies to access information on the tender process and invite local companies to bid for project work.
• Unskilled labour force	The reviewed specialist reports recommend the following to address the lack of skills of the local labourers: • Skills and development programmes implemented by proponents. • Preference should be given to the locals for low-skilled level and semi-skilled level jobs. Skilled jobs can be outsourced from the surrounding communities.
• The effect on family structures and social networks within the community due to the influx of job seekers and the presence of workers	Due to the high unemployment within the area and the surrounding areas, job seekers will gather at the project requesting jobs. The specialised reports recommend the following measures to reduce the increased security risks to the farmers: • Preference is given to locals to reduce the risk of outsiders creating a threat to families and businesses due to a lack of understanding of the community • 'No employment at the gate' policy should be implemented • Communication of job positions are via newspapers and employment offices The presence of the workers will be unavoidable but can be managed. As per mitigation measures in specialist reports: • The creation of a Monitoring Forum (MF) should be initiated between the proponent, Local Municipality, community and farmers to manage the risks of the projects • A Code of Conduct should be formulated and signed between the proponent, contractors, construction workers and farmers prior to construction commencing so a common understanding is established and negative impacts on the community is reduced • The contractor should take responsibility for managing the construction workers Stock losses, poaching, theft and damage to farm infrastructure is a potential result from the presence of construction workers onsite. • Contractors shall be liable to pay for any losses incurred by farmers as a result of construction workers

	• The Code of Conduct should specify regulations in regards to the theft and damage to property • Dismissal and disciplinary measures should be in accordance to the developed Code of Conduct and South African labour legislation
• Potential impact on local farmers associated with loss of farm labour	• The impact on the loss of farm labour is minimal due to the temporary nature on farming operations during the replacement period. • Farm labourers cannot be excluded from applying for construction jobs. • It should be emphasised that construction jobs are temporary in comparison to permanent jobs to weigh in on the negative impacts so farm labourers can make an informative decision.

Operational Phase:

Impact	Details
• Temporary job creation	76 jobs will be created over the operational phase, much lower than the construction phase.
	20 of the jobs will be offered to the skilled labour force.
	10 of the jobs will be offered to the semi-skilled labour force.
	30 of the jobs will be offered to the low-skilled labour force.
• Unskilled labour force	A training and skills development programme should be implemented for the locals to maximise the number of locals that are employed within the operational phase, this should be implemented during the first 5 years.
• Establishment of a Community Trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development	The trust will promote economic growth within the local community and support healthcare, education, training and skills development and support for SMME's
• The effect on family structures and social networks within the community due to the influx of job seekers and the presence of workers	The influx of job seekers may reduce as there will be less jobs available within the operational phase. The same 'no gate policy' and communication channels in regards to employment should be followed in the operational phase.

	The Code of Conduct established prior to the construction phase and the MF should continue in the operational phase to manage security risks, theft, losses and damages. Alterations may need to be agreed upon and changes made to the Code of Conduct to suit operational conditions.
• Potential impact on local farmers associated with loss of farm labour	Continuous liaison with farmers within the community will prevent loss of farm labour within the community.

4 IMPACT ANALYSIS

The following sections discuss the socio-economic impacts that the proposed project is envisaged to create, considering the knowledge of the potentially affected socio-economic environment and the project components. The analysis of impacts is divided into the following groups:

- Impact on natural capital
- Impact on human capital
- Impact on social capital
- Impact on cultural and spiritual capital
- Impact on physical capital
- Impact on financial capital
- Impact on political and institutional capital

The review of the potential impact takes into account the entire project inclusive of all of its components and considered alternatives. All impacts identified are assessed in terms of the impact ratings methodology as prescribed by the Environmental Assessment Practitioner (EAP) (refer to Annexure A). It should be noted that some impacts that are to be exerted by activities during construction may remain during the operation phase. In this instance, impacts are analysed under the phase when they were first experienced and their duration reflected over a period that lasts beyond the construction phase.

When evaluating the cumulative effect of the proposed project, the analysis of socio-economic impacts identified in EIA studies conducted by specialists for other projects proposed to be located in the area and summarised earlier in this report were taken into account. The formulation of the proposed mitigation measures also took into account recommendations made by other specialists as part of EIAs conducted for other renewable energy projects proposed to be built in the area.

4.1 Impact on natural capital

4.1.1 Impact associated with loss of agricultural land and disruption of agricultural activities

Results from the interviews undertaken indicate that the majority of the properties surveyed are primarily used for livestock farming (sheep). While agricultural activities and wind farms can co-exist with little impact resulting from wind energy facilities, activities associated with the construction phase such as establishment of road infrastructure, movement of heavy vehicles and preparation of foundations for the wind facility will damage farmland and result in loss of agricultural land for grazing and disruption of farming activities.

It is assumed that all the infrastructure associated with the Aletta Wind Energy Facility will be contained on Portion 1,2,3 and the remainder of the farm Drielingspan No. 101. These farm portions are approximately 11 000 hectares in extent and are used for commercial sheep farming. During consultations with the farm owner, no indication was made as to whether livestock farming would be halted completely during construction or if livestock would be moved to sections of the farms not affected by the construction activities. Whichever the case, it would be reasonable to assume that farmers will be compensated for losses in revenue during the construction phase. On the other hand, all areas disturbed by the construction-related activities can, and should be rehabilitated to allow farming operations to continue.

Although the development of the Aletta wind facility appears to have a negligible negative impact on the agricultural activities, the combination of the various renewable energy projects planned in the area may result in a notable cumulative loss of grazing agricultural land, particularly considering that some of the nearby renewable energy projects approved include solar PV facilities. The potential loss of agricultural land therefore will mainly be derived from the potential impact of other projects in the area and not from the proposed Aletta Wind Energy facility. Such an impact can be described as a long-term impact due to the fact that the land will be neutralised for agriculture activities for at least the lifespan of the Aletta project (approximately 20 years). The cumulative impact of the loss of agricultural land across the region may last even longer as a result of the fact that the proposed projects will not all begin and end at the same time. Rehabilitation of land to grazing potential will thus not happen all at once, resulting in less land available for agricultural use over the long-term, the impact of which may be significant over the long-term. It should be iterated though that the cumulative impact that the proposed Aletta Wind Energy Facility will exert in light of other projects already approved will be insignificant.

No differentiation can be made of the effect of the impact in question on the substation alternatives as the impact remains the same regardless of the alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Loss of agricultural land (during construction and operations)	
Environmental Parameter	Loss of land which is currently used for grazing.
Issue/Impact/Environmental Effect/Nature	The physical space required for the wind turbines will lead to a permanent loss of grazing land.
Extent	The impact is only expected to affect the site.
Probability	Land loss will definitely occur to accommodate the wind turbine. (greater than 75% chance).
Reversibility	The impact is expected to be partly reversible following decommissioning and rehabilitation.
Irreplaceable loss of resources	There will be a marginal loss of resources, that is, the loss of grazing land a part of the facility's footprint and no other land loss beyond that.
Duration	The landowners will not be able to uses the land on which the towers will be erected for the duration of the construction (24 months) and operation (20-25 years) phases. The impact will therefore, be long-term.
Cumulative effect	The cumulative effect associated with loss of agricultural land will be notable considering the approved development of other renewable energy projects, particularly solar PV.
Intensity/magnitude	The intensity will be low as only a small portion of the grazing land will be lost to the wind farm.
Significance rating	**Prior to mitigation measures:** Negative low

	After mitigation measures: Negative low	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	1	1
Probability	4	4
Reversibility	2	2
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-13	-13
Mitigation measures	• The project developer should design the infrastructure layout in a manner that limits the footprint of the facility and all associated infrastructure. • Consultation with the directly affected and adjacent land owners must be on-going to limit the effect on productive agricultural land.	

Disruption of farming activities due to construction related activities		
Environmental Parameter	Farming activities my need to be halted on the directly affected farm portions during construction.	
Issue/Impact/Environmental Effect/Nature	The activities associated with the construction phase such as establishment of road infrastructure, movement of heavy vehicles and preparation of foundations for the wind facility and power lines will disrupt the farming activities.	
Extent	The impact is only expected to occur at site level.	
Probability	The impact will probably occur (between 50% to 75% chance).	
Reversibility	The impact is completely reversible with minor mitigation required.	
Irreplaceable loss of resources	There will be no production losses experienced by the affected farmers.	
Duration	The interruption will be experienced during the construction phase; therefore, the impact will be short-term.	
Cumulative effect	Although there are numerous renewable energy projects already approved for the area, the development of these projects I likely to be taking place at different time than the proposed project. This suggests that the cumulative effect on operations of the local agricultural activities will be limited.	
Intensity/magnitude	Although some sections of the farms will be affected, grazing activities will be able to continue unabated. The intensity will be low.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating

Extent	1	1
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	1	1
Intensity/magnitude	1	1
Significance rating	-8	-8
Mitigation measures	• The footprint associated with construction related activities facility and all associated infrastructure must be minimised. • Construction vehicles should only access the construction site via demarcated access roads and should not be allowed to cut across farms or vacant (agricultural) land. • The project developers and affected land owners should discuss and agree on appropriate construction procedures, which will minimise disruption of current faming activities.	

4.2 Impact on human capital

4.2.1 Impact on employment

The impact of the proposed project on employment will occur during construction and operation. The impact on employment during construction would only be temporary whereas the impact during operation would be long-term.

During construction

Based on information provided by the project proponent, it is assumed that the construction phase of the Aletta Wind Energy Facility will span over a period of 24 months and will create approximately 128 job opportunities at peak construction. Contractors will be appointed to complete tasks associated with the construction phase, which include establishment of the facility and associated components. Also based on previous similar studies undertaken, it can be expected that approximately 30% of the employment opportunities will be available to low skilled workers (labourers, security staff, etc.) and 70% to skilled workers (machine operators, engineers, project managers, supervisors, etc.). Of all these opportunities, about 40% will be made available to local labour.

Considering that formal sector employment for the Siyathemba LM consists of mainly semi-skilled (43.9%) and unskilled workers (39%), with only 17.1% being skilled workers, local community members are likely to be in a position to meet the requirements for the majority of the low-skilled and semi-skilled positions. These employment opportunities will be of a temporary nature as they will last only for the duration of the construction of the facility. The municipality has highlighted high unemployment as one of the pressing developmental challenges; therefore, creation of potential employment opportunities, even of a temporary nature will represent a significant socio-economic benefit.

Given the low population levels in Copperton, it is most likely that the majority of the labourers will come from Prieska which is about 50 km away from the project site. As noted earlier, residents within the

Siyathemba LM have limited access to public transport; therefore, alternate travel arrangements will need to be made by the contractors to ferry labourers to and from work.

On the downside, there could be some unintended impacts on local farmers where their farm labourers may be recruited for construction work. Usually, local farmers are unlikely to be in a position to match the competitive salaries offered by the contractors involved in the development of renewable energy projects. As a result, farm workers may be tempted to resign from their permanent positions on the farms in favour of the short-term (more highly paid) employment. The loss of experienced farm workers will have a negative impact on local farming operation; however, this will only be temporary as farm workers can be replaced. While some of the farm workers might be re-employed after the construction phase is over, others might not be so fortunate. These farm workers would potentially be negatively impacted upon in the medium- to long-terms.

The proposed project on its own is unlikely to have a significant impact on the loss of farm labour, but the proposed establishment of a number of renewable energy projects could potentially impact the agricultural activities within the area. However, given that the opened positions for farm workers are likely to be easy to fill, the impacts are likely to be temporary.

No differentiation can be made of the effect of the impact in question on the substation alternatives.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Temporary employment creation during construction	
Environmental Parameter	Creation of temporary employment opportunities.
Issue/Impact/Environmental Effect/Nature	The project will create approximately 128 job opportunities at peak construction. 40% (about 51 positions) of the available employment opportunities will be made available to the local community.
Extent	Employment will be created at all levels depending on availability of required skills, but will largely create benefits at the local level.
Probability	The impact will probably occur (between 50% and 75% chance of occurrence).
Reversibility	Once construction is over the jobs created will cease, therefore the impact is completely reversible
Irreplaceable loss of resources	The impact will not result in any loss of resources.
Duration	Short-term – the impact and its effects will disappear once the construction period is over.
Cumulative effect	The impact could contribute towards a significant cumulative effect since temporary job opportunities on offer will increase and be available over longer time periods as the construction of the various facilities will not be taking place at the same time.

Intensity/magnitude	There will be 51 job opportunities available to the local community during the construction phase. Given the size of the local community the intensity will be low.	
Significance rating	**Prior to mitigation measures:** Positive low **After mitigation measures:** Positive low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/magnitude	1	1
Significance rating	12	12
Mitigation measures	• Where possible and feasible, local procurement of labour should be applied to ensure the maximum benefit to the impacted community. • Where feasible, training and skills development programmes targeted at the locals should be initiated prior to commencement of the construction phase. • Establish if a skills database exists within the local area; if so, it should be made available to contractors - information sharing will ensure that the proposed development is understood, enabling those individuals with fitting skills, if any, to make their services and/or knowledge available to the project proponent. • If no database exists, set-up a skills desk at the local municipal office and in the nearby communities to identify skills available in the community which will assist in recruiting local labour during both construction and operation. • The recruitment process should promote gender equality.	

Loss of farm labour to the construction phase	
Environmental Parameter	Recruitment of farm labourers for construction work.
Issue/Impact/Environmental Effect/Nature	Farm workers may be tempted to resign from their permanent positions on the farms in favour of the short-term (more highly paid) employment created by the construction phase.
Extent	The impact will affect the local area and will not be limited only to the site
Probability	The impact could possibly occur (between 25% and 50% chance of occurrence).

Reversibility	The impact is partly reversible – some workers could be re-employed by farmers once construction is over.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	Short-term – the impact and its effects will disappear once the construction period is over.	
Cumulative effect	The proposed establishment of a number of renewable energy projects could lead to notable losses in farm labour in the area and potentially impact the agricultural activities within the area.	
Intensity/magnitude	Low intensity considering the number of farm employees within the vicinity of the project.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	2
Reversibility	2	2
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	3	2
Intensity/magnitude	1	1
Significance rating	-11	-10
Mitigation measures	• When hiring, the EPC contractor should enquire about current or previous employment and avoid employing farm workers, where feasible. • When hiring, the ECP contractor should inform all potential job seekers and candidates that construction work will be temporary and also warned of the potential negative consequences, e.g. loss of permanent employment. • Liaison between the EPC contractor and farmers is necessary to prevent losses in farm labour and to identify the severity of the impact on farm operations.	

During operation

Once fully operational, it is anticipated that the proposed facility will create approximately 39 sustainable employment opportunities for the entire duration of operations. If possible, the majority of these employment opportunities will be filled by suitably qualified individuals from within the local community. However, studies show that there is a limited skills base to operate and maintain renewable energy facilities as the industry is fairly new and growing at a rate above the country's ability to produce required skills. It might be difficult to obtain the required highly skilled workers from within the local community in which case, positions will be filled by individuals from elsewhere in the country. Nonetheless, at least 16 of the created permanent positions at the facility will be filled by individuals from the local communities.

It is estimated that the unemployment rate in the Siyathemba LM is 24.7%, which equates to 1 757 unemployed individuals (excluding the 774 discouraged job seekers). The majority (1 212) of these unemployed individuals reside in Prieska. The magnitude of the impact on employment creation that is envisaged to be generated by the Aletta Wind Facility will be of low significance during construction and even lower during operations. However, when compared to the employment created by existing activities observed on the site, the potential is significantly higher. The agricultural activities currently taking place on the proposed site employ nine farm workers on a permanent basis. The establishment of the proposed facility will not only allow to retain the existing jobs on the farm but will create an additional 39 sustainable jobs.

The potential cumulative benefits to the local employment considering other approved and proposed renewable energy projects will be the creation of additional temporary and sustainable employment opportunities. The creation of a cluster of renewable energy projects in the area will therefore lead to a drastic change in the local labour force profile. However, the contribution of the proposed project towards the cumulative effect will be small to limited depending on the phase considered.

No differentiation can be made of the effect of the impact in question on the substation alternatives.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Sustainable employment during operation	
Environmental Parameter	Creation of long-term employment opportunities.
Issue/Impact/Environmental Effect/Nature	The project will create approximately 39 new job opportunities during its operational period. Approximately 60% (about 23 positions) of the available employment opportunities will be made available to the local community.
Extent	Employment will be created at all levels depending on availability of required skills.
Probability	The impact will probably occur (between 50% and 75% chance of occurrence).
Reversibility	The impact is completely reversible.
Irreplaceable loss of resources	The impact will not result in any loss of resources.
Duration	This impact is considered long-term since it will last for at least the lifespan of the project.
Cumulative effect	There are a number of planned renewable energy developments in the area, which will start operations in different periods. In the context of the local economy, where the unemployment rate measures at 24.7%, the envisaged 39 permanent employment opportunities together with permanent jobs created at other facilities (solar PV and wind) could create a notable cumulative effect, as they will increase the intensity of the impact.

Intensity/magnitude	There will be 39 sustainable employment opportunities available to during operations - the intensity will therefore be low.	
Significance rating	**Prior to mitigation measures:** Positive low **After mitigation measures:** Positive low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	3	3
Intensity/magnitude	1	1
Significance rating	13	13
Mitigation measures	• Where possible and feasible, local procurement of labour should be applied to ensure the maximum benefit to the impacted community. • Continuous skills and development training will equip low-skilled labourers with experience and advanced skills to work on other future renewable energy projects within the area, thus creating long-term employment if the foreseeable future.	

4.2.2 Impact on skills and knowledge

During construction

The construction of the proposed Aletta Wind Facility will require general construction experience as well as specialised knowledge. The local community members, who will be employed during the construction phase, will most probably benefit from on the on-the-job training. It is expected that where specialist training can be provided, candidates from local communities will be trained. People involved in the project will have opportunities to further perfect and develop the skills within their own fields of expertise or acquire new skills. Unlike the employment opportunities created during the construction phase, skills developed during the same period are of permanent nature as once an individual has obtained a certain skill it cannot be lost.

The impact on skills development and training is the same regardless of the substation alternative chosen therefore no preference is given to either of the alternatives.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Skills development and training during construction

Environmental Parameter	Skills development: employment creation gives way to a host of skills transfer and development opportunities in terms of honing an existing skill or acquiring a new skill.	
Issue/Impact/Environmental Effect/Nature	Employed individuals will benefit from on-the-job training and experience.	
Extent	The impact will affect the local community.	
Probability	The impact may occur (between 25% and 50% chance of occurrence), as one cannot be certain that people gaining employment during the construction phase will be able to develop or acquire new skills.	
Reversibility	The effect of the impact (increased experience and knowledge) is unlikely to be reversed.	
Irreplaceable loss of resources	The impact will not result in any loss of resources	
Duration	Permanent – knowledge and experience cannot be considered to stop over a certain period, the effect of the impact will continue indefinitely.	
Cumulative effect	A significant cumulative effect could result since temporary job opportunities on offer will increase and be available over longer time periods as the construction of the various facilities will not be taking place at the same time. Individuals will work and gain experience for longer periods, or more local community members will gain employment.	
Intensity/magnitude	Medium impact on local employees' skills - 11.5% of the adult population in the Siyathemba LM had no education at all, while 64% have primary or secondary education and only 5.5% have higher educational qualifications.	
Significance rating	**Prior to mitigation measures:** Positive medium **After mitigation measures:** Positive medium	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	3
Reversibility	3	3
Irreplaceable loss	1	1
Duration	4	4
Cumulative effect	4	4
Intensity/magnitude	2	2
Significance rating	32	34
Mitigation measures	• Where possible and feasible, local procurement of labour should be applied to ensure the maximum benefit to the impacted community. • Knowledge sharing and on-the-job training should be promoted by the developer among the appointed	

	contractors and, where feasible, viewed as a prerequisite for securing contracts related to the project.

During operations

During operations, labourers and skilled workers who include management staff, electrical engineers and technicians will be required. Existing labour with adequate qualifications and expertise in mechanics, maintenance, management, and security can be trained to operate and maintain the facility. Although maintenance of the facility will be limited, it is highly technical and it seems reasonable to assume that qualified maintenance staff will not be obtained from the local community. In this case, individuals from outside the town and most probably even outside the local municipality might be required to relocate to the area, improving the general skills profile of the local municipality.

No differentiation can be made of the effect of the impact in question on the substation alternatives as the electricity capacity generated remains the same regardless of the alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Skills development and training during operations	
Environmental Parameter	Skills development: employment creation gives way to a host of skills transfer and development opportunities in terms of honing an existing skill or acquiring a new skill.
Issue/Impact/Environmental Effect/Nature	Permanently employed individuals (39) will benefit from on-the-job training and experience. No certainty exists at this stage, but the project proponent could initiate skills development as a part of the Enterprise Development and Social Development requirement.
Extent	It is envisaged that the benefits will be limited to the local area.
Probability	The impact could possibly occur – one cannot be certain that people gaining employment during the operational phase will be able to develop or acquire new skills (between 25% and 50% chance of occurrence).
Reversibility	The effect of the impact (increased experience and knowledge) is unlikely to be reversed.
Irreplaceable loss of resources	The impact will not result in any loss of resources
Duration	Permanent – knowledge and experience cannot be considered to stop over a certain period, the effect of the impact will continue indefinitely.
Cumulative effect	The impact could contribute towards a notable cumulative effects due to the approval of another four renewable energy projects in the area.

Intensity/magnitude	An impact is rated as being of low intensity due to the fact that the number of permeant jobs created is limited and that it is doubtful at this stage that the envisaged number of locals will benefit from the employment opportunities and subsequently skills development.	
Significance rating	**Prior to mitigation measures:** Positive low **After mitigation measures:** Positive low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	3
Reversibility	4	4
Irreplaceable loss	1	1
Duration	4	4
Cumulative effect	3	3
Intensity/magnitude	1	1
Significance rating	16	17
Mitigation measures	• Where possible and feasible, local procurement of labour should be applied to ensure the maximum benefit to the impacted community. • Research should be undertaken to determine the viability of a skills development programme as a part of the Enterprise Development and Social Development initiatives that will have to be implemented by the project proponent.	

4.2.3 Impact on health (and nutrition) of the community

The following health-related issues can be expected to ensue with the development of the proposed project:

- Dust disturbance due to the movement of heavy vehicles during the construction phase.
- An increase in alcohol and drug abuse due to the influx of construction workers and job seekers.
- An increase in sexually transmitted disease including HIV also due to the influx of construction workers and job seekers.

The movement of construction vehicles and construction activities will increase noise and decrease air quality through dust. Noise and dust will lead to increased irritation, especially in the directly affected communities, which may cause social distress, and possible health impacts. This is a short-term impact, as it is expected to last for the duration of the construction phase.

The influx of job seekers and migrant construction workers is expected to create social disturbances in the local economy, amongst which include adverse health impacts around the site and elsewhere in the community. The presence of construction workers may result in an increase in the spread of Sexually Transmitted Diseases (STDs) and increase in drug and alcohol abuse. The significance of such impacts depends to some extent on the proportion of workers that are recruited from outside the local community.

On the other hand, it could be argued that the higher standard of living achieved through income generated from working on the project during construction and operation of the proposed facility would lead to improved nutrition levels for those local households whose members will be employed by the project.

Considering the other approved and proposed renewable energy projects in the vicinity of the Aletta facility, the adverse impacts on the community's health may be amplified. On the other hand, a collective increase in living standard, health, and nutrition as more job opportunities are made available for locals and greater sustainable income increase is experienced. The fact that the developments are likely to be constructed and operated at different times, further increases the cumulative benefit to the local community as the positive impact will be experienced over a longer period than just the lifespan of the Aletta development.

No differentiation can be made of the effect of the impact in question on the substation alternatives.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Impact on health during construction		
Environmental Parameter	Health impacts associated with influx of workers and job-seekers during construction.	
Issue/Impact/Environmental Effect/Nature	The adverse impacts on community health associated with the proposed project.	
Extent	The impact will affect the local community	
Probability	The impact will possibly occur (between 25% and 50% chance of occurrence).	
Reversibility	This impact is barely reversible. The spread of STDs, effects of domestic violence, and unwanted pregnancies will have a lasting negative impact on the community.	
Irreplaceable loss of resources	The impact will not affect resources.	
Duration	The health impacts related to the construction phase are expected to occur over the short-term. Some of the effects however, could be long-lasting, e.g. in the case of HIV/AIDS.	
Cumulative effect	The cumulative effect associated with the adverse health impacts, which could be created by the other related projects is notable.	
Intensity/magnitude	The intensity will be low. The impact is not expected to be wide-spread given the small-scale of these additional activities; however, the negative effects could be significant and long lasting.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2

Probability	2	2
Reversibility	3	2
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	3	3
Intensity/magnitude	1	1
Significance rating	-12	-11
Mitigation measures	• Raising awareness among construction workers on health issues, including HIV/AIDS. • Make condoms available to employees and all contractor workers for free. • Developing a Code of Conduct for all employees related to the project, which includes no tolerance of activities such as alcohol and drug abuse. • A Monitoring Forum (MF) should be created between the parties of interest who are directly and indirectly impacted by the project.	

4.3 Impact on social capital

4.3.1 Impact on social relations

Historical trends show that large construction projects often tend to attract people to the area in the hope that they might find employment even if it is of a temporary nature. Job seekers can become stranded or decide to stay on in the area regardless of whether they have found employment or not. The influx of job seekers and migrant construction workers can lead to the creation of social disturbances and conflicts in the local economy. While the proposed project alone may not result in the influx of significant numbers of job seekers to the area, the establishment of a number of renewable energy projects has the potential to attract large numbers of job seekers to the area, which has already been seen in some of the area such as Upington and De Aar.

The recruitment of construction workers from outside the nearby communities could result in social conflicts between the local population and the migrant workers, as the former could perceive the latter of stealing employment opportunities in the area that are already in short supply in the local municipality. Alcohol abuse among construction workers may also cause irresponsible behaviour which often escalates to violence or conflict between individuals or groups.

It is most likely that the majority of employees will come from the community or nearby towns and will reside in their homes, whereas the rest of the workers coming from outside the nearby communities will stay in guest houses around the area to support local business and the hospitality service. This means that the possibility of conflict among the local population and migrants to the area (including construction crew and job seekers) will be relatively limited.

Conflicts might not only result from the influx of job seekers to the local community, but may also develop between private landowners and the project proponent.

Private landowners' attitudes towards a certain issue or situation relating to the project may strongly influence their views of the project as a whole. The project proponent needs to take into consideration

issues and concerns raised by the land owners (these include security concerns and concerns about damage to farm property) and in consultation with the land owners' device solutions or mitigation measures which both parties are agreeable to. If such current issues are not resolved, it can be expected that the current project will fuel additional conflict with landowners.

The impact on social relations is the same regardless of the substation alternative chosen therefore no preference is given to either of the alternatives.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Impact on social relations during construction		
Environmental Parameter	Conflicts may result between job seekers/construction workers and the local community, as well as develop between private landowners and the project proponent.	
Issue/Impact/Environmental Effect/Nature	Conflict situations that can delay the project and prolong the duration of impacts.	
Extent	The impact will affect the local community.	
Probability	The impact could possibly occur (between 25% and 50% chance of occurrence).	
Reversibility	The conflicts, which might ensue are for most parts completely reversible if they can be resolved.	
Irreplaceable loss of resources	The impact will not result in loss of resources.	
Duration	Conflict situations for the most part will be limited to the construction phase.	
Cumulative effect	Although conflict situations relating to one project might be insignificant, issues might persist or be intensified with the development of other renewable projects such that the local community as a whole can start resenting such activities.	
Intensity/magnitude	The impacts will be for most part of medium intensity.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	2	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	3	3
Intensity/magnitude	2	2
Significance rating	-22	-18

Mitigation measures	• Locals should be informed upfront about employment opportunities so that there are no unrealistic expectations on the part of the community. • The project proponent should attempt to resolve issues and concerns, which they are made aware of immediately. If this is not possible, this should be communicated to the landowner along with a plan on how and when the problem will be addressed. • The Code of Conduct should be used as a set of regulations to be followed to reduce the risk of conflict.

4.3.2 Impact on safety and damage to farm infrastructure

One of the land owners interviewed during the study indicated that one of his major concerns is the risk to their personal safety and increased possibility of stock theft as a result of an influx of people, when construction of the proposed wind facility begins.

The project proponent needs to make sure that expectations surrounding employment provision are carefully managed to reduce the influx of job seekers. As the movement of people increases in the proposed study area, specifically during the construction period, the risk of stock theft or burglaries experienced by the impacted community may increase. The movement of construction workers on and off the site also possesses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Livestock may also be lost if gates are left open and/or if fences are damaged.

The impact is also likely to intensify considering the number of projects already approved for the area, which is likely to increase the attractiveness of the local economy as the place with high rate of labour absorption. As more projects are developed in the area, more people will migrate to the community in the hope of finding employment. These individuals may not all be able to return home, or choose to stay as they wait for employment to become available at construction of other facilities. This could result in a notable cumulative effect on the local economy; thus increasing the risks of personal and livestock thefts in the area.

The impact on safety and damage to farm infrastructure is the same regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Impact on safety and security during construction	
Environmental Parameter	Increased safety and security risk to farmers, their properties, guests and local residents.
Issue/Impact/Environmental Effect/Nature	Potential risk to the safety and security of farm workers and residents, guests of local tourism facilities, and personal property

	of farmers posed by the presence of construction workers on site and job seekers.	
Extent	The impact will affect the local area or district.	
Probability	The impact will likely occur (between 50% and 75% chance of occurrence)	
Reversibility	The impact is partly reversible – farmers can be compensated for losses or damage.	
Irreplaceable loss of resources	The impact will result in marginal loss of resources.	
Duration	The impact might continue even after the construction phase as job seekers might stay on.	
Cumulative effect	The development of at least four projects preceding the proposed Aletta Wind Facility is likely to create high expectations among job seekers from all parts of the country and intensify the influx of people and, as a result, increase the risks to personal safety and security.	
Intensity/magnitude	The impacts will be for most parts of medium intensity.	
Significance rating	**Prior to mitigation measures:** Negative medium **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	2	2
Irreplaceable loss	2	2
Duration	2	1
Cumulative effect	3	2
Intensity/magnitude	2	2
Significance rating	-28	-22
Mitigation measures	• Ensure clear communication of the project information and effective public participation processes to minimise the influx of migrant job seekers. • Movement of construction workers on and off site must be closely monitored and managed. • Prior construction, rules and regulations regarding presence of construction workers on site need to be devised in consultation with the land owners of directly affected and adjacent properties. • During construction the rules and regulations must be clearly communicated to all workers, personal property must be respected and avoided. • Manage workers to ensure that they are only on site during the reasonable working hours.	

4.4 Impact on cultural and spiritual capital

4.4.1 Impact on sense of place

The general sense of place could be affected by the visual, noise and nuisance impacts linked to the proposed project. The area is valued for its wide open spaces and lack of large-scale infrastructure; this may change with the construction and operation of the proposed project.

The findings from desktop analysis and interviews with land owners indicate that the area is sparsely populated and the number of visual receptors in terms of farm houses is therefore, limited to the local residents, farm workers, the users of the R357 and occasional visitors to one of the guest houses. None of the farmers operating in the vicinity of the proposed facility also indicated that the visual impact of the proposed wind facility was an issue of concern. Nonetheless, the change in the sense of place that will be brought by the visual effects of the proposed wind facility will remain beyond the construction phase and will last until the decommissioning of wind turbines after the project's lifespan.

In addition to the visual impact, the noise disturbance caused by movement of construction vehicles and operation of heavy machinery will contribute to the change in the sense of place. However, this impact will be limited to the construction phase only, unlike the visual effect.

A far more significant long-term cumulative impact on the sense of place of the local communities could ensue as the number of renewable energy developments in the area increases. It is known that at least two solar PV and two wind energy facilities will be built in the area and numerous other facilities are proposed to be constructed in the area. Therefore, the proposed Aletta Wind Facility will add to the cumulative effect, which could be notable from a sense of place perspective.

No differentiation can be made as the impact on sense of place is the same regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Change in the sense of place	
Environmental Parameter	Negative impact on sense of place in the area.
Issue/Impact/Environmental Effect/Nature	The impact on sense of place could be experienced by residents, workers, the R2257 road users, and tourists visiting the area who will not value the change to the area.
Extent	The impact will affect the local area or district.
Probability	The impact will definitely occur.
Reversibility	This impact would be completely reversible when the plant is decommissioned.
Irreplaceable loss of resources	The impact will result in marginal loss of resources.
Duration	The impact will last for the entire project life; hence it will be long term.

Cumulative effect	The cumulative impact on the sense of place could be significant, since at least four other renewable energy projects will be built in the area by the time the proposed Wind Facility is constructed.	
Intensity/magnitude	The intensity will be low – none of the farmers interviewed pointed out that the project would create negative impacts on their sense of place. There is no significant tourist activity currently taking place.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	4
Reversibility	1	1
Irreplaceable loss	2	2
Duration	3	3
Cumulative effect	4	4
Intensity/magnitude	1	1
Significance rating	-16	-16
Mitigation measures	• Adhere to the mitigation measures recommended by the visual, noise, and air quality specialists; this will limit the negative impact on sense of place of the directly and indirectly affected community members.	

4.5 Impact on physical capital

4.5.1 Impact on production and Gross Domestic Products (GDP)

The impact of the proposed project on production will occur during construction and operation. A temporary increase in production will be experienced during the construction phase while a sustainable increase in production will be experienced during operations.

During construction

Based on information provided by BioTherm, it is estimated that about R2.6 billion will be spent in the country during the construction period. During the construction phase, the demand for necessary goods, services, and materials will induce production amongst the supporting industries and their supply value chains. Considering the specialised nature of most of the goods and services required, it is likely that a large portion of this will be sourced from outside the local community and possibly the province in general. However, it can be assumed that local businesses will benefit from sub-contracting opportunities, living expenditure of the construction crew, and an increase in income of locals who are directly employed in the construction activities or benefit from the project through local procurement.

In addition to the direct impact resulting from the initial capital investment, it is envisaged that an increase in new business sales will be created through production and consumption induced effects. Production induced effects arise from companies that will be supplying inputs and services to the contractors and engineering firms operating on site while consumption induced effects arise from the new employment

opportunities created through direct and indirect effects, which will in turn increase income levels of the respective households thereby pushing up household consumption.

The proposed windfarm will have the same impact on GDP during construction regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Temporary increase in production and Gross Domestic Product during construction		
Environmental Parameter	Temporary increase in production. Economic production can be defined as an activity that uses inputs of varied nature to produce goods and services.	
Issue/Impact/Environmental Effect/Nature	The impact takes place due to the investment on the project that will be spent in the country. Besides the direct impact, it involves the indirect and induced effects that are also created. It is expected that approximately R2.6 billion of CAPEX will be spent in South Africa.	
Extent	Considering the specialised nature of most of the goods and services required it is likely that a large portion of this will be sourced from outside the local community and the province in general. Therefore, the impact will affect the entire country.	
Probability	The impact will probably occur (50% to 75% chance of occurrence).	
Reversibility	The impact is completely reversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources	
Duration	Short term: the impact will continue for the duration of the construction period.	
Cumulative effect	The impact could result in a significant cumulative impact. The national economy will be stimulated by the various investments. At the same time, the local economy may be able to achieve the economies of scale required for the development of a local support industry, increasing the benefit to the local economy.	
Intensity/magnitude	High, the investment value is considerably high.	
Significance rating	**Prior to mitigation measures:** Positive medium **After mitigation measures:** Positive medium	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1

Cumulative effect	4	4
Intensity/magnitude	3	3
Significance rating	42	42
Mitigation measures	• Where possible and feasible, local procurement of labour, goods, and services must be practiced to maximise the benefit to the local economy.	

During operations

Further, it is estimated that about R1.3 billion of annual revenue will be generated once the facility is operational. In addition to the new business sales created each year that are directly attributable to the proposed project, new business sales will also be generated as a result of production and consumption induced effects. Although it is difficult to adequately comment on the exact spatial distribution of the benefits mentioned above. However, it is expected that a notable portion of the direct impacts will be accrued in the local economy, thus increasing its output.

If the other proposed projects are brought into consideration, the potential impact on the local economy will be significantly greater. In this instance, the cumulative impact will not only be positive but will most likely lead to the creation of the local small renewable energy cluster with possible establishment of warehousing facilities for spare parts and other supporting services.

The proposed windfarm will have the same impact on GDP during operations regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Sustainable increase in production and GDP during operations	
Environmental Parameter	Sustainable increase in production. Economic production can be defined as an activity that uses inputs of varied nature to produce goods and services.
Issue/Impact/Environmental Effect/Nature	The impact results from operation of the proposed facility, as well as procurement of goods and services required for its sustainable operations and creation of sustainable employment opportunities through direct and indirect effects.
Extent	The national economy will experience an increase in production.
Probability	The impact will probably occur (50% to 75% chance of occurrence).
Reversibility	The impact is irreversible.
Irreplaceable loss of resources	The impact will not result in any loss of resources
Duration	This impact is rated as long-term since it will be experienced over the entire operational life of the project.
Cumulative effect	The impact could result in a significant cumulative impact. The national economy will be stimulated by the various investments.

Intensity/magnitude	The direct impact associated with the project will lead to the change in the local economy's structure; therefore, resulting in a medium intensity.	
Significance rating	**Prior to mitigation measures:** Positive medium **After mitigation measures:** Positive medium	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	3	3
Reversibility	4	4
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/magnitude	2	2
Significance rating	34	34
Mitigation measures	• Where possible and feasible, local procurement of labour, goods, and services must be practiced to maximise the benefit to the local economy.	

4.5.2 Impact on road infrastructure

The main road passing through the area is the R357, which is a tarred road linking the site to Prieska. In addition, there are dirt/farm roads, which can also be used to access the site but these are not suited for large traffic volumes.

During the construction phase of the project, abnormally sized vehicles will be required to transport components such as the wind tower, nacelle and rotor, the blades as well as construction equipment (graders, excavators, etc.). This has the potential to disrupt vehicle and pedestrian traffic and restrict the movement of people reliant on the surrounding roads. Increased heavy vehicle activity can potentially damage roads and also poses a safety risk to employees, surrounding residents and other road users. The potential impacts however, can be mitigated by timing the trips so as to avoid periods of the year when traffic volumes are likely to be high and also through implementing strict traffic control measures. The increase in traffic could also lead to the deterioration of the road infrastructure and this would require greater expenditure on road maintenance by the municipality. A maintenance programme on road infrastructure should be implemented by the project proponent.

The negative impact on the quality of local road infrastructure could further be increased if the proposed facility is built in relative short period of time after the construction of the renewable energy projects that are already approved. This could be due to the fact that the local municipality may not have sufficient time to adequately restore the road conditions, if it becomes damaged by traffic created by vehicles delivering goods for the construction of other renewable energy projects in the area.

The proposed windfarm will have the same impact on road infrastructure regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option

Alternative	Preference	Reasons (incl. potential issues)
Option 2	No preference	No differentiation between this and the other option

Temporarily increased traffic and the impact on road infrastructure during construction		
Environmental Parameter	Impact of movement of heavy vehicles during construction on road infrastructure and road safety.	
Issue/Impact/Environmental Effect/Nature	Potential noise, dust, safety and road quality risks associated with the movement of heavy vehicles during construction.	
Extent	The impact will affect the local area/district.	
Probability	The impact is likely to occur.	
Reversibility	The impact is partly reversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	The impact will last for the duration of the construction period.	
Cumulative effect	The impact will result in significant cumulative effects.	
Intensity/magnitude	The quality and use of roads will be slightly modified and affected hence the impact will be of medium intensity.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	2	2
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/magnitude	2	1
Significance rating	-26	-12
Mitigation measures	• Damage caused to local farm roads by construction related activities must be repaired by the project proponent. • Dust suppression measures must be implemented. • Appropriate signage must be put up for traffic control and road safety. • Engage with local municipality to discuss the potential impact on local road quality and the possible mitigation measures.	

4.5.3 Impact on social facilities

The proposed project will attract job seekers and will lead to the migration of construction workers to the area at least for the period of 24 months. An increase in the number of people in a small community such as Prieska, could create additional pressure on economic and social infrastructure in the local economy.

Although there appears to be no imminent gaps in terms of provision of social facilities, an influx of people to the area could put a strain on existing facilities including educational and health facilities, especially considering that job seekers may be accompanied by their families. Proper mitigation measures need to be put in place to minimise the impact on social infrastructure and to ensure that increased pressure does not lead to the deterioration of services provided to local residents, which could reduce the standard of living of the entire community.

The impact on social facilities in relation to the proposed Aletta facility alone is expected to be of low significance, and short-term as it should only last for the duration of the construction period. However, simultaneous in-migration of unemployed jobseekers that could be intensified due to the prior development of other projects in the area, could increase the cumulative effect of the project in question.

The proposed windfarm will have the same impact on the demand for social facilities regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Increased demand for social facilities	
Environmental Parameter	Increased pressure on existing social infrastructure.
Issue/Impact/Environmental Effect/Nature	If unmanaged, expectations about job opportunities during the construction of the proposed project may attract numerous migrant workers. The result will be increased pressure on the local social facilities.
Extent	The impact will affect the local area.
Probability	The impact will likely occur (between 50% and 75% chance of occurrence).
Reversibility	The impact is partly reversible but more intense mitigation measures are required.
Irreplaceable loss of resources	The impact will not result in any loss of resources.
Duration	Medium term, the effect may last slightly longer than the construction phase since some migrant job seekers could linger in the area.
Cumulative effect	The impact could result in a significant cumulative impact. As more projects are approved, the job creation during construction of the projects will increase. At the same time, the construction is not likely to all take place at the same time, increasing the length of the impact by acting as motivation for migrants to remain in the area longer in hopes of finding employment.
Intensity/magnitude	Rated as medium, considering that there are no significant existing challenges experienced by the area.
Significance rating	**Prior to mitigation measures:** Negative low

	After mitigation measures: Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	2	2
Irreplaceable loss	1	1
Duration	2	2
Cumulative effect	4	4
Intensity/magnitude	2	1
Significance rating	-28	-13
Mitigation measures	• Ensure effective communication of the project information throughout all stages to effectively manage expectations of local communities, local authorities and local land owners. • Ongoing consultation with the municipality to prepare local authorities for the activity and the increase demands for public services and affordable housing that may result from this.	

4.5.4 Impact on service delivery

As in the case of social facilities, an influx of people to the area and employment of construction workers from outside the local communities will put a strain on the housing situation and other basic service provision within the local municipality.

If an influx of unemployed jobseekers occurs, this can magnify the temporary increase in the need for housing. Some of the jobseekers might find shelter with friends or family while others are left destitute. This can then lead to the creation of an informal settlement around Copperton, which in turn can place additional strain on already limited municipal resources. The development of an informal settlement and/or the increase in the population in existing communities puts the local municipality under pressure as it increases the housing backlog with more people requiring formal housing and municipal services on par with RDP standards.

The impact in relation to the proposed Aletta facility is expected to be of low significance, as well as short-term as it should only last for the duration of the construction period. However, if the proposed project is built not long after the construction of already approved renewable energy projects is completed, the cumulative effect of the proposed project on the quality of service delivery could be notable.

The proposed windfarm will have the same impact on service delivery regardless of the substation alternative chosen.

Alternative	**Preference**	**Reasons (incl. potential issues)**
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Impact on service delivery		
Environmental Parameter	Increased demand for basic services and affordable accommodation.	
Issue/Impact/Environmental Effect/Nature	If unmanaged, expectations about job opportunities during the construction of the proposed project may attract numerous migrant workers. The result will be increased pressure on the local authorities' ability to adequately provide basic services.	
Extent	The impact will affect the local area.	
Probability	The impact will likely occur (between 50% and 75% chance of occurrence).	
Reversibility	The impact is partly reversible but more intense mitigation measures are required.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	Medium term, the effect may last slightly longer than the construction phase since some migrant job seekers could linger in the area.	
Cumulative effect	The impact could result in a significant cumulative impact. As more projects are approved, the job creation during construction of the projects will increase. At the same time, the construction is not likely to all take place at the same time, increasing the length of the impact by acting as motivation for migrants to remain in the area longer in hopes of finding employment.	
Intensity/magnitude	Rated as medium, considering that there are no significant existing challenges experienced by the area.	
Significance rating	**Prior to mitigation measures:** Negative low **After mitigation measures:** Negative low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	2
Reversibility	2	2
Irreplaceable loss	1	1
Duration	2	2
Cumulative effect	4	4
Intensity/magnitude	2	1
Significance rating	-28	-13
Mitigation measures	• Ensure effective communication of the project information throughout all stages to effectively manage expectations of local communities and local authorities. • Ongoing consultation with the municipality to prepare local authorities for the activity and the increase demands that may result from this.	

	• Establish a health facility for the duration of the construction period to provide services to the construction crew and alleviate pressure on the local facilities.

4.6 Impacts on financial capital

4.6.1 Impact on household income and financial resources

The average monthly household income in the Siyathemba LM was estimated at R6 858 in 2014 prices. Overall, approximately two thirds of the population in the Siyathemba LM earns up to R3 200 a month, while approximately 39.4% of the households qualify as indigent (monthly household income <R1500). Indigent households refer to those, which due to a number of socio-economic factors, are unable to afford basic services such as water, basic sanitation, basic energy, health care, housing, food and clothing.

The project proponent estimates that labour costs associated with the construction phase will amount to R20.7 million while annual labour costs for the operational period will amount to R9.6 million in 2016 prices. Considering the fact that the estimated level of local labour procurement of the available positions is 40% during construction and 60% during operation, it can be argued that the benefit that will accrue to local community members will be limited. However, the benefitting households will experience an increase in disposable income. An increase in disposable income is often associated with an increased standard of living due to factors such as access to better nutrition, improved living conditions, improved ability to make economic choices among others.

The impact of the proposed project on household income will be a temporary (short-term) increase during construction and sustainable (long-term) increase during operation. The creation of employment opportunities during construction and operation of the Aletta facility will positively impact on household income levels and allow these households to improve their standard of living. Furthermore, persons who obtain jobs as an indirect result of the facility's operations will experience growth in their income levels and consequently, more households in the province and other parts of the country will also benefit.

Considering the other proposed renewable energy developments in the area, the cumulative positive impact will be a marked increase in household income for the local community.

The proposed windfarm will have the same impact on household income and financial resources regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Temporary increase in household disposable income during construction	
Environmental Parameter	Temporary increase in the household income of members employed during the construction phase.
Issue/Impact/Environmental Effect/Nature	The impact takes place during construction as a result of jobs created through direct, indirect and induced impacts.

Extent	An estimated minimum of 51 households in the Siyathemba LM may temporarily benefit from an increase in disposable income directly as a result of the proposed development. About 77 of the employment opportunities will be filled by people from outside the local area, and even the province. It follows that an increase in household income will take place along the same geographical boundaries as employment creation.	
Probability	The impact will most likely occur (between 50% and 75% chance of occurrence).	
Reversibility	The impact is completely reversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	Short term, the increased disposable income will disappear once the construction is completed.	
Cumulative effect	The impact could result in a significant cumulative impact. As more projects are approved, the job creation during construction of the projects will increase. At the same time, the construction is not likely to all take place at the same time, increasing the length of the impact. The benefitting households will benefit for longer or more households will benefit.	
Intensity/magnitude	Considering the total income to be earned by individuals and consequently households directly benefitting from the construction phase project, i.e. about R41 million, the impact is considered to be of medium intensity.	
Significance rating	**Prior to mitigation measures:** Positive low **After mitigation measures:** Positive low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/magnitude	2	2
Significance rating	28	28
Mitigation measures	• Where possible, local labour should be used during the construction activities. • When feasible local procurement of goods and services should be implemented to further increase the benefit to the local community.	

Sustainable increase in household disposable income during operations

Environmental Parameter	Sustainable increase in the household income of individuals involved in the activities associated with the operational phase of the facility.	
Issue/Impact/Environmental Effect/Nature	It is expected that the households benefitting will experience an increase in income as a result of the sustainable jobs created through the operation of the wind farm directly and its multiplier effects.	
Extent	Local, since the jobs will be created locally.	
Probability	The impact will most likely occur (between 50% and 75% chance of occurrence).	
Reversibility	The impact is irreversible – income received during operations cannot be undone.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	This impact is rated as long-term since it will be experienced over the entire operational life of the project.	
Cumulative effect	The impact could result in a significant cumulative impact. As more projects are approved, the job creation during operations of the projects will increase. At the same time, the developments are unlikely to become fully operational at the same time, increasing the length of the impact. The benefitting households will benefit for longer or more households will benefit.	
Intensity/magnitude	Considering the total income to be earned by individuals and consequently households directly benefitting from the operation phase project, i.e. ~R9.6 million per annum, the impact is considered to be of medium intensity.	
Significance rating	**Prior to mitigation measures:** Positive medium **After mitigation measures:** Positive medium	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	3
Reversibility	4	4
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/magnitude	2	2
Significance rating	34	34
Mitigation measures	• Where possible, local labour should be used during the construction activities. • When feasible local procurement of goods and services should be implemented to further increase the benefit to the local community.	

4.6.2 Impact on property values

The farms located on or near to the proposed development site are mainly used for commercial livestock farming. The owners of these farms have indicated that they plan to continue with their commercial agricultural activities regardless of whether the wind facility is established or not. Income earned from the potentially affected properties is thus, not sensitive to the proposed project. However, concerns relating to stock theft and personal safety were raised by these landowners.

According to Seeff Properties (Prieska) agents who were engaged with, there has been a decrease in property sales and an increase in rentals over the past couple of years mainly because of the high interest rates associated with buying property. Rental prices also increased as a result of the Mulilo-Sonnedix Prieska PV project – there was a huge increase in demand for rental properties and accommodation at the local guest houses. The agents are of the view that the proposed project will also create a huge demand for rental accommodation including guest houses. This will in turn lead to an increase in property prices.

In general, any development with the potential for environmental effects could have one of two primary impacts on property values:

- Land value could be reduced based on real or perceived adverse effects of the proposed development such as noise levels; traffic; and aesthetics, or
- The demand for surrounding properties could increase, leading to a rise in the area's property value. This could occur when considering the accessibility to transmission infrastructure and resource potential.

Based on the fact that the farms directly affected by the project's proposed footprint and those in the vicinity will continue with current commercial agriculture activities, it is reasonable to assume that the property values will remain unaffected by the project. Moreover, property values in the local municipality, and more specifically Prieska and surrounds, could potentially experience an increase based on the fact that demand for residential and commercial property is likely to increase in line with the expected development and growth of the local economy as more renewable energy projects are developed (operational and cumulative impacts).

The proposed windfarm's impact on property values remains the same regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Impact on property values and desirability of property	
Environmental Parameter	Property prices and the desirability of property in the project vicinity.
Issue/Impact/Environmental Effect/Nature	Establishment of the facility could increase the demand for real estate and positively impact on the property values in the area.

Extent	The impact on property prices resulting from the operation of the wind energy facility will occur at the local level.	
Probability	The impact could possibly occur (between 25% and 50% chance of occurrence).	
Reversibility	Reversible.	
Irreplaceable loss of resources	The impact will not result in loss of resources.	
Duration	Medium-term, the impact is likely to last longer than construction influenced by developments in the area.	
Cumulative effect	The impact could result in a notable cumulative impact given the number of similar facilities planned in the area.	
Intensity/magnitude	The intensity could reach medium levels.	
Significance rating	**Prior to mitigation measures:** Positive low **After mitigation measures:** Positive low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	2
Reversibility	1	1
Irreplaceable loss	1	1
Duration	2	2
Cumulative effect	3	3
Intensity/magnitude	1	1
Significance rating	11	11
Mitigation measures	• It is recommended that in order to curb the increase in property prices in the area, proper planning concerning accommodation of the construction crew is done. • Aim to hire as many people from the local community as possible to limit the increase in demand for accommodation.	

4.7 Impacts on political and institutional capital

Political and institutional capital impacts focus on the way in which the proposed development could affect political structures and institutions in the community. This includes the impact on service delivery in the affected area, the power relationships between groups and how people are able to negotiate through situations that might affect their lives.

4.7.1 Impact on government ability to service community

The municipality still faces challenges in terms of drinking water quality, backlogs in sanitation provision (there are still households using bucket toilets) and backlogs in housing provision. The main reason behind these challenges is the municipality's limited financial resource base.

During the construction and operational phases, companies and workers will earn income and pay government taxes such as payroll and income taxes. Although the spending of this money by government is difficult to associate with a specific budget item, any revenue received by government is allocated towards certain budget items, provinces or local municipalities to support and assist with improvement of

their service delivery. Thus, without doubt, this revenue would be spent on improving socio-economic conditions of the population in some way.

The significance of the increase in the local government's ability to deliver services will intensify due to the potential cumulative impact of various proposed renewable energy projects to be developed within the LM. Each of these developments will lead to an array of rates and taxes collected through various channels, with the same multiplier effects applying to every development's employees and service providers. Importantly, the potential for the local government to benefit significantly from an increased tax base is rooted in the support of the eventual development of the renewable energy industry and associated support businesses in the LM. The income and employment generation that will result from this will produce the revenue streams required for better service provision enabling the LM to potentially become a catalyst for growth and development.

The potential revenue to be generated by the government as a result of the development of the windfarm is the same regardless of the substation alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option
Option 2	No preference	No differentiation between this and the other option

Temporary increase in tax revenue for government during construction		
Environmental Parameter	Increase in government revenue.	
Issue/Impact/Environmental Effect/Nature	The project proponent will have to pay taxes such as income taxes and payroll taxes. It cannot be said with certainty how this income will be distributed and spent; however, the government will no doubt utilise it to better service provision somewhere in South Africa.	
Extent	The impact will affect the entire country	
Probability	The impact will most likely occur (between 50% and 75% chance of occurrence).	
Reversibility	The impact is completely reversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	Short term, the increase in government revenue linked to the construction of the facility will cease once construction is completed.	
Cumulative effect	The impact could result in a significant cumulative impact.	
Intensity/magnitude	The project will make a small contribution to the national revenue, hence the intensity rating is low.	
Significance rating	**Prior to mitigation measures:** Positive low **After mitigation measures:** Positive low	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	3	3

Reversibility	1	1
Irreplaceable loss	1	1
Duration	1	1
Cumulative effect	3	3
Intensity/magnitude	1	1
Significance rating	13	13
Mitigation measures	No mitigation measures exist.	

Increase in tax revenue for government during operations		
Environmental Parameter	Increase in government revenue.	
Issue/Impact/Environmental Effect/Nature	The project proponent will have to pay taxes such as local taxes and rates, and income taxes and payroll taxes. Local taxes and rates will increase the revenue of the local government, while the income taxes and payroll taxes will become part of the national fiscus. It cannot be said with certainty how this income will be applied; however, the government will no doubt utilise it to better service provision somewhere in South Africa.	
Extent	The impact will affect the entire country	
Probability	The impact will most likely occur (between 50% and 75% chance of occurrence).	
Reversibility	The impact is reversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	Long term, the impact and its effects will last and continue for the operational span of the project.	
Cumulative effect	The impact could result in a significant cumulative impact.	
Intensity/magnitude	The project will make a notable contribution to the national revenue, hence the intensity rating is moderate.	
Significance rating	**Prior to mitigation measures:** Positive medium **After mitigation measures:** Positive medium	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	4
Probability	3	3
Reversibility	1	1
Irreplaceable loss	1	1
Duration	3	3
Cumulative effect	3	3
Intensity/magnitude	2	2
Significance rating	30	30
Mitigation measures	No mitigation measures exist.	

5 NEEDS AND DESIRABILITY FROM A LOCATIONAL PERSPECTIVE

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

Table 5-1: Need and desirability of the proposed project from a locational perspective

Aspect	Comment
Creation of residential and employment opportunities in close proximity to or integrated with each other	Copperton is the closest town to the proposed Aletta Wind Facility. However, there is a very small population residing there. The closest major town is Prieska, which is about 50km from the project site. It is envisaged that the majority of people who will be employed will be travelling from Prieska and no new residential units will be built closer to the site. Given the dispersed nature of the region and that some individuals travel further than 50km to get to their places of work, it can be argued that the employment opportunities to be created by the project will be fairly close to existing settlements.
Reduction in the need for transport of people and goods	Since it is envisioned that the majority of workers will come from Prieska, transport will be required to get the workers to and from the project site. Contractors will most probably make necessary transport arrangements for their workers.
Access to public transport or enable non-motorised and pedestrian transport	The project is not expected to aid in achieving this goal.
Complimenting other uses in the area	The proposed project site and surrounding farms are currently used for commercial sheep farming (grazing). Research shows that agricultural activities and wind farms can co-exist with little impact resulting from wind energy facilities. Therefore, it can be said that the development compliments current land use.
Alignment with planning for the area	Although the project is not specifically mentioned in the municipal planning reports, reference is made to wind energy facilities. Planning policies from national to local level advocate the development of renewable energy facilities and social and economic development of the local community (as outlined in detail in Section 2) and the proposed project promotes these goals.
Use of underutilised land available (only for urban related development)	Not applicable.
Optimisation of the use of existing resources and infrastructure	The proposed project is in line with the overall objectives of optimal and sustainable resource usage. The production and employment to be created by the proposed project is expected to be greater than that created by the current activities on site. Moreover, the project is not envisaged to negatively impact on these activities – sheep farming activities will be able to continue. Further, the electricity generated by the proposed development will be fed into the national grid, thus strengthening it.

Aspect	Comment
Discouragement of "urban sprawl" and contribute to compaction/densification	The facility is not expected to have a direct/deliberate effect on urban sprawl. However, there will be a temporary influx of job seekers and their families to the area, which will increase the demand for affordable accommodation and may contribute towards growth of informal settlements.
Contribution to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current need	The proposed development will provide employment opportunities, give some community members the opportunity to gain skills and encourage development of local businesses through procurement policies which they would not have necessarily been able to obtain themselves.
Encouragement of environmentally sustainable land development practices and processes	Wind facilities at utility scale are considered to be green and sustainable means to generate electricity. The use of land for the establishment of the wind facility, which will also allow the continuation of the current land uses (i.e. commercial sheep farming) is definitely seen as the environmentally sustainable land development practice.
Consideration of special locational factors that might favour the specific location	Although the Northern Cape or a very long time was acknowledged to be suited for solar energy projects only, the National Wind Atlas Data clearly indicated that the province has a significant potential for wind energy generation. Two other renewable energy projects have already been approved to be developed in the vicinity of the proposed wind facility, illustrating that the area is suitable not only for solar PV projects but has excellent wind profile to justify the establishment of utility-scale wind farms.
Generation of the highest socio-economic returns	The proposed development will generate higher socio-economic benefits as compared to current activities that are observed on the site (increased employment, increase in household income, increase in GDP and production). Importantly, the development will allow the commercial sheep farming, which is undertaken on site, to continue thus allowing the land to be used in the most productive way for generation of the highest socio-economic benefits.
Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area	The components associated with the proposed facility will have a visual impact and therefore, impact on the landscape and sense of place. There is a limited number of sensitive visual receptors in area, given the low number of homesteads located in the vicinity of the proposed site for the wind facility. The project is not expected to have a significant impact on sense of place.
Promotion or contributing to create a more integrated settlement	The project is likely to invest in the community development through Socio-Economic Development and Enterprise Development contributions during its operation. These could improve the universal access to services and various facilities in the area and aid in creating a more integrated community.

6 CONCLUSION

The proposed Aletta 140 MW Wind Facility is to be located near Copperton in the Siyathemba Local Municipality, within the Northern Cape Province. The construction of the facility will last for about 24 months and will require an investment of about R5.75 billion of which approximately 45% (R2.6 billion) will be spent in South Africa. The facility's operations will generate about R1.3 billion per year in revenue for about 20 years.

The national, provincial, and local government policy and strategy documents analysed in the report support the establishment of renewable energy projects as they have been recognised as potential stimulants of local economic growth, job creation, and also with regards to their contribution to sustainable development. The NCPGDS also notes that "sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile eco-systems and vulnerability to climatic variation". In this regard, care needs to be taken to ensure that renewable energy facilities do not impact negatively on the region's natural environment. However, there will be no significant threats to the natural environment as has been noted during the impact assessment.

The economy of the Siyathemba LM is in need of investment and development and the establishment of the wind facility in the area will offer such an opportunity. Furthermore, if the other proposed projects are approved, this could contribute to the growth of this sector as well as stimulate economic development further. The project will have the potential to improve the standard of living of the communities located within a 50 km radius given the commitments towards socio-economic and enterprise development.

The construction and operation of the facility will result in various positive economic impacts.

- It is estimated that the capital expenditure on the 140 MW wind facility will be R2.6 billion. Approximately, 128 employment opportunities will be created during the construction phase. About 40% of the employment opportunities, specifically for unskilled and semi-skilled individuals are likely to be available to local community members. Employment opportunities for skilled individuals are likely to be associated with contractors appointed during the construction phase.
- The annual revenue generated by the plant could amount to up to R1.3 billion. Furthermore, it is expected that 39 jobs per annum will be created at the plant.

It is assumed that all the infrastructure associated with the Aletta Wind Energy Facility will be contained on the remainder of the farm Witfontein No. 54, Portion 8 and 9 of the farm Nelspoortjie No. 103, portion 3 of the farm Blaauwbosch Poortjie No. 66 as well as sections of the REM and Portion 2 of the farm Blaauwbosch Poortjie No. 66. These farm portions have multiple owners and are used for commercial sheep farming (grazing). During consultation with the farm owners, no indication was made as to whether livestock farming would be halted completely during construction or if livestock would be moved to sections of the farms not affected by the construction activities. However, it is anticipated that farmers will be compensated for losses in revenue during the construction phase. Farming operations will be able to continue undisturbed when construction is completed.

Overall, the impacts discussion and evaluation revealed that no fatal flaws are present from a socio-economic perspective, preventing the proposed development from being approved and implemented. In fact, as can be seen from Table 6-1 that all of the expected negative socio-economic impacts are of low significance.

Table 6-1: Summary of construction and operation phase impacts

Impact	Significance rating with no mitigation	Post mitigation significance rating
Construction phase		
Loss of productive agriculture land	Negative low (13)	Negative low (13)
Disruption of farming activities	Negative low (8)	Negative low (8)
Temporary employment creation	Positive low (12)	Positive low (12)
Loss of farm labour	Negative low (11)	Negative low (10)
Skills development and training	Positive medium (32)	Positive medium (34)
Impact on health	Negative low (12)	Negative low (11)
Impact on social relations	Negative low (22)	Negative low (18)
Impact on safety and security	Negative medium (28)	Negative low (22)
Change in sense of place	Negative low (16)	Negative low (16)
Temporary increase in production and GDP	Positive medium (42)	Positive medium (42)
Impact on traffic and road infrastructure	Negative low (26)	Negative low (12)
Increased demand for social facilities	Negative low (28)	Negative low (13)
Impact on service delivery	Negative low (28)	Negative low (13)
Temporary increase in household income	Positive low (28)	Positive low (28)
Impact on property values	Positive low (11)	Positive low (11)
Temporary increase in government revenue	Positive medium (42)	Positive medium (42)
Operation phase		
Sustainable employment creation	Positive low (13)	Positive low (13)
Skills development and training	Positive low (16)	Positive low (17)
Sustainable increase in production and GDP	Positive medium (34)	Positive medium (34)
Sustainable increase in household income	Positive medium (34)	Positive medium (34)
Sustainable increase in GDP	Positive medium (38)	Positive medium (38)
Increase in government revenue	Positive medium (30)	Positive medium (30)

With respect to the substation and O&M building alternatives, considering all potential impacts, no clear differentiation between the two alternatives can be made.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION AND O & M BUILDING ALTERNATIVES		
Option 1	No preference	No differentiation between this and the other option in terms of the socio-economic impacts considered – will result in the equal impacts.
Option 2	No preference	No differentiation between this and the other option in terms of the socio-economic impacts considered - will result in the equal impacts.

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ANNEXURE A: IMPACT RATING CRITERIA AND METHODOLOGY

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 as

Table 0-1: 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 a 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.

Assessing the significance of each issue the following criteria is used: