ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF THE XHA! BOOM WINDFARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

SOCIO-ECONOMIC IMPACT STUDY

SCOPING PHASE INPUT

NOVEMBER 2016

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TABLE OF CONTENTS

LIST OF MAPS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

CAGR	Compounded Average Growth Rate
CSP	Concentrated Solar Power
DM	District Municipality
ED	Enterprise Development
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GDP-R	Gross Domestic Product
GGP	Gross Geographic Product
I&P	Interested and Affected Parties
IDP	Integrated Development Plan
IRP	Integrated Resource Plan
IPAP	Industrial Policy Action Plan
LED	Local Economic Development
LM	Local Municipality
MLL	Minimum Living Level
MW	Megawatt
NC	Northern Cape
NDP	National Development Plan
NGPF	New Growth Path Framework
PGDS	Provincial Growth & Development Strategy
PV	Photovoltaic
RE	Renewable Energy
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SED	Socio-economic Enterprise Development
SDF	Spatial Development Framework

1 INTRODUCTION

The proposed project consists of the development of a 235MW Wind Farm. This document is prepared by **Urban-Econ Development Economists** in request by **SiVEST Environmental Division** on behalf of **Mainstream Renewable Power South Africa (Pty) Ltd.** to undertake a Socio-Economic Impact Study for the development of the **Xha! Boom Wind Farm** near Loeriesfontein in the Northern Cape Province of South Africa. The socio-economic impact study is conducted as part of the Environmental Impact Assessment (EIA) process managed by SiVEST. This document forms part of the deliverable for the scoping phase of the process and undertakes to determine the current socio-economic baseline characteristics of the preliminary delineated study area, and identify the potential influence of the proposed project on the surrounding economic activities and communities to guide the assessment during the next phase.

1.1 Scope of the Study

The purpose of the socio-economic impact assessment is to determine the potential socio-economic implications of the project activities and associated infrastructure and to compare its effects with the "no-go" alternative. The "no go" alternative assumes that the proposed 235MW Xha! Boom Wind Farm is not established, which means that it represents the current status of the environment, including the socio-economic situation.

The current report is prepared as part of the socio-economic study and is used as an input into the scoping report that is compiled by SiVEST Environmental Division. The scoping phase inputs address only a portion of the scope of work involved in the Socio-Economic Impact Assessment Study and enable the project team and the client to make more informed decisions regarding the way forward for the proposed project, from an environmental management point of view. The purpose of the socio-economic scoping report is as follows:

- Undertake a policy review and assess the alignment of the proposed project with the national, provincial and local socio-economic policies
- Create a socio-economic profile for the study area using secondary data
- Identify potential negative and positive economic impacts that could be generated by the proposed alternatives during the project life cycle
- Identify impacts and project effects (direct, indirect, induced, and cumulative) that will require further investigation and recommend an approach for pursuit during the EIA phase for completion of the impact assessment exercise
- Identify gaps in knowledge and data that will need to be addressed during the EIA phase

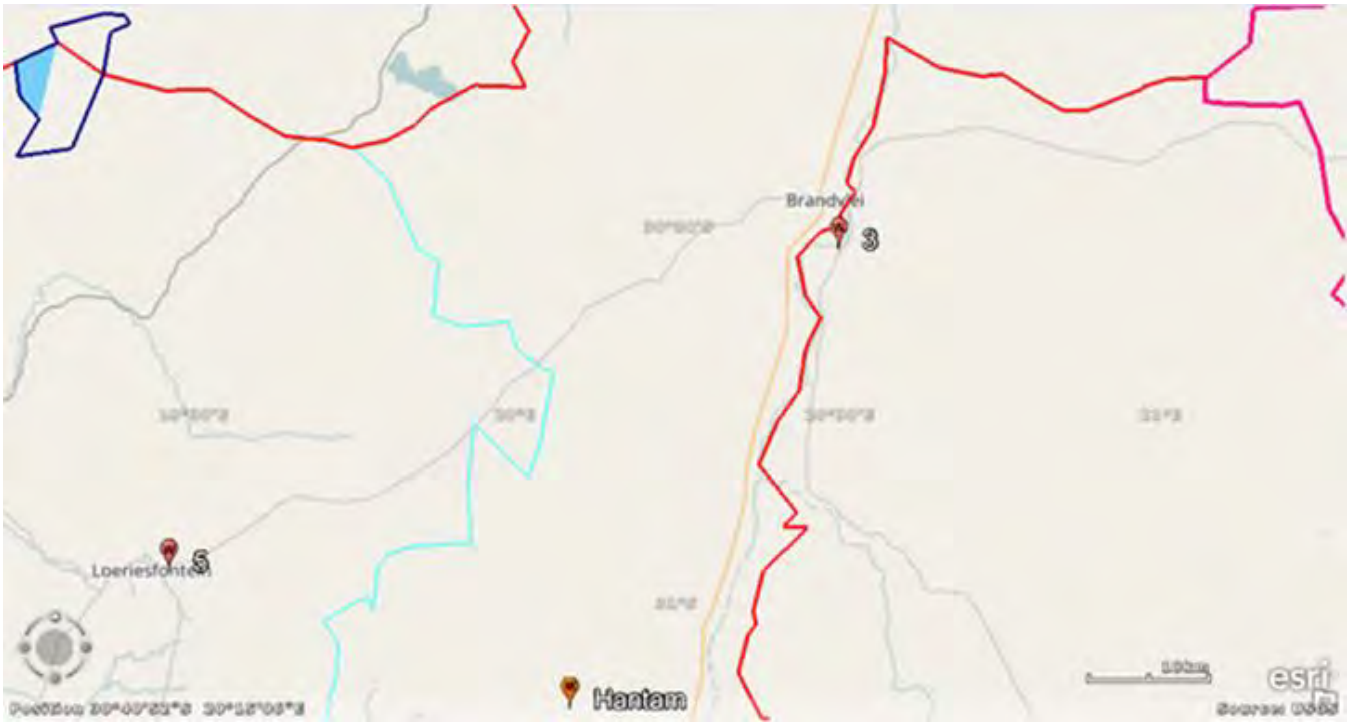
1.2 Project Content, Location and Study Area Delineation

The Xha! Boom Wind Farm and accompanying infrastructure is planned to be built on the north-western portion of the Hantam Local Municipality (LM), and on the southern interior of Khai-Ma Local Municipality (LM). As clearly outlined in Map 1-1 below, the proposed Xha! Boom Wind Farm is to be located in close proximity to the borders of Hantam LM and the Khai-Ma LM, which both form part of the Namakwa DM in the Northern Cape Province.

Map 1-1 Regional Location of the project

To substantially delineate the study area, it is essential to understand the concept of socio-economic impacts, which, broadly defined refer to the relationship that exists as a result of the interactions between economic development activities such as this one and regional social processes. Due to this, socio-economic impacts of a particular study area are therefore directly linked to the structure, composition and activity of the area. Thus, an understanding of the potential distribution and concentration of impacts is essential as it aids in determining the magnitude and significance of these impacts in the context of spatial units within a study area.

As depicted in Map 1-2 below, in the Hantam LM, Loeriesfontein is the closest town to the proposed site, the distance between the site and the town is approximately 75km. Brandvlei, is the second closest town situated to the east of the project site in the Hantam LM is roughly located about 116km away from the site. Brandvlei, as well as major towns such as Calvinia situated within the LM, are located further away from the proposed site and will therefore, not be included in the study area analysis.



Map 1-1 Site location and nearby towns

The proposed site lies in close proximity to the borders of Hantam LM and Khai-Ma LM. Hantam is a small municipality with a population of 21 581 people whilst the Khai-Ma LM has an even smaller population of 12 466 people (Stats SA, 2011). Surrounding municipalities within the Namakwa DM include the Karoo Hoogland LM, which has a population of 12 586 people; the Kamiesberg LM with 10 185 people; the Nama Khoi LM with 47 043 inhabitants and the Richtersveld LM with a population of 11 981 people (Stats SA, 2011).

As a result of the development of the project, several impacts are expected to arise on the population and economies of neighbouring towns and settlements. Thus, regarding the above, the baseline analysis will consider the Hantam LM and the Khai-Ma LM as well as the Namakwa DM. Within the Hantam LM, specific attention will be directed to the town closest to the development site, namely Loeriesfontein. The Hantam LM is the primary study area; however, due to the proximity of the site to the border of the Khai-Ma LM but relatively distant location of the towns, Khai-Ma LM will be included in the analysis alongside the Hantam LM. The procurement of majority of the inputs required for the development of the wind farm will occur in the Northern Cape Province and generally in South Africa and will therefore, be respectively classified as secondary and tertiary study areas; however, reference to these economies will only be made where applicable.

1.3 Methodology for the Scoping Phase

The methodological approach adopted for conducting the scoping study includes three phases:

- **Data collection:** Secondary research encompassing the examination of relevant policies, local and provincial strategic documents, and secondary data presented by Stats SA and Quantec. The information obtained assists in providing a preliminary profile of the socio-economic environment that could potentially be affected. Primary research is also undertaken in cases where land owners or farm managers will be directly or indirectly affected by components of the proposed project.

- **Baseline profiling:** A description of the study area is given in terms of selected socio-economic variables. It includes the analysis of parameters such as population size and household numbers, structure and growth of the economy, labour force and the employment situation. Profiling for the study is done making use of the Quantec Research database, Stats SA's Census 2011 data, and various strategic documents produced for the relevant municipality. A brief profile of the local area and specifically the directly affected zone of influence are also provided, which is based on the information gathered during the site visit and interviews with various stakeholders.
- **Identification of the anticipated impacts:** This step includes the identification of the socio-economic impacts that could be expected during various phases of the project's life cycle and the way forward with respect to the collection of data required to quantify and qualify the impacts.

2 POLICY REVIEW

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

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

- National (South Africa):
    - 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) (2012/2013 – 2014/2015)

- Regional:

    - Northern Cape Provincial Spatial Development Framework (2012)
    - Northern Cape Municipal Local Economic Development Framework (2011)
    - Northern Cape Provincial Growth and Development Strategy (2011)

- Local: Namakwa District Municipality, Hantam and Khai-Mai Local Municipalities

    - Namakwa District Spatial Development Framework 2012
    - Namakwa District Municipality Integrated Development Plan 2015-2016
    - Hantam Local Municipality Local Economic Development Strategy 2011
    - Hantam Local Municipality Integrated Development Plan 2015-2020
    - Hantam Local Municipality Rural Spatial Development Framework 2010
    - Khai-Ma Local Municipality Integrated Development Framework 2012-2017
    - Khai-Ma Local Municipality Spatial Development Framework 2011

Alignment with National development objectives

The expansion of South Africa's renewable energy capacity generation will play a vital role in consolidating energy security, mitigating climate change and stimulating economic growth to improve the general standard of living of all South Africans. Developing the Renewable Energy (RE) industry is one of the national priorities as per the following policies and strategies:

- **New Growth Path Framework** (NGPF): The overarching objectives listed in national policy and frameworks include the impending need to reduce poverty, achieve equity, and increase economic growth. Thus, at the forefront of the government action plan is the creation of decent employment opportunities through the support of labour-intensive sectors and assurance of long-term economic growth. To ensure sustained job creation prospects, government has placed further emphasis on the promotion of local industrial capacity and skills development in advanced industries. Because of this, the New Growth Path Framework (NGPF) states that the diversification of the national economy is vital to improving both the rate of absorption as well as the Gross Domestic Product (GDP) growth rate and has thus set a target to stimulate employment by five million new jobs by the year 2020. The development of the RE sector is particularly

identified to have a potential to play an important role in creating decent work, reducing inequality and eradicating poverty (Department of Economic Development, 2010).

- The **National Development Plan** (NDP): To successfully overcome the triple threat challenge of poverty, unemployment, and inequality posed to the country, the National Development Plan encourages all regions to seize the advantage of natural resources endowed to them. This, however, must be achieved in a sustainable and equitable manner**.** For the goals embedded within the policy to be met, of critical importance is the proposed path toward developing and growing a green economy. In line with international protocol and ambitions, the NDP acknowledges South Africa's dependence on fossil fuel based energy production as a key challenge and this has placed further emphasis on the need to transition toward a low-carbon economy. To achieve this, the NDP seeks to ensure that half of all new electricity generating capacity is provided through renewable energy resources. This means that at least 20 000 MW of electricity should be procured from renewable resources by 2030. Electricity derived from these sources will increase both the national grid capacity and replace the 11 000 MW of electricity derived from coal-powered stations (National Planning Comission, 2011)**.**
- **Integrated Resource Plan** (IRP): The IRP**,** which was promulgated in 2011, was established with the purpose of serving as a living plan to monitor South Africa's forecast electricity capacity by the year 2030. Since the IRP's establishment, the government has committed itself to producing 8 400 MW from Photovoltaic (PV), 8 400 MW from wind as well as 1 000 MW from Concentrated Solar Power (CSP) by the year 2030. The path to achieving this goal then led to the establishment of the Renewable Energy Independent Power Producer Procurement programme (REIPPP) which is essentially the key vehicle for securing electricity capacity from the private sector for renewable energy as well as non-renewable sources. Currently, the three ministerial determinations have called for a procurement of 13 125 MW of renewable energy from IPP's; of this, 6 360 MW has been allocated to wind energy projects. In consideration of the four and a half bidding windows that have already been achieved, 3 346 MW have already been awarded to existing wind projects. This has resulted in the possibility of 3 013 MW to be allocated to more renewable energy projects thus creating opportunities for projects such as the one under analysis to be established.
- **Industrial Policy Action Plan** (IPAP): Both the Integrated Resource Plan and the Industrial Policy Action Plan (IPAP) specify that 21 500 MW of renewable energy capacity should be established by 2030. This capacity will be primarily derived from wind and solar technologies, which will serve to reduce the country's heavy reliance on energy derived from coal-intensive non-renewable resources thus significantly reducing greenhouse gas emissions. With this, the crucial goal of improving employment will be achieved whilst improving the standard of living of South African resident's in the process. Based on the above, it can be concluded that the proposed Xha! Boom Wind Farm agrees and is in alignment with national policies insofar as it will assist in achieving the set target for electricity generation using renewables and contribute to the development of human capital and technology (Department of Trade and Industry, 2015).

Alignment with Provincial policies

- **Northern Cape Provincial Growth and Development Strategy** (NC PGDS): This document highlights the importance of developing new energy sources through adopting energy applications that are in correlation with the Provinces' natural resource endowment. This is encouraged so as to be mindful of the vulnerable and fragile ecosystems whilst maintaining the integrity of the natural and cultural attributes of the Province (Northern Cape Government, 2008). The provision

of electricity through renewable energy sources is also seen as a reliable way to promote and accelerate economic growth within the Province through ensuring that key industry users at critical locations improve their competitiveness. Although there is sufficient reason towards investing in the use of renewable energy in the Province, it is essential that potential developments be considerate of the tourism industry component of the Province.

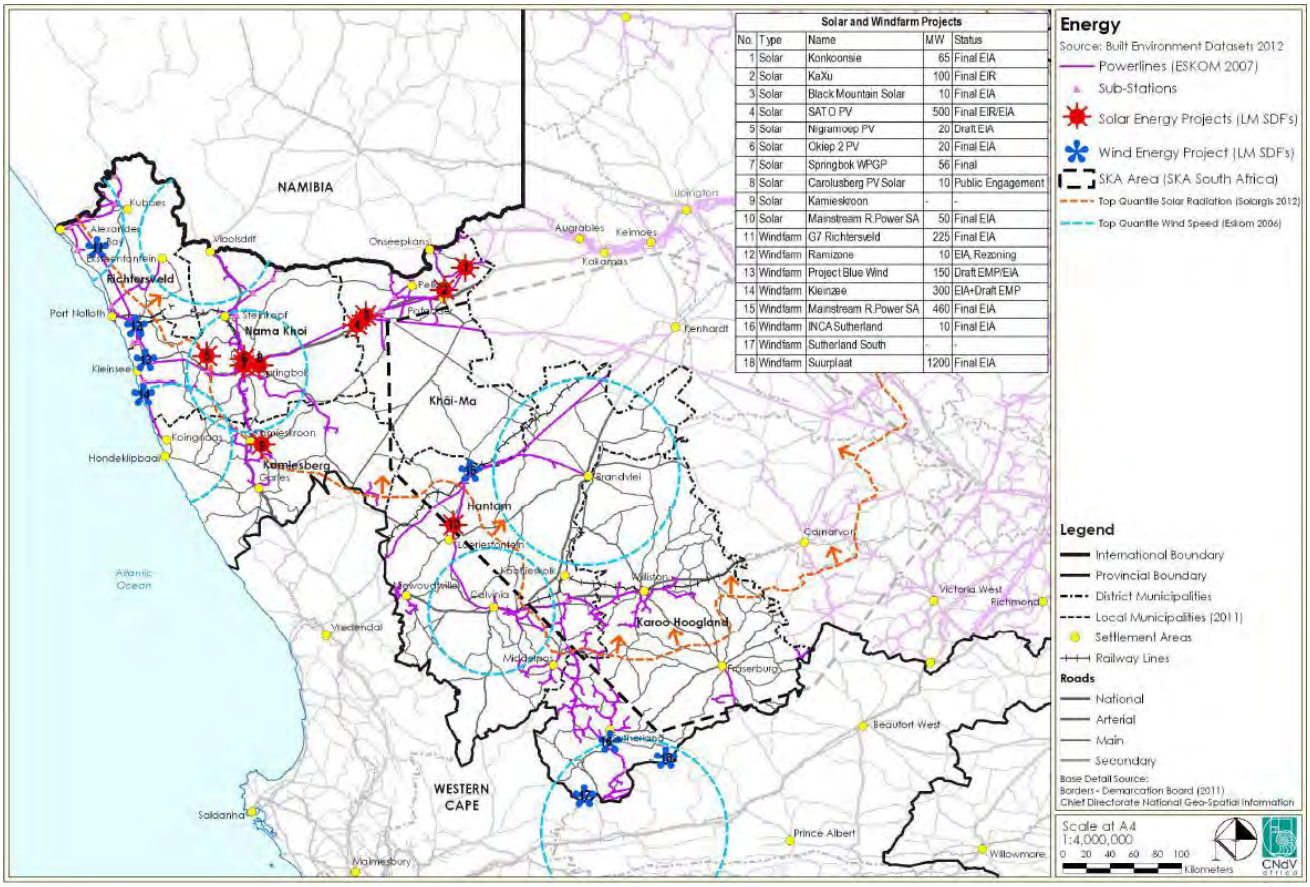
  - The Northern Cape Province has had 17% average annual growth in national visitors as well as 25% annual growth of international visitors during the 2001-2011 period, resulting in a total tourism contribution of 6% toward the provincial Gross Geographic Product (GGP) (Dennis Moss Partnership, 2012). This highlights that tourism is a key sector in the Northern Cape that has the potential to grow, transform and diversify the provincial economy. This means that extra care should be taken in ensuring that renewable energy developments do not result in a negative impact on the tourism potential of the Province and nor do they interfere with the region's natural environment.

- **Northern Cape Municipal Local Economic Development Framework** (NC LED)**:** In South, just over a third (37%) of the population reside in rural areas. Due to this, of particular importance is the provision of a mix of alternative energy sources so as to make affordable and adequate energy available to developing communities. To achieve this, there needs to be a sufficient optimal exploitation of renewable sources. As a result of this, the Department of Minerals and Energy has embarked on several national, provincial and local level wind and solar energy systems. The Namakwa District in particular, has potential for both wind and solar electricity generating capacity developments such as the one under analysis (Northern Cape Province, 2011).

Alignment with Local and Regional development priorities

Although much of the focus within district and local municipalities relates to the development and delivery of basic services, infrastructure, agriculture and tourism, the development of a green economy remains to be seen as an additional fundamental pillar of growth. Thus, in like manner with the national and provincial policies, the district and local municipalities have placed considerable emphasis on the prioritisation and promotion of renewable energy resources within their boundaries. The Namakwa District Municipality, Khai-Ma and Hantam Local Municipalities have developed strategies to extract growth and development potential from such investments.

- **Namakwa Integrated Development Plan** (IDP): This plan sets out to utilise natural resources in the Province by optimally utilising and managing resources in each sector; this includes the growing realisation of investing in more renewable energy based development. The Namakwa DM has a competitive advantage in the energy sector as wind, solar, wave, nuclear and natural gas energy plants have all been identified as suitable investments in the area. Amongst other sectors such as agriculture and tourism, renewable energy is thus prioritised. Several large-scale renewable energy projects have already been included in the IDP of the district. These are also depicted on Map 2-1 below. The district also recognises the importance of the agriculture and tourism industries in the area and promotes their development and transformation, especially eco-heritage. This and other projects that are under investigation are outlined in the following map extracted from the districts' Spatial Development Framework (Namakwa DM, 2014).



Map 2-1 Renewable projects in Namakwa (CNdV Africa, 2012)

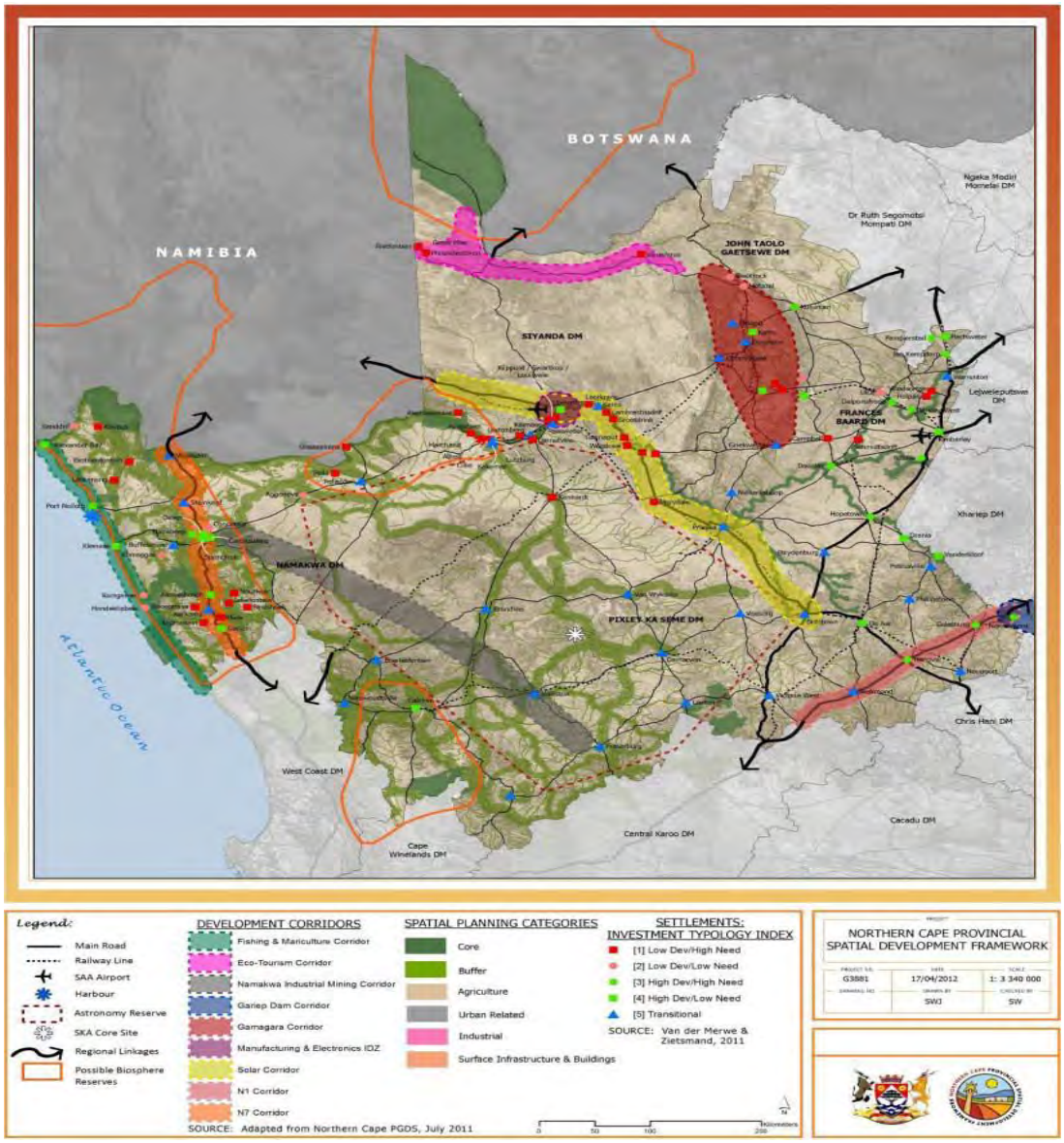
- **Hantam LM Integrated Development Plan and Khai-Ma LM Integrated Development Plan (IDP)**: Considering the location of the site relative to the Hantam and Khai-Ma Local Municipalities, the review of the strategic policies thereof highlights the importance of improving the living standards of the citizens of the municipalities as being amongst the top priorities of local government. Stimulating and strengthening the economy through various sector development interventions is envisioned to be one of the means to achieve this. Based on the composition and natural resource endowment of these municipalities, particular developmental priority is given to the agriculture and tourism sectors. Although flower tourism is seasonal in the Hantam LM, eco-tourism has been recently seen as the main growth stimulant for the regional economy. At the same time, the agricultural sector provides the most employment opportunities in the municipal area; thus, making it the backbone of the Hantam LM (Hantam IDP, 2015). The above suggests that the tourism and agricultural sectors should be preserved and all effort needs to be made in order to ensure that no new development results in the loss of these activities.

From the above, it is clear that the local government priorities, aside from the improvement of service delivery and living standards of its residents focuses on the development of the local economies by stimulating the growth of among other the tourism and agricultural industries. In general, wind farms are associated with a limited footprint and can co-exist with the above-mentioned sectors. In some instances, the presence of wind farms can be turned into a local attraction, which could stimulate the tourism further. Therefore, it can be suggested that the proposed project does not only conflict with any of the identified developmental priorities of the local governments in question but is also in alignment with the identified means to stimulate the local economy.

Alignment with Spatial planning

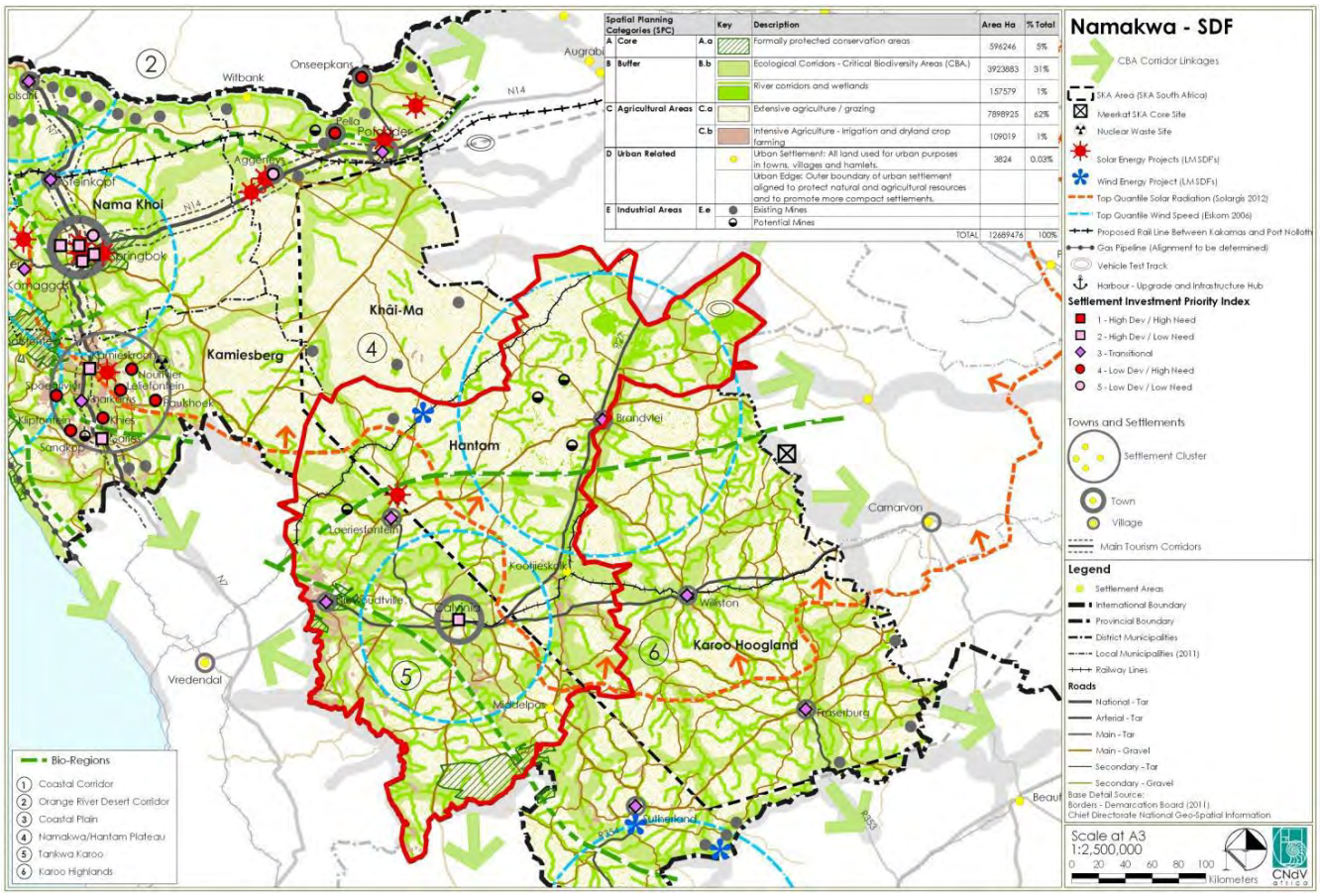
- **Northern Cape Spatial Development Framework** (NC SDF): The provincial Spatial framework is premised on the vision of effectively managing the Provinces' resources in a sustainable and equitable manner, which will be of benefit to the people directly dependent on them. Linked to this, further stress is directed towards the importance of utilising renewable energy to address the needs of the Province prior to exporting the services to the rest of the country. Due to this, in accordance with the Sustainable Development Initiative (SDI), the establishment of a renewable energy system is to be utilised as a driver for economic development; thus, making renewable energy projects a high priority on the provincial agenda (Dennis Moss Partnership, 2012).

  Certain interior parts of the Province as well as the Namaqualand coast are said to have considerable potential for renewable energy production and this has resulted in several targets being put in place. For instance, 25% of the Provinces' energy generation capacity is set to be acquired from renewable energy products such as wind, solar, thermal, biomass and hydroelectricity by the year 2020 (Dennis Moss Partnership, 2012). Focusing on renewable energy development will not only assist in diversifying the economy of the Province but it will also be of benefit in aligning regional goals with national goals as it will add to the promotion and growth of green industries. Reviewing the NC SDF as outlined in map 2-2 below, it can be seen that the project under current study will not have any potential spatial development conflicts with provincial plans.



Map 2-2 Northern Cape Spatial Development Framework (Dennis Moss Partnership, 2012)

- **Hantam LM Spatial Development Framework and Khai-Ma LM Rural Spatial Development Framework (SDF):** In considering the spatial development pattern of the Khai-Ma LM, strengthening local economic growth is one of the focal aspects. In terms of their contribution to GDP, the agriculture and tourism sector are the main contributors to the economic sector of the Khai-Ma LM as the municipality has a unique environment that needs to be exploited in a sustainable manner (Umsebe Development Planners, 2010). The Hantam LM SDF also further highlights that economic sector interventions in the area has led the municipality to seek complementary development opportunities in sectors such as agriculture, mining, tourism and renewable energy (Umsebe Development Planners, 2010).



Map 2-3 Namakwa SDF-Hantam and Khai-Ma LM (CNdV Africa, 2012)

Upon reviewing the spatial planning component, the Namakwa DM as well as the Hantam and Khai-Ma LMs' spatial development frameworks do not suggest any potential conflicts between the planned spatial development visions and the proposed wind energy project. As outlined in Map 2-3 above, the site where the proposed project will be developed is not located near any settlement or tourism attraction or agricultural land that might be sensitive to the environmental effects of the proposed project.

3 BASELINE INFORMATION

This chapter examines key socio-economic characteristics of the study area, as per delineation provided in the previous chapter. This is essential as it provides both qualitative and quantitative data related to the communities and economies under observation, creating a baseline against which the impacts can be assessed. As previously mentioned, the proposed wind farm project is located in within the Hantam LM and in close proximity to the border of Khai-Ma LM which both fall under the Namakwa DM.

Spatial context and regional linkages

Geographically, the **Northern Cape** is the largest province located within South Africa with an area of 372 889km^2 equating to approximately 30.6% of South Africa's spatial composition. Despite having the largest surface area, the Northern Cape is the least populated province in South Africa with a population of 1.1 million people equating to 2.2% of the national population (Stats SA, 2011). This province is a dry and hot region classified as a semi-desert as it also experiences scarce rainfall patterns. The Northern Cape Province consists of five districts, namely Frances Baard, Pixley ka Seme, Namakwa, ZF Mgcawu (previously known as Siyanda) and John Taolo Gaetsewe.

The proposed project falls within the **Namakwa DM** which is situated on the western part of the Northern Cape Province and is the largest municipality of the five main municipal districts of the Province covering an area of 126 900km^2 (34%) of the total provincial landmass. The Namakwa DM is bordered by the Western Cape province on the southern side, Namibia towards the northern side and two districts (ZF Mgcawu and Pixley ka Seme) on the north-east and east side respectively. Although it is the largest district geographically, the Namakwa DM is sparsely populated with a population of 115 842 people, which comprise 10.11% of the total province population (Stats SA, 2011).

In the Namakwa DM, the project lies within the borders of the Hantam LM and the Khai-Ma LM. The **Hantam LM** is an inland municipality which lies on the west of the Namakwa DM and is located 140km from Springbok. The Hantam LM covers an area of 36 128km^2 and has a population of 21 581 people (Stats SA, 2011). The municipality is known for its wide open space, striking mountain ranges and nature reserves filled with a vast array of indigenous plants and bulbs (Hantam IDP, 2015). The main attractions of the area are therefore, the floral displays, hiking and the natural environment. Hantam municipality is also furnished with four conservation areas, namely Oorlogskloof Nature Reserve, Hantam National Botanical Gardens, Tankwa Karoo National Park and the Akkerdam Nature Reserve (Umsebe Development Planners, 2010).

With a total surface area of 16 627km^2, the **Khai-Ma LM** is situated along the north-western part of the Namakwa DM and is a sparsely populated region with 12 466 people. The Khai-Ma LM is bordered by Namibia on the north, the ZF Mgcawu LM on the east and, the Nama-Khoi LM on the west. Urban nodes surrounding the local municipality include Pofadder as the main centre, Aggeneys, Pella, Witbank and Onseepkans. Although the surrounding area of the region has a low grazing potential, vast amounts of extensive land in Khai-Ma is predominantly used for livestock farming (Umsebe Development Planners, 2010).

3.1 Sense of place, history and cultural aspects

Loeriesfontein is a small rural service centre town that lies within a basin surrounded by mountains and is situated to the north-west of the town of Calvinia. Loeriesfontein was built around a general store in the year 1894 by a British bible salesman, Frederick Turner (Hantam IDP, 2015). Loeriesfontein has a population of 2 746 people which has grown by 12.4% since the year 2001. The town covers a total surface area of 34.45km^2 and has a population density of 80 people/km^2 (Stats SA, 2011).

The south-western part of Loeriesfontein forms part of Namaqualand which is a region popular for its spring flowers and its wide variety of diverse vegetation (Hantam IDP, 2015). Loeriesfontein town also houses the Gannabos (Quiver) Forest, which is home to the worlds' largest colony of the *Aloe Dichotoma* species (Umsebe Development Planners, 2010). During spring, the town is flooded by tourists attracted by the spring flowers. The town also boasts of its' Windmill museum, which is one of only two in the world. Sheep farming and salt mining are the predominant activities within and around Loeriesfontein town (Umsebe Development Planners, 2010).

Map 3-1 Hantam LM towns

3.2 Demographic Profile

Population demographics

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.

As previously noted, the **Hantam LM** has a population of 21 581 individuals, this accounts for 18.6% of the total population of Namakwa DM. In comparison to the year 2001, the Hantam LM has increased by 6.6%. Within the local municipality, 80% of the people reside in urban areas whilst the rest occupy farms. In total, the Hantam LM has 6 341 households with a household density of 0.14km^2 (Stats SA, 2011). The majority of the people in the Hantam LM reside in the city centre, which is Calvinia town; thus, only a small percentage of people reside in other smaller surrounding towns such as Loeriesfontein (13%) (Stats SA, 2011). Over 90% of the residents in the municipality as well as the nearby towns (Loeriesfontein and Brandvlei) speak Afrikaans as a first language, with the dominant race being coloured people (82%) and white people lagging behind at 11%. The Hantam LM's population consists of 50.1% males and 49.9% females. The largest group of people fall under those aged between 35 and 64 years of age. In this LM, the youth (15-34 years) encompass about 29.1% of the total population. Only 28% of Hantam residents are married, whilst 54% have never been married (Stats SA, 2011).

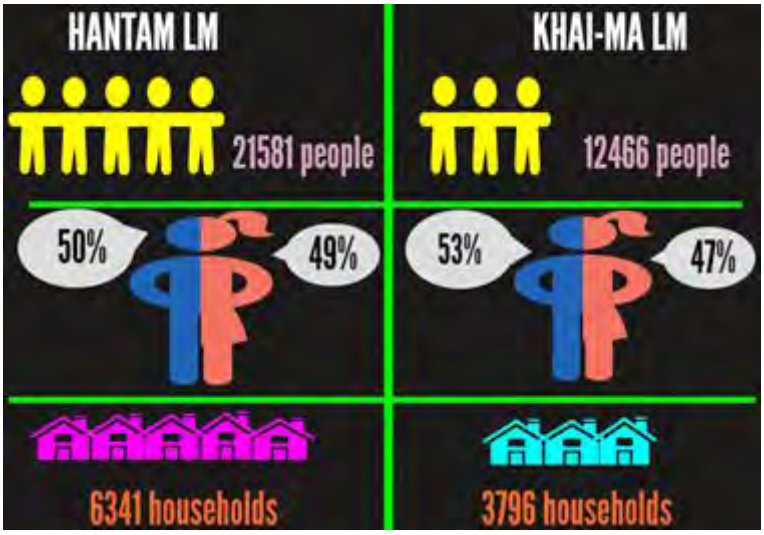


Figure 3-1 Hantam and Khai-Ma Population demographics (Stats SA, 2011) (Quantec, 2016)

Loeriesfontein, the closest town to the project site, only has 806 households in total resulting in a household density of 23.3 km². The majority (94.3%) of people have access to formal housing whilst the rest either live in houses or flats in a backyard (0.87%) or in informal dwellings (4.12%). A huge portion of people living in Loeriesfontein are coloured (86%), followed by white people at 11.54% whilst Black people equate to 1.9% of the total population. Afrikaans is the main language spoken as more than 90% of the people cited it as their first language, only 0.4% residents speak English whilst 0.5% speak Setswana (Stats SA, 2011). Only 26.5% residents are married, whilst 56.9% have never married.

Although Loeriesfontein is a relatively small town, residents and farm owners stated that since the establishment of similar projects in the area, namely Khobab and Loeriesfontein 2, the town has experienced and influx of people either in an attempt to find employment or to seize economic opportunities brought by the wind farms.

The **Khai-Ma LM** on the other hand, has a smaller population of 12 466 people; this accounts for 10.7% of the total population of the Namakwa DM. Although the population has increased by 6.2% from 11 692 people in 2001, it is still only almost two thirds of the Hantam population (Stats SA, 2011). Most residents within Khai-Ma LM reside in the urban areas (81%) whilst some reside in farms (17%). The total number of households in the Khai-Ma LM is 3 796 resulting in a household density of 0.22km^2. Just over 80% of the residents speak Afrikaans in the municipality (Stats SA, 2011). Coloured people equate to three quarters of the total population with black people (18%) being the second dominant race. Only 24% of the Khai-Ma LM residents are married whilst 64% have never been married. In like manner with the Hantam LM, the Khai-Ma LM has more males (52.6%) than females (47.4%) with the largest population also falling within 35 and 64 years of age. Although this is the case, this local municipality however, has a youth population (15-34 years) that is just over a third (36.8%) of the total population (Stats SA, 2011).

Health demographics

The process of assessing and monitoring the level of health in a particular area is beneficial as it provides useful information on the development as well as human welfare of an area. Over the last 15 years, in comparison to the rest of South Africa and the Northern Cape Province, the effect of HIV has been less severe on the DM and LM's. AIDS related deaths have also been following a similar pattern.

In the year 2015, the **Hantam LM** reported a total of 956 people to be living with HIV, which equates to 4.5% of the total LM population. Although the number of HIV-positive people for the Namakwa DM (4.9%) is close to that of the LM (4.5%), national and provincial HIV infected percentage levels are much higher, as they are at 11.4% and 7.3%, respectively.

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

Indicator	South Africa	Northern Cape	Namakwa DM	Hantam LM	Khai-Ma LM
Population	54 956 509	1 175 780	116 834	21 371	11 805
HIV positive	6 248 908	86 146	5 702	956	673
AIDS deaths	206 761	2 360	113	20	7
Other deaths	444 866	9 729	1 159	213	98

The **Khai-Ma LM** had a slightly higher percentage of people living with HIV (5.7%). AIDS related deaths at the national, provincial, regional and local context are relatively low as they range from a range of 0.1%-0.4%. In a period of 15 years (2000-2015), people living with the HIV illness in the Hantam LM had increased by 695 people whilst residents living in the Khai-Ma LM with the same illness increased by 463 within the same period.

Although the prevalence of HIV/Aids in **Loeriesfontein town** isn't clear, during the site visit and interviews conducted with various stakeholders it was revealed that construction workers employed to develop wind farms in the area, namely Khobab and Loeriesfontein 2, mingle with young females and this has since resulted in a sharp increase in the rate of teenage pregnancies. The presence of construction workers in the area has also increased a number of social ills such as the use of alcohol and drug abuse. Although many of the residents agree that this has always been a norm in the town, many alluded to the fact that the social ills have exacerbated in the last few years correlating with the period of establishment of the two wind farms. One such example is the increase in the number of liquor licences applied for, as well as an increase in the number of young school girls who interact with construction workers resulting in unwanted pregnancies.

Crime demographics

In the **Hantam LM**, 816 serious crimes were reported; of these, a total amount of 760 were community reported crimes whilst 56 of them were detected by the police. Common assault was the most frequently reported crime with 207 cases, followed by property-related crime with 154 cases and assault with the intention to harm with 125 cases. The total number of serious crimes equate to 17% of the district reported crimes and 1.41% of the provincial reported crime cases. Although the use the alcohol and drugs have increased in Loeriesfontein town, crime levels have been stable and have not resulted in any criminal activities that can be directly linked to the heavy influx of people.

In 2015, the **Khai-Ma LM** had less crime-related occurrences, as only a total of 285 serious crimes were reported. The most commonly reported crimes are similar to trends noted in the Hantam LM but are at less severe rates with common assault reported to have had 69 cases, property related crime with 52 cases and assault with the intent to harm with 46 cases. Crimes reported in Khai-Ma LM equate to 6% of the cases reported at the district level and only 0.5% of the provincial reported crimes.

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

Types of crime	South Africa	Northern Cape	Namakwa DM	Hantam LM	Khai-Ma LM
Serious crimes	2209068	57817	4782	816	285
➢ **Community reported crimes**	2068261	54724	4212	760	255
➢ **Crimes dependent on police action for detection**	140807	3093	570	56	30

(Quantec, 2016)

3.3 Economy

The structure of the economy and the composition of its employment provide valuable insight into the dependency of an area on specific sectors and its sensitivity to fluctuations of global and regional markets. Knowledge of the structure and the size of each sector 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.

The **Hantam LM** is a relatively small economy that is valued at R1 184 million in current prices. In total, the economy of the Hantam LM equates to 11.1% of the Namakwa Districts Gross Domestic Product per Region (GDP-R) which was valued at R10 696 million in current prices (Quantec, 2016). The contribution of the LM to the Province as a whole is significantly low as it only accounts for 1.64% of the Northern Cape Province. As outlined in Figure 3-2 below, the Hantam LM economy has been manifesting a fluctuating growth rate revealing its' sensitivity to external shocks related to national and global changes. For instance, the Hantam economy was adversely affected by the 2008 global recession as presented in Figure 3-2. Although this was the case, the economy began slowly recovering between the 2010-2011 period. Overall, between the 1995-2011 period, the Hantam LM economy grew at a Compounded Annual Growth Rate (CAGR) of 3.19%.

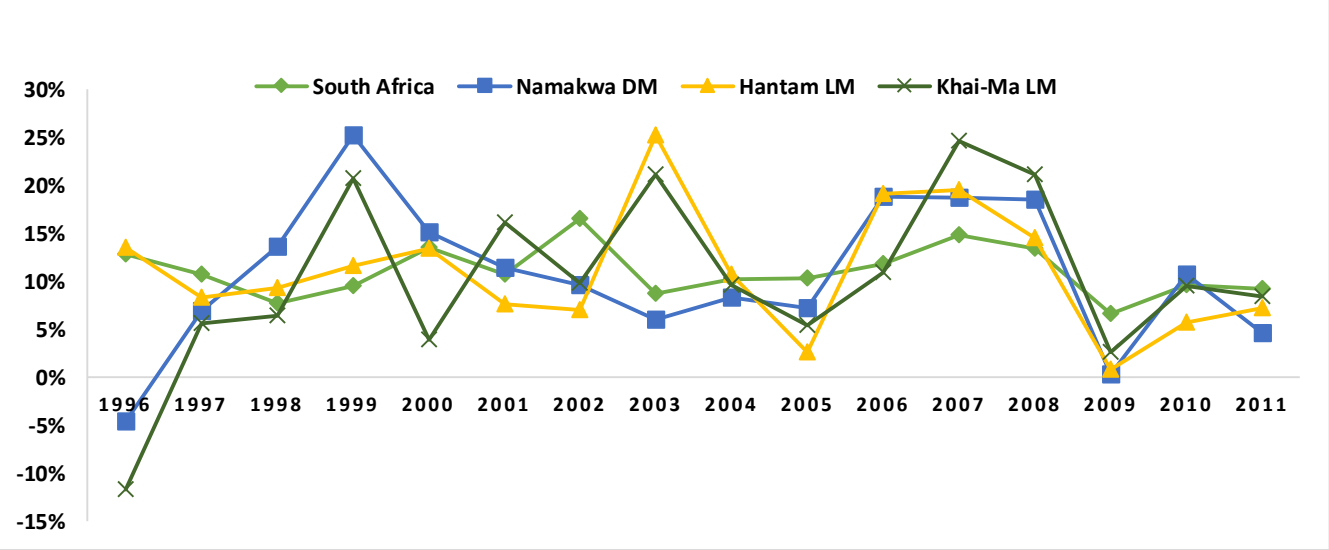


Figure 3-2 Regional economic GDP-R historical trends (Quantec, 2016)

The economy of the **Khai-Ma** LM lags behind the Hantam economy with a total size of R939 million in current prices (Quantec, 2016). This contribution accounts for 8.8% of the districts economy and 1.3% of the Province economy. The Khai-Ma LM experienced similar growth patterns with Hantam, as it experienced stagnation in the year 2009 after the global recession and began recovering shortly after. At current prices, the 20-year period (1995-2011) CAGR for Khai-Ma LM equates to 2.44%.

According to the Hantam LED Framework (2011), economic development ought to be sustainable. Ensuring that it is sustainable entails strengthening and diversifying the economy through a range of sectors such as the primary, secondary and tertiary sector which should cater for all consumer and business needs. Due to the fact that 72% of the GDP-R of the **Hantam LM** is generated by the tertiary sector, this LM is a service economy with prominent sub-sectors such as general government (13%), transport and communication (16%) as well as wholesale, retail and trade (25%). A contributing factor to this is mostly likely the numerous government departments that are situated in Calvinia town as it serves as the main seat and administrative town of the Hantam LM (Hantam IDP, 2015). On the other end of the spectrum, within the primary sector, agriculture is the main contributor to GDP-R as it equates to 18% of the Hantam economy.

Although the mining industry currently has a very low contribution to the economy, 80% of the worlds' gypsum reserves lie just outside Loeriesfontein town; thus, an opportunity exists for salt and gypsum mining in the region as salt pans at Dwaggas Pit also employ 30 permanent workers (Umsebe Development Planners, 2010).

Since the start of the construction of Khobab and Loeriesfontein 2 wind farms, the informal hospitality industry in the town of Loeriesfontein has boomed as construction workers have been in need for accommodation in town thus majority of town. In order to meet the increased demand in accommodation, the majority of the town residents have transformed their backyards and availed their garages for rent purposes. In conjunction with the 20-year old wind museum in the town, the recently established wind farms have also added value to the tourism component of the area. Due to the influx of people in the town, the economic impact has been positive for the town as a result of this; food and fuel sales have spiralled increasing businesses' gross revenues and profits in an unprecedented manner. Further positive investments are expected to trickle down to the Loeriesfontein community when the surrounding wind farms break even (after 9 years) and 5% of the generated profits will be invested in the community.

In the **Khai-Ma LM,** the primary sector contributes the highest percentage (67%) to the municipal GDP-R. Within the primary sector, mining and quarrying is the prominent industry with a contribution of 51%, whilst the agriculture industry contributes 15% to the overall economy. The high percentage contribution of the mining industry is most likely due to the presence of various minerals within the municipal area such as zinc, copper, lead, granite and quartz (Umsebe Development Planners, 2010). Mining activity is thus exacerbated by the existence of the Black Mountain mine in Aggeneys town as well as the gypsum mine in Pofadder town. The second contributor to the GDP-R of the Khai-Ma LM is the tertiary sector with a contribution of 28%. Within the tertiary sector, the most imminent industries are general government (10%), transport and communication (6%) as well as wholesale and retail trade, catering and accommodation (6%).

3.4 Labour Force and Employment Structure

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

Labour force composition

During the year 2011, the total working population of the **Hantam LM** consisted of 13 680 people, within this figure, the total labour force only equated to 7 004 people. As outlined in Table 3-3 below, a percentage of 3.4% of people are described as discouraged job seekers, which typically refers to a group

of people who are capable of searching for employment but have become discouraged and are no longer looking for employment. The difference between the number of people employed (6 122) and unemployed (882) in the region results in an unemployment rate of 12.6%, which is relatively low in comparison to the national and provincial unemployment rates (29.7% and 27.4%), respectively. Within the Hantam region, Loeriesfontein town has a slightly higher unemployment rate of 14.7% (Stats SA, 2011).

Although only 100-150 local residents are currently employed by the nearby wind farms, the impact of increased employment levels in **Loeriesfontein** has been significant; this is so because in the past the town was heavily reliant on income from extensive farming. However, in the event that agricultural farms undergo expansion, employment levels usually remain the same as farming in the area largely comprises of livestock farming, which is not very labour-intensive. However, with that being said, the prevalence of drug abuse has restricted the number of locals that can be employed as the impact of the drugs is said to result in a lack of personal motivation.

In the **Khai-Ma LM**, the total working population consisted of 8 541 people with a labour force equating to 5 889 people. In 2011, about 4% of people were recorded as discouraged jobseekers. The Khai-Ma LM has a relatively higher unemployment rate of 20.9% (Stats SA, 2011).

Table 3-3 National, Provincial & Regional Labour Force Profile

Town/settlement	Working age	Labour force			Discouraged job seekers	Unemployment rate
		Employed	Unemployed	Total		
South Africa	33928806	13254829	5586624	18841453	1848720	29,7%
Northern Cape	736205	284202	107379	391581	40170	27,4%
Namakwa DM	76579	33713	8455	42168	4258	20,1%
Hantam LM	13860	6122	882	7004	475	12,6%
Loeriesfontein	1767	680	117	797	33	14,7%
Khai-Ma LM	8541	4660	1229	5889	327	20,9%

(Stats SA, 2011)

Employment structure

As depicted in Figure 3-3 below, within the working age population (15-64 years) of the **Hantam LM**, about 60% of the individuals are employed in the formal sector whilst 21% are employed in the informal sector. Employment opportunities provided by private households equate to approximately 17% of the Hantam working population. Within the Hantam LM, Loeriesfontein town employed the least people in the formal sector resulting in it being the dominant job creator in the informal sector. In the **Khai-Ma LM**, more employment is offered in the formal sector whilst only a minority of people work in the informal sector. Similar patterns can be observed for the provision of employment by private households within the LM as well as the towns.

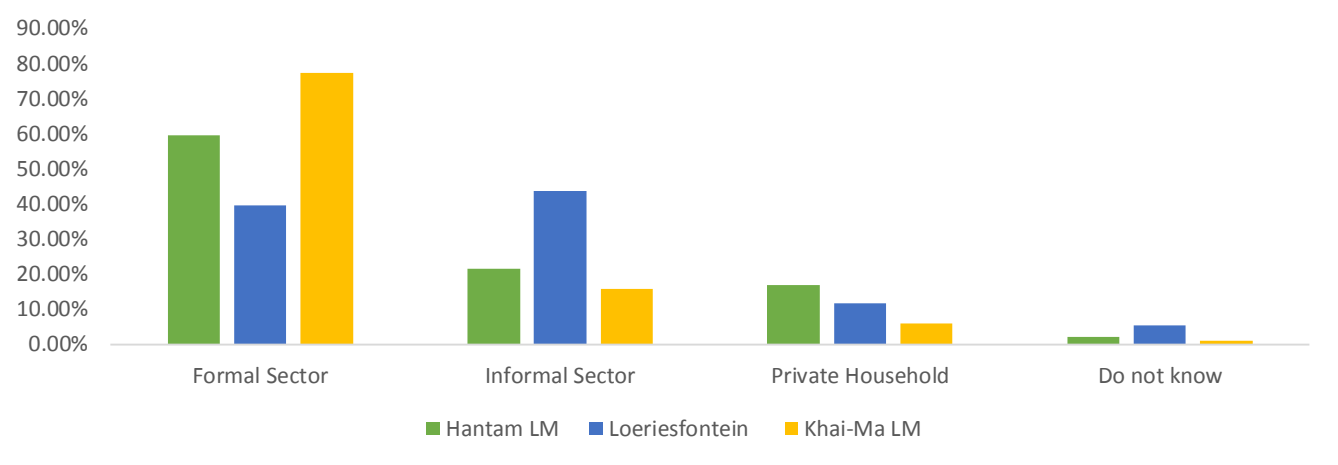


Figure 3-3 Hantam LM regional employment by sector (Stats SA, 2011)

Within the formal sector, only 14% of people of the Hantam LM's working population are considered to be skilled, whilst majority (30%) of the people either occupy jobs that require semi-skilled or low-skilled individuals. The rest of the working population (27%) are employed in the informal sector. In the Khai-Ma LM, very few individuals (10%) within the working population are considered skilled. Instead, similar to the Hantam LM, majority of people are semi-skilled and lowly-skilled (Quantec, 2016). Twenty percent (20%) of the people within the LM are occupied in the informal sector. As it can be noted in Table 3-4 below, employment percentages by skill level for the Local Municipalities (Hantam and Khai-Ma) are relatively similar to the districts skill level percentages.

Table 3-4 Employment sector and compensation by skill level (2015)

Skills	Employment sector & compensation by skill level					
	Namakwa DM		Hantam LM		Khai-Ma LM	
	Employment	%	Employment	%	Employment	%
Formal: skilled	5092	14%	987	14%	446	10%
Formal: Semi-skilled	11151	32%	2004	29%	1613	36%
Formal: Low-skilled	9917	28%	2077	30%	1536	34%
Informal	8962	26%	1849	27%	879	20%

(Quantec, 2016)

In the Hantam LM, the tertiary sector is the largest contributor to formal and informal employment with 60% share of all employment provided in the municipality. As depicted in Table 3-5 below, such employment consists of opportunities working in wholesale and trade (18%), finance and business services (7%), general government (17%) as well as community, social and personal services with 15%. Although the Hantam LM is dominated by the services sector, within the primary sector, agriculture employs the largest number of people (29%). The secondary sector makes very little contribution to employment services as it only accounts for 10% of the Hantam working population.

In contrast, the Khai-Ma LM is dominated by the primary sector, equating to 54% of municipal working age population. Within this sector, half of the total employment within the municipality is provided by the agriculture industry. The tertiary sector is the second largest contributor to job creation in the Khai-Ma LM; within this sector, prominent industries include general government (12%) and wholesale and retail trade (12%). The secondary sector lags with a contribution of 10% to the working population.

Table 3-5 Employment by economic services (2015)

Economic sector	Employment by area					
	Namakwa DM		Hantam LM		Khai-Ma LM	
	Employment	%	Employment	%	Employment	%
Agriculture, Forestry & Fishing	7948	23%	1972	29%	2220	50%
Mining and Quarrying	783	2%	2	0%	175	4%
Manufacturing	1384	4%	140	2%	335	7%
Electricity, gas & water	152	0%	20	0%	4	0%
Construction	2760	8%	564	8%	114	3%
Wholesale and retail trade, catering and accommodation	7016	20%	1253	18%	517	12%
Transport, storage and communication	1138	3%	218	3%	64	1%
Finance, insurance, real estate and business services	2689	8%	493	7%	178	4%
General government	6269	18%	1200	17%	557	12%
Community, social and personal services	4983	14%	1055	15%	310	7%
Industry employment total	**35122**	**100%**	**6917**	**100%**	**4474**	**100%**

3.5 Income

In order to improve the living standards of residents in terms of to the Minimum Living Level (MLL), which broadly refers to the minimum monthly income needed to sustain a household, the Khai-Ma SDF stipulates that a greater disposable income per household is required. Linked to this point, economic development is thus seen as an essential pathway to raising the living standards and general wellbeing of residents (Umsebe Development Planners, 2010).

Figure 3-4 Hantam and Khai-Ma LM household income distribution (Stats SA, 2011) (Quantec, 2016)

The average household annual income in the **Hantam LM** is R116 276 in 2016 prices; this implies an average household monthly income of R9 690. The monthly income for Loeriesfontein is R10 620; these figures are relatively higher than the provincial average income, which is R8 521 per month. As highlighted in Table 3-6 below, 9% of households do not have a regular amount of income in both the Hantam LM and Loeriesfontein town which in on par with the national and provincial levels, where the proportion of people who do not receive any form of income equated to 9% and 7% respectively. In the Hantam LM, 54% of people fell within the poverty line as they earned less than R3 200 per month.

The main source of income in the municipality is the agricultural sector; predominantly sheep farming and rooibos tea. The second largest income contributor is the community employment sector; particularly the social and personal services industry.

Subsequent to the establishment of wind farms in the area, new economic opportunities in **Loeriesfontein** town have emerged. Public transport has benefitted as a result of the increased demand for the transportation of workers to and from construction sites. Cleaning services have also provided work opportunities for unemployed individuals whilst informal trading amongst residents has also increased and has stimulated further income and job creation in the town. Wind farm construction companies either pay their workers once a month or every fortnight; this has resulted in more money in circulation as the purchasing power of local residents also increased. This is important as it may assist in reducing the number of people living below the poverty line. Upon consultation, one farmer went to the extent of sharing that poverty levels have been slightly alleviated in the Loeriesfontein town.

The average household annual income in the **Khai-Ma LM** was R99 144 in 2016 prices; this equated to an average household monthly income of R8 262. The main source of income in Khai-Ma is the Black Mountain Mine situated in Aggeneys town, as well as several government departments. Commercial farmers depend on incomes generated from their farms. The rest of the residents are either dependent on the government grant or they earn a living by providing housekeeping and gardening services (Umsebe Development Planners, 2010).

Table 3-6 Household per monthly income groups (2011)

Indicator	Namakwa DM	Hantam LM	Loeriesfontein	Khai-Ma LM
No income	8%	9%	9%	5%
R1 – R3 200	54%	57%	61%	62%
R3 201 – R6 400	14%	12%	12%	10%
R6 401– R12 800	12%	11%	10%	13%
R12 801– R25 600	7%	6%	4%	6%
R25 601– R51 200	2%	2%	2%	1%
>R51 200	4%	3%	3%	2%

(**Stats SA, 2011**)

3.6 Education

The key characteristics of the education profile of the population in the analysed municipalities are presented below.

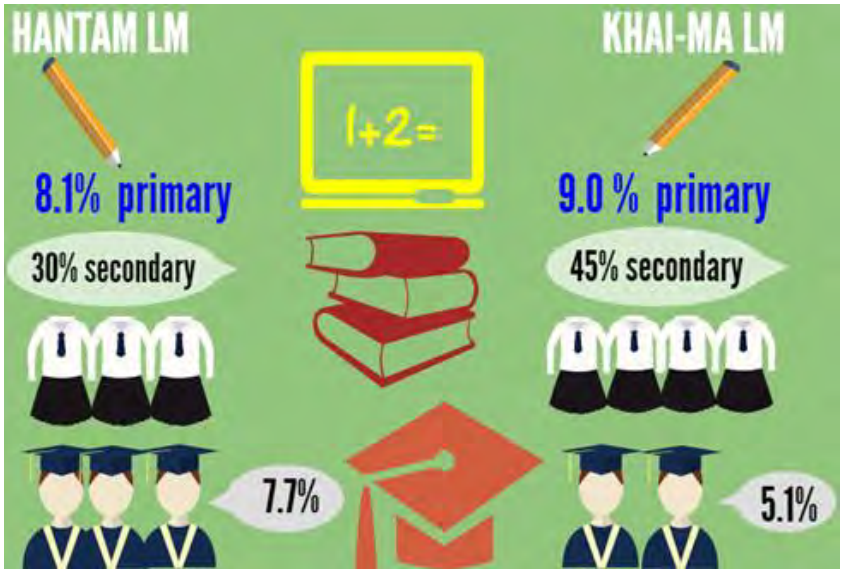


Figure 3-5 Hantam & Khai-Ma LM Level of education (Stats SA, 2011) (Quantec, 2016)

In terms of education levels in the **Hantam LM**, during the year 2011, 13.8% people living in the municipality did not have any form of schooling. This is worse than the provincial and national level, which were 6.3% and 11.1%, respectively. As depicted in Figure 3-5 above, thirty percent (30%) of the population acquired some form of secondary schooling but had not completed the full course. Only 7.7% of people continued on to further their studies by pursuing higher education. Amongst the nearby towns, in Loeriesfontein 15.2% people indicated that they had never been exposed to a school environment whilst 23.3% failed to complete primary school resulting in an even lower portion (15.4%) of people completing secondary school (Stats SA, 2011).

In the **Khai-Ma LM**, only 3.8% of the people did not have any form of schooling. Although the proportion of people without any form of schooling was relatively low in comparison to the Hantam LM, only 5.1% people furthered their studies in the form of higher education (Stats SA, 2011). This can be possibly ascribed to the fact that there is no university in the Namakwa DM as well as the Northern Province, it is also highly unlikely for individuals who have obtained further education elsewhere to return to the region (Umsebe Development Planners, 2010). Another contributing factor to the low higher education levels in Khai-Ma could be due to the fact that 45% of the residents indicated that they had not completed their secondary studies which reduce the chances of being admitted in a higher institution of learning. The low percentage of individuals who have completed their studies in both municipalities also coincides with the abundance of semi- and low-skilled individuals working in the formal sector.

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

In comparison to the national population density (42 people/km^2), the Hantam LM is characterised by a low density of people per square km. It is also relatively lower than the district (0.91 people/ km^2) and provincial (3.07 people/ km^2) density. Although population densities for the LM are significantly low (0.59 people/ km^2), as outlined in Table 4-1 below, Loeriesfontein town has a higher population density of 79.69 people/km^2 making it the most densely populated area between the three areas under analysis.

Table 3-7 Population density of Hantam and Khai Ma LM (2011)

Indicator	Towns in the Hantam & Khai-Ma LM's		
	Hantam LM	Loeriesfontein	Khai-Ma LM
Population total	21581	2746	12466
Area (Sq. Km)	36128.07	34.45	16627.9
Population density	0.59	79.69	0.74

(Stats SA, 2011)

The Khai-Ma LM also has a relatively low population density with only 0.74 people/km^2, making it a sparsely populated region. Most people in the Khai-Ma LM are situated in the urban areas or in agricultural clusters along the Orange River, which also provides opportunities for water sport and recreation as well as resort development (Umsebe Development Planners, 2010).

3.7.2 Access to Housing and Basic Services

With respect to basic service provision and housing, the Namakwa DM is responsible for assisting and ensuring that local municipalities provide adequate housing to inhabitants in their jurisdiction such. The current level of access to various basic services in the municipality are as follows:

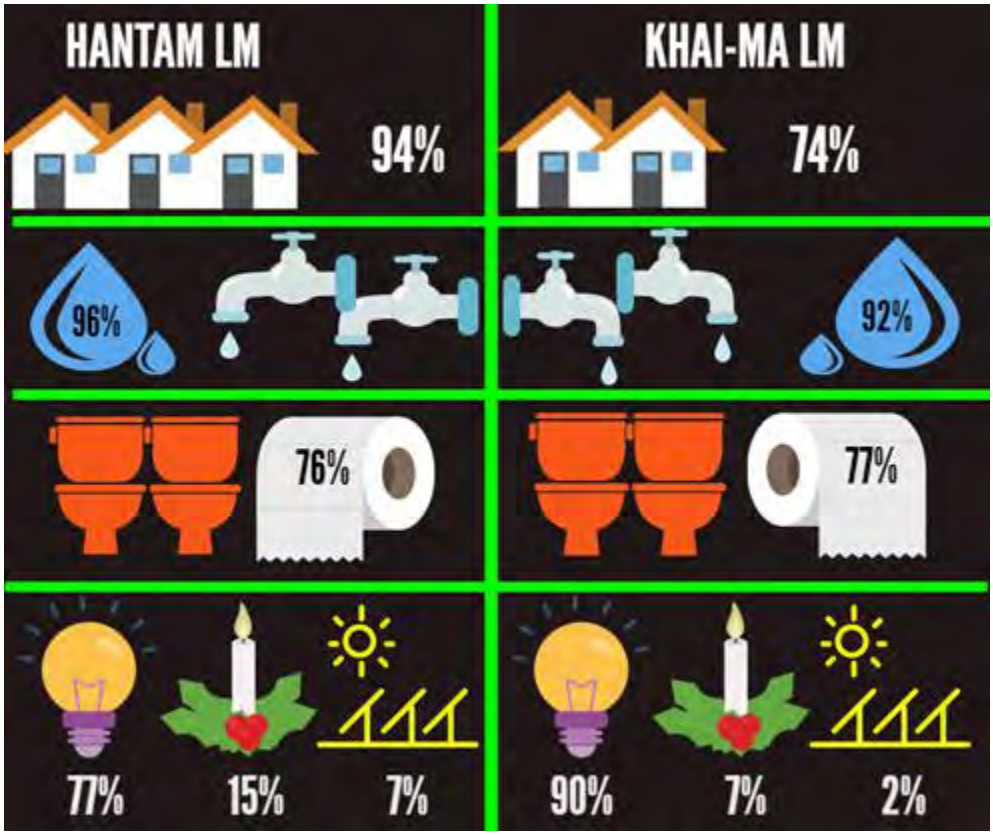


Figure 3-6 Hantam & Khai-Ma LM's access to housing and basic services (Stats SA, 2011)

- **Housing:** During the year 2011, housing shortages in the **Hantam LM** were an acute problem. In Hantam LM, 94% of houses had access to formal housing (i.e., a house made of brick or a concrete structure on a separate yard). Towns of the Hantam LM followed a similar path with Loeriesfontein having 94% access to formal housing (Stats SA, 2011). Amongst other pressing developments of the municipality, new housing unit developments have been identified by the Hantam SDF (Umsebe Development Planners, 2010). In comparison to the Hantam LM, the **Khai-Ma LM** residents had less access to formal housing as only 74% of inhabitants resided in formal housing structures (Stats SA, 2011).
- **Access to piped water**: In the **Hantam LM,** more than 90% of the households have access to piped water either inside their dwellings or yards. This includes residents living in Loeriesfontein town. More than 95% of water for the Hantam LM as well as for nearby towns is supplied by a regional or local water scheme operated by the municipality. In the **Khai-Ma LM**, more than 90% of households have access to piped water either in their dwellings or yards. A very low percentage of people do not have any type of access to piped water in the Khai-Ma LM.
- **Access to sanitation**: Although the Spatial Development Framework suggests that almost all households in the **Hantam LM** had access to flush toilets in 2011 (Umsebe Development Planners, 2010), statistics show that just over three quarters (76%) of households in Hantam LM have access to flush toilets either connected to the sewerage or to a septic tank. Whilst the Hantam LM believes to have eradicated the bucket system (Umsebe Development Planners, 2010), 3.1% of residents rely on the bucket latrine system whilst 0.9% do not have any form of access to any form of sanitation (Stats SA, 2011). Just over half of Loeriesfontein residents utilise flush toilets. The **Khai-Ma LM** has the same proportion of people who have access to flush toilets as the Hantam LM, with 6% of people who have no access to any type of sanitation.

- **Access to electricity:** In the **Hantam LM**, only urban areas are provided with electricity whilst the rural areas depend on other sources (Umsebe Development Planners, 2010). Slightly more than three quarters (77%) of households in the municipality have access to electricity for lighting whilst only 15% and 7% of people use candles and solar for lighting, respectively (Stats SA, 2011). Similar trends can be noted when assessing the towns of the municipality as more than 90% of Loeriesfontein town residents have access to electricity. One of the objectives of the municipality is to improve the living standards of its' residents by implementing opportunities for bulk infrastructure development (Urban-Econ Development Economists, 2011). Although the SDF highlights electricity as one of the sectors experiencing backlogs in the **Khai-Ma LM**, 90% of households in the municipality use electricity for lighting whilst the rest use 7% candles and 2% use solar. Development objectives premised on the optimisation of resources relating to bulk infrastructure such as electricity remains a goal for the municipality (Umsebe Development Planners, 2010).

3.7.3 Transport infrastructure

The transport sector plays a vital role in meeting the objectives of economic development, access to employment opportunities and social infrastructure (Dennis Moss Partnership, 2012). As a result of this, industrial development ought to take the mode of transport utilised by the labour force of a particular region into consideration. This means that new economic developments should not be situated far from the pick-up or drop-off points of various means of transport (Urban-Econ Development Economists, 2011). In 2001, just over a third 36.8% of people in the Hantam LM travelled to work or school by foot. The rest of the people used public transport (4.92%) whilst others made use of bicycles (1.39%) and their own transport facilities (5.12%) (Stats SA, 2001). Using the R55 gravel road, the distance between Calvinia and Loeriesfontein is 86km, whilst travelling from Calvinia to Brandvlei requires the utilisation of the R27 tar surface road for approximately 2 hours and 30 minutes.

The **Hantam LM** is traversed by a number of regional roads and encompasses two transport corridors (Umsebe Development Planners, 2010):

- Niewoudtville – Calvinia - Williston corridor consisting of the R63 tar road and railway link among Calvinia, Williston and Carnarvon, which links Gauteng and the Western Cape
- Nieuwoudtville – Calvinia – Brandvlei -Kenhardt corridor consisting of the R27 tar road leading from Cape Town to Upington, which provides a shortcut alternative to the route via Springbok and is often used by trucks particularly during the grape season. Considering that this is the main route in the region, it is essential that this road is maintained as it is of economic importance to the area.

The **Khai-Ma** IDP places emphasis on the need for local communities to have adequate accessibility to services through the provision of sufficient transport infrastructure. Although the Khai-Ma LM recognises the need for sufficient transport facilities, about 30% of people walked home either to and from work or school. The second most-utilised mode of transport is public transport in the form of buses, trains and taxis (Umsebe Development Planners, 2010).

3.7.4 Social and Recreational Infrastructure

The **Hantam LM** has the following social and recreational infrastructure available:

- Three libraries in Calvinia, Loeriesfontein and Nieuwoudtville
- Five secondary schools in Calvinia, Loeriesfontein, Nieuwoudtville and Brandvlei

- Three hospitals in Calvinia, Loeriesfontein and Brandvlei
- Seven sport facilities in Calvinia and Loeriesfontein
- Nine religious centres in Loeriesfontein and Brandvlei

The **Khai-Ma LM** has the following social and recreational infrastructure available:

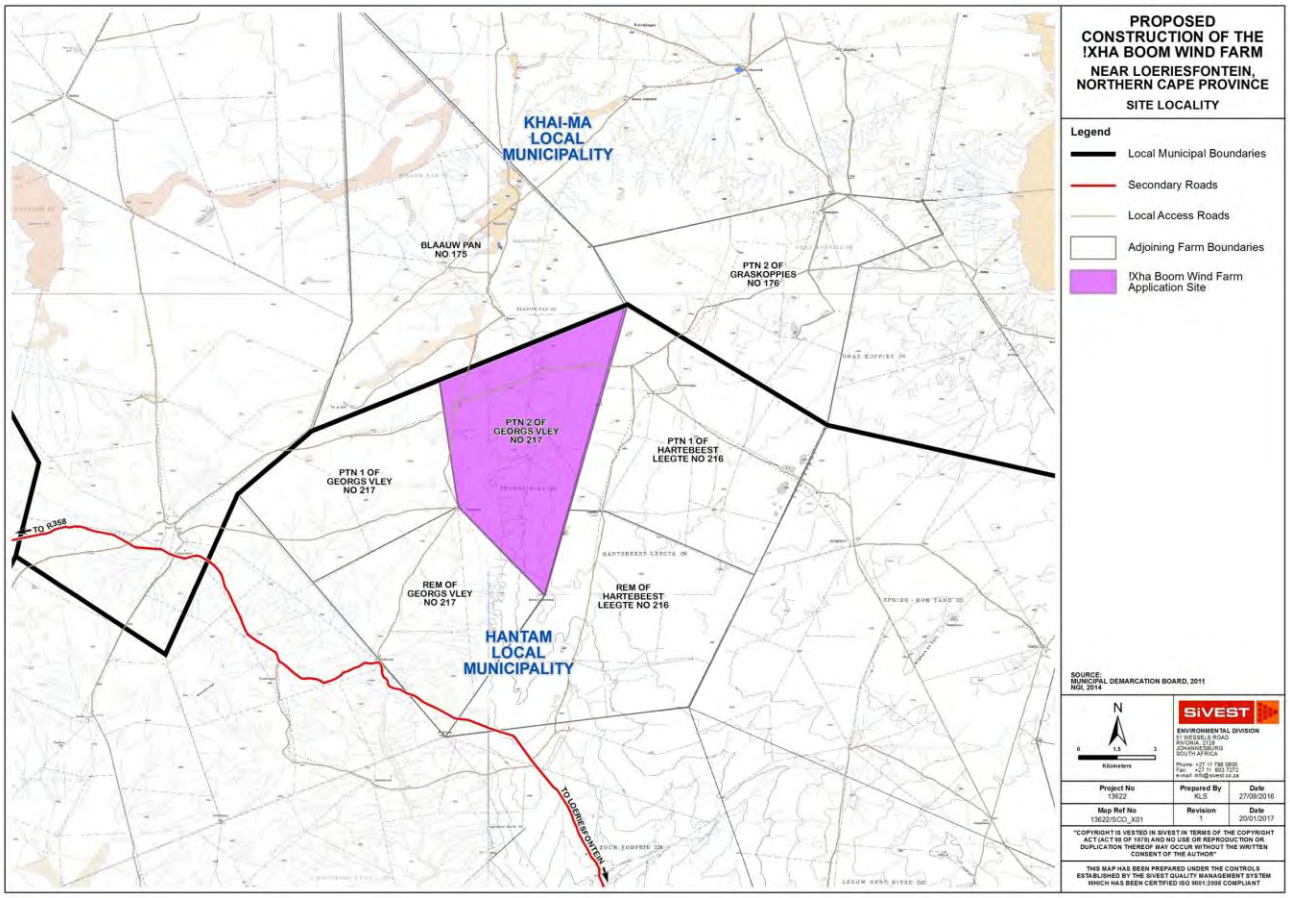
- Four primary and schools in Pofadder and Aggeneys
- Two clinics in Pofadder and Aggeneys
- Three police stations in Pofadder and Aggeneys

4 PROFILE OF THE ZONE OF INFLUENCE

The profile of the zone of influence section will investigate the various dynamics of the proposed site in order 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.

4.1 Land-use profile

The site that is earmarked for the development of the proposed wind farm is shown on Map 4-1 below



Map 4-1 Site Location of the project

The land is currently used for agricultural purposes, specifically commercial sheep farming. Due to the fact that sheep farming and windfarms can successfully coexist within the same land, it can be deduced that the proposed development is not expected to result in adverse effects on the current land use activities. The site is located approximately 75km away from the closest urban area and will be developed across the following farm portions (presented in Table 4-1 below):

Table 4-1 Directly and indirectly affected farm portions across zone of influence

Farm Portion	Farm Name	Farm no	Type
2	Georges Vley	217	Directly affected
1	Hartebeest Leegte	216	Adjacent
Rem	Hartebeest Leegte	216	Adjacent

Portion 2 of Georges Vley Farm no.217 (directly affected)

- **General information**
  - ± 13000 hectares are used for commercial sheep farming which is the main source of income
  - Type of sheep: Mainly Dorpers
  - Average annual revenue: ± R1 400 000
  - Family permanently resides on the farm during summer rainfall time
  - Two permanent workers live on the farm (one of which is a long term employee who lives with his wife and two children
- **Concerns raised during construction phase: short term**
  - The farm owner expressed his concerns about the destruction of the bossie veld (shrubs) as once it is destroyed, it recovers very slowly and it is the primary source of food for the sheep.
  - The construction will be situated 14km away from our main house; therefore, we are not concerned about any disturbances during the construction phase
  - During the construction phase, 200 sheep will need to be relocated to another rented farm and compensation for this is necessary. There is also concern there will be limited grazing land if all the farm owners have to move their sheep
  - No jobs will be lost on farm during the construction phase
  - Not concerned about the developments that are occurring in the area as long as they do not affect the farms daily operations
  - Not concerned about construction workers as most of them prefer to reside in town
  - Water is a very scarce commodity in the area so there is great concern related to where the water for the project will be sourced from during the construction phase
- **Concerns raised during construction phase: long term**
  - An average of 200 sheep is lost to jackals every year; thus, the farm owner had hope that the wind turbines would drive the jackals away; however, jackals quickly get used to the turbines

Portion 1 of Hartebeest Leegte Farm No.216 (adjacent)

- **General information**
  - 5 100 hectares are used for commercial livestock (sheep) farming which is the main source of income
  - Type of sheep: Dorpers
  - Average annual revenue: ± R500 000
  - No workers currently live on the farm
- **Concerns raised for construction phase:**
  - The farm is almost only grass; this however, is not a concern because grass grows very quickly but the destruction of the veld and shrubs are a concern because they recover at much slower rates than the grass and they are the primary source of food for the sheep
  - During the building process, the sheep will have to be moved to another farm which will be rented and there is not much farmland available to rent in the area thus farm owner will have to be adequately compensated for this
  - Water is a very scarce commodity in the area so there is great concern related to where the water for the project will be sourced from during the construction phase
- **Concerns raised for operational phase:**

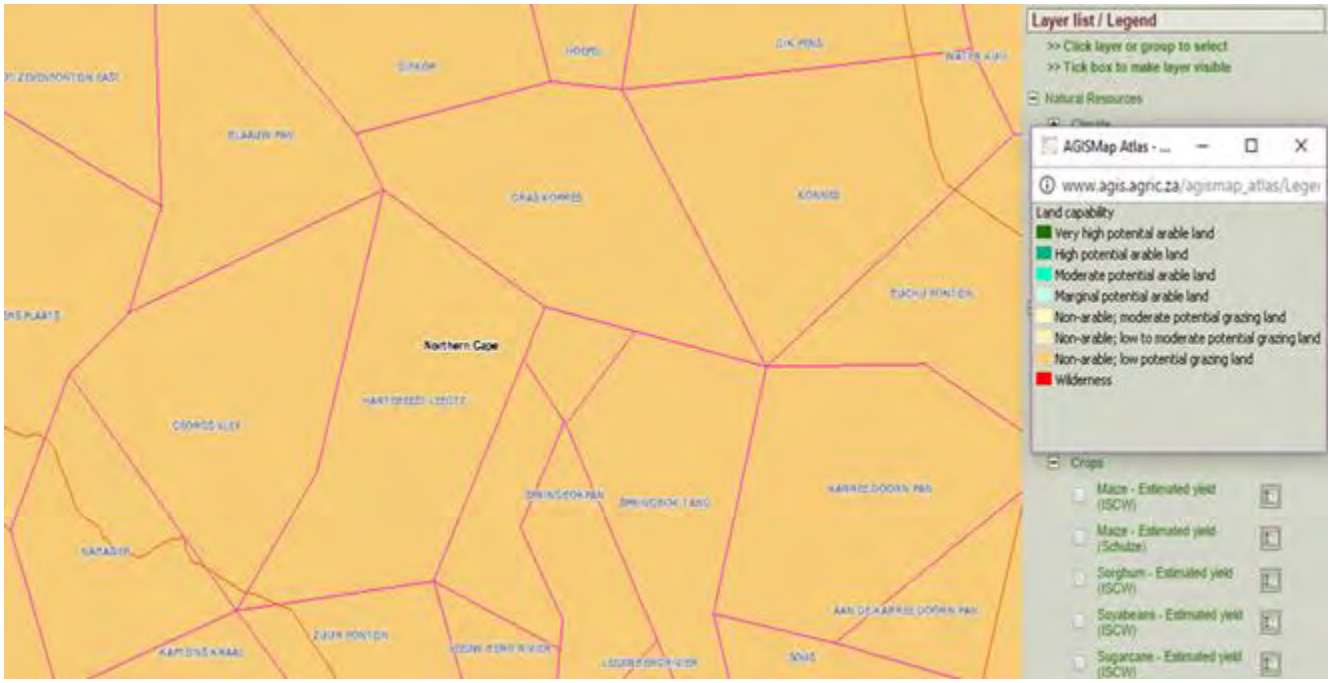
- Farm owner is not concerned about the visual impact as he jokingly added that the sheep will most probably enjoy the shade of the wind turbines
- Economic benefits and opportunities for the farm and the town
- Concerns related to the rising population as Loeriesfontein is a relatively small town
- Water scarcity in the area

Remainder of Hartebeest Leegte Farm No.216 (adjacent)

- **General information**
  - 5 400-6000 hectares used for commercial farming however main source of income derived from date farming
  - Type of sheep: Wit Dorpers and Merino's
  - Average annual revenue: ± R183 333
  - Currently, no-workers are employed by the farm however workers periodically live on the farm during the sheering season
- **Concerns raised:**
  - The farm owner mentioned that any operational losses incurred will require compensation
  - Incurred losses will be proportionate to the forfeited rental income (in the event that the sheep are relocated elsewhere during the construction phase)
  - The construction company must ensure that minimal damage is done to the veld and that roads are built without infringing on existing infrastructure (farms, farm gates, water pipes, water installations, windmills etc.)
  - All construction roads that will potentially be built across the farm to be communicated with farm owner in time
  - The construction workers must ensure that they are careful during the construction phase and none of the project activities cause unnecessary damage to the existing infrastructure and veld Farm
  - Dust needs to be controlled as the Merino sheep are especially affected by this

4.2 Resources and land capability

The proposed study area is demarcated as agricultural land. Although the area is delineated for agricultural purposes, the land is also deemed non-arable with a very low grazing potential. As such, the grazing capacity for the area is low and is not suitable for arable farming; thus, making the region suitable for sheep farming which is a characteristic of the municipal area. A very small percentage (4%) of the Hantam region is considered to be high potential agricultural soils (Umsebe Development Planners, 2010), as a result of this the lack of water bodies as well as the lack of productivity in the area due to has also led to a very low Gross Domestic Product per hectare contribution.



Map 4-2 Land capability of surrounding area (Agricultural Geo-References Information System, 2007)

4.3 Access to infrastructure

There is currently no national road that passes through the Hantam municipal area. Due to the influx of people and heavy load traffic in the Hantam LM as well as nearby towns, the main route (R27) in the area, which is also the only tarred road connecting Nieuwoudtville and Brandvlei via Loeriesfontein has been rapidly deteriorating and needs to be frequently maintained.

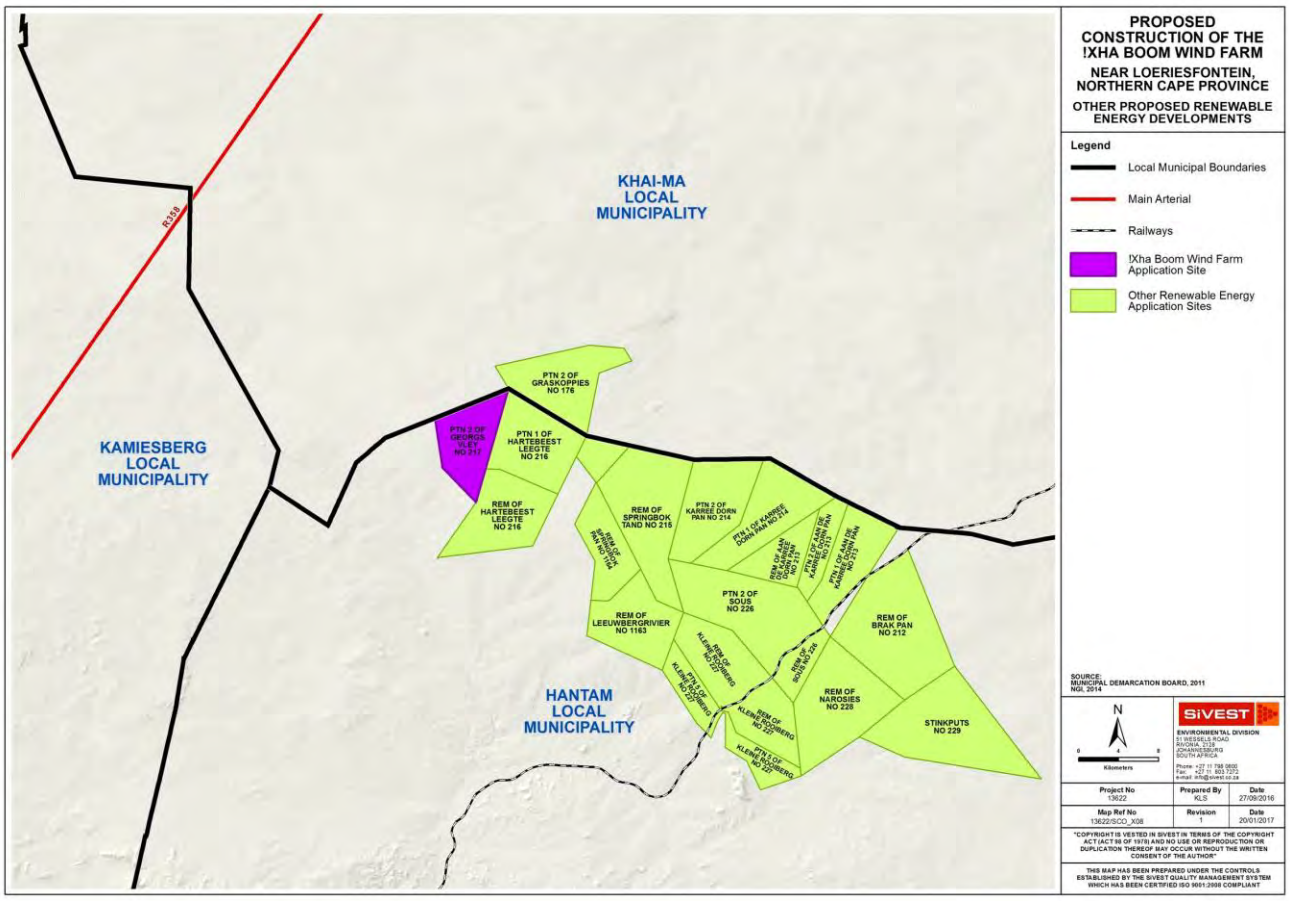
The project site for the proposed wind farm can be accessed through a small gravel access road that isn't wide enough to be traversed by large construction vehicles, which farm owners have expressed their desire for the road to be moved as it isn't far from one of the farm portions. With respect to water availability in the area, consultations with farm owners revealed that the affected farm portions do not have any direct access to water as it is a scarce resource in the area. To prevent water shortage impacts, some farmers in the area have reservoirs within their property or use water tanks to store water.

4.4 Other projects in the vicinity: potential cumulative effects

In recent years, developers of various renewable energy projects have taken a notable interest in the area where the Xha! Boom wind farm is proposed to be established. A likely contributing factor to this, is linked to the wind and solar energy potential of the region. Such developments, whether they are approved or are at the proposal stage as this one, need to be taken into consideration as they have a potential to create numerous positive or negative cumulative socio-economic impacts. Table 4.2 below lists all the various projects that will need to considered when examining the cumulative impacts and their location relative to the project under analysis as depicted on Map 4-3 below.

Table 4-2 Renewable energy projects in the area

Development	Current status of development	Proponent	Capacity	Farm details
Khobab Wind Farm	Under Construction	Mainstream Renewable Power	140MW	Pt 2 of Farm Sous 226
Loeriesfontein 2 Wind Farm	Under Construction	Mainstream Renewable Power	140MW	P1 & 2 of Farm Aan de Karree Doorn Pan No. 213
Wind Farm	Environmental Authorisation Issued	Mainstream Renewable Power	50MW	Pt 1 of Farm Aan de Karee Doorn Pan No. 213
PV Solar Energy Facility	Environmental Authorisation Issued	Mainstream Renewable Power	100MW	Pt 2 of Farm Aan de Karree Doorn Pan No. 213
Hantam PV Solar Energy Facility	Environmental Authorisation Issued/ Approved under REIPPP	Solar Capital (Pty) Ltd	Up to 525 MW	Rem of Farm Narosies No. 228
PV Solar Power Plant	Environmental Authorisation Issued	BioTherm Energy	70MW	Pt 5 of Farm Kleine Rooiberg No. 227
Dwarsrug Wind Farm	Environmental Authorisation Issued	Mainstream Renewable Power	140MW	Rem of Farm Brak Pan 212 & Stinkputs No. 229
Kokerboom 1 Wind Farm	Environmental Impact Assessment (EIA) underway	Business Venture Investment No. 1788 (Pty) Ltd (BVI)	240MW	• Rem of Farm Leerbergrivier No. 1163 • Rem of Farm Kleine Rooiberg No. 227
Kokerboom 2 Wind Farm	Environmental Impact Assessment (EIA) underway	Business Venture Investment No. 1788 (Pty) Ltd (BVI)	240MW	• Rem of Farm Springbok Pan No. 1164 • Rem of Farm Springbok Tand No. 215



Map 4-3 Location of other renewable projects (proposed and approved) in the area

The Khobab and Loeriesfontein projects have both been approved and have reached financial closure. As a result of this, these two wind farms have been under construction since the beginning of 2015. Under the Renewable Energy Independent Power Producer Procurement Programme (REIPPP), only one of the other projects listed in Table 4-2 above has been approved whilst the rest are yet to be approved. This means that, at this stage the possible timelines of their development are uncertain.

Considering the uncertainty associated with the future project roll-out, two possible extreme scenarios could be foreseen assuming that all of these projects are implemented at a certain point in time in the future. The first scenario is premised on the assumption that all the projects will be developed at the same time, whilst the second extreme scenario would be that all projects are developed one after another. From the quantitative impacts perspective, both scenarios will lead to the same impact on the GDP-R, employment, and household income; however, they may have a different effect on the standard of living and the social pathologies of the local community due to the level of concentration of the potential impacts that could be created at any given point in time.

The difference will lie in whether the impacts become concentrated (generated over a short period of time), or they all take place at the same time. Seeing that it is impossible to conclude with certainty which of these options would be realised, for the purposes of this study, it is assumed that all projects which are yet to be approved will be all built at the same time. This option is considered to be the least preferred option and therefore represents the worst case scenario.

5 PRELIMINARY IDENTIFIED IMPACTS AND THEIR EVALUATION

The following section includes the socio-economic impacts that the proposed project is envisaged to create and the ratings thereof according to the methodology (see Annexure A) provided by the Environmental Assessment Practitioner. These impacts will need to be investigated in greater detail during the Environmental Impact Assessment (EIA) phase and they are informed by the feedback received during the interviews with the directly and indirectly affected property owners, as well as other Interested and Affected Parties (I&APs).

Impacts such as the sterilisation of agricultural land and overgrazing of the allocated farm portion (which are linked to the loss of agricultural potential and employment opportunities) are omitted in this report as they are addressed in the Agricultural Specialist Report.

5.1 Construction phase impacts

The following list contains the preliminary identified construction phase socio-economic impacts considering the existing knowledge concerning the project and the potentially affected or benefitting socio-economic environment. Their evaluation is provided in the tables further in this section.

- Increased production and temporary stimulation of GDP-R
- Employment creation
- Skills development due to the creation of new employment opportunities
- Investment in the local community and economic development projects as part of a Social Economic Development (SED) and Enterprise Development Plan (ED)
- Increased household income and improved standard of living
- Increase in government revenue due to capital investment
- Impact on agricultural activities on the directly affected farms due to movement of vehicles and workers
- Change in demographics due to migration of workers from other areas and influx of jobseekers
- Increase in social pathologies associated with the influx of migrant labourers and job-seekers to the area
- Added pressure on basic services and social and economic infrastructure
- Establishment of informal hospitability industry due to increased demand for accommodation

As previously mentioned, according to the Namakwa IDP, the NC Province's climate is conducive to solar and wind RE development. As a result of this, the area has received heightened attention from various Independent Power Producers regarding the establishment of such projects. The region, which the Xha! Boom Wind Farm is proposed to be built, is one of the examples as there are already two RE projects (i.e. Khobab and Loerisfontein 2 Wind Farms) under construction. Several other RE projects in the area have also been proposed for the development and considering the government's continued interest in renewables as outlined in the IRP, they are likely to be implemented sometimes in the future. The development of the projects in the area, though will result in numerous cumulative effects, which will have both positive and negative outcomes.

- With respect to the positive effects, the combination of the effects of the projects already under construction as well as the ones still to be potentially approved is expected to result in increased production, temporary creation of employment both for the local labour and workers coming outside the local community, skills development, and creation of local business opportunities. Considering the small size of the local economy, the significance of these cumulative impacts in

the context of the local municipality could be prominent and result in the growth and diversification of the local economy, reduced unemployment rates, and greater local government earnings.

- Construction of a number of projects in a relatively remote and rural area, which has a small economic base and limited labour, could though lead to undesired but sometimes unavoidable socio-economic impacts. Projects of such nature would attract job seekers and bring workers from outside the local community, which could lead to various social pathologies. This could offset some of the positive impacts that would be derived from the same projects during construction and would need to be carefully managed to ensure that they are minimised and possibly eliminated altogether.

Tabulated below are the potential socio-economic impacts expected to ensue during the construction phase:

Table 5-1 Construction phase impact description and rating

Increased production & temporary stimulation of GDP-R	
Environmental Parameter	GDP-R: Refers to the value of all final goods and services produced within a region during a year.
Issue/Impact/Environmental Effect/Nature	Project capital expenditure is expected to result in an increase in the production of national and local economies as majority of inputs (with the exception of the cell and blades) will be produced in South Africa. A multiplier effect will be seen at a national level as the injection of funds will in turn increase people's incomes thus increasing their demand for goods and services.
Extent	The national economy will experience an increase in production.
Probability	The impact will certainly occur (>75% chance of occurrence).
Reversibility	Once capital is spent, impact is irreversible.
Irreplaceable loss of resources	The impact will not result in any loss of resources
Duration	The impact will last during construction (± 2 years), which will be extended to a short-term period.
Cumulative effect	Establishment of similar projects will multiply the positive impact therefore cumulative impact is high.
Intensity/Magnitude	Impact at a national level will be high.
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a significant positive impact at the national level.

	After mitigation measures: No viable mitigation measures exist to increase the intensity of the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	4	4
Probability	4	4
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/Magnitude	3	3
Significance rating	+54 (High positive)	+54 (High positive)
Mitigation measures	• No mitigation measures exist.	
Employment creation during construction phase		
Environmental Parameter	Employment: Towns and settlements surrounding the project site are characterised by very high levels of unemployment, reflecting that the economy of the area is stagnant and is in need of economic stimulation.	
Issue/Impact/Environmental Effect/Nature	During the establishment of a wind farm, large numbers of workers are required for the duration of the construction phase.	
Extent	The impact will affect the local community and district.	
Probability	The impact will certainly occur (>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	The impact will last during construction (± 2 years), which will be extended to a short-term period.	
Cumulative effect	The developments of other renewable projects in the area could significantly increase the number of jobs created,	

	with wind energy projects, it could grow proportionally to the number of new projects implemented.	
Intensity/Magnitude	Considering the high unemployment rate in the district as well the local community, the impact could have a significant impact on alleviating the unemployment levels in the area.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have significant positive effects. **After mitigation measures:** Ensuring that jobs are allocated to workers in the local area will significantly increase the impact of job creation	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	1	1
Irreplaceable loss of resources	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/Magnitude	3	4
Significance rating	+36 (Medium positive)	+52 (High positive)
Mitigation measures	• Drafting legal and binding enforcements stipulating that majority of the unskilled positions in the project be allocated to local labourers • Where possible, subcontract to local construction companies • Consultation with local authorities is essential so as to manage job creation expectations and ensure that all eligible workers in the primary study area are informed of the opportunities.	
Skills development due to the creation of new employment opportunities		
Environmental Parameter	Skills development: it is expected that those who will receive employment as a result of the construction	

	activities will either be improving an existing skill or acquiring a new skill.	
Issue/Impact/Environmental Effect/Nature	The population of the primary study area mainly consists of unskilled workers with low literacy rates therefore employees will benefit from a skills development programme, which is a key component of the development of this project.	
Extent	Impact will affect the district and local communities.	
Probability	The impact will certainly occur (>75% chance of occurrence).	
Reversibility	The impact is irreversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	The impact will have a permanent effect on the employed individuals as the acquired skills and necessary knowledge will have already been acquired and will remain with the relevant workers.	
Cumulative effect	The development of similar projects in the area will lead to greater labour productivity and employability of construction phase workers.	
Intensity/Magnitude	The low primary school completion percentages indicate a lack of skills amongst local communities, thus the opportunity to develop a skilled workforce will have a high impact on the community.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a significant positive effect. **After mitigation measures:** Utilising appropriate mitigation measures, which ensure that skills development is implemented as part of the establishment will increase the intensity of the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	3	4
Reversibility	4	4

Irreplaceable loss of resources	1	1
Duration	4	4
Cumulative effect	3	4
Intensity/Magnitude	3	3
Significance rating	+51 (High positive)	+57 (High positive)
Mitigation measures	• Contracts ensuring that on-the-job training is included and enforced as a condition for the development of this project. • To improve the chances of skills development during the construction phase, contractors are encouraged to provide learner-ships and encourage further knowledge sharing.	
Increased household income and improved standard of living		
Environmental Parameter	Household income: the result of a household member engaging in economic activity; has a direct link to the standards of living. Currently just over half of the residents of the Hantam LM generate an income less than R3 200.	
Issue/Impact/Environmental Effect/Nature	Certain households are expected to experience an increase in household income as a result of the job creation as well as skills development.	
Extent	Will affect local district and community.	
Probability	The impact will certainly occur (>75% chance of occurrence).	
Reversibility	The impact is reversible as the income will only be earned for the duration of the construction period.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources	
Duration	The impact will last during construction (± 2 years), which will be extended to a short-term period.	
Cumulative effect	With the potential development of similar renewable projects in the area, the number of jobs created through multiplier effects will increase leading to increased household income.	
Intensity/Magnitude	With just over 50% of individuals in the municipality who earn less than R3 200, the impact of the increase in	

	disposable household income will thus result in a medium-sized impact.	
Significance rating	**Prior to mitigation measures:** Due to the improved living standards accompanying household income increases, the impact will result in a low positive effect. **After mitigation measures:** Utilising appropriate mitigation measures, the intensity of the impact has increased to a medium positive effect.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	1	1
Irreplaceable loss of resources	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/Magnitude	2	3
Significance rating	+26 (Low positive)	+39 (Medium positive)
Mitigation measures	• Recruit local labour as far as possible so as to ensure that the benefits accrue to local households within the community • Employ labour-intensive methods as far as feasible in the construction phase • Where possible, sub-contract to local companies	
Investment in the local community and economic development projects as part of a Social Economic Development (SED) and Enterprise Development Plan (ED)		
Environmental Parameter	Investment in the local community	
Issue/Impact/Environmental Effect/Nature	SED and ED initiatives, as part of the Independent Power Producer Procurement Programme (IPPPP); project owners are required to allocate a certain percentage of the projects' revenue towards community development. As such, the developer aims on investing R450 000 in nearby communities through several community development initiatives.	
Extent	The impact will affect the local district.	

Probability	Investing into the local economy is a government requirement therefore the impact will certainly occur (>75% chance of occurrence).	
Reversibility	Once the investments are injected into the economy, it can be assumed that the impact will be irreversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	This impact is rated as medium term as it will take place during the pre-construction and construction phase of the project.	
Cumulative effect	The base-town for several of the other projects in the area is Loeriesfontein as well, thus the cumulative impact is high.	
Intensity/Magnitude	The local district as well as Loeriesfontein town is in need of an economic stimulus therefore benefits from the investment will have a high intensity impact.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a significant positive effect. **After mitigation measures:** After viable mitigation measures are implemented, the anticipated impact will have a significant positive effect.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	2	2
Cumulative effect	4	4
Intensity/Magnitude	3	4
Significance rating	+51 (High positive)	+68 (High positive)
Mitigation measures	• It is recommended that the proponent/project owner establishes a relationship with the local authorities such as the Hantam LM so as to ensure that the SED & ED initiative that are invested into are aligned with the particular and relevant needs of the Loeriesfontein community.	

	• The government should find a way to monitor and evaluate the compliance of the proponent to the requirement of investing into a local community.	
Increase in government revenue due to the capital investment		
Environmental Parameter	Government revenue: government obtains its revenue from collecting taxes and rates from the country's residents and business	
Issue/Impact/Environmental Effect/Nature	The increase in employment opportunities and disposable income has a direct influence on the increase in the tax base as a result of investment on the proposed project. The increased tax revenue also implies that large sum of money to be spent on improving the service delivery of the local district.	
Extent	The impact will affect the entire country.	
Probability	The impact will certainly occur (>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	The impact will last during construction (± 2 years), which will be extended to a short-term period.	
Cumulative effect	Considering surrounding renewable energy products, the cumulative impact could potentially be high	
Intensity/Magnitude	At a national level, the impact (increase in government revenue) will have a medium impact and at this stage, government revenue will not be as large as when the wind farm becomes operational	
Significance rating	**Prior to mitigation measures:** The anticipated impact will result in a medium positive effect. **After mitigation measures:** No mitigations measures exist and the significance of the impact will remain unchanged.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	4	4

Probability	4	4
Reversibility	1	1
Irreplaceable loss of resources	1	1
Duration	1	1
Cumulative effect	4	4
Intensity/Magnitude	2	2
Significance rating	+30 (Medium positive)	+30 (Medium positive)
Mitigation measures	• No mitigation measures exist.	
Change in demographics due to migration of workers from other areas and influx of jobseekers		
Environmental Parameter	Demographics of the area: the area has a naturally established, relatively small community.	
Issue/Impact/Environmental Effect/Nature	The Loeriesfontein as well as Hantam LM labour force does not have the essential skills and is not diversified enough to provide all skills required in the construction phase, this will necessitate the migration of workers to the area. The projects will also attract job-seekers from various parts of the Province and possibly outside its borders.	
Extent	The impact will affect the local area and district as the demographics of the area will be altered.	
Probability	The impact will certainly occur (>75% chance of occurrence).	
Reversibility	In the likely event that migrant workers as well as job seekers remain in the area after the construction phase in the hope for employment during the operating phase, the impact would be partly reversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	The impact is rated as long term based on the likelihood that migrant workers will stay in the area for the life of the project.	
Cumulative effect	Considering other renewable energy projects that are situated in the area, the impact would result in a significant	

	cumulative effect as it might attract several other migrant workers	
Intensity/Magnitude	The male population is expected to increase in the area thus affecting the demographics of the area thus resulting in an impact of a medium intensity.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will result in a medium negative effect. **After mitigation measures:** Considering the proposed mitigation measures, the intensity of the impact has remained the same.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	3
Reversibility	2	2
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	3
Intensity/Magnitude	2	1
Significance rating	-32 (Medium negative)	-30 (Medium negative)
Mitigation measures	• Developers should be open to local recruitment processes and be willing to offer some skills transfer during this phase of the project to ensure maximum local labour procurement. This will decrease the likelihood of an influx of migrant workers.	
Increase in social pathologies associated with the influx of migrant labourers and job-seekers to the area		
Environmental Parameter	Social pathologies: factors such as the deterioration in health, increase in crime, prostitution, xenophobia and drugs, etc.	
Issue/Impact/Environmental Effect/Nature	Activities in the construction phase will attract job-seekers and will involve the migration of construction workers to either the site or the surrounding town. The increase in the	

	number of construction workers is expected to cause a further increase in social pathologies.	
Extent	The impact will affect the local area and district.	
Probability	Considering the impacts that the already existing wind farms (Khobab & Loeriesfontein 2) have had on the Loeriesfontein community, the impact will certainly occur (>75% chance of occurrence).	
Reversibility	Impacts such as social ills are not defined to a particular area and tend to develop over long time periods. Therefore, if the migrant workers choose to remain in the area after the construction, the impact is rated as party reversible.	
Irreplaceable loss of resources	This impact will most likely result in a moderate increase in the stock theft therefore this impact is rated to possibly result in a marginal loss of resources.	
Duration	In the event that migrant workers remain in the area after the construction period, the impact is rated as long term.	
Cumulative effect	Considering the other renewable projects in the area, the cumulative impact of increased social pathologies is expected to be high.	
Intensity/Magnitude	The increase in social pathologies is most likely to jeopardise the integrity of the area resulting in a medium intensity effect.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have highly negative effects and will require significant mitigation measures to achieve an acceptable level of impact. **After mitigation measures:** The anticipated impact will be reduced to a medium negative effect.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	3
Reversibility	2	2

Irreplaceable loss of resources	2	2
Duration	3	3
Cumulative effect	4	3
Intensity/Magnitude	3	2
Significance rating	-51 (High negative)	-30 (Medium negative)
Mitigation measures	• Assist local communities crippled by high levels of drug and alcohol abuse through remedial intervention and awareness programs • Introduce awareness campaigns for workers on the dangers of substance abuse • Place more emphasis on the role of and need of a social worker in the area	
Added pressure on basic services and social and economic infrastructure		
Environmental Parameter	Basic services and social and economic infrastructure, water provision and adequate housing.	
Issue/Impact/Environmental Effect/Nature	The influx of jobseekers in the area will result in an increased demand for basic services, as well as social and economic infrastructure in the area. This will put pressure on the local municipality to ensure that the services are not further deteriorated.	
Extent	The impact will affect the local district	
Probability	The impact will certainly occur (>75% chance of occurrence).	
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 at least the duration of the construction period (± 2 years), which will be extended to a short-term period, however, it may remain for several years into the operational period, thus the impact will have a medium-term effect.	
Cumulative effect	The demand for basic services and infrastructure is most likely to increase as more similar developments appear in the area, thus the cumulative impact is high.	

Intensity/Magnitude	With the municipality already experiencing backlogs in housing and like services, the impact is rated as a medium-sized effect.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a medium negative effect and will require moderate mitigation measures. **After mitigation measures:** The anticipated impact will be reduced to a low negative effect.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	3
Reversibility	2	2
Irreplaceable loss of resources	1	1
Duration	2	2
Cumulative effect	4	3
Intensity/Magnitude	2	2
Significance rating	-30 (Medium negative)	-26 (Low negative)
Mitigation measures	• Engage with the local authorities to inform them on the timeframes of the project and possible risks from a service delivery perspective. • Where possible, assist the local municipality in ensuring that the quality of the social and economic infrastructure does not deteriorate by making use of social responsibility allocations.	
Establishment of informal hospitality industry due to increased demand for accommodation		
Environmental Parameter	Formation of informal hospitality industry as a result of the increased demand for accommodation.	
Issue/Impact/Environmental Effect/Nature	In the event that construction workers do not reside on the construction sites, local residents have identified an opportunity in providing accommodation for the construction workers and majority of them have resorted to transforming their backyards and garages into rooms available for monthly rentals.	

Extent	The impact will affect the local area or district.	
Probability	The impact will certainly occur (>75% chance of occurrence).	
Reversibility	Considering projects similar to this one, some migrant workers and job-seekers might remain in the area therefore the impact is partly reversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	The impact will last for at least the duration of the construction period (± 2 years), which will be extended to a short-term period, however, it may remain for several more years if similar projects are developed in the area.	
Cumulative effect	In consideration of projects of a similar nature, the cumulative impact is rated as high.	
Intensity/Magnitude	In consideration of the dynamics that currently characterise the existing windfarms, construction workers have a preference of residing in town as opposed to living on the construction sites resulting in increased demand for accommodation in the local town; thus, the impact is rated as high.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a medium negative effect and will require moderate mitigation measures. **After mitigation measures:** No mitigation measures exist.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	2	2
Irreplaceable loss of resources	1	1
Duration	2	2
Cumulative effect	4	4
Intensity/Magnitude	3	3

Significance rating	+45 (Medium positive)	+45 (Medium positive)
Mitigation measures	• No mitigation measures exist.	

5.2 Operational phase impacts

The following list contains the preliminary identified socio-economic impacts that are expected to ensure during operations.

- Sustainable increase in production and GDP-R of the national and local economies through operation and maintenance activities
- Sustainable increase in government revenue stream
- Creation of long term in local and national economies through operation and maintenance activities
- Skills development due to the creation of new sustainable employment opportunities
- Increased household income
- Investment in the local community and economic development projects as part of a Social Economic Development (SED) and Enterprise Development Plan (ED)
- Improved standard of living of households directly or indirectly benefiting from created employment opportunities
- Improved access to basic services and community services

Considering the existing wind farms as well as other similar projects still to be approved, cumulative socio-economic impacts arising during the operation phase are expected to be largely positive. This is due to the fact that the supposed simultaneous operational life of all these projects will provide sustainable employment opportunities, improved access to basic services as a result of increased income as well as an improved standard of living. The prescribed investment into socio-economic and enterprise development initiatives by IPPs will also lead to improvement of general standard of living in the area.

Tabulated below are the socio-economic impacts expected to ensue during the operation phase:

Table 5-2: Operation phase impact description and rating

Sustainable increase in production and GDP-R of the national and local economies through operation and maintenance activities	
Environmental Parameter	GDP-R: The total value of all final goods and services produced in a region within a year.
Issue/Impact/Environmental Effect/Nature	The operating phase of the wind farm will contribute to an increase in production of the national economy.
Extent	The impact will affect the entire country.
Probability	The impact will certainly occur (>75% chance of occurrence).
Reversibility	The impact is irreversible as one cannot 'un-do' production.
Irreplaceable loss of resources	The impact will not result in the loss of any resources.

Duration	The impact is rated as long term as it will last for the entire operational life of the development therefore, it is rated as long term.	
Cumulative effect	In consideration of the other planned project for the area, the cumulative impact could be high.	
Intensity/Magnitude	The impact will alter the economy of the entire community; it will therefore, result in a medium-sized effect.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a moderate positive effect. **After mitigation measures:** No mitigation measures exist to increase the intensity of the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	4	4
Probability	4	4
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/Magnitude	2	2
Significance rating	+40 (Medium positive)	+40 (Medium positive)
Mitigation measures	• No mitigation measures exist	
Sustainable increase in government revenue stream		
Environmental Parameter	Government revenue: through the operations of the project, a contribution will be made to the government revenue which will indirectly improve the provision of basic services to the population.	
Issue/Impact/Environmental Effect/Nature	The impact will mostly take place when there is an increase in the amount of tax on the salaries of salaries and wages of people, as well as payment of company taxes.	
Extent	The impact will affect the entire country.	
Probability	The impact will certainly occur.	
Reversibility	Government will collect money in the form of tax and will utilise the injection to improve the socio-economic	

	standards of the population, for this reason; the impact is rated as irreversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	The impact is rated as long term as it will last for the entire operational life of the development; therefore, rated as long term.	
Cumulative effect	Considering the projects that are to be developed in the area, the tax revenue will increase. The impact could be a medium-sized effect.	
Intensity/Magnitude	The impact will potentially alter the living conditions of the population through government investment; thus, the impact is of a medium-sized intensity.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have high positive effects. **After mitigation measures:** No mitigation measures exist to increase the intensity of the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	4	4
Probability	4	4
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	3	3
Intensity/Magnitude	3	3
Significance rating	+57 (High positive)	+57 (High positive)
Mitigation measures	• No mitigation measures exist.	
Creation of long term employment in local and national economies through operation and maintenance activities		
Environmental Parameter	Sustainable employment opportunities.	
Issue/Impact/Environmental Effect/Nature	Throughout the lifespan of the project, several people will receive employment.	
Extent	Will affect the local area and district.	

Probability	The impact will certainly occur (>75% chance of occurrence).	
Reversibility	The employment is expected to last for the entire life span of the project upon which the impact is rated as barely irreversible.	
Irreplaceable loss of resources	The impact will not result in any loss of resources.	
Duration	The impact and its effects is expected to last for the entire operational life of the development resulting in a long-term effect.	
Cumulative effect	The cumulative impact of the project is expected to be high as a number of people in the Hantam economy will receive long term employment.	
Intensity/Magnitude	Although the operational phase promises long term employment, in the context of the entire Hantam economy, the effect of the impact is expected to medium-sized.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have moderate positive effects. **After mitigation measures:** The anticipated impact will have highly significant positive effects.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	3	3
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/Magnitude	2	3
Significance rating	+34 (Medium positive)	+51 (High positive)
Mitigation measures	• Where possible, ensure that the created jobs are acquired by local people.	
Skills development due to the creation of new sustainable employment opportunities		

Environmental Parameter	Skills development, long term knowledge transfer and skills development will take place as a result of the expected new employment creation.	
Issue/Impact/Environmental Effect/Nature	Individuals who have receive the long term employment in the operational activities of the project will gain skills and will be able to practice already existing skills.	
Extent	Will affect the entire country.	
Probability	Considering the current skills base, the required skills may not be available locally and will need to be sourced elsewhere thus the impact will likely occur.	
Reversibility	The impact irreversible as once skilled are gained, they cannot be lost.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	Considering the duration of the phase, impact will be long term.	
Cumulative effect	The cumulative impact is rated as medium-sized as the rest of the skills will arise from other projects.	
Intensity/Magnitude	Considering the current skills base of local people, the intensity of the impact is expected to be low.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a minor positive effect. **After mitigation measures:** The anticipated impact will have a minor positive effect.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	4	4
Probability	3	3
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	3	3
Intensity/Magnitude	1	1
Significance rating	+18 (Low positive)	+18 (Low positive)

Mitigation measures	• Contracts ensuring that knowledge sharing and on-the-job training should be enforced as a condition for the development of the project. • To ensure that skills are adequately acquired, ensure that there are additional training programmes held during the construction phase to prepare them for the next phase; operational.	
Increased household income		
Environmental Parameter	Household income: the result of a households' member engaging in economic activity which has a direct link of the living standards of a household.	
Issue/Impact/Environmental Effect/Nature	About 54% of the people in the municipality earn less than R3 200 a month thus the operation of the wind farm is expected to result in an injection in the salary of people so as to indirectly improve their standard of living.	
Extent	The impact will affect the local area and district.	
Probability	The impact will certainly occur (>75% chance of occurrence).	
Reversibility	The impact is irreversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	The impact will be relevant for the entire life span of the project, long term.	
Cumulative effect	Based on the current size of the district and local area, the cumulative impact is expected to be high.	
Intensity/Magnitude	In Loeriesfontein, employment is currently dominated by the informal sector opportunities, thus the provision of sustainable jobs will significantly improve the living standards of local residents.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have significant positive effects. **After mitigation measures:** The intensity of the impact remains the same at a significant positive effect.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	4	4

Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/Magnitude	3	4
Significance rating	+54 (High positive)	+72 (High positive)
Mitigation measures	• Ensure that local labour is procured to maximise benefit to the local households.	
Investment in the local community and economic development projects as part of a Social Economic Development (SED) and Enterprise Development Plan (ED)		
Environmental Parameter	Investment in the local community	
Issue/Impact/Environmental Effect/Nature	SED and ED initiatives, as part of the Independent Power Producer Procurement Programme (IPPPP); project owners are required to allocate a certain percentage of the projects' revenue towards community development.	
Extent	The impact will affect the local district.	
Probability	Investing into the local economy is a government requirement therefore the impact will certainly occur (>75% chance of occurrence).	
Reversibility	Once the investments are injected into the economy, it can be assumed that the impact will be irreversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	This impact is rated as long term as it will take place annually for the duration of the project.	
Cumulative effect	The base-town for several of the other projects in the area is Loeriesfontein as well, thus the cumulative impact is high.	
Intensity/Magnitude	The local district as well as Loeriesfontein town is in need of an economic stimulus therefore benefits from the investment will have a high intensity impact.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a significant positive effect. **After mitigation measures:** After viable mitigation measures are implemented, the anticipated impact will have a significant positive effect.	

	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/Magnitude	3	4
Significance rating	+54 (High positive)	+72 (High positive)
Mitigation measures	• It is recommended that the proponent/project owner establishes a relationship with the local authorities such as the Hantam LM so as to ensure that the SED & ED initiative that are invested into are aligned with the particular and relevant needs of the Loeriesfontein and wider reaching communities. • The government should find a way to monitor and evaluate the compliance of the proponent to the requirement of investing into a local community.	
Improved standard of living of households directly or indirectly benefiting from created employment opportunities		
Environmental Parameter	Improved standard of living.	
Issue/Impact/Environmental Effect/Nature	During the construction and operational phase of the project, indirect employment opportunities are created through the provision of services such as transport as well as accommodation which indirectly improves the living standards of the locals.	
Extent	The impact will affect the local area or district.	
Probability	This impact will certainly occur (>75% chance of occurrence).	
Reversibility	During the operational phase, people are expected to receive employment for the duration of the project thus the impact is barely reversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	

Duration	The impact is expected to last for the entire operational life of the project.	
Cumulative effect	With the development of similar projects in the area, the cumulative impact could be high.	
Intensity/Magnitude	Indirect employment opportunities can play a role in alleviating the high unemployment rate in Loeriesfontein town, therefore the intensity of the impact is of a medium-sized effect.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a moderate positive effect. **After mitigation measures:** After the implementation of ensuring that residents of the local community are employed, the anticipated impact will have significant positive effects.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	3	3
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/Magnitude	2	3
Significance rating	+34 (Medium positive)	+51 (High positive)
Mitigation measures	• Ensure that local labour is procured to maximise the benefit to the local households. • Consultation with local authorities is essential so as to manage job creation expectations and ensure that all eligible workers in the primary study area are informed of the opportunities.	
Improved access to basic services and community services		
Environmental Parameter	Access to basic services.	
Issue/Impact/Environmental Effect/Nature	The project will allocate a certain percentage of its revenue toward community development for the duration of its operational life. This will assist in addressing currently existing backlogs in the community and will therefore	

	improve the access of the people to basic and community services.	
Extent	The impact will affect the local area or district.	
Probability	This impact will certainly occur (>75% chance of occurrence).	
Reversibility	The impact is irreversible.	
Irreplaceable loss of resources	The impact will not result in the loss of any resources.	
Duration	The impact is expected to last for the entire operational life of the project.	
Cumulative effect	With the development of similar projects in the area, the cumulative impact could be high.	
Intensity/Magnitude	The amount of funds that will be injected into the local community will be on an annual basis and this will result in a significantly high intensity of the impact.	
Significance rating	**Prior to mitigation measures:** The anticipated impact will have a significant positive effect. **After mitigation measures:** No mitigation measures exist that can improve the intensity of the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	2	2
Probability	4	4
Reversibility	4	4
Irreplaceable loss of resources	1	1
Duration	3	3
Cumulative effect	4	4
Intensity/Magnitude	3	3
Significance rating	+54 (High positive)	+54 (High positive)
Mitigation measures	• No mitigation measures exist.	

6 CONCLUSION

Mainstream Renewable Power South Africa (Pty) Ltd proposes the development of Xha! Boom wind farm, with the capacity to generate 235 MW, near Loeriesfontein in the Namakwa DM which is located in the Northern Cape Province.

Relevant national, provincial and local government policies reveal that the development of RE technologies is strongly supported both:

- At the national level, developing an RE sector is supported with respect to the need to diversify and expand energy supply
- At the provincial and local level, RE sector development support is premised on the prioritisation of regional economic stimulation as well as the creation of employment opportunities for the benefit of local people.

The nationally envisioned transition toward a green and low carbon economy in the NDP and NGP framework has led to the identification of the significant role played by renewable energy products in economic development and in growing the energy generation mix. Increasing competitiveness in the renewables sector has resulted in much recognition being placed on renewable energy as an alternative electricity generating option. Wind energy has been viewed as a suitable alternative for various reasons particularly because it is the cheapest and cleanest renewable energy commitment. Wind is also a naturally occurring resource meaning that it cannot be depleted thus reducing dependency on fossil fuels and in the process create jobs for local communities whilst providing them with affordable electricity prices.

From a provincial perspective, the Northern Cape is imbued with a highly significant comparative advantage in its inherent resources (renewable and non-renewable), this particular fact is imperative to achieving economic development in the Province as it ensures long term sustainability. Thus, the development of various energy sources is one of the ways in which economic opportunities and activities can be generated. As a result of this, according to the NC SDF, one of the sustainability objectives of the Province is to ensure and promote the use of renewable resources in preference to non-renewable resources. Promoting the development of the RE sector also increases the diversity of the domestic energy supply and in the process, avoids energy imports whilst minimising detrimental environmental impacts.

In order to effectively formulate an economically driven vision at the district level, manufacturing of renewable energy equipment for power generation at a local level is one the elements upon which the Namakwa DM SDF places a need for strengthening. At the local municipal level, prefeasibility studies have shown that the Hantam LM has the opportunity to strategically place itself within South Africa's renewable energy production. This is owing to the municipality's climate and geographical context, which makes it suitable for solar and wind energy. In the process of developing the RE sector, the economic base of the local municipality will also be broadened. Although there is sufficient evidence for the support of the RE sector in the Hantam LM, the agricultural sector is a very vital sector in the LM as it contributes the most to the GDP-R as well as creates the most employment opportunities for Hantam residents. The role played by the agricultural sector in Hantam not only highlights the need to establish complementary industrial activities, but also means that developments that are pursued in the region ought to be sensitive to impacts that might potentially affect the agricultural industry. Although is it evident that the provincial and local government of the Northern Cape long recognised the potential of capitalising on renewable energy production in the Province, it is also beyond evident that most parts of the district as well as the various parts of the Hantam LM provide an outstanding scenic and aesthetically appealing landscape

which attracts national and international visitors. Developments such as this one therefore need to be sensitive to the agriculture and tourism sector.

The overall consideration of the favourable alignment of local, regional and national policy with the proposed project as well as the complementary nature of wind farms and the current land use of the project site is evidence that no fatal flaws are present from the socio-economic perspective. Tabulated below (Table 6-1) is a summary of the preliminary impacts before and after mitigations.

Table 6-1 Summary of construction and operation phase impacts

Impact	Significance rating with no mitigation	Post mitigation significance rating
Construction phase		
Increased production and GDP-R	High positive (54)	High positive (54)
Employment creation	Medium positive (36)	High positive (52)
Skills development and training	High positive (51)	High Positive (57)
Increased household income	Low positive (26)	Medium positive (39)
Investment in local community (SED & ED)	High positive (51)	High positive (68)
Increase in government revenue	Medium positive (30)	Medium positive (30)
Change in demographics due to migration	Medium negative (32)	Medium negative (30)
Increase in social pathologies	High negative (51)	Medium negative (30)
Added pressure on basic services	Medium negative (30)	Low negative (26)
Impact on informal hospitality industry	Medium positive (45)	Medium positive (45)
Operation phase		
Sustainable increase in production	Medium positive (40)	Medium positive (40)
Sustainable increase government revenue	High positive (57)	High positive (57)
Long term employment	Medium positive (34)	High positive (51)
Skills development and training	Low positive (18)	Low positive (18)
Increased household income	High positive (54)	High positive (72)
Investment in local community (SED & ED)	High positive (54)	High positive (72)
Improved standard of living	Medium positive (34)	High positive (51)
Improved access to basic services	High positive (54)	High positive (54)

Considering all the potential socio-economic impacts for both the construction and operational phase, with respect to the substation, there is no differentiation that can be made regarding the potentially ensued socio-economic effects as they will remain the same regardless of the sub-station site alternative chosen.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION ALTERNATIVES		
On-site Substation Option 1	No preference	No differentiation between this and the other option in terms of the socio-economic impacts identified - will result in equal impacts.
On-site Substation 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.

7 ANNEXURE A: IMPACT RATING CRITERIA AND METHODOLOGY

The assessment of impacts will be based on the professional judgement of specialists at SiVEST, fieldwork, and desk-top analysis. The significance of potential impacts that may result from the proposed development will be determined in order to assist DEA in making a decision.

Table 7-1 Criteria used to determine the significance of the impact

NATURE		
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.		
GEOGRPHICAL EXTENT		
The area in which the impact will be expressed. Typically, the severity and significance of an impact have different impact scales and us such bracketing range are often required.		
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 a 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 resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result 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 or last for the entire operational life of the development, but will be mitigated by direct human action or by 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 Effect	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 often impossible. If possible rehabilitation and remediation 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. The describes the significance of the impact on the environmental parameter. The calculation of the significance of the 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 the 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 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 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 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 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 as fatal flaws.
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

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