

APPENDIX H: SOCIO-ECONOMICS SPECIALIST OPINION

**SOCIO-ECONOMIC IMPACT ASSESSMENT
FOR THE PROPOSED PLAN 8 INFINITE ENERGY
GRAHAMSTOWN WIND ENERGY FACILITY PROJECT
(2018 – PROPOSED AMENDMENTS)**

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Report prepared for:

Plan 8 Infinite Energy
PO Box 3804, Cape Town, 8000
info@Plan 8.co.za



Prepared by:

Urban-Econ Development Economists
127 Cape Road, Mount Croix, Port Elizabeth
ec@urban-econ.com



TABLE OF CONTENTS

Chapter 1	INTRODUCTION	104
1.1	Study Goals and Objectives	105
1.2	Project Background and Locality	105
1.3	Study Methodology	106
1.3.1	<i>Economic Impact Assessment Method</i>	106
1.3.2	<i>Impact Evaluation Model</i>	107
1.3.3	<i>Data Collection</i>	109
1.4	Study Area Delineation	109
1.4.1	<i>Primary study area</i>	110
1.4.2	<i>Secondary and tertiary study areas</i>	110
1.4.3	<i>Visually affected study area</i>	110
Chapter 2	POLICY AND PLANNING ENVIRONMENT	111
2.1	National Informants	112
2.1.1	<i>National Energy Act (2008)</i>	112
2.1.2	<i>The White Paper on Renewable Energy (2003)</i>	112
2.1.3	<i>National Climate Change Response Paper Green Paper (2010)</i>	112
2.1.4	<i>The New Growth Path Framework (2010)</i>	112
2.1.5	<i>The Integrated Resource Plan 2010 – 2030 (2011)</i>	112
2.1.6	<i>National Development Plan (NDP)</i>	113
2.1.7	<i>Renewable Energy Vision 2030 South Africa (2014)</i>	113
2.1.8	<i>Integrated Energy Plan (2016)</i>	113
2.1.9	<i>Renewable Energy Independent Power Producer Procurement Programme (REI4P)</i>	114
2.2	Key Provincial Documents	114
2.2.1	<i>The Eastern Cape Industrial Development Strategy (2011)</i>	114
2.2.2	<i>The Eastern Cape Sustainable Energy Strategy (2012)</i>	115
2.2.3	<i>The Eastern Cape Provincial Economic Development Strategy (PEDS) (2017)</i>	115
2.3	Local Guidance	116
2.3.1	<i>Sarah Baartman District SDF (2013)</i>	116
2.3.2	<i>Sarah Baartman District IDP (2017)</i>	116
2.3.3	<i>Makana Local Municipality IDP (2017-2022)</i>	116
2.3.4	<i>The Makana LED Strategy (2009)</i>	117
2.4	Synopsis	117
Chapter 3	SOCIO-ECONOMIC PROFILE OF THE STUDY AREA	117
3.1	Population, Income and Employment Profile	117
3.2	Economic Profile	119
3.3	Profile of the Immediately Affected Environment	120
3.3.1	<i>Land use profile</i>	120
3.3.2	<i>Socio-economic profile of the affected area</i>	121
Chapter 4	IMPACT ASSESSMENT ASSUMPTIONS	123
4.1	Grahamstown WEF Assumptions	123
4.1.1	<i>Construction phase assumptions</i>	123
4.1.2	<i>Operational phase assumptions</i>	124
4.1.3	<i>Decommissioning phase assumptions</i>	124
4.2	Assumptions Regarding Potential Losses in the Area Affected by Visual Impacts	124
4.2.1	<i>Assumptions regarding sensitivity of tourists to visual disturbances</i>	125
4.2.2	<i>Assumptions regarding the extent of visual effects on properties and revenues</i>	126
Chapter 5	EVALUATION OF IMPACTS AS A RESULT OF THE WEF	128
5.1	Defining Economic Impacts	128
5.1.1	<i>Types of economic impacts</i>	129
5.1.2	<i>Economic impacts considered</i>	129
5.2	Construction Phase Impacts	129
5.2.1	<i>Positive impacts during construction</i>	130
5.2.2	<i>Negative impacts during construction</i>	135
5.3	Operational Phase Impacts	143
5.3.1	<i>Positive impacts during operations</i>	143

5.3.2	Negative impacts during operations.....	148
5.4	Decommissioning Phase Impacts.....	152
5.5	Net Effect and Trade-off Analysis	153
5.5.1	Construction	153
5.5.2	Operation.....	154
5.5.3	Decommissioning.....	155
Chapter 6	RECOMMENDATIONS	155
Chapter 7	ENVIRONMENTAL MANAGEMENT PLAN	156
7.1	Construction Phase.....	156
7.2	Operational Phase	160
	REFERENCES.....	163

TABLES

Table 1:	Impact evaluation model	108
Table 2:	Overview of the primary study areas population structure, 2017	118
Table 3:	Employment profile of the primary study	118
Table 5:	GDP-R structure between 2011 and 2017 in Constant 2010 prices	119
Table 8:	Potential estimated production losses associated with visual impacts (R' millions; 2018 prices).....	128
Table 9:	Estimated impact on the national and local economies compared between 2013 report and 2018 proposed amendments (R' million, 2018 prices).....	130
Table 10:	Estimated Full Time Equivalent positions to be created during construction (2013 and 2018 values)	132
Table 11:	Summary of construction phase impacts	153
Table 13:	Comparison of no-go option to Grahamstown WEF development for operational phase.....	155

FIGURES

Map 1:	Location of proposed WEF	106
Map 2:	Cumulative visual exposure from proposed turbine (hub height 125m; rotor diameter 149m) layout	111
Map 3:	Farm numbers of the immediately affected environment	121

CHAPTER 1 INTRODUCTION

EOH Coastal Environmental Services (EOH CES) is undertaking an Environmental Impact Assessment (EIA) for the proposed amendment of the Plan 8 Grahamstown Wind Energy Facility (WEF) East of Makhanda (formerly known as Grahamstown) in the Eastern Cape Province on behalf of Plan 8 Infinite Energy (Pty) Ltd (Plan 8). This socio-economic impact assessment (SEIA) is an update based on the amendments proposed by Plan 8, and forms part of a range of specialist studies that make up part of the EIA process. This document discusses activities undertaken to evaluate the nature of socio-economic impacts associated with the proposed Plan 8 WEF.

The proposed amendments to the project comprises increasing the generating capacity of each of the turbines from a maximum of 3MW to a maximum of 4.5MW, thereby increasing the total installed generating capacity of the facility from a maximum of 66MW to a maximum of 99MW. This is to be achieved by increasing the hub height of the turbines from a maximum of 91.5m to a maximum of 125m above ground level and increasing the diameter of the rotor from maximum of 117m to a maximum of 149m. The number of turbines remains unchanged at 22, and the locations of the turbines on the site will also not change (except for possible pre-construction micro-siting). Because the bases of the turbines and

the hardstanding areas will be larger, the footprint of the facility will increase from 13.7ha to 18.9ha, an increase of about 34%. The increased footprint will be about 0.72% of the total area of the site.

This socio-economic impact assessment (SEIA) is an update based on the amendments proposed by Plan 8, and forms part of a range of specialist studies that make up part of the EIA process. This document discusses activities undertaken to evaluate the nature of socio-economic impacts associated with the proposed Plan 8 WEF.

This document is an updated version of the August 2013 SEIA that formed part of the EIA approved by the Department of Environmental Affairs (DEA) in 2015 for the Plan 8 WEF. This document forms the updated SEIA for the purposes of the amendment to be submitted by Plan 8. All figures, policy documents and research where possible, have been updated to the latest available as of November 2018. The grey text boxes throughout summarise the key changes that have occurred since 2013 and the significance these changes may have based on the proposed amendments to the development concept. The SEIA study goals and objectives, methodology and study area have otherwise not changed for this update.

1.1 STUDY GOALS AND OBJECTIVES

The national guidelines for conducting Socio-Economic Impact Assessments indicate that the overall aim of an SEIA is to understand the current social and economic environment and use it as a baseline for predictions and measurements (DEAT, 2006). More specifically, this study seeks to determine and assess all potential positive and negative socio-economic impacts of the proposed amended development and contrast it against the “do-nothing” alternative to identify whether the proposed amended development will have a net positive or a net negative effect on the society and economy.

Terms of Reference: The specific objectives of the study were:

- Generating a profile of the local and regional economy in order to understand the economic dynamics, potential and challenges of the area
- Developing a profile of the affected environment which would then represent the “do nothing” alternative
- Identifying all possible positive and negative socio-economic impacts that could be expected to arise from the project during both the construction and operational phases of the development
- Where possible, quantify socio-economic impacts using an economic model developed on the basis of a Social Accounting Matrix (SAM) or other techniques
- Determine the significance of potential impacts using criteria determined by the environmental practitioner
- Compare various alternatives and advise on the most advantageous option
- Provide, where possible and when necessary, practical mitigation measures to reduce or completely eliminate the potential negative impacts of the proposed development

1.2 PROJECT BACKGROUND AND LOCALITY

Plan 8 Infinite Energy, a renewable energy company, plans to submit an application to amend the Environmental Authorisation for a wind energy facility (WEF) approximately 30km outside of Makhanda (formerly known as Grahamstown) along the N2 in an easterly direction towards East London, in the Eastern Cape Province of South Africa. The Department of Environmental Affairs (DEA) approved the project and granted Environmental Authorisation on 22nd October 2015. Three appeals against the

granting of environmental authorisation were submitted to the minister, and were dismissed minister on 20th September 2016 and 16th March 2017.

The proposed site is on the farms Gilead, Tower Hill and Peynes Kraal, and the project area lies within the Makana Local and Sarah Baartman (formerly Cacadu) District Municipal jurisdictions. The location of the proposed WEF is presented in Map 1. Makhanda is the major urban settlement within the Makana municipality and is the centre of formal business, administrative capital and host to several civic, public and educational institutions. Other secondary urban settlements are found at Salem, Riebeck East and Alicedale.

Map 1: Location of proposed WEF



Source: Urban-Econ GIS Unit (2013)

(Circled numbers indicate Ward numbers in the Makhanda Local Municipality area of jurisdiction)

The site of the proposed wind energy project is located in Ward 13, MLM, approximately halfway between Makhanda and Peddie (a smaller town that services rural subsistence agrarian communities) in the Ngqushwa Local Municipality. The site is located on the N2 national road and is surrounded by a combination of game, livestock and crop farms. These are private ventures with limited resident populations on-site. As such, the immediate surrounds of the proposed wind energy site do not have significant built-up footprints (these land uses typically require low labour intensities to achieve sustainable yield returns). Higher concentrations of settlement are found at Collingham Towers, Trentham Towers, Pershoek, Fraser’s Camp Coombs, Fort Brown and Committee’s Drift.

Apart from the turbines to be constructed, the WEF will also have supporting infrastructure. Powerlines (overhead) to connect the WEF to the national grid will be constructed. This will be supported by a sub-station which will be built. Other infrastructure to be provided includes roads for internal access on the farms and small buildings for maintenance, storage and operation control.

1.3 STUDY METHODOLOGY

1.3.1 Economic Impact Assessment Method

Socio-Economic Impact Assessment studies are undertaken to determine, evaluate, and where possible, quantify the effects of an intervention. This intervention could be either an existing activity within the

economy or a new activity (i.e. the proposed Makhanda WEF).

Socio-economic impacts generated by an intervention can be disaggregated in terms of the initial or direct impacts that occur when the intervention begins. Such impacts in turn trigger secondary and further flow-on rounds of impacts, thereby creating a multiplier effect. This multiplier effect can be either positive or negative. In pure economic terms these impacts are expressed as indirect and induced effects, where:

- Indirect effects relate to the changes in economic indicators that are triggered along the upstream industries that supply goods and services to the intervention
- Induced effects refer to the changes in economic indicators that are stimulated by changes in consumption expenditure of households that were directly or indirectly affected by the intervention.

In addition, two additional types of socio-economic impacts can be distinguished. These include:

- Secondary impacts that are caused by the intervention, but that are further removed in distance or take a greater amount of time to materialise but are still reasonably foreseeable. Secondary impacts generally relate to changes in land use patterns, economic performance, changes to the character of a community and property values in the vicinity of the interventions location.
- Cumulative effects are the results of incremental consequences of the intervention when added with other past, present and anticipated future interventions. Cumulative effects consider the manner in which the impacts of a project may affect or be affected by other projects. Such effects are generally difficult to identify as they require a complete knowledge of local conditions and development plans, and accordingly are sometimes even more difficult to quantify.

Projection of the initial impacts and multiplier effects is usually done by employing an input-output model or a General Equilibrium Model. The use of these models in socio-economic impact assessments allows for the quantification of potential impacts in terms of a number of economic indicators such as production, Gross Value Added (GVA), employment, and income. The scale of these impacts is dependent on the size and diversification of the economy under analysis which in turn determines the leakage. Secondary and cumulative effects can be identified through an expert opinion technique, consultations, development matrices and interviews. Such impacts can be difficult to quantify. Overall, a socio-economic impact analysis that includes the assessment of primary impacts, multiplier effects, secondary impacts and cumulative effects provides a comprehensive assessment of potential impacts. It furthermore assists in ranking the intervention using a methodology prescribed by the Department of Environmental Affairs.

The socio-economic impact assessment made use of the economic models based on the Eastern Cape Social Accounting Matrix (SAM) developed in 2006 and adjusted to represent 2018 figures. The SAM is a comprehensive, economy-wide database that contains information about the flow of resources that takes place between the different economic agents in this case the Eastern Cape economy. The selection of this model in the assessment is attributed to the expected spatial distribution of procurement during both the construction and operational phases of the project.

1.3.2 Impact Evaluation Model

All impacts identified were evaluated in terms of the extent, duration, magnitude, probability and significance. The model also assesses whether impacts will be positive or negative, in line with DEDEAT guidelines. The following approach was used to assess each of these aspects of the impact:

Table 1: Impact evaluation model

Aspect	Ranges
Extent (E)	Affected site/s (1) Surrounding Area (2) Local economies (3) National (4) International (5)
Duration (D)	Very short term, 0-1 years (1) Short term, 2-5 years (2) Medium term, 5-15 years (3) Long term, 15+ years (4) Permanent (5)
Magnitude (M)	Small, no effect on environment (0) Minor, no impact on processes (2) Low, slight impact on processes (4) Moderate, process continue in modified way (6) High, processes temporarily ceases (8) Very high, complete destruction of patterns and permanent cessation of processes (10)
Probability (P)	Very improbable, probably will not happen (1) Improbable, some possibility, but low likelihood (2) Probable, distinct possibility (3) Highly probable, most likely (4) Definite, impact will occur regardless of any prevention measures (5)
Significance (S)	Calculated using the following formula $S = (E+D+M)P$ < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area) 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated) 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

In addition, each impact is evaluated in terms of the following:

- The degree to which the impact can be reversed (Reversible or Not)
- The degree to which the impact may cause irreplaceable loss of resources (Yes or No)
- The degree to which the impact can be mitigated (Yes or No)

It is important to state that the evaluation undertaken using this method will in many cases be based on subjective criteria that are difficult to quantify at a high percent confidence interval. This is a result of the nature of this project, whereby:

- Wind energy is now more developed than previously in South Africa in 2013 when the report was originally authored, but there is still a lack of information regarding impacts of the WEF on various socio-economic aspects.
- The results of the impact evaluation model are thus to a great degree based on a combination of reviewed literature and results of surveys administered (as discussed in the next section).
- Where results of the literature review diverge significantly from those of the surveys administered, a middle-ground approach is adopted in order to consider both extreme cases and arrive at a likely outcome.
- Emphasis is thus to be drawn away from the numerical value of the significance rating and more to the issues discussed (extent, duration, magnitude and probability). Although these are often subjective matters (given the absence of historical data on which to base econometric modelling

for extrapolation of trends). It is thus recognised that while no absolute value can be ascertained to the impacts identified in this report, it is still important to identify these potential impacts and highlight some of the critical issues that will apply in the specific case of the proposed Plan 8 Infinite Energy Grahamstown WEF.

1.3.3 Data Collection

As part of the data collection process for the socio-economic impact assessment of the Grahamstown WEF the following activities were undertaken:

- **Review of planning documents**

In order to document the socio-economic context of the study area within the Makana Local Municipality, important policy, planning and strategic documents were reviewed, referenced and used to inform this SEIA.

- **Literature Review**

In order to substantiate the findings of the socio-economic impact assessment a number of secondary research documents have been considered as they relate to the proposed WEF.

These documents include academic journals and studies available on the internet or in print media. It is intended that these documents substantiate the baseline profile while at the same time providing context to the project.

- **Interviews with stakeholders**

The interviews with stakeholders were originally conducted in 2013 and were repeated in 2018 for the purpose of the proposed amendments. Where possible the original stakeholders contacted in 2013 were contacted again in 2018 in order to determine if changes had occurred in land use in the area.

Interviews were originally undertaken in 2013 then again in 2018 as part of the SEIA to collect information from key parties that are likely to be interested in and affected by the proposed WEF. These interviews were primarily conducted telephonically. These interviews formed the basis of the primary data collection and assisted with the gathering of baseline information, as well as establishing the stakeholder's perceptions, interests and concerns. The survey template which was used is attached as an appendix to this report. Results of this survey are presented in an aggregate form throughout this report. This is done in order to preserve the confidentiality of the results. As such, responses are not presented per farm/property/land owner or respondent.

It is recognised that responses to the survey may be based on subjective opinions that are difficult to quantify. Despite this shortcoming, it was however, still important to gauge the perceptions of identified interested and affected parties as they represent local community, business and government interests.

- **Site visits**

Trips were made to the site in order to gain a contextual knowledge of its surrounding land uses.

1.4 STUDY AREA DELINEATION

Study area delineation depends on the type of economic activity that is analysed and the perceived spread of economic impacts that are expected to be generated from the project during both the construction and operational phases. The municipal area where the site is located is likely to experience some direct, indirect and induced impacts resulting from the activities on the site; however, it is unlikely that a local economy can be sufficiently diversified to supply all materials and services and support construction and operational activities from start to finish. Economic impacts therefore tend to extend beyond municipal boundaries and spread throughout the entire national economy.

For the purpose of this study both a primary and secondary study area were delineated. These are discussed in more detail in the subsequent section.

1.4.1 Primary study area

The primary study area (hereafter referred to the local area) refers to the locality where the direct economic impacts of the proposed development will be concentrated. The primary study area is defined based on the actual location of the proposed development, proximity to skilled and unskilled labour, position relative to suppliers of products and data availability.

Based on these criteria the Makana Local Municipality was selected as the smallest administrative units for which current economic and demographic data can be obtained.

1.4.2 Secondary and tertiary study areas

The secondary study area is where the majority of indirect and induced effects will be concentrated. Although the proposed WEF is located an estimated 30 kilometres from Makhanda it is anticipated that a portion of construction inputs will be sourced from the Nelson Mandela Bay Metro, situated an estimated 160 kilometres from the proposed development site on the N2 route.

This suggests that the Nelson Mandela Bay Metro will likely benefit more from the indirect and induced effects of the development than the Makana Local Municipalities. The procurement of construction inputs are, however, unlikely to be limited to the Nelson Mandela Bay Metro, and will likely be sourced from other parts of the Eastern Cape such as East London which is 150 kilometres from the WEF site on the N2. Accordingly, the Eastern Cape was selected as the secondary area.

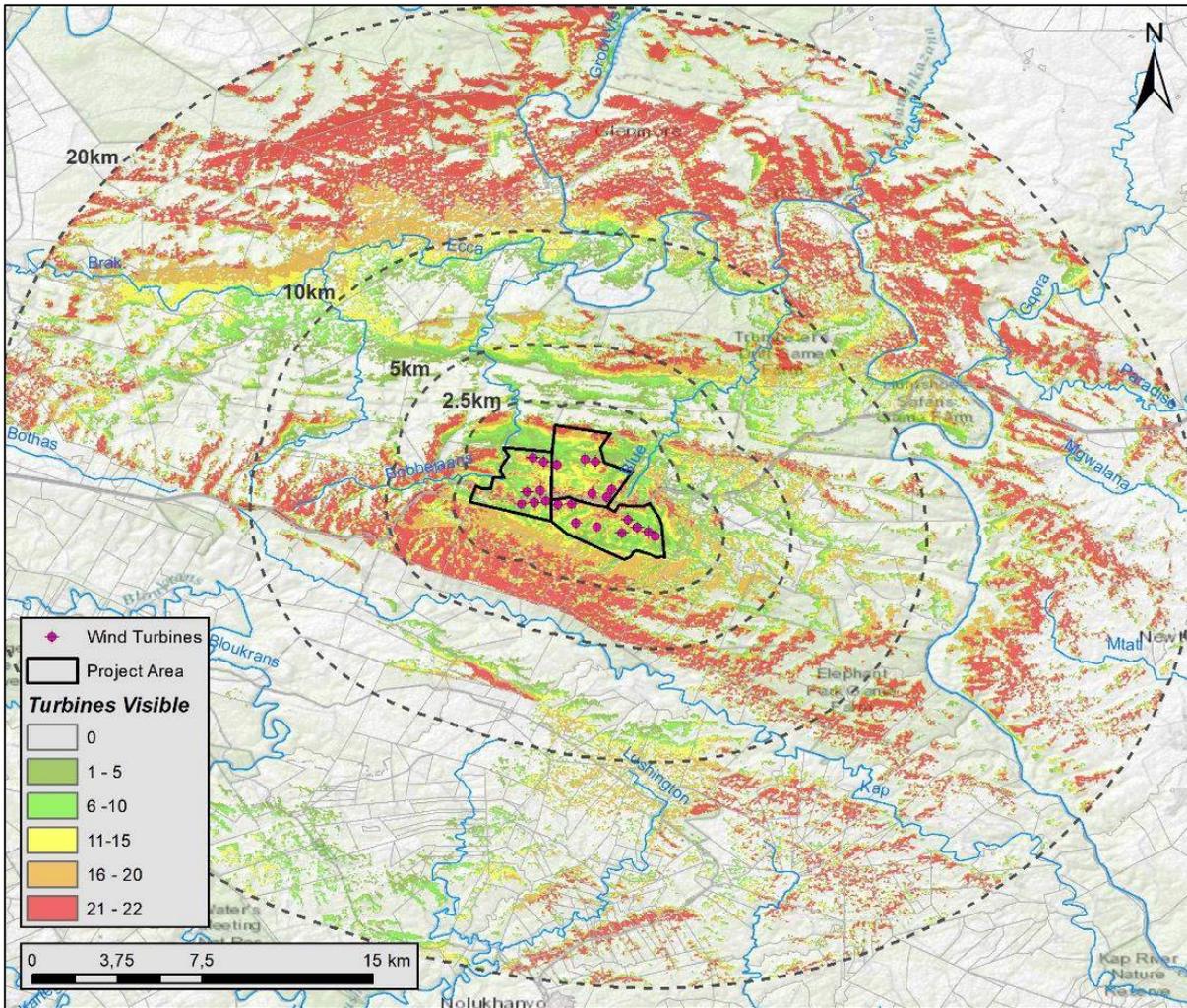
South Africa was chosen to be the tertiary study area as the proposed WEF is likely to benefit South Africa's overall domestic expenditure both directly and indirectly.

1.4.3 Visually affected study area

Through consultation with other specialists on the project team and the review of the minutes of various public participation meetings that have been held, it is evident that the most significant environmental impacts associated with the proposed development are to arise through the perceived resultant effects of the visual disturbance to the area's landscape. The public participation process also highlighted the fact that some of the current economic activities located in the vicinity of the development (including game farming/hunting) could potentially be adversely affected by the proposed project through visual disturbance.

In order to determine, and where possible quantify, the secondary economic impacts that can potentially be induced by the proposed Grahamstown WEF, a visually affected zone was delineated. This area was restricted to the potential visual exposure that was determined by the visual specialist on the project team. This area is illustrated in Map 2 below.

Map 2: Cumulative visual exposure from proposed turbine (hub height 125m; rotor diameter 149m) layout



Source: EOH CES Visual Impact Assessment Study (2018)

CHAPTER 2 POLICY AND PLANNING ENVIRONMENT

This chapter examines the key legislation and policies relevant to the proposed development and includes a review of pertinent national, provincial and local policies that have a direct bearing on the development.

The overall aim of this review process is to provide insight into the government’s priorities and plans in terms of renewable energies. This assists in determining the importance of the project with regard to the development objectives of the various spheres of government as well as in identifying potential developmental conflicts that the project might create. A brief review of the most relevant documents is provided in this section.

The policy and legislative landscape has changed since 2013. This is largely as a result of the acceptance of renewable energy by the country as well as a greater awareness of climate change and the dangers it poses. The new policies included in this 2018 updated SEIA and to be reviewed below are:

- Renewable Energy Vision 2030 South Africa (2014)
- Integrated Energy Plan (2016)

- Renewable Energy Independent Power Producer Procurement Programme (REI4P)
- The Eastern Cape Provincial Economic Development Strategy (PEDS) (2017)
- Sarah Baartman District IDP (2017)

2.1 NATIONAL INFORMANTS

2.1.1 National Energy Act (2008)

Seeks to, in its preamble; facilitate the increased generation and consumption of renewable resources while at the same time taking into account environmental management requirements and the interactions amongst economic sectors.

2.1.2 The White Paper on Renewable Energy (2003)

Sets a target of generating 10 000 GWh from renewable energy sources by 2013, which is equivalent to two units of a combined coal power plant with a capacity of 660 MW. The energy generated should come primarily from biomass, wind, solar and small-scale hydro. This renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating systems and bio-fuels.

2.1.3 National Climate Change Response Paper Green Paper (2010)

Focuses on making a fair contribution towards the stabilisation of greenhouse gas emissions and adapting and managing climate change impacts. The Paper proposes a number of approaches of dealing with climate change impacts with respect to selected sectors. Energy, in this context, is considered to be one of the key sectors that provides for possible mitigation to address climate change. Some of the responses proposed include:

- Diversifying the energy mix
- Using market-based measures such a carbon tax, to motivate and drive diversification of the energy mix
- Establish a business environment for the successful development of renewable energy manufacturing industry in the country
- Design and roll out ambitious Research and Development Projects aimed at diversifying the energy mix
- Review and scale up the 2013 targets of generating 10 000 GWh of renewable energy

2.1.4 The New Growth Path Framework (2010)

Is the government's programme of action that focuses firstly on the creation of decent employment opportunities through the support of labour-intensive sectors and secondly on ensuring long term growth through the support of advanced industries.

As a starting point, employment creation is planned to be stimulated in a few sectors including the green economy. Government plans to create 300 000 employment opportunities in the green economy alone by 2020, more than two thirds of which is intended to be created in construction, operation and maintenance of new environmentally friendly infrastructure.

2.1.5 The Integrated Resource Plan 2010 – 2030 (2011)

Projected that and additional capacity of 56 539 MW will be required to support the country's economic development and ensure adequate reserves over the next 20 years. The required expansion is more than twice the size of the existing capacity of the system.

A significant component of the above-mentioned plan is the expansion of the use of renewable energy sources to reduce carbon emissions involved in generating electricity. Overall, the proposed plan implies a total generating capacity of 9 200 MW from wind by 2030.

2.1.6 National Development Plan (NDP)

Vision 2030 was formulated by the National Planning Commission and released on 11 November 2011. The NDP proposes to create 11 million employment and grow the economy at an average rate of 5.4% per annum by 2030. The NDP also seeks to ensure that half of the new future generation capacity comes from renewable energy sources. It furthermore recognises the importance of the transition to a low carbon economy. As such the NDP suggests the following:

- Support carbon budgeting
- Establish an economy wide price for carbon by 2030 complemented by energy efficiency and demand management interventions
- Set a target of 5 million solar water heaters by 2030
- Implement zero emission building standards that promote energy efficacy
- Simplify regulatory regime to encourage renewable energy, regional hydroelectric initiative and independent power producers (IPPs)

2.1.7 Renewable Energy Vision 2030 South Africa (2014)

The renewable energy vision is a document developed by the World Wildlife Fund (WWF) and outlines South Africa's position, compared to other similarly developing countries, in terms of renewable energy development and energy generation. The document outlines goals and states that:

- Renewable energy as an exceptional source of flexible supply within the context of uncertain energy demand
- Comprehensive renewable energy base will support a resilient South African future
- A sustainable energy mix that excludes undue risks for the environment of society

2.1.8 Integrated Energy Plan (2016)

The integrated energy plan is developed by the Department of Energy and outlines the South African Energy Generation Strategy and plan for the future. The document states that South Africa should continue to track a diversified energy mix which lessens reliance on a few primary energy sources. In addition to solar energy facilities, wind energy should continue to contribute in the generation of electricity. Other aspects the document outlines include:

- Allocations to safeguard the development of wind energy projects aligned with the Integrated Resource Plan 2010 should continue to be pursued
- Ensure energy security and supply
- Reduce environmental impacts
- Endorse job creation and localisation
- Lessen cost of energy
- Reduce water consumption
- Diversify supply sources
- Promote energy efficiency
- Promote energy access

2.1.9 Renewable Energy Independent Power Producer Procurement Programme (REI4P)

The Department of Energy's (DoE) Independent Power Producers Procurement Programme was established at the end of 2010 as one of the South African government's urgent interventions to enhance South Africa's power generation capacity.

The DoE, national Treasury and the Development Bank of Southern Africa established the IPP Office for the specific purpose of delivering on the IPP procurement objectives. The primary mandate of this office is to secure electricity from renewable (REI4P) and non-renewable energy sources from the private sector. However, energy policy and supply is not only about technology, but also has a substantial influence on economic growth and socio-economic development. As such the IPPP has been designed to go beyond procurement of energy to also contribute to broader national development objectives such as job creation, social upliftment and the broadening of economic ownership.

At a national level the following commitments have been made for bid windows 1, 2, 3, 3.5 and 4 as of December 2017 (DoE, 2018):

- 6 422 MW of electricity had been procured from 112 RE Independent Power Producers (IPPs) in the seven bid rounds;
- 3 052 MW of electricity generation capacity from 56 IPP projects has been connected to the national grid;
- Investment (equity and debt) to the value of R 201.8 billion, of which R 48.8 billion (24%) is foreign investment, was attracted;
- Created 31 207 job years for South African citizens;
- Socio-economic development contributions of R 357.4 million to date;
- Enterprise development contributions of R 115.2 million to date;
- Carbon emission reductions of 15.4 MtonCO₂ has been realised by the programme from inception to date.

From an Eastern Cape perspective, the following commitments have been made across the aforementioned bid windows:

- Add 1 509 MW to the national grid from 17 REI4P projects;
- Incur R 33.8 billion in project costs increasing the gross domestic product (GDP) of the province;
- Incur R 4 489 million in social economic development expenditure;
- Contribute R 7 434 million to community trusts established as part of the programme;
- Create 18 137 job years.

2.2 KEY PROVINCIAL DOCUMENTS

2.2.1 The Eastern Cape Industrial Development Strategy (2011)

Sets out a number of strategic goals which include positive economic growth, ensuring that economic growth leads to labour absorption and ensuring that existing employment are retained. In pursuit of these goals the Industrial Development Strategy identifies the need for:

- R&D and innovation
- Skills development
- Improving infrastructure and logistics
- Providing developmental finance

- Promoting investment, trade and exports
- Developing institutional structures

The achievement of these strategic goals is planned through the development of several key sectors including:

- Tourism
- Chemicals and Petrochemicals
- Agriculture and agro-processing
- Capital goods
- Green industries
- Automotive

The Industrial Development Strategy also seeks to develop an industrial base for the manufacturing of components required for the production of solar cells, solar panels and certain components of wind turbines

2.2.2 The Eastern Cape Sustainable Energy Strategy (2012)

Seeks to lay out the provinces strategic direction in terms of the renewable energy industry. The focus of the strategy is to encourage sustainable, affordable and environmentally friendly energy production by creating an enabling environment for energy production and sustainable technology, skills and industry development. This is to be achieved through several initiative including:

- An intensive training programme among relevant decision makers with respect to renewable energy project approvals
- The establishment of an implementation task team to provide potential investors with a one-stop-shop for renewable energy information in the province
- Development of a provincial locational perspective of renewable energy
- Lobbying Eskom to expedite and strengthen the transmission capacity of the former Transkei area
- Lobbying the Department of Energy to set out long-terms programme for the procurement of renewable energy generation

Through the pursuit of these initiatives the Eastern Cape Province seeks to become a leading and preferred destination for renewable energy investment in South Africa.

2.2.3 The Eastern Cape Provincial Economic Development Strategy (PEDS) (2017)

The Eastern Cape PEDS seeks to create a clear, long-term vision and strategy for the growth and development of the Eastern Cape by building on the strength and opportunities of the province, while at the same time addressing its weaknesses and threats.

In pursuit of this goal, PEDS identifies six high potential economic sectors that can catalyse growth in the province. These sectors are:

- Agri-industry
- Sustainable energy
- Ocean economy
- Automotive
- Light manufacturing
- Tourism

With respect to sustainable energy, PEDS notes that it is imperative that the province aligns all its energy opportunities so as to:

- Create the optimal institutional environment for the location of sustainable energy projects in the Eastern Cape
- Harness the maximum possible value chain, localisation and industrialisation opportunities from sustainable energy projects
- Ensure adequate and aligned skills development
- Link innovation, entrepreneurial and small business opportunities to sustainable energy projects
- Link black industrialist opportunities to sustainable energy projects

2.3 LOCAL GUIDANCE

2.3.1 Sarah Baartman District SDF (2013)

The Sarah Baartman SDF observes that the district's economy is dependent on the natural resources of the area (tourism and production). As such, spatial planning initiatives need to support the implementation of the district's Socio-Economic and Enterprise Development Strategy (SEEDS) by:

- Implementing effective spatial planning land use management
- Ensuring that the SDP identifies areas for renewable energy production
- Recognizing that game reserves and farming are playing a greater role in the economy
- Undertaking urban regeneration projects
- Identifying where infrastructure upgrading is required.
- Providing the spatial framework for the district's Area Based Plan (ABP)

The Sarah Baartman SDF further notes that the introduction of alternative energy generation infrastructure and the associated land use change will provide both economic opportunities but may also have a negative impact on the ecotourism of the district (in the form of potential changes to the visual and cultural landscapes). This is an important consideration as part of the proposed site falls in an area identified by the SDF as the N2 development corridor.

2.3.2 Sarah Baartman District IDP (2017)

The Sarah Baartman IDP identifies the green economy (including, but not limited to renewable energy and ecosystem services) as a focal point of economic development in the district, noting that such investments are likely to have significant economic spinoffs for the region. To achieve this, the IDP proposes investing in natural capital so as to create a new generation of green and blue economy jobs rooted in renewable energy.

2.3.3 Makana Local Municipality IDP (2017-2022)

The Makana IDP notes the growing importance of renewable energy and its associated infrastructure to the municipality's economy, particularly WEFs. There is already a WEF operational in the municipality which is expected to have R 400 million economic spinoffs over 20 years.

The municipality is looking at innovative alternative energy sourcing methods and there is a draft policy which sets out the criteria which will enable the evaluation of renewable energy generation infrastructure to be developed. The municipality also recognises that the southern portions of the municipality shows great potential for development of a WEF.

2.3.4 The Makana LED Strategy (2009)

As part of its strategic vision, identifies the need to move towards a green and environmentally sustainable economy. The LED Strategy further identifies the need for a reliable source of electricity as it promotes development and business confidence. The development of WEFs was associated as a positive step towards ensuring electricity generation.

2.4 SYNOPSIS

The review of the policy environment suggests that utilisation of renewable energy sources in South Africa is considered to be an integral means of reducing the carbon footprint of the country, diversifying the national economy and reducing poverty. Any project contributing to the above-mentioned objectives can therefore be considered strategically important to South Africa.

From a provincial and municipal policy perspective the facilitation of renewable energy projects and interventions that related to the broader green economy are seen as a priority. The Eastern Cape Provincial Industrial Development Strategy makes particular reference to the need to develop green industries which includes renewable energies. Likewise, the Makana municipality has noted the importance of wind energy in its IDP and is actively seeking to promote such developments.

CHAPTER 3 SOCIO-ECONOMIC PROFILE OF THE STUDY AREA

This chapter documents various aspects of the primary study area including, population and household numbers, income levels and employment. In addition, the chapter also reviews the economic structure and performance of the study area.

The intention of this review is to provide an overview of the socio-economic context of the area so as to better understand the dynamics of the area and to inform the SEIA process.

The socio-economic landscape of the study area has not changed significantly since 2013. Issues that were prevalent in 2013 such as poverty, lack of skills and education are still significant factors that define the socio-economic context of the study area. The following section contains updated socio-economic data for Makana Local and Sarah Baartman District municipalities and compares 2011 Census data figures to 2017 datasets where appropriate. Reference is made to the sources of data within the chapter below.

3.1 POPULATION, INCOME AND EMPLOYMENT PROFILE

Selected demographic information is presented in Table 2 for Makana Local Municipality and Sarah Baartman District Municipality. The Makana Local Municipality falls within the Sarah Baartman District Municipality and accounts for 19% of the district population, making it the second most populous locality after the Kouga Local Municipality. Population growth between 2011 and 2017 was 0.9%. This is similar to the Sarah Baartman District Municipality's population growth rate, which grew at 0.9% over the same period. These figures however, strongly suggest the possibility of out-migration due to the limited number of employment opportunities available in the area. These limited employment opportunities likely force people and households to move closer to urban centres that have greater potential for employment.

Table 2: Overview of the primary study areas population structure, 2017

Indicator	Sarah Baartman DM	Makana LM
Area (km ²)	58 243	4 376
Population	471 366	91 471
Number of Households	131 451	23 919
Population density (km ²)	8.1	20.90
Average household size	3.6	3.8
Population growth rate (2011-2017)	0.9%	0.9%
Average monthly household income	R 9 508	R 11 572

Source: Quantec Standardised Regional (2018)

The disposable average monthly income of households was R 9 508 in Sarah Baartman and R 11 572 for Makana. This is higher than that of the Eastern Cape (R 8 011) and the highest amongst other district municipalities. Makana has the highest average monthly household income largely as a result of the tertiary and secondary educational institutions located in Makhanda as well as business services and tourism located in the town.

The high earning households in the municipality skew the average monthly household income however, and the table below indicates that the employed rate is far lower than that of the District and the unemployment rate is far higher.

Table 3: Employment profile of the primary study

Indicator	Sarah Baartman DM	Makana LM
Employed	80%	68%
Unemployment Rate	20%	32%
Not Economically Active	37%	43%
Labour force participation rate	63%	57%

Source: Quantec Standardised Regional (2018)

As seen in Table 3, the review of the employment profile indicates that almost a third of the economic active population is unemployed. The unemployment rates and labour force participation rate was notably worse than that of the Sarah Baartman District Municipality (Unemployment rate: 32%; Labour force participation rate: 57%).

The implication of employment statistics presented in Table 3 are that

- There is likely to be a high rate of worker discouragement (people that have given up looking for work) in the area as a result of opportunities for employment being very limited
- The local labour force is likely to be under-skilled as a result of limited working opportunities
- The bulk of employment is likely to be in Makhanda, as farming operations in rural settings within Makana are typically not labour-intensive due to the nature of crops and livestock produced and the region's natural attributes.

3.2 ECONOMIC PROFILE

Table 5: GDP-R structure between 2011 and 2017 in Constant 2010 prices

Sector	2011	2017	CAGR 2011-2017
Primary Sectors	2.6%	2.3%	-0.3%
Agriculture and hunting	2.5%	2.3%	-0.3%
Mining and quarrying	0.1%	0.1%	1.5%
Secondary Sectors	16.2%	17.7%	2.4%
Manufacturing	10.8%	12.5%	3.1%
Electricity, gas and water	1.3%	1.0%	-2.7%
Construction	4.1%	4.3%	1.7%
Tertiary Sectors	81.2%	80.0%	0.8%
Trade	18.4%	18.9%	1.4%
Transport and communication	7.0%	8.0%	2.9%
Finance and business services	18.0%	19.4%	2.1%
Community services	9.5%	8.8%	0.0%
General government	28.3%	24.9%	-0.7%
TOTAL REAL GDP-R	R 3.422 bil	R 3.688 bil	1.1%

Source: Quantec (2018)

Over the last six years the Compounded Annual Growth Rate (CAGR) was 1.1%. The growth rate is lower than both the district (2.1%) and provincial (1.5%) economies (Quantec, 2018). This can be attributed to the size and diversity of these municipalities' economies relative to the Sarah Baartman District and the Eastern Cape.

As evident from Tables 5 and 6 the agricultural sector has experienced a decline in terms of its economic output but an increase in terms of employment. The economic decline could possibly be attributed to the longstanding drought that the area has recently experienced as well as economic uncertainty. The local area has also experienced a gradual movement away from traditional livestock farming towards game farming/hunting and eco-tourism.

The local agricultural sector includes limited subsistence farming, unlike other areas in the Eastern Cape where this practice is more dominant. The presence of this subsistence agricultural means that the number of households that are dependent on agricultural activities for income could be slightly greater than the figures presented in Table 6. This is due to the fact that the table only indicates those individuals that are formally employed in the agricultural sector.

Agricultural activities are labour intensive, thus a small decline in the size of the sector would generally lead to greater employment losses than for example in utilities, which tend to be more capital intensive. The agricultural sector is also frequently one of the largest employers in rural areas and it is for these two reasons that the sector is generally prioritised in development strategies.

Table 6: Employment structure

Sector	2011	2017	Change 2011-2017
Primary Sectors	9.9%	11.1%	3.2%
Agriculture and hunting	9.9%	11.0%	3.2%
Mining and quarrying	0.0%	0.0%	2.6%
Secondary Sectors	12.2%	13.1%	2.6%
Manufacturing	7.0%	7.4%	2.4%
Electricity, gas and water	0.3%	0.3%	0.2%
Construction	4.9%	5.5%	3.1%
Tertiary Sectors	77.9%	75.9%	1.2%
Trade	22.1%	23.2%	2.3%
Transport and communication	3.2%	3.6%	3.2%
Finance and business services	11.7%	11.6%	1.5%
Community services	20.4%	20.9%	1.9%
General government	20.5%	16.5%	-1.5%
TOTAL EMPLOYMENT	21 607	24 090	1.6%

Source: Quantec (2018)

3.3 PROFILE OF THE IMMEDIATELY AFFECTED ENVIRONMENT

3.3.1 Land use profile

The map below shows farm numbers of properties within a 20-kilometre radius of the site of the proposed Grahamstown WEF. The purpose of the map is to provide a spatial perspective to the locality of the site in relation to properties in the immediately affected environment. The map contains properties with different levels of visual exposure to the WEF (ranging from no impact to high impact) and is meant to provide a reference point to Map 1 and Map 2 from earlier on in this document. The distance of 20km is used in order to provide congruence with Map 2 from this document, whilst providing additional detail in comparison to Map 1 from this document. The distances provided (20km, 10km and 5km) are thus not representative of deemed visual impacts, but merely to provide spatial reference points. Farm numbers were used rather than farm names as it is recognised that colloquial names are often used as reference points for farms, and these may not always match with farm names registered at the Surveyor General's offices. The map informs the profiling undertaken in this section.

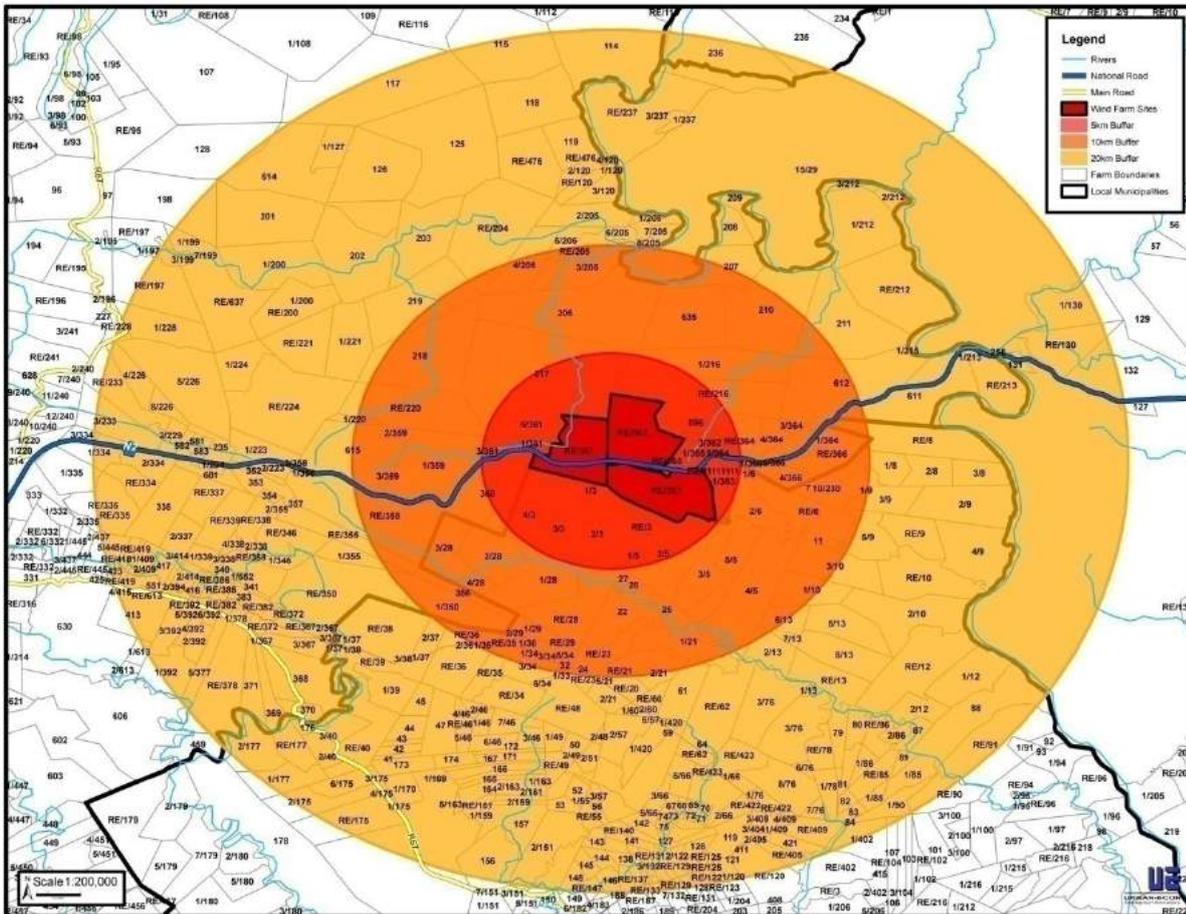
The farm portions on which the WEF is located is currently used for livestock and crop farming.

The area surrounding the proposed Plan 8 WEF is to a large extent put to the use of game farming/hunting and eco-tourism purposes. Livestock farming (sheep, goats and cattle), and to a lesser extent crop farming (Lucerne, horticulture and maize) is also undertaken on some properties. Some of the land is used solely for the purposes of rearing animals for resale to the hunting industry. Other properties are dedicated to hunting activities while others are dedicated to accommodation of tourists that do not hunt on the properties. Such accommodation facilities host people that visit the area for hunting, as well as other activities. accommodation facilities range from low-end chalets to luxury units.

It must be noted that a number of properties have mixed-uses. As such, some properties are used for both conventional farming (livestock rearing or crop) and game farming and hunting. Properties with mixed land uses typically cater to the local tourism market and rear animals for this market.

It is important to point out that some farm owners declined to respond to the questionnaire used to gather information for this report.

Map 3: Farm numbers of the immediately affected environment



Source: Adapted by Urban-Econ GIS (2013).

3.3.2 Socio-economic profile of the affected area

From the data obtained from surveyed land owners, it is estimated that agricultural operations (including hunting and tourism) in the directly affected area employ approximately 168 people, the majority of whom are permanent employees. The majority of the employees live on the farm and are those who do not, live in Makhanda. An additional 40 people live on the farms who are not labourers.

In comparison to the 2013 survey results, despite the slight decrease in the number of surveyed farm owners, there has been a general reduction in the number of temporary farm workers especially in the hunting/tourism industry and crop farming industry. There has however, been a drastic increase in the number of permanent staff employed by these operations. Overall there was a ratio of 10,4 staff per farm owner in 2013, whilst in 2018 there has been found to be a ratio of 10,5, indicating that while the permanent/temporary dynamic has changed dramatically, the overall number of staff per farmer has remained the same over this period.

Table 7: Selected socio-economic description of properties by land use in 2018. (2013 figures are in parentheses)

Land use	No. of farm Owners	No of labourers employed		
		Permanent	Temporary	Total
Hunting/tourism	7 (13)	96 (65)	15 (71)	118 (136)
Crop farming	1 (3)	1 (13)	0 (37)	1 (50)
Livestock farming	8 (7)	51 (20)	5 (34)	56 (54)
TOTAL	16 (23)	148 (98)	20 (142)	168 (240)

It is important to distinguish between farm portions and farm owners. One farm owner may own several farm portions of one or multiple farms. As such, the number of farm owners listed in the table above is not a direct indication of collective or total ownership of farms in the region. It was found that some farms were owned by more than one owner, and similarly some farm owners owned multiple farms or farm portions.

It is recognised that many farms in the area practice a combination of crop, livestock and hunting activity. As such, most farms are involved in all three land uses as shown in Table 7 to varying extents. Table 7 shows the dominant activity currently undertaken on farms that were surveyed. In addition to the information presented in Table 7, the following observations were made regarding land use and the area's socio-economic profile:

- The majority of the livestock farmers are commercial and only two of the respondents indicated that they kept livestock or crops for subsistence use
- The dominant area utilised by the farmers was for game breeding (13 000ha) and hunting (11 000ha) followed by livestock (5 700ha)
- The majority of labourers live on the farms they work on with their family members
- Employees on hunting farms tend to have higher skill levels than those who farm on crop or livestock farms
- Livestock animals reared for sale and kept for production of food products include goats, sheep and cattle
- Approximately 88% of the farms were the primary residence of the farm owner
- Approximately 190 international tourists visited the area for hunting purposes in a year
- 153 domestic tourists visited the area for hunting purposes in a year
- Over 400 international tourists have been found to visit the area for leisure purposes while over 500 domestic tourists have visited the area for the same purpose in the past year
- Some of the farms have accommodation facilities for visitors
- Game farms receive visitors mostly between April and December (predominantly for the purpose of hunting)
- Some of the game farms earn income through the trading of live game (predominantly for the purposes of hunting)
- Eco-based tourism in forms such as photography, trails is also undertaken in the area but to a lesser extent than hunting.

CHAPTER 4 IMPACT ASSESSMENT ASSUMPTIONS

This chapter of the report describes the assumptions used in the socio-economic impact assessment study and specifically in the economic modelling exercise which aims to quantify the economic impact of the project.

A limited number of the assumptions have changed between 2013 and 2018 versions of this report. The changes that have occurred are the total MW produced at the facility which has increased from 66MW to 99MW largely as a result of the larger rotor technology to be employed.

Other changes include:

- The date of the commencement of construction from 2015 to 2019,
- Increase in local spend during construction from R715 million (inflation adjusted to 2018 values) in 2013 to R952 million in 2018.
- Increase in labour required during construction from 142 to 307 Full Time Equivalent (FTE) positions
- The date of the commencement of operation from 2015 to 2022,
- Increase in local spend during operation from R7,6 million (inflation adjusted to 2018 values) in 2013 to R9,4 million in 2018.

The remaining assumptions such as number of persons to be employed during operations will remain as per the previous stated assumptions.

The assumptions presented in this chapter refer to:

- Construction, operation and decommissioning assumptions applicable to the project as provided by Plan 8 Infinite Energy.
- Assumptions associated with the visual impacts resulting from the project and the related potential losses of affected businesses

4.1 GRAHAMSTOWN WEF ASSUMPTIONS

The proposed facility is to have a maximum installed capacity of approximately 100 MW. The assumptions specific to the phases of the project's lifespan are provided in the following paragraphs.

4.1.1 Construction phase assumptions

The following assumptions regarding the construction phase of the proposed WEF are made:

- The construction of the facility is planned to commence in 2019 contingent on the project being selected under the Renewable Energy Independent Power Producer Procurement (RE IPPP) Programme.
- The total investment into the establishment of the facility is valued at R 1 320 832 500 in 2018 prices, of which R 952 036 001 will be spent within the South African economy and the rest on imported goods and services.
- Only local expenditure is considered in this analysis.
- Of the South Africa spend across all phases, 49.59% will be incurred on the procurement of goods and services and the rest will be spent on labour costs.
- About 13% of the localised spending for all phases will be incurred in the local area, of which R 82.1 million will be spent on supply chain and R 42.5 million will be spent on labour.
- The construction of the facility will create an estimated 307 project specific personnel of which 146 employment positions will be created for local labour. These employment positions will comprise of

the following occupations:

- * 2 managers and highly skilled professionals
- * 16 skilled artisans and supervisors
- * 128 low skilled individuals (security and general labourers)

4.1.2 Operational phase assumptions

The assumptions regarding the operational phase of the project used in the modelling exercise are as follows:

- Operations are expected to reach full capacity in 2022 after construction commences in 2019
- The facility will operate for 20 years
- The operations and maintenance cost of the facility will be valued at R 16 148 300 in 2018 prices per annum, of which R 9 492 562 will to be spent within the local South African economy (under Operations and Maintenance Contract).
- The greatest share of local spending will be directed at covering labour costs associated with the employment of 10 permanent workers.
- The required workforce of the entire facility includes 4 highly skilled positions (i.e. engineers, programmers), 4 skilled positions and 4 positions for security personnel, welfare officers and other general personnel. South African residents will fill all of these positions and most will come from the local area.
- Up to 5% of turnover generated by the WEF will be invested in social development and economic development projects in and around surrounding communities. Details of these projects are contained in the community needs analysis and assessment document which is available from Plan 8 infinite energy. Social and economic development projects will be undertaken at the site of the WEF as well as in Collingham towers, Eluxolweni, Pershoek, Fingo village and Trentham Park. This amounts to an average potential total spend of R 11 514 820 per year for 20 years.

4.1.3 Decommissioning phase assumptions

The costs of decommissioning the plant are not yet known. Given the nature of wind technology and the unlimited wind resource, it is highly likely that instead of decommissioning the plant, it will be refurbished in order to extend its lifespan beyond the 20-year period.

4.2 ASSUMPTIONS REGARDING POTENTIAL LOSSES IN THE AREA AFFECTED BY VISUAL IMPACTS

During the operation of the WEF, farming operations will be able to continue as is currently undertaken on part of the land not taken up by permanent WEF infrastructure (turbines, substation, control building etc.). It is not envisaged that significant changes will occur to land use once the WEF has been built, and animals will be free to graze across the site with landowners being able to continue to use the land in the same manner as they did prior to the establishment of the WEF. Similarly, cultivation of crops will still be possible on the remaining extent of the farm on which the turbines will be installed.

Accordingly, the revenue generated through livestock and crop farming is not anticipated to be affected by the visual disturbances in the area. The opposite however, applies to the tourism and game farming/hunting industries. The following paragraphs describe the sensitivity of the tourism and the game farm/hunting industries towards potential visual disturbances and provide an estimation of the potential loss in revenue that could result from the establishment of the WEF.

A number of changes occurred between 2013 and 2018 versions of this report. The 2018 version of this report now recognises that the renewable energy landscape has changed significantly from 2013 when WEFs were uncommon in the Eastern Cape compared to 2018 where a large number of WEFs have subsequently been developed and are now fully operational. The report also acknowledges that the Waainek WEF is also operating in the area. The presence of such a development would have likely changed perceptions towards WEFs and the renewable energy sector in the area. It is likely that fears over the presence of WEFs have been reduced as residents become more familiar with the changes in their surroundings. This is in keeping with academic literature which indicates that opposition to WEFs generally decreases after construction is completed largely as a result of a greater understanding of the nature of the WEFs. This has led to an adjustment in the sensitivity values (percentage points) that the tourists and locals would experience. This is discussed in the following section.

4.2.1 Assumptions regarding sensitivity of tourists to visual disturbances

Based on the outcomes of the surveys conducted with local land owners, the majority of the revenue generated by game farms and hunting activities in the immediately affected environment is generated through international tourist visitors, with the rest being derived from domestic visitors. International tourists visiting farms in the area are almost exclusively trophy hunters. Some of these international tourists however, do engage in other activities such as bow hunting, photography, painting etc. Domestic tourists are mainly described as 'biltong hunters.' A small number of domestic tourists also visit the area for general recreation purposes i.e. bird watching and game viewing.

International tourists are expected to be fairly sensitive to a visual disturbance in the area. One of the reasons international tourists visit the area is to experience a "Wild Africa" and to hunt/view game. Any outside disturbance that would affect this "Wild Africa" experience is therefore likely to negatively impact the level of satisfaction that these tourists experience. It was however, indicated that one of the critical factors that international hunters consider when visiting local game farms is the quality of the trophy. In many cases this is the chief concern of international hunters.

It was also noted that many of the international tourists visiting local game farm/hunting establishments are repeat visitors and have been referred to the farms by friends and family. This means that any visual disturbance that would affect the experience of international visitors would impact on their decision to return to the respective game farm/hunting establishment. It is also probable that these international visitors would likely spread the word about their experience to other potential tourists meaning that, in a case where the experience is unsatisfactory, international tourists may not make referrals to the game farms for their activities such as hunting.

Domestic tourists are also expected to be sensitive to visual disturbance that affect their sense of places, as well as their experience of the game farms. Biltong hunters are, however, expected to be less sensitive than trophy hunters or even domestic visitors interested in eco-tourism. This is largely due to the fact that small groups of biltong hunters primarily hunt for meat and biltong and are generally not very demanding as far as their facilities and environment are concerned. The situation might differ if corporate groups are examined. Corporate tourists are likely to be more demanding with regard to facilities and thus more sensitive to the ambience created by the surrounding environment.

It should also be noted that the Makana Municipality already has a functional WEF while many more exist in the Eastern Cape. This may have changed some of the perceptions of wind energy and its associated

infrastructure among locals and international tourists traveling through the area.

It is also important to note that for both international and domestic tourists the visual experience of the area is but one factor that is considered when visiting a game farm/hunting establishment. Other factors include, inter alia:

- Location and quality of the facilities
- Variety and abundance of wildlife
- Quality of the trophy (for hunting tourists)
- Relationship with the farm owner

In order to determine the sensitivity of various groups towards the visual disturbances created by the proposed development, a telephonic perception survey was conducted with professional hunters operating in the area, as well as local game farm/hunting establishments situated in the area. Based on the outcomes of this survey in 2013, as well as other qualitative and quantitative assessments (as discussed and referenced throughout chapter 5 of this document) the following assumptions were made:

- **International tourists**

A maximum of 50% of international tourists would definitely change their decision to visit the area if there was a high visual disturbance associated with the WEF. A small visual impact (large distance from the WEF) created by the WEF though was of a lesser concern. Nevertheless, it still might result in an estimated 15% of tourists choosing not to visit the respective farms. This means that as word spreads and usual repeat tourists visit the game farm/hunting establishment that is within visual impact of the WEF, the potential decline in the number of international tourists could range between 15% and 50% depending on the distance from the facility.

- **Domestic tourists**

Domestic tourists are also assumed to be sensitive towards the visual impact but to a slightly lesser degree than international tourists. Based on the qualitative and quantitative assessments, between 10% and 40% of domestic visitors to game farm/hunting establishments would change their decision to visit the farm depending on the extent of the visual impact.

4.2.2 Assumptions regarding the extent of visual effects on properties and revenues

Using the visual impact index map as seen in Map 2 with respect of the proposed WEF, assumptions with regard to the sensitivity of the specific game farm/hunting establishments towards the visual impact were made.

The first step was determining the degree to which a specific farm would be visually affected by the WEF. Thereafter, the following was taken into account to determine the rating of that impact from a socio-economic perspective:

- The visual impact maps
- The location of accommodation facilities
- The extent to which the visual impact would spread over the entire property
- The existing visual disturbances (i.e. existing power lines) on the properties

The range used to rate the sensitivity of the farm towards visual impacts was as follows:

- **Low visual exposure:** Turbines not particularly noticeable to the viewer. Minimal change in the surroundings

- **High & moderate visual exposure:** Turbines dominate, clearly noticeable or recognisable to the viewer. Exceptional viewer sensitivity and viewpoints associated with tourism or recreational attractions. Noticeable change in surroundings
- This is based entirely on the visual exposure as shown in Map 2 and discussed in the revised Visual Impact study submitted as part of the EIR. Ranges of distance were not used in the assessment of visual exposure as the nature of the region’s relief would result in under- or over- representation of properties.
- Consideration was made of the percentage of land within the farm cadastral that was classified as high, moderate or low visual exposure. As such, if only low percentages of the land division’s extents were classified as high/ medium/ low visual exposure, this would be reflected in the tables below.
- The nature of activity on each property was also factored in this assessment. As such, it was assumed that properties that are engaged in tourism-related activities such as hunting and accommodation solely would be more sensitive to the degree of visual exposure than those involved in mixed activity (with hunting that typically caters to biltong hunters and other domestic tourists).

For the purpose of considering potential losses to farm revenue, the following scenarios are presented, incorporating the possibilities of extreme outcomes as well as a moderate outcome. The scenarios assume different degree of change in tourist behaviour as a result of the establishment of the WEF.

Monetary values are assigned to these scenarios showing results of the estimated potential losses for tourism and game farm/hunting establishments that could occur in Table 8. It must be noted that these are based on scenario testing. Distinction is also made between farms with low visual exposure (turbines not particularly noticeable to viewers) and those with moderate (recognisable to the viewer) and high visual exposure (dominant or clearly noticeable).

Sensitivity values have been adjusted across the board by between 2% and 10% depending on the scenario and the visitor type largely as a result of the reduction in sensitivity to WEFs as a result of the presence of new WEFs in the region between 2013 and 2018.

Description	Scenario 1		Scenario 2		Scenario 3	
	Low degree of visitor sensitivity		Moderate degree of visitor sensitivity		High degree of visitor sensitivity	
Change in international tourist visitors	High & moderate visual exposure property	Low visual exposure property	High & moderate visual exposure property	Low visual exposure property	High & moderate visual exposure property	Low visual exposure property
	-8%	-4%	-30%	-15%	-50%	-25%
Change in domestic tourist visitors	High & moderate visual exposure property	Low visual exposure property	High & moderate visual exposure property	Low visual exposure property	High & moderate visual exposure property	Low visual exposure property
	-5%	-2%	-25%	-10%	-40%	-20%

Table 8: Potential estimated production losses associated with visual impacts (R' millions; 2018 prices)

Description	Scenario 1		Scenario 2		Scenario 3	
	Low degree of visitor sensitivity		Moderate degree of visitor sensitivity		High degree of visitor sensitivity	
Change in international tourist visitors	High & moderate visual exposure	Low visual exposure	High & moderate visual exposure	Low visual exposure	High & moderate visual exposure	Low visual exposure
	R1.1m	R0.5m	R4.1m	R2m	R6.8m	R3.4m
Change in domestic tourist visitors	High & moderate visual exposure	Low visual exposure	High & moderate visual exposure	Low visual exposure	High & moderate visual exposure	Low visual exposure
	R0.4m	R0.1m	R2.4m	R0.9m	R3.9m	R1.9m

As indicated in Table 8, the potential losses to the local game farm/hunting, tourism and associated industries due to the construction of the WEF could range between R 0.1 million and R 3.9 million per annum for domestic tourists and R 0.5 million and R 6.8 million for international tourists in 2018 prices. Comparatively the values from 2013 indicate that the potential losses due to the construction of the WEF are between R1,3 million and R 8,3 million (inflation adjusted to 2018) for domestic and international tourists.

Note section 5.2 and 5.3 for a comparison of these potential losses against and the anticipated economic gains of the project.

CHAPTER 5 EVALUATION OF IMPACTS AS A RESULT OF THE WEF

This chapter of the report seeks to describe and evaluate the economic and social impacts that are expected to occur as a result of the development of the Grahamstown WEF. This chapter also provides a net effect and trade off analysis of the development of the WEF in order to determine the preference of one option over another. This chapter has separated the assessment of the Grahamstown WEF into the projects three lifecycle phases namely construction, operation, decommissioning.

Due to the nature of the proposed amendments, no changes to the impact tables are expected between 2013 and 2018. The increase in value of the local spend for construction and operation as well as the new technology will not fundamentally change the impacts presented below especially with regards to magnitude, extent, duration or probability. The major changes are however, those of an economic nature and are discussed in the relevant sub-section.

5.1 DEFINING ECONOMIC IMPACTS

Economic impacts can be defined as the effects (positive or negative) on the level of economic activity in a given area(s). The net economic impact is usually measured as the expansion or contraction of an area’s economy, resulting from the changes in (i.e. opening, closing, expansion or contraction of) a facility, project or programme.

5.1.1 Types of economic impacts

The net economic impact of an exogenous change in the economy will be translated according to various direct and indirect economic effects, as are defined below:

- **Direct economic impacts:** are the changes in local business activity occurring as a direct consequence of public or private activities in the economy, or public programmes and policies. Furthermore, increased user benefits lead to monetary benefits for some users and non-users (individuals and businesses) within the geographical area:
 - * For affected businesses, there may be economic efficiency benefits in terms of product cost, product quality or product availability, stemming from changes in labour market access, cost of obtaining production inputs and/or cost of supplying finished products to customers. For affected residents, benefits may include reduced costs for obtaining goods and services, increased income from selling goods and services to outsiders, and/or increased variety of work and recreational opportunities associated with greater location accessibility.
- **Indirect and induced impacts:** The direct benefits to business and the residents of communities and regions may also have broader impacts, including:
 - * Indirect business impacts – business growth for suppliers to the directly affected businesses and potential growth of municipal revenue due to raised taxes and service levies.
 - * Induced business impacts – business growth as the additional workers (created by direct and indirect economic impacts/effects) spend their income on food, clothing, shelter and other local goods and services.

5.1.2 Economic impacts considered

The direct and indirect economic impacts listed are measured according to the following broad economic variable categories:

- **Production/Business Sales:** refers to the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of the introduction of an exogenous change in the economy. Explained more simply, new business sales equates to additional business turnover as a result of the introduction of an exogenous change in the economy.
- **Contribution to GDP-R:** 'Gross Domestic Product' (GDP-R) is a broader measure of the full income effect. This measure essentially reflects the sum of wage income and corporate profit generated in the study area as a result of an exogenous change in the economy.
- **Employment:** Refers to the employment resulting from the construction or operation of the project under investigation.

Using the Input/Output model methodology, various anticipated direct and indirect economic impacts of construction and operational phases of the proposed WEF have been quantified. These economic impacts have been derived using an understanding of economic cause-effect relationships. The principle of cause-effect is that for any economic action, there can be a multitude of different economic reactions (effects).

5.2 CONSTRUCTION PHASE IMPACTS

The following sections indicate the impacts that are likely to occur during the construction phase of the proposed WEF. Since the facility is expected to have both positive and negative effects in terms of the same indicator, the evaluation of impacts are grouped accordingly.

5.2.1 Positive impacts during construction

a) Temporary stimulation of the national and local economy

The most significant change to the development has been that of increased spend on the development. This is especially relevant for the local content aspect. It is likely that the project will inject a larger investment into the local economy than originally anticipated due to the amended development concept. It is also likely that the induced and indirect economic benefits will increase accordingly. This increase however, will not change the overall extent, duration, type or probability of the impact. These remain unchanged when compared to the 2013 SEIA.

The proposed Grahamstown WEF is expected to require R 1.320 billion (2018 prices) to establish during construction. Of the above-mentioned expenditure, R 952 million will be spent in the country. R125 million will be spent within the Makana Local economy, R43 million of which being allocated to local labour costs. This equates to approximately 13% of all national expenditure by the developers. An additional R177 million will be spent within the Eastern Cape Province. Aspects such as aggregate civil works for the substation and electrical infrastructure and fuel will be procured predominantly from Makana suppliers. Equipment and plant which is not available in Makhanda and other towns within the Makana region will be procured from suppliers within the province. The localised expenditure on the project will stimulate the local and national economies. The availability of materials within South Africa will dictate where inputs are sourced from and which company will be awarded the tender, with closely proximity to site and BBEE status given as preference.

As indicated in Table 9 it is estimated that the construction of the project will increase the production in the country (i.e. new business sales) by R 2.4 billion, which will translate into an additional R 838 million of Gross Domestic Product per Region (GDP-R). Besides the value added that could be generated by local construction businesses through sub-contracting agreements and employment of freelancers, the sectors that are expected to benefit the most from the production and consumption induced effects are tertiary services such as trade, accommodation, transport services, personal services, real estate, and insurance.

The values presented in Table 9 also indicate that the new 2018 figures are significantly higher than those of the 2013 (inflation adjusted) values from the original application. This indicates that the development will inject more investment into the South African economy than originally planned.

Table 9: Estimated impact on the national and local economies compared between 2013 report and 2018 proposed amendments (R' million, 2018 prices)

2018 Values			
Direct	Indirect	Induced	TOTAL
Impact on Production			
R 952,03	R 1 030,99	R 401,76	R 2 384,51
Impact on Gross Domestic Product per Region			
R 284,02	R 401,83	R 151,78	R 837,64
2013 Values (Inflation Adjusted)			
Direct	Indirect	Induced	TOTAL
Impact on Production			
R 536,30	R 599,19	R 216,58	R 1 352,08
Impact on Gross Domestic Product per Region			

R 124,44	R 209,60	R 81,86	R 415,91
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The greatest effects on production and GDP-R stimulated during construction activities will be created through the multiplier effects, specifically through a combination of production and consumption induced effects. The former refers to the impact generated along backwards linkages when the project creates demand for goods and services required for construction and subsequently stimulates the business sales of the suppliers of inputs that are required to produce these goods and services. The latter refers to the effects of household spending which is derived from an increase in salaries and wages directly and indirectly stimulated by the project’s expenditure.

Sectors and industries that will experience the greatest stimulus from these indirect and induced impacts include:

- Basic metals, structural metal products and other fabricated metal products industries
- Trade
- Insurance
- Transport services
- Electrical machinery and apparatus

<i>Nature: Temporary increase in the GDP-R and production of the national and local economies during construction</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Medium term (3)	Medium term (3)
<i>Magnitude</i>	High (8)	High (8)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	60 (High)	60 (High)
<i>Reversibility</i>	Benefit is terminated with the end of construction	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • The developer should be encouraged by the EPC contractor to increase the local procurement practices and promote the employment of people from local communities, as far as feasible, to maximise the benefits to the local economies. • The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers were feasible. 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • A number of WEFs are proposed to be built in the municipality (Albany WEF) and province with some already constructed (Waainek WEF). This could provide sufficient economies of scale and thus open up opportunities for the establishment of new industries in the country and new businesses in the local area, specifically in the sectors that are not well represented in the economy. This has already occurred to a certain extent with the manufacturing of WEF components in the country. 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • None foreseen at this stage 		

b) Temporary increase employment in the national and local economies

The proposed amendments to the facility will likely created more Full Time Equivalent (FTE) positions during construction for the local population indicating a larger positive impact on the employment levels in the area. This increase however, will not change the overall extent, duration, type or probability of the impact. These remain unchanged when compared to the 2013

The proposed facility will create 307 Full Time Equivalent (FTE) employment positions during construction. About 87% of the employment positions involve skilled and semi-skilled construction workers, with the remaining being managers, professional engineers and supervisors. It is anticipated that 48% of the employment will be filled by people from local communities. The table below also indicates the 2013 compared to the 2018 values. The project will create more FTE positions in 2018 based on the proposed amendments compared to 2013.

Given the size of the local construction sector it is anticipated that there will be sufficient local labour to satisfy the demand for unskilled workers.

Table 10: Estimated Full Time Equivalent positions to be created during construction (2013 and 2018 values)

2018 Values			
Direct	Indirect	Induced	TOTAL
307	1 940	802	3 049
2013 Values			
Direct	Indirect	Induced	TOTAL
142	897	370	1 410

Beyond the direct employment opportunities that will be created by the project during the construction phase the development will also have a positive spin-off effect on the employment situation in other sectors of the national and local economies as shown in Table 10 Most of these positions will be in sectors such as construction, business services and trade. Given that a significant portion of the multiplier effects will be generated through backward linkages, more than half of these FTE employment positions will be created along the supply chain and amongst industries providing inputs to the businesses in the supply chain.

Based on these figures the total contribution of the project towards employment creation in South Africa is estimated at 3 049 FTE employment positions. Throughout the construction phase it is recommended that the developer encourage the EPC contractor to fill as many local positions as possible.

<i>Nature: Temporary increase in employment in local and national economies</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Short term (2)	Short term (2)
<i>Magnitude</i>	High (8)	High (8)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	56 (Medium)	56 (Medium)
<i>Reversibility</i>	Benefit is terminated with the end of construction	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> Organise local community meetings to advise the local labour force about the project that is planned to be established and the employment that can potentially applied for Establish a local skills desk (in Makhanda) to determine the potential skills that could be sourced in the area Recruit local labour as far as feasible Employ labour-intensive methods in construction where feasible 		

<ul style="list-style-type: none"> • Sub-contract to local construction companies particularly SMMEs and BBBEE compliant enterprises where possible • Use local suppliers where feasible and arrange with the local SMMEs to provide transport, catering and other services to the construction crews.
<p><i>Cumulative impacts:</i></p> <ul style="list-style-type: none"> • None foreseen given the nature of employment
<p><i>Residual Impacts:</i></p> <ul style="list-style-type: none"> • Experience in building Wind Energy facilities

c) Contribution to skills development in the country and local economy

The construction of the proposed Grahamstown WEF is likely to have a positive impact on skills development in South Africa, particularly given the limited number of such facilities currently operating in the country. Since there are a limited number of operational wind energy facilities in South Africa, the local expertise in the construction of such facilities is very limited. During the turbine component assembly and tower manufacturing period which is included as part of the construction phase and is planned to be conducted in the Eastern Cape, it is likely that foreign technical experts will be involved. This will present an opportunity for skills and knowledge transfer between these technical experts and local manufactures.

It is also expected that the construction crew involved in the project will gain knowledge and experience in respect of the development of wind energy facilities. This will be highly beneficial, given South Africa’s target of generating 9 200 MW from wind energy by 2030 (Department Energy, 2011).

In addition to the direct effects of the project on skills development in the country and the local economy, the project could contribute to the development of the local R&D and manufacturing industries associated with wind technology. This could be achieved through partnerships with Rhodes University (situated in the Makana Local Municipality) or the Nelson Mandela University (NMU) in Port Elizabeth. Partnerships of this nature could further enhance the development of new skills and expertise.

<i>Nature: Contribution to skills development in the country and in the local economy</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Medium term (3)	Medium term (3)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Probable (3)	Highly Probable (4)
<i>Significance</i>	39 (Medium)	52 (Medium)
<i>Reversibility</i>	Yes, skills can be lost if not practiced	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • Facilitate knowledge and skills transfer between foreign technical experts and South African professionals during the pre-establishment and construction phases • Set up apprenticeship programmes to build onto existing skill levels or develop new skills amongst construction workers especially those from local communities 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • Improved labour productivity and employability of construction workers for similar projects • Possible development of local skills and expertise in R&D and manufacturing industries related to wind technology through partnerships with Rhodes University and NMU 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • South Africa’s human capital development 		

d) Temporary increase in household earnings

The proposed amendments to the facility will likely increase the earnings during construction for those directly employed to construct the facility, as compared to the 2013 SEIA forecasts. This increase, however, will not change the overall extent, duration, type or probability of the impact. These remain unchanged when compared to the 2013 report.

The proposed WEF will create a total of 3 049 FTE employment positions during construction generating R 1.9 billion of revenue for the affected households in the country through direct, indirect and induced effects. Of this figure R 480 million will be paid out in the form of salaries and wages to those individuals directly employed during the construction phase. The remaining R 1.4 billion million in households' earnings will be generated through indirect and induced effects resulting from project expenditure.

Although temporary, this increase in household earnings will have a positive effect on the standard of living these households. This is especially applicable to the households benefiting from the project that reside in the Makana Local Municipality. The proposed amendments to the project will increase the overall earnings per household for those employed by the facility for the duration of the construction. This is largely as a result of the increased number of FTE positions that have been added by the proposed amendments between 2013 and 2018.

<i>Nature: Temporary improvement of the standard of living of the positively affected households</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Short term (2)	Short term (2)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Probable (3)	Probable (3)
<i>Significance</i>	36 (Medium)	36 (Medium)
<i>Reversibility</i>	Benefit is terminated with the end of construction	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • Recruit local labour as far as feasible to increase the benefits to the local households • Employ labour intensive methods in construction where feasible • Sub-contract to local construction companies where possible • Use local suppliers where feasible and arrange with local SMMEs and BBBEE compliant enterprises to provide transport, catering and other services to the construction crews 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • Improved standard of living of the affected households 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • Possible increase of households' saving accounts 		

e) Temporary increase in government revenue

The investment in the Grahamstown WEF will generate revenue for the government during the construction period through a combination of personal income tax, VAT, companies' tax etc. Government earnings will be distributed by national government to cover public spending which includes amongst others the provision and maintenance of transport infrastructure, health and education services as well as other public goods.

<i>Nature: Temporary increase in government revenue</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Short-term (2)	Short-term (2)
<i>Magnitude</i>	Low (4)	Low (4)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	40 (Medium)	40 (Medium)
<i>Reversibility</i>	Benefit is terminated with the end of construction	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • None suggested 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • Lower government debt and servicing costs 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • None envisioned 		

5.2.2 Negative impacts during construction

a) Negative changes to the sense of place

A community's sense of place is developed over time as it embraces the surrounding environment, becomes familiar with its physical properties and creates its own history. The sense of place is created through the interaction of a number of different factors such as the area's visual resources, its aesthetics, climate, culture and heritage as well as the lifestyle of individuals that live in and visit the area. Most importantly, it is a highly subjective matter and dependent on the demographics of the population that resides in the area and their perceptions regarding trade-offs.

For example, a community living in poverty is generally more likely to be accepting of industrial development that promises employment opportunities, while a more affluent residential area is more likely to oppose such a development on the grounds that the development is not likely to generate gains for the community.

The area proposed for the development as well as its surrounds does not currently have any large-scale industries or high-rise buildings. Noise and light intrusion during the night in the area is also very low. Given the above characteristics the area can be defined as being largely rural. Any rapid changes that alter the characteristics that define the areas sense of place could potentially have a negative impact.

It is important to note that noise in this discussion refers to the construction period of the project and does not refer to the operation phase of the WEF. During the construction of the proposed WEF there are likely to be noise impacts caused by the movement of vehicles, as well as construction activities on site. These impacts are anticipated to occur primarily during the day with illumination from the site being experienced during the night. The presence of this noise is likely to alter the way the surrounding environment is experienced by households in the area.

It is worth noting' however, that as the site is located adjacent to the N2 road, which is characterised by relatively high levels of traffic compared to other national roads, and which therefore in itself generates notable levels of noise pollution as it stands. This road has also recently experienced redevelopment, and increased construction traffic has been experienced on the road. This could mean that the noise generated by construction activities may possibly exacerbate the current situation, or not be noticed at all as a result

of high levels of ambient noise. Such issues are discussed in the Environmental Impact Report prepared by EOH CES for Plan 8 infinite energy and fall outside the scope of this assessment.

Visual impacts associated with the sense of place will initially be very limited, as the site will only be visible to a few individuals in the early stages of construction. In the early stages of construction, the equipment, machinery and changes to the site will not be visible from a distance as road building and digging of foundations will take place at this stage. As construction activities progress and the footprint of the facility grows, the visual impact will also become more apparent and the sense of place experienced by households residing within the visually affected area will altered further. This will happen when the towers, nacelles and blades are being erected. While it is recognised that much of the local natural environment has been transformed by agricultural activities in the past, some farms that are involved in tourism-related activities have undertaken activities to rehabilitate the land. As such, the sense of place in some properties will be a notable factor while this will be less of a concern on other properties.

It is anticipated that households residing on the farms on which wind turbines are proposed to be established will experience the greatest disruption in their sense of place during the construction period. Individuals living on the properties, as well as tourists to the area staying in hospitality facilities, will over the course of the construction phase of the project be subjected to either visual or noise disruptions that are currently not present in the area.

The sense of place at the farms located adjacent to or beyond the site of the proposed WEF will also be affected to some extent. The visual exposure on all these farms during the construction phase will not be continuous, given the proximity of some of the farms to the proposed WEF. Nevertheless, the knowledge of the facility near the farm and the fact that it could be seen from some parts will still have a negative connotation and will alter the sense of place experienced by the households residing on these farms. This, however, may be limited as a result of the presence of other WEFs in the Eastern Cape as well as WEFs located within Makana Municipality itself (Waainek WEF near Makhanda).

It is important to provide a caveat that some households in the affected area may consider the changes to the area’s sense of place during construction as positive. Such sentiments may emanate from perceptions about the construction project facilitating a shift towards a greener or more sustainable future (through increased use of renewable energy production).

It is also important to note that only construction aspects of the sense of place will cease once construction is over at the site. It is likely that the sense of place change as a result of the construction will continue into the operation of the facility (these impacts discussed in the sub-section below).

<i>Nature: Impact on the sense of place experienced by the local community as a result of visual and noise effects that appear during the construction phase</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Site surrounding area (2)	Affected site (1)
<i>Duration</i>	Short term (2)	Short term (2)
<i>Magnitude</i>	High (8)	High (8)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	48 (Medium)	44 (Medium)
<i>Reversibility</i>	Possible to reverse but only with decommissioning	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	No	No

Can impacts be mitigated?	Yes
Mitigation:	
<ul style="list-style-type: none"> The mitigation measures proposed by the visual and noise specialists should be adhered to Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during construction 	
Cumulative impacts:	
<ul style="list-style-type: none"> Change in perception of the area due to the construction of other wind turbine developments in the surrounding area albeit temporarily 	
Residual Impacts:	
<ul style="list-style-type: none"> Altered characteristics of the environment Change in the perception of tourists of the local environment 	

b) Negative impact on the local tourism, game industry and associated industries

As indicated earlier the increased noise as well as the visual disturbance generated by the construction phase of the development will affect residents’ sense of place. This, however, will not only affect the people that live in the area but also alter the experience of any international and domestic tourists that visit the area.

Changes in the perceptions of the aesthetics of the surrounding environment by tourists visiting the potentially affected game farm/hunting establishments are likely to increase as construction progresses. The construction activity is, however, likely to impact their experience and perceptions of the destination, which could have an impact on both their decision to revisit the area in future as well as their recommendations that they provide to other potential tourists. Thus, the majority of the negative effect of the facility on the tourism industry is likely to be captured during the operation phase of the project.

<i>Nature: Impact on the local tourism and game farm/hunting industry that ensue during the construction phase as a result of noise and visual effects</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local economies (3)	Site surrounding area (2)
<i>Duration</i>	Short term (2)	Short term (2)
<i>Magnitude</i>	High (8)	Moderate (6)
<i>Probability</i>	Highly probable (4)	Probable (3)
<i>Significance</i>	52 (Medium)	30 (Low)
<i>Reversibility</i>	Possible to reverse with decommissioning	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> Mitigation proposed by the visual specialists should be implemented during the beginning of the construction period to screen off visual disturbances as soon into the development phase as feasible Heavy vehicles travelling on secondary roads should adhere to low speed limits to minimise noise and dust pollution If feasible, no construction activities should be carried out during weekends and outside daytime working hours 		
Cumulative impacts:		
<ul style="list-style-type: none"> Reduction in the number of tourists visiting the area due to the construction of other wind turbine developments in the surrounding area albeit temporarily 		
Residual Impacts:		
<ul style="list-style-type: none"> Visual impacts cannot be eliminated due to the height of the turbines thus the local industry could still experience some losses Perceptions of international tourists regarding the area’s representation as “Wild Africa” would change due to the development as well as similar developments proposed for other parts of the Makana Local Municipality 		

c) Temporary increase in social conflicts associated with the influx of people

The Makana economy is not sufficiently diversified to supply the entire workforce for the construction of the proposed WEF, particularly in terms of skilled positions. A significant number of the unskilled and semi-skilled workers required during the construction phase will however, be sourced locally. It is estimated that up to 48% of employment that will be created during the construction phase could be filled by labour coming from the local municipality. Migrant workers will therefore comprise just over half of the total work force, equating to approximately 161 highly-skilled, skilled and semi-skilled workers.

The migration of people to the area is not likely to result in social conflicts between the local population, and the migrant work force from the local population perceiving the migrant workers as “stealing” their employment opportunities. Given the low reliance on labour sourced externally, the potential of the influx of people into the area leading to a temporary increase in level of crime, illicit activity and possibly a deterioration of the health of the local community through the spread of infectious diseases is low. Semi-skilled and unskilled construction workers are unlikely to choose to remain in the area following the completion of the construction phase given the rural nature of the project site (with limited human settlements in the surrounding area). The risk of such individuals exacerbating the level of poverty within the Makana Local Municipality from living in the area without a source of income is thus low.

The influx of employment seekers and the potential social conflicts that can arise with in-migration of temporary workers to an area is difficult to mitigate. Plan 8 Infinite Energy has indicated that appropriate awareness campaigns and strict adherence to recruiting practices will be employed to reduce the possibility of adverse effects such as stock theft, incidents of trespassing and littering.

During the construction phase none of the workforce (excluding security personnel) will live on site as they will be transported on a daily basis from Makhanda. Access control will restrict access to the construction site. Furthermore, a community liaison officer (approved by the Makana Local Municipality) will be appointed prior to the commencement of the construction.

Addressing the challenges related to potential social impacts is best done in partnership with all stakeholders in the area, specifically the affected and adjacent property owners, local communities, ward communities and municipalities. This would promote transparency, information sharing and help build good relationships between all affected parties. In addition, all opportunities that would could include the community in the project should be explored and where possible implemented. Employment opportunities, including the provision of ancillary services, are particularly relevant in this incidence as the creation of employment opportunities for locals could eliminate the potential alienation between the community and the project as well as migrant workers.

While the updated development concept will increase the number of employees on the site as compared to the 2013 forecasts, it is unlikely that the increase will be significant enough to change the overall extent, magnitude and probability of this impact.

<i>Nature: Temporary increase in social conflicts associated with the influx of construction workers and employment seekers to the area</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Surrounding areas (2)	Affected site (1)
<i>Duration</i>	Short term (2)	Very short term (1)

<i>Magnitude</i>	Low (6)	Small (4)
<i>Probability</i>	Probable (3)	Very improbable (1)
<i>Significance</i>	30 (Medium)	6 (Low)
<i>Reversibility</i>	Reversibility within a short period	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	Yes	Yes
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • Adhere to strict labour recruitment practices that would reduce the desire of potential employment seekers to loiter around the properties in the hope of finding temporary employment • Control the movement of workers between the site and areas of residence to minimise loitering around the facility. This should be achieved through the provision of scheduled transportation services between the construction site and area of residence • Employ locals as far as feasible through the creation of a local skills database • Establish a management forum comprising key stakeholders to monitor and identify potential problems that may arise due to the influx of employment seekers to the area • Ensure that any damages or losses to nearby affected farms that can be linked to the conduct of construction workers are adequately reimbursed • Assign a dedicated person to deal with complaints and concerns of affected parties 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • None foreseen 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • Contribution towards social conflicts in the area by construction workers and employment seekers who decide to stay in the area after construction is complete and who are unable to find a sustainable income 		

d) Impact on economic and social infrastructure

Given that migrant workers will require accommodation and other services there is likely to be an increase in the demand for rental accommodation, social services and access to water and electricity. Local workers may also be required to be accommodated overnight on the site in temporary accommodation during the construction phase of the project

According to the Makana Local Municipality’s IDP (2017) the municipality has a number of clinics and hospitals situated throughout its municipal area.

The effects of the project on road infrastructure should also be considered, as it is highly likely that the development will lead to an increase in traffic volumes in surrounding areas. This could lead to a deterioration of local road conditions which could place additional financial burden on the Makana Local municipality through additional maintenance costs. This may add additional operating costs to farmers in the area due to delays in deliveries and damage to vehicles.

Potential damage to roads will be reduced as a result of

- The site being adjacent to the N2 national road. This reduces the need to travel on by-, farm-, arterial- or secondary-roads that are typically constructed to inferior design specification to those of the N2 road
- The EPC contractor will construct additional roads within the site for access within the site

Based on the above discussion it is expected that the housing and accommodation situation, basic service provision, health facilities and road infrastructure will be under additional strain during the construction period. Given that the project is anticipated to attract additional people to the area the significance of the

impact is considered to be medium. These impacts can however, be mitigated if the developer engages with the local municipalities and plans accordingly.

<i>Nature: Added pressure on economic and social infrastructure during construction as a result of increase in local traffic and in migration of construction workers</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Surrounding areas (2)	Surrounding areas (2)
<i>Duration</i>	Short term (2)	Short term (2)
<i>Magnitude</i>	Moderate (4)	Minor (2)
<i>Probability</i>	Probable (4)	Probable (3)
<i>Significance</i>	32 (Medium)	18 (Low)
<i>Reversibility</i>	Reversible within a short period	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> Engage with local authorities and inform them of the development as well as discuss with them their ability to meet the additional demands on social and basic services created by the in migration of workers Where feasible, assist the municipality in ensuring that the quality of the local social and economic infrastructure does not deteriorate through the use of social responsibility allocations 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> None foreseen due to the temporal nature of the construction phase 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> None foreseen at this stage 		

e) Impact on real estate dynamics and business activity in the immediately affected area

During the scoping phase of the project the local community expressed concern that the visual impact and the proximity of the farms to the proposed sites could negatively impact land values in the area. This report does not attempt to quantify potential positive and negative impacts on property values resulting from the proposed investment. This report rather makes reference to previous studies of a similar nature in order to provide perspective on factors to consider.

In general, any development associated with some negative environmental effects can influence property values in two primary ways:

- Firstly, it can reduce the value of the land if the proposed development has a negative image associated with it. This could be related to the real or perceived adverse effects that the proposed development could have on ability to conduct business, air quality, noise levels, aesthetics, traffic congestion, health, and crime levels in the area.
- Secondly, the development could increase the demand for surrounding properties and lead to a rise in the area’s property values. This could occur in situations where nearby properties are found to carry valuable marketable natural resources.

Impact on real estate dynamics

The value of a commercial agricultural property can be determined using a “going concern value” method which refers to a real estate value, personal property value and a business enterprise value. The former two refer to physical assets or property values, whilst the latter refers to the value of the income derived from a business and its goodwill or other intangible assets. An investigation into the potential effects of these parameters could shed some light onto the potential effects of the proposed project on the property value

of the land in the area.

Given the recency of the development of WEFs in South Africa and the lack of suitable time to assess the impact of these facilities on property values there are very little data available. There are also no known domestic studies that investigate the impact of WEFs on property prices. Several international studies however, have been conducted but many of these studies reveal conflicting results.

For example, a study undertaken by British Wind Energy Association (BEWA) (now known as RenewableUK) in Cornwall in the United Kingdom, indicates that most estate agents (60% of 405 respondents) agreed that there was a detrimental effect on property value in close proximity to or within visibility of a WEF (Dent and Sims, 2007). This study, however, also suggested that since most negative responses were acquired during the planning stages, these concerns are most likely the result of uncertainty or fear of a wind farm being constructed nearby and that concerns would lessen with time (Dent and Sims, 2007).

On the contrary, other studies have demonstrated that the establishment of WEFs have no impacts on property and house values. This was evident in an American study, which examined 24 300 property transactions at ten locations over a six-year period, and which found no evidence that wind turbines within an eight-kilometre radius had a negative impact on property values (Sterzinger, Beck & Kostiuk, 2003). Alternatively, some of the property values rose above the regional average, suggesting that perhaps close proximity to wind turbines (within 10 miles or 16 kilometres) can actually increase residential property values.

Another study conducted by the New South Wales Valuer General (Duponts, 2009) also sought to determine the impact that WEFs have on the surrounding land value in Australia. The main finding of the study was that WEFs, in most cases, did not appear to have negatively affected property values in the analysed areas. Of the 45 sales investigated, 40 did not show any reduction in value, while only five properties were found to have lower than expected sale prices (Duponts, 2009).

The results from rural residential properties (known as 'lifestyle properties') were more mixed. A relatively small number of these properties located very close (less than 500 metres) to WEFs were found to have lower than expected sales prices (based on statistical analysis), and it is possible that audio and visual aspects of WEFs contributed to this phenomenon (Duponts, 2009). Property values alongside these locations however, also appeared not to have been affected.

Furthermore, landowners can also potentially benefit from the presence of WEFs on their land. Wind energy companies provide an annual fee for the use of the land (CanWEA, 2006; Wasatch Wind, 2011) and, since only a small percentage of the land is used for wind turbines, existing land use (such as farming, recreation, ranching) can continue. This thereby increases the landowners' revenue without materially impacting the existing land use. This, however, only applies for the owners of the land on which the turbines will be located, and owners of land adjacent to the turbines may experience disbenefits.

Impact on business enterprise activity

Business enterprise value is determined by goodwill and income derived by the business at the time of the transaction. Goodwill, as an intangible asset, is extremely difficult to quantify as it refers to factors such as management style, customer loyalty, brand recognition, etc. Income on the other hand is easier to assess as it includes all revenue derived by the activity using the combination of the capital and labour resources.

Among the major types of businesses that exist within the visually affected environment of the proposed Plan 8 Infinite Energy Grahamstown WEF are conventional farming (crops and livestock), game farm/hunting and eco-tourism.

It is anticipated that, in respect of existing conventional farming operations, the proposed project will not affect the goodwill or the productivity of the land and thus the revenue derived from farming. The effects of the proposed project on the business value of conventional farming are therefore expected to be marginal if not non-existent. The situation with game farm/hunting and eco-tourism though is expected to be different.

As mentioned earlier in this report the changes in the aesthetics and visual resource of the environment as a result of the WEF development are expected to have a negative impact on the number of international and domestic tourists of the nearby game farm/hunting and eco-tourism establishments, albeit to a different extent. Many of these tourists are repeat visitors, meaning that the proposed activity could potentially diminish the client lists of both the game farm/hunting and eco-tourism establishments, thereby diminishing their goodwill component. Furthermore, it will have an impact on the revenue derived by game farm/hunting and eco-tourism businesses. A key determinant of business value is the ability of its assets (both fixed and current) to generate revenue in the future. As such, any factors that impair this ability may negatively affect business valuation. In this case, the possibility of a reduced capability to generate revenue from hunting and related activities exists. The business enterprise values of nearby game farm/hunting and eco-tourism establishments could thus be reduced because of the proposed project.

It is also worth noting that the extent of such a reduction in business values would be for the entire local municipality rather than just for the site around the affected area. This is because of the value chains which exist in the local hunting-based tourism sector in the Makana region. As such, hunting activities are thus interrelated with business values of taxidermists, freight forwarders, transporters, and booking agencies. These mean that small changes in tourist visitor numbers to the region would have far-reaching effects on the local economy of Makhanda.

Given the visual exposure of the proposed WEF from different game farm/hunting and eco-tourism establishments in the area, and estimated losses in revenue derived from international and domestic tourist by these facilities, the following can be suggested:

- Game farm/hunting establishments that cater to mostly international tourists and are in the immediate vicinity of the development could potentially experience the largest decrease in existing business enterprise value relative to their current values. These farms could potentially lose up to 50% of their revenue.
- Game farm/hunting establishments that cater to mostly domestic tourist could potentially lose up to 40% of their revenue.

It is critical to note, as indicated earlier, that revenue from game farming/hunting and eco-tourism establishments has been estimated based on total tourist numbers visiting the respective farms as well as the reported average spend by tourists as quoted by survey respondents. Total revenue, as utilised in this calculation, is therefore a function of tourist numbers and does not fully incorporate other sources of income. The decline in tourism numbers therefore has a disproportionately high impact on the revenue changes indicated above than would be the case if other sources of income were considered.

Given the combination of the possible effects of the proposed project on property prices and the income of businesses the following can be envisaged:

- The value of crop and stock farms located in the area could be negatively affected by the proposed activity. In the likelihood of this happening the impact would most likely be small and short-lived.

It is important to note that this assessment is based on a combination of two factors: real estate value and business enterprise value. The literature discussed in this section refers more to real estate values than business enterprise values (which are based on survey feedback and engagements with various stakeholders. This is thus reflected in the assessment presented in this section.

<i>Nature: Impact on real estate dynamics and business activity in the immediately affected area</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local Economies (3)	Local Economies (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	High (8)	Moderate (6)
<i>Probability</i>	Highly Probable (4)	Probable (3)
<i>Significance</i>	60 (High)	39 (Medium)
<i>Reversibility</i>	Reversible with decommissioning of the facility	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	Yes	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • The developer should offer some form of an agreement, incentive, or property value guarantee to the nearby farms to offset potential losses in property values provided they are proven to result from the establishment of the facility in the area. The nature and conditions of such agreements should be negotiated with the affected landowners and should be acceptable by both parties • Mitigation measures to reduce the impact on the sense of place should also be implemented 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • May be present as other similar projects are proposed within the region 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • Perceptions associated with the effect of industrial type developments on aesthetics and landscape of the natural environment cannot be entirely eliminated, thus some potential buyers might still reserve themselves from buying a property in the area 		

5.3 OPERATIONAL PHASE IMPACTS

The following section describes the impact that the proposed wind energy facility will have once it is operational. According to the project plan, the facility is expected to be fully operational by 2022. The facility is envisaged to have a lifespan of approximately 20 years, which means that the impacts observed during this phase, regardless of whether the impacts are positive or negative, will be long-lasting. All data presented in this section should be interpreted as annual figures at 2018 prices.

5.3.1 Positive impacts during operations

a) Sustainable increase in production and GDP-R nationally and locally

The most notable updates compared between 2013 and 2018 were largely in the construction phase of the development. There is a smaller but significant change between the operational costs between the two periods. This increase, however, will not change the overall extent, duration, type or probability of the impact. These remain unchanged when compared to the 2013 report.

The proposed facility will generate approximately R230.29 million in revenue annually and will require annual operational expenditure of R 16.14 million, of which approximately R 9.4 million (R 7.6 million 2013 inflation adjusted) will be spent locally in the country on an annual basis. The total impact on production in the country as a result of the project's operations will equate to R 20.65 million (R 17.4 million 2013 inflation adjusted) per annum in 2018 prices. Of the R20.65 million in production generated it is anticipated that with local expenditure related to the annual spending on labour and procurement of local goods and services, new business sales within Makana Local Municipality will increase by R10 million (R 8.9 million 2013 inflation adjusted) on an annual basis, over and above current business sales. Aside from the utilities sector, industries that will experience the greatest stimulus from the project on a national scale will include the transport and transport equipment industries, chemical and chemical product industries as well as the trade and business services industries.

Through indirect and induced effects brought on by this injection to the local and national economy, a total of R 9.1 million (R 7.6 million 2013 inflation adjusted) of GDP-R will be generated per annum from the project within the whole of South Africa. A total of R 4.3 million (R 4 million 2013 inflation adjusted) in value add will be generated in the Makana Local Municipality alone. The production- and consumption-induced multiplier effects of the project are considered to be relatively small compared to conventional electricity generating industries. This is due to the energy source used to produce electricity by the proposed wind energy facility is free, unlike conventional power stations where raw inputs (i.e. coal) and the transport thereof comprise a significant portion of operating expenditure. It is for this reason that such a facility is a highly attractive business venture.

The proposed amendments to the original application will have a small but significant increase in the values presented in 2013. This indicates that the change in technology is likely to increase the economy even more than was originally anticipated in 2013.

<i>Nature: Sustainable increase in production and GDP-R nationally and locally</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	52 (Medium)	52 (Medium)
<i>Reversibility</i>	Benefits are sustained only over project's lifespan	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> The operator of the wind energy facility should be encouraged to, as far as possible, procure materials, goods and products required for the operation of the facility from local suppliers to increase the positive impact in the local economy 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> Improved energy supply in the country Reduced carbon emissions in generation of electricity If other wind energy facilities proposed to be established in the Eastern Cape are approved, together with the Plan 8 project, sufficient economies of scale could be created to establish new businesses in the local economies. These businesses could then supply the goods and services required for the operation and maintenance of the facility than cannot currently be procured in the area. This would contribute to the local economies' growth and development 		
<i>Residual Impacts:</i>		

- None foreseen at this stage

b) Creation of sustainable employment positions nationally and locally

The proposed facility is anticipated to create new 36 permanent employment positions once fully operational throughout the country. This figure includes approximately 8-10 direct employment opportunities on site, translating into the creation of a total of 26 new employment positions within Makana Local Municipality. Of the direct employment positions created, 20% to 40% will be semi-skilled and unskilled labourers, the remainder being skilled and highly skilled. The skilled positions will comprise facilities managers, technicians and environmental engineers. Unskilled and low skilled staff will include positions such as security personnel.

Due to the spatial allocation of procurement spending and direct employment created, most of the indirect and induced positions will also be created within the local Makana area. The trade, agriculture and community and personal services sectors will benefit the most from these new employment opportunities.

Unlike the construction phase impacts, this is unlikely to change with the proposed amendments when compared with the original report in 2013.

<i>Nature: Creation of sustainable employment positions nationally and locally</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	52 (Medium)	52 (Medium)
<i>Reversibility</i>	Benefits are sustained only over project's lifespan	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • Where possible, local labour should be considered for employment so as to increase the positive impact on the local economy • As far as possible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the facility 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • Improved living standards of the directly and indirectly affected households 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • Experience in operating and maintaining a wind energy facility 		

c) Skills development of permanently employed workers

It is likely that the majority of the highly and semi-skilled employees required for the operation of the facility will likely to be recruited from larger Metropolitan areas and trained by the manufacturer. These employees will undertake a variety of maintenance activities throughout the lifetime of the turbines. A maintenance schedule usually involves an initial inspection after commissioning, semi-annual inspection, an annual inspection and two- and five-year inspections but this varies according to the turbine. Typical activities during maintenance include changing of oil, replacement of brake lining and cleaning of components. The continual development of these employees will add valuable skills to the municipality which is in desperate need throughout the country.

<i>Nature: Skills development of permanently employed workers</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local economy (3)	Local economy (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Low (4)	Low (4)
<i>Probability</i>	Highly probable (4)	Definite (5)
<i>Significance</i>	44 (Medium)	55 (Medium)
<i>Reversibility</i>	Yes, skills can be lost in not practiced	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> The developer should consider establishing vocational training programmes for the local labour force to promote the development of skills required by the wind energy facility and thus provide for the opportunities for these people to be employed in other similar facilities elsewhere 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> Development of new skills and expertise in the country to support the development of the wind energy industry 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> Human capital development of the affected workers 		

d) Improved standards of living for benefitting household

The creation of approximately 36 FTE positions throughout the country will generate about R 7.1 million of personal income (2018 prices), which will be sustained for the entire duration of the project's lifespan. The sustainable income generated as a result of the project's operation will positively affect the standard of living of all benefitting households. This is specifically applicable to the Makana Municipality, as the average income per employee at the facility would far exceed the average household income within the region currently. In Makana Local Municipality alone it is anticipated that total worker income to the region will increase by R 4.4 million on an annual basis.

<i>Nature: Improved standard of living for benefitting households</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local economy (3)	Local economy (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Probable (4)	Probable
<i>Significance</i>	52 (Medium)	52 (Medium)
<i>Reversibility</i>	Benefits are sustainable only over project's lifespan	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> Where possible, the local labour supply should be considered for employment opportunities to increase the positive impact on the area's economy As far as feasible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the facility 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> Improved productivity of workers Improved health and living conditions of the affected households 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> None foreseen at this stage 		

e) Sustainable increase in national and local government revenue

The annual operation and related expenditure of the proposed facility will, through property taxes, salaries and wage payments (PAYE), contribute towards both local and national government revenue in the form of a variety of tax payments i.e. to SARS and to the Local Municipality.

At a local level the project will contribute to local government through payments for utilities used in the operation of the facility. It will also increase its revenue through an increase in property taxes compared to the current levels. The land where the proposed facility is to be established is currently zoned for agricultural purposes and is used for low intensive agricultural activities. In order for the facility to proceed it is likely that the affected properties will have to be rezoned from agriculture to special purpose. This change in zoning is also likely to lead to an increase in the existing property tariff given that under the current tariff regime properties zoned for farming pay the lowest tariff rate. The increased tariff will, however, not adversely affect existing landowners, as any additional tariff brought about by the development will be borne by the developer.

Given that the Makana Local Municipality has a relatively small economy, and judging by the rates income derived by the municipalities (Makana IDP, 2018), the municipality would benefit significantly from any increase in rates revenue derived from zoning changes. This money generated can in turn be used by Makana to fund poverty alleviation and other social upliftment projects at their discretion.

On a national level, the revenue derived by the project during its operations, as well as the payment of salaries and wages to permanent employees, will contribute to the national fiscus. Although it is impossible to trace exactly how such revenue is allocated, any additional revenue generated means that national governments can increase its spending on public goods and services.

<i>Nature: Sustainable increase in national and local government revenue</i>		
	Without mitigation	With mitigation
<i>Extent</i>	National (4)	National (4)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Low (4)	Low (4)
<i>Probability</i>	Highly probable (4)	Highly probable (4)
<i>Significance</i>	48 (Medium)	48 (Medium)
<i>Reversibility</i>	Benefits are sustained only over project's lifespan	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	No	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> None suggested 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> Possible improvement in local service delivery 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> None foreseen at this stage 		

f) Local economic and social development benefits derived from the project's operations

The proposed Plan 8 Wind Energy Facility will make a notable contribution to poverty and social and community development in the area. It is anticipated that a Community Trust will be established and funded through income generated by the development. Members of this trust will be both previously disadvantaged individuals and those living close to the proposed facility. This entity will share in profits derived by the proposed project and will thus benefit financially from its activities. Government prescribes

that between 1% and 1.5% of the revenue derived by a project should be allocated towards the needs of the community (Tait, 2012). However, the intention of the developers is to contribute between 2% and 5% to such initiatives. Thus, the Community Trust’s share of the project revenue can subsequently be utilised for local social development projects. This represents extensive funding to uplift rural communities and is to be coupled with a high degree of accountability from the Department of Energy.

Furthermore, the Community Trust will be engaged in numerous local welfare projects and community development initiatives that will be directed at uplifting local people and improving their standards of living.

<i>Nature: Local community and social development benefits derived from the project’s operations</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local economies (3)	Local economies (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Moderate (6)	High (8)
<i>Probability</i>	Definite (5)	Definite (5)
<i>Significance</i>	65 (High)	75 (High)
<i>Reversibility</i>	Benefits could stretch beyond project’s lifespan	
<i>Status (positive or negative)</i>	Positive	Positive
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes (enhanced)	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> The Community Needs analysis and Assessment Report programmes and projects should be supported throughout the project’s lifespan This plan should constantly be refined in consultation with local authorities and local communities to identify community projects that would result in the greatest social benefits. These plans should be reviewed on an annual basis and, where necessary, updated When identifying enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises In devising the programmes to be implemented through the Community Trust allocations, the developer should take into account all updates to the Makana’s Integrated Development Plans and Local Economic Development Strategies. 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> Declining levels of poverty in Makana Local Municipality. Improved standards of living of the members of the Community Trust and households that benefit from the trusts programmes Possible improvements in access to services and status of local infrastructure 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> None foreseen at this stage 		

5.3.2 Negative impacts during operations

a) Negative changes to the sense of place

The effects on the community’s sense of place will initially be felt during the construction period and will continue into the operational phase. 68% of respondents to the survey indicated that they had concerns about negative changes to the area’s sense of place (in relation to its function as a tourism destination).

This must however, be counterbalanced by the fact that the operation of the facility may be seen by other members of the wider community as contributing positively towards a more sustainable or ‘green’ future through an increase in the use of renewable energy sources. Such positive sentiment may in itself create opportunities for tourism (e.g. educational tours by schools from the area).

It is important to note that the surveys conducted in 2018 indicated that 38% of the respondents were not in favour of the WEF because of the change in sense of place. This is notably lower than the previous survey conducted in 2013 which had 50% of the respondents with negative feedback. This indicates a generally more favourable view towards the development by respondents.

<i>Nature: Impact on the sense of place experienced by the local community as a result of visual and noise effects that appear during the operation phase</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Site surrounding area (2)	Site surrounding area (2)
<i>Duration</i>	Long Term (4)	Long Term (4)
<i>Magnitude</i>	High (8)	Moderate (6)
<i>Probability</i>	Definite (5)	Highly probable (4)
<i>Significance</i>	70 (Medium)	48 (Medium)
<i>Reversibility</i>	Possible to reverse but only with decommissioning	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> • The mitigation measures proposed by the visual and noise specialists should be adhered to • Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during construction 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> • Change in perception of the area due to the operation of other wind turbine developments in the surrounding area 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> • Altered characteristics of the environment • Change in the perception of tourists of the local environment 		

b) Negative impact on local tourism, game farm/hunting and associated industries

The negative effects on the local tourism and game farming industry are expected to be created during the construction phase of the development. Such negative impacts are expected to ensue as a result of noise and most importantly visual disturbance, which will alter the natural and cultural landscape features of the environment and subsequently the experience of visitors to local tourism destinations and game farms. The full extent of the negative impact will, however, most probably be achieved during the operational phase of the project when the word about the proximity of the project to local game farms spread amongst potential tourists and repeat visitors.

Proposals for WEF developments commonly receive resistance from the tourism and game farming/hunting industry, who believe such developments are likely to adversely affect the tourism potential of an area. Several issues are raised by these stakeholders including the visual impact of the wind turbines on the scenery; the cumulative effect of providing bad publicity to an area; and the detrimental effects on birds and other wildlife (especially for companies offering outdoor activities) (NFO WorldGroup, 2003). The visual impact of WEFs causes the greatest concern for local tourist companies – especially in countries known for their natural environment (NFO System Three, 2002). Tourism companies, who in addition to being concerned about the actual turbines, also express concern about additional infrastructure linked to the proposed WEF i.e. roads and cabling (NFO System Three, 2002). This supporting infrastructure is also seen as having a negative visual affect. A number of these concerned tourism stakeholders however, believe that these adverse visual impacts can be mitigated through having WEFs “sensitively sited” so as to avoid important tourism sites (NFO System Three, 2002).

People have also expressed positive perceptions about WEF development within their area. Some studies have suggested that WEFs themselves can actually act as tourism attractions in themselves and can increase “green tourism” in the area (AusWEA, 2003; NFO WorldGroup, 2003; BWEA, 2006; CanWEA, 2008). Another survey found that WEFs can have a positive effect on tourism by enhancing the reputation of a region or country as an environmentally friendly destination (NFO System Three, 2002). In addition, WEFs can also bring temporary visitors and possibly create access to more remote areas thereby providing some revenue to these areas (NFO System Three, 2002; NFO WorldGroup, 2003).

Determining how WEFs directly affect the tourism industry is therefore very difficult, and thus many authors and organisations are of the opinion that it is not possible to draw conclusions. As a result, many surveys have been conducted with tourists to determine how the sight of WEFs affected their visit to the area. It should be noted that most of these surveys bear out the finding that a significant number of tourists (between 70% and 91%) are not overly concerned by the presence of WEFs (NFO System Three, 2002; NFO WorldGroup, 2003; BWEA, 2006). No studies that look specifically at the impact of WEFs on hunting-based tourism (as found in the Makana area) in a South African context have been undertaken, however.

Besides direct effects, business activities generate production- and consumption-induced effects. Any decline in business sales would, then, lead to a decrease in demand through backward linkages that stimulate production-induced impacts. This could potentially stimulate a decline in the consumption effect through salaries and wages earned by employees. It is estimated that every R 1 spent in the game farming industry R 1.02 of new business sales are created elsewhere in the economy through both indirect and induced impacts. The production multiplier for the tourism industry is estimated at R 1.96 for every R 1.00 spent by domestic tourists, and R 1.90 for every R 1.00 spent by international tourists (Saayman, Saayaman & Naude, 2000).

The potential losses to the local tourism and taxidermy industry need to be considered as part of the proposed WEF development. Since one of the drivers of these losses could be the altered aesthetics and visual resources of the area, mitigation of this impact should be focused on addressing these aspects (i.e. the focus should be on the cause rather than the effect). This means that mitigation measures to reduce the potential impact on the local tourism and associated industries would need to comprise the measures suggested by the visual specialists.

It should be acknowledged that it will not be possible to mitigate all visual impacts, given the size and extent of the development. In certain cases, the developer should engage with the owner of the affected farm to find a solution that is acceptable to both parties.

<i>Nature: Impact on the local tourism, game farm/hunting industry and associated activities due to the altered visual and aesthetic environment experienced during the operational phase</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local economies (3)	Local economies (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	High (8)	Moderate (6)
<i>Probability</i>	Probable (3)	Probable (3)
<i>Significance</i>	45 (Medium)	39 (Medium)
<i>Reversibility</i>	Possible to reverse with decommissioning	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		

<ul style="list-style-type: none"> • It is advisable to consult owners of the game farm/hunting establishments during the design and construction process to take into account their requests with respect to mitigation of long-term visual disturbances and come up with practical solutions that would be acceptable to both parties • The mitigation measures proposed by the visual specialists should be adhered to • The mitigation measures proposed by the noise specialists should be adhered to
<p><i>Cumulative impacts:</i></p> <ul style="list-style-type: none"> • Change in the perception of international tourists regarding the local area’s representation as a “Wild Africa” environment and possibly the entire South Africa when compared to other destinations in Africa
<p><i>Residual Impacts:</i></p> <ul style="list-style-type: none"> • Visual impacts cannot be entirely eliminated; thus, the local industry could still experience some losses

c) Negative impact on the livelihoods of the households dependent on the local tourism, game farming/hunting and association industries

The potential decline in the number of tourists visiting local game farms is likely to reduce the revenue of these businesses. This in turn could have a negative impact on the livelihoods of the households that are directly or indirectly dependent on the tourism and game farm/hunting industry in the visually affected area. The households that could be affected include:

- *Owners of the businesses and their households:* The decrease in the number of tourists and subsequent decline in the revenue of local game farms would most likely reduce the personal income of the owners of these farms and subsequently their households. Reduced income levels would result in lower household consumption expenditure, savings or investment levels. This lower personal income translates into less business sales and business development activity elsewhere in the local economy.
- *Employees in the local game farm/hunting industry and their households, as well as households indirectly dependent on the activities on these farms:* The decline in the revenue of local game farms could have a negative impact on the number of employment positions that are created and sustained on an annual basis by these businesses. Based on a 2011 report on eco-tourism-based private game reserves in the Eastern Cape commissioned by Indalo the average employment multiplier amongst local game farms is five employment positions per R 1 million in business revenue/sales (Muir, Skowno and Kerley, 2011). If the proposed facility were to result in the loss of revenue, it could potentially be associated with the loss of employment. Alternatively, it could lead to a reduction in the salaries and wages paid to employees. Due to the multiplier effect, the decline in game farm/hunting revenue could lead to further employment losses locally and elsewhere in the country. Since these FTE positions however, represent a combination of employment person years to be lost in different sectors, it would mostly likely be translated into a decline in revenue rather than actual employment losses. Regardless of the outcome annual household earnings could decline, which will negatively affect livelihoods and worsen the standard of living of the affected households.

It is important to note that the hunting related-economy is interlinked across vertical and horizontal value chains. An example is thus given as follows:

- Properties that rear hunting animals as a sole source of income would not be negatively affected by a change in the sense of place of the area, as the activity of animal rearing itself would not be negatively affected by the construction or operation of the Grahamstown WEF.
- It may be posited that a significant percentage of properties in the area that operate solely as rearing operations for hunting purposes (without any hunting take place on the said property) do so on the basis of the growth and location of hunting activity in other farms in nearby areas.
- If such properties sell the majority of their animals to hunting operations within the affected vicinity, then a possible reduction in tourist numbers would affect the revenue of these properties

Depending on the actual effect of the facility on tourist numbers, and subsequently on the revenues of the farms, the negative effect could translate into lower income levels and social benefits of dependent households (in the best-case scenario) or into the loss of employment and support of dependent households (in the worst-case scenario).

One of the causes of these outcomes is the visual disturbance created by the facility that changes the aesthetics and visual resources of the environment. Some of these factors can be mitigated and any measures aimed at reducing the visual effect and preserving the “Wild Africa” image of the area should be considered and implemented where feasible.

<i>Nature: Impact on the livelihoods of households dependent on the local tourism, game farming/hunting and related industries (directly or indirectly)</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local economies (3)	Local economies (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	High (8)	Low (4)
<i>Probability</i>	Highly probable (4)	Probable (3)
<i>Significance</i>	60 (High)	33 (Medium)
<i>Reversibility</i>	Possible to reverse, but only after decommissioning	
<i>Status (positive or negative)</i>	Negative	Negative
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> Implement all measures suggested to mitigate the impact on the sense of place In the case when employees of nearby farms are retrenched, and a strong causal link can be established between the retrenchments and the project activities, the developer should assist the retrenched workers to find alternative employment by either recruiting them to work at the facility or assisting them through the enterprise development programme and/or social development funding allocations prescribed by government In order to avoid exerting a negative impact on the families dependent on the game farming/hunting industry and any other household that could be affected by the project, the developer should seek to partner with the various game farms to support affect families and ensure that the aid given to them is retained 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> Worsening of the unemployment situation in the area Possible increase in local poverty levels Stronger alienation towards future developments in the area 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> Possible income losses for the farm owners 		

5.4 DECOMMISSIONING PHASE IMPACTS

Upon the expiry of the Grahamstown WEFs lifespan the facility would need to be dismantled, although the developer has indicated that ideally the facility would be upgraded in order to maintain and prolong the lifespan of the facility.

If the facility is decommissioned, the land will be rehabilitated in order to return it to pre-project conditions. This also means that all impacts whether positive or negative, which take place during the operational phase will cease to exist. At the same time spending on the disassembly of the components and rehabilitation of land will increase the demand for construction services and other industries, thus stimulating economic activity in the local area, albeit over a temporary period.

Socio-economic impacts stimulated during the decommissioning phase are expected to be similar to those that took place during the construction phase. They will also be temporary in nature, but most likely will take a much shorter time than the construction phase. They will also be associated with some expenditure, although it will be considerably less than the investment required during the development phase. Besides the positive impacts on production, employment, household income and government revenue that could ensue from the project, some negative impacts could also occur. These would largely be related to a slight increase in noise in the area surrounding the site, increase in traffic congestion and concerns over local safety and security due to a greater number of people accessing the area.

All of the positive impacts can be enhanced to increase the benefits to the local communities, while the negative impacts could be mitigated. Mitigations and enhancement measures suggested for the construction phase would apply.

The proposed amendments are unlikely to change the overall decommissioning phase impacts. These impacts will be similar to those presented in 2013.

5.5 NET EFFECT AND TRADE-OFF ANALYSIS

The review of the proposed amendments to the approved Grahamstown WEF is associated with both positive and negative socio-economic impacts. In order to assess whether the project is beneficial, the additions to the environment brought about by the project need to be evaluated. The additional benefits of the intervention are the difference between the reference case position (i.e. the no-go option) and the position if the intervention is implemented. It involves the evaluation of the net effect and trade-offs associated with the proposed intervention.

Tables 11 and 12 provide summaries of the construction and operational phase socio-economic gains and losses that are expected to ensue from the project

5.5.1 Construction

Table 11: Summary of construction phase impacts

Factor	Nature	Significance without mitigation / 100	Significance with mitigation / 100
Temporary stimulation of national & local economy	Positive	60 High	60 High
Temporary increase in employment in national and local economy	Positive	56 Medium	56 Medium
Contribution to skills development in the country and in the local economy	Positive	39 Medium	52 Medium
Temporary improvement of the standard of living of the positively affected households	Positive	36 Medium	36 Medium
Temporary increase in government revenue	Positive	40 Medium	40 Medium
Impact on the sense of place experienced by the local community as a result of visual and noise effects that appear during the construction phase	Negative	48 Medium	44 Medium
Impact on the local tourism and game farming/hunting industry that ensue during the construction phase as a result of noise and visual effects	Negative	52 Medium	30 Low

Factor	Nature	Significance without mitigation / 100	Significance with mitigation / 100
Temporary increase in social conflicts associated with the influx of construction workers and employment seekers to the area	Negative	30 Low	6 Low
Added pressure on economic and social infrastructure during construction as a result of increase in local traffic and in migration of construction workers	Negative	32 Medium	18 Low
Impact on real estate dynamics and business activity in the immediately affected area	Negative	60 High	39 Medium

From an economic perspective direct, indirect and induced impacts on a national level resulting from the construction of the WEF are expected to outweigh losses in revenue and property value for the tourism sector on a local level. Construction of the WEF will also temporarily contribute positively to employment, skills development, government revenue and household income. Construction will, however, create socio-economic disbenefits to the local community through disruptions to the area’s sense of place, property values and the local tourism sector.

5.5.2 Operation

Table 12: Summary of operation phase impacts

Factor	Nature	Significance without mitigation / 100	Significance with mitigation / 100
Sustainable increase in production and GDP-R nationally and locally	Positive	52 Medium	52 Medium
Creation of sustainable employment positions nationally and locally	Positive	52 Medium	52 Medium
Skills development of permanently employed workers	Positive	44 Medium	55 Medium
Improved standards of living for benefiting household	Positive	52 Medium	52 Medium
Sustainable increase in national and local government revenue	Positive	48 Medium	48 Medium
Local community and social development benefits derived from the project’s operations	Positive	65 High	75 High
Impact on the sense of place experienced by the local community as a result of visual and noise effects that appear during the construction phase	Negative	70 High	48 Medium
Impact on the local tourism, game farming/hunting and associated activities due to the altered visual and aesthetic environment experienced during the operational phase	Negative	45 High	39 Medium
Impact on the livelihoods of households dependent on the local tourism, game farming/hunting and related industries (directly or indirectly)	Negative	60 High	33 Medium

The operation of the project is associated with multiple negative impacts on the local tourism sector as well as its downstream linked activities. The sense of place of the area will also be negatively affected. This in turn is linked to livelihoods based on the tourism value chain.

In operation the WEF will however, contribute significantly to national production and income and gains attributable to this investment will outweigh losses from risks posed to the tourism sector.

5.5.3 Decommissioning

The impacts that can occur during decommissioning would be similar to those observed during the construction phase. These impacts would however, be experienced over a much shorter period and would be associated with significantly lower gains. Some impacts on the local infrastructure and the lives of the communities in the area could take place, however, they will also be short lived. Overall, the trade-offs between positive and negative impacts would be small.

CHAPTER 6 RECOMMENDATIONS

The proposed amendments to the original design of the WEF proposed by Plan 8 are not likely to change the overall recommendations presented in the August 2013 SEIA (impact in terms of extent, duration, magnitude etc.). The proposed amendments have increased the overall positive impact on the economy during construction and operation as well as the number of FTE positions required during construction. The development will now inject a larger proportion of spend into the local economy which will create significant downstream impacts as presented in section 4 and 5.

Based on survey responses regarding visitor statistics, potential production losses to the local tourism sector associated with visual exposure are estimated at between R 0.1 million and R 6.8 million per year. These are to be compared with the proposed WEF's once-off direct capital injection of R 124 million into the Makana Local Economy. This is estimated as potentially creating a further R 187 million for the local economy through indirect and induced production effects and a further R 70.69 million through GDP-R impacts. Annual production impacts of the facility once operational are expected to exceed R 20 million per annum. These impacts are higher than those initially considered for the original application in 2013 when adjusted for inflation. It is also likely that because of the increasing occurrence of WEFs in the region, as well as the Eastern Cape as a whole, there may be a higher degree of acceptance of the facilities. The table below provides a summary of the key impacts.

Table 13: Comparison of no-go option to Grahamstown WEF development for operational phase

Potential annual losses from a reduction in tourist numbers (hunting included)	Total positive impacts of the operational expenditure (OPEX) in South Africa as a result of the Grahamstown WEF	Total FTE employment positions created during the operation phase of the Grahamstown WEF
<ul style="list-style-type: none"> R 0.1 million – R 6.8 million 	<ul style="list-style-type: none"> R 20.6 million – Production impact R 9 .1 million GDP-R impact 	<ul style="list-style-type: none"> 10 direct FTE positions 16 indirect FTE positions 10 induced FTE positions
	<ul style="list-style-type: none"> Impacts include the CAPEX impacts – local content 	<ul style="list-style-type: none"> Impacts include the CAPEX impacts – local content

Benefits accruing to the region from investments and activity in the tourism sector are thus outweighed by those that would arise from the construction and operation of a WEF. As such, this report finds that the positive benefits anticipated from the WEF construction and operation will outweigh any potential negative losses within the local tourism industry. This is in line with the recommendations given for the initial application in 2013.

CHAPTER 7 ENVIRONMENTAL MANAGEMENT PLAN

7.1 CONSTRUCTION PHASE

OBJECTIVE 1: Stimulate and enhance production impacts, employment impacts and benefits to households in the country, specifically in the Makana local economy during the construction phase		
Project component/s	Construction of the wind energy facility and associated infrastructure	
Potential Impact	Limited local economic benefits	
Activity/risk source	<ul style="list-style-type: none"> Construction procurement practices employed by EPC contractor Developer's investment plan 	
Mitigation: Target/Objective	Increase the procurement of local goods and services and create new employment opportunities within the local economy as well as nationally	
Mitigation: Action/control	Responsibility	Timeframes
Encourage the EPC contractor to increase the local procurement practices and employment of people from local communities (as far as feasible) to maximise the benefits to the local economies	Plan 8 Infinite	Construction period
Where possible, engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers	Plan 8 Infinite	Construction period
Organise local community meetings to advise the local labour on the planned project and what employment could potentially be applied for	Plan 8 Infinite	Construction period
Establish a local skills desk (in Makhanda) to determine the potential skills that could be sourced in the area	Plan 8 Infinite EPC contractor	Construction period
Recruit local labour as far as feasible, with a minimum of 20% of employment created for local communities	EPC contractor	Construction period
Employ labour-intensive methods in construction where feasible	EPC contractor	Construction period
Where possible, sub-contract to local construction companies	EPC contractor	Construction period
Use local suppliers where feasible and arrange with the local Small and Medium Enterprises to provide transport, catering services and other services to the construction crew	EPC contractor	Construction period
Performance Indicator	<ul style="list-style-type: none"> Developer has engaged with local authorities and business organisations (Yes/No) Percentage of expenditure on the project spent in the local communities versus nationally Percentage of person-years spent on construction by workers from the local community Number of contracts and contract values signed between the EPC contractor/Developer and local construction companies and SME's to supply goods and services directly used in construction or support the activities on site 	
Monitoring	Checklists, quarterly reports and post-construction report	

OBJECTIVE 2: Skills enhancement in the construction and manufacturing sectors in the local economy as well as in the country	
Project component/s	Construction of the wind energy facility and localisation of the project's expenditure
Potential Impact	Limited or no local expertise development

Activity/risk source	<ul style="list-style-type: none"> Construction procurement practice employed by the EPC contractor Developer’s investment plan Willingness of foreign experts to share knowledge and expertise 	
Mitigation: Target/Objective	Ensure knowledge transfer and skills development between foreign experts involved in the development and the local workforce involved directly or indirectly in the project	
Mitigation: Action/control	Responsibility	Timeframes
Facilitate knowledge and skills transfer between foreign technical experts and South African professionals during the pre-establishment and construction phases focusing on turbine component assembly and tower manufacturing	Plan 8 Infinite EPC contractor	Pre-Construction period & Construction period
Set up apprenticeship programmes for construction workers to build on existing skills or develop new skills, especially those coming from local communities	Plan 8 Infinite EPC contractor	Construction period
Performance Indicator	<ul style="list-style-type: none"> Hours spent by foreign technical experts on skills and knowledge transfer to South African based workforce Number of apprenticeships offered 	
Monitoring	Quarterly reports and post-construction final report	

OBJECTIVE 3: Reduce the visual and noise disturbances during both day time and night time

Project component/s	Construction activities associated with the wind energy facility and associated infrastructure	
Potential Impact	Changes in the sense of place that also result in the negative impact on the local tourism, game farm/hunting and associated industries	
Activity/risk source	<ul style="list-style-type: none"> Construction activities The wind turbines and associated infrastructure 	
Mitigation: Target/Objective	Reduce the visual and noise disturbances to minimise the losses in sense of place and potential decline in the business activity of the local tourism, game farm/hunting and associated industries	
Mitigation: Action/control	Responsibility	Timeframes
Natural areas that are not affected by the footprint should be retained as such and efforts should be made to avoid these areas during construction	Plan 8 Infinite EPC contractor	Construction period
Mitigation proposed by the visual and noise specialists should be adhered to and if possible, implemented during the beginning of the construction period	Plan 8 Infinite EPC contractor	Construction period
Heavy vehicles travelling on secondary roads should adhere to low speed limits to minimise noise and dust pollution and should follow the roads agreed with the property owners	Plan 8 Infinite EPC contractor	Construction period
Night-time lighting should be kept to a minimal and should be designed and positioned in such a way as to minimise the light intrusion during the night experienced from nearby properties, but without jeopardising the security and safety of the people working at the facility	Plan 8 Infinite EPC contractor	Construction period
Where possible construction activities limited to normal working hours	Plan 8 Infinite EPC contractor	Construction period

Performance Indicator	<ul style="list-style-type: none"> Meeting with the affected parties, specially local residents to determine their concerns regarding visual and noise impacts and find plausible but feasible solutions for all Adhere to mitigation measures proposed by the visual specialist (checklist) Periodic speed measurements on secondary roads
Monitoring	Checklists, quarterly reports during construction and annual report inclusive of other performance assessments during operations

OBJECTIVE 4: Reduce the possibility of an increase in crime and social conflicts in the area as well as the negative impacts associated with property damages and the loss of assets

Project component/s	Construction of the wind energy facility and associated infrastructure	
Potential Impact	Spike in crime and social conflicts due to the influx of construction workers and employment seekers into the area; property damage and the loss of assets on nearby farms	
Activity/risk source	<ul style="list-style-type: none"> Construction of the wind energy facility 	
Mitigation: Target/Objective	Reduce the chances of an increase in crime and other social conflicts in the area as well as an increase in property damage and the loss of assets	
Mitigation: Action/control	Responsibility	Timeframes
Set up a recruitment office in the nearby town (i.e. Makhanda) and adhere to strict labour recruitment practices that would reduce the desire of potential employment seekers to loiter around properties in the hope of finding temporary employment	Plan 8 Infinite EPC contractor	Pre-Construction period & Construction period
Employ locals as far as feasible through the creation of a local skills database and the recruitment of suitable candidates	Plan 8 Infinite EPC contractor	Pre-Construction period & Construction period
Control the movement of workers between the site and areas of residence with the intention of minimising loitering around the proposed facility through the provision of scheduled transportation services between areas of residence and the construction site	EPC contractor	Construction period
Ensure that any damages or losses that nearby farms experience, and which can be linked to the conduct of the construction workers, are adequately reimbursed	Plan 8 Infinite EPC contractor	Construction period
Assign a person(s) to deal with the complaints and concerns of affected parties	Plan 8 Infinite EPC contractor	Construction period
Land owners should be adequately compensated for any unforeseen damage to property or loss of assets such as livestock	Plan 8 Infinite EPC contractor	Construction period
Ensure that construction/maintenance workers do not damage property or inflict other losses to land owners and households residing on the farms	Plan 8 Infinite EPC contractor	Construction period
Negotiate terms and conditions that would guide construction/maintenance activities on the properties as well as the behaviour and conduct of the construction/maintenance crew	Plan 8 Infinite EPC contractor	Pre-Construction period & Construction period
A predefined access route to the servitude should be chosen in consultation with the land owner and should be strictly adhered to by all construction/maintenance vehicles and crews; the chosen route should follow existing roads as far as feasible	EPC contractor	Construction period
Site clearance activities should be limited to the minimum required area to minimise potential damage to the environment and property	EPC contractor	Construction period
Construction/maintenance vehicles are to follow safe speed	EPC contractor	Construction period

limits and should avoid animals inhabiting the farms		
If feasible, construction/maintenance activity should only be undertaken during working hours	EPC contractor	Construction period
Performance Indicator	<ul style="list-style-type: none"> • A recruitment office(s) is set up prior to the construction period • Percent of workers employed in construction that come from local communities • Set up transport services for construction workers between the site and main towns of residence • Assignment of a dedicated person to deal with any complaints by nearby farmers and resolve concerns including damages to property and the loss of assets • Number of complaints regarding property damage and asset losses received from the affected properties and the percentage thereof that have been resolved • Agreement between the EPC contractor and property owners regarding access to properties, access routes and compensation conditions if property is damaged or an assets lost that can be proven to be as a result of the activities of the construction crews 	
Monitoring	Checklists, quarterly reports as well as the post-construction report inclusive of other performance assessments	

OBJECTIVE 5: Address the potential adverse effects on land, property and business values		
Project component/s	Construction of the wind energy facility and associated infrastructure	
Potential Impact	Reduced land, property and business values	
Activity/risk source	<ul style="list-style-type: none"> • Development of the wind energy facility 	
Mitigation: Target/Objective	Reduce the impact on land property and business values	
Mitigation: Action/control	Responsibility	Timeframes
Meet the affected owners and discuss their concerns over property and land values as well as educate and inform them on the potential environmental impacts that could occur	Plan 8 Infinite	Pre-Construction period
Mitigation measures to reduce the impact on the sense of place should be implemented	Plan 8 Infinite	Pre-Construction period & Construction period
Performance Indicator	<ul style="list-style-type: none"> • Number of meetings and awareness campaigns conducted • List of people attending the meetings and awareness campaigns and percentage of the affected land owners attending the sessions • Surveys and appraisals of the nearby properties • Negotiate with the affected land owners; the formal agreement concerning the compensation approaches in the case where property values are negatively affected and it can be clearly linked to the facility's operation • Mitigation measures proposed to address the impacts on sense of place implemented 	
Monitoring	Checklists and reporting	

OBJECTIVE 6: Reduce the pressure on local social and economic infrastructure	
Project component/s	Construction of the wind energy facility and associated infrastructure
Potential Impact	Dilapidation of local infrastructure and a decline in the quality of service offered
Activity/risk source	<ul style="list-style-type: none"> • Movement of vehicles

	<ul style="list-style-type: none"> Influx of migrant workers and employment seekers 	
Mitigation: Target/Objective	Reduce the pressure on local social and economic infrastructure	
Mitigation: Action/control	Responsibility	Timeframes
Provide adequate signage along the N2 to warn motorists of the construction activities taking place on the site	EPC contractor	Pre-Construction period
Engage with local authorities and inform them of the development as well as discuss with them the ability of the municipality to meet the demands for social and basic services created by the migrant construction workers	Plan 8 Infinite	Pre-Construction period
Assist the municipality where feasible in ensuring that the quality of the local social and economic infrastructure does not deteriorate	Plan 8 Infinite	Construction period
Performance Indicator	<ul style="list-style-type: none"> Adequate signage along the N2 provided Established relationship with the Makana Local Municipality. Assistance provided to the Makana Local Municipality with respect to the local infrastructure through the social responsibility programme 	
Monitoring	Checklists and annual report inclusive of performance assessments	

7.2 OPERATIONAL PHASE

OBJECTIVE 1: Maximise production, employment and local community benefits		
Project component/s	Operation and maintenance activities	
Potential Impact	Loss of opportunities to stimulate production and employment in the local economy	
Activity/risk source	<ul style="list-style-type: none"> Labour and procurement practices employed during operations 	
Mitigation: Target/Objective	Maximise the production and employment benefits in the local economy	
Mitigation: Action/control	Responsibility	Timeframes
As far as possible, the operator of the wind energy facility should be encourage to procure material, goods and products required for the operation of the facility from local suppliers to increase the positive impact in the local economy	Plan 8 Infinite	Operational period
Where possible, local labour should be considered for employment to increase the positive impact on the local economy	Plan 8 Infinite	Operational period
Local SME's should be approached to investigate the opportunities for supplying the inputs required for the maintenance and operation of the facility where possible	Plan 8 Infinite	Operational period
A three-year social, and economic development programme should be devised by the developer throughout the project's lifespan	Plan 8 Infinite	Operational period
The plan should be development in consultation with local authorities as well as the community in order to identify community projects that would result in the greatest social impact	Plan 8 Infinite	Operational period
This plan should be reviewed on an annual basis and, where necessary, updated	Plan 8 Infinite	Operational period
When devising enterprise development initiatives, the focus should be on creating sustainable and self-sufficient	Plan 8 Infinite	Operational period

enterprises		
In devising the programmes to be implemented through the Enterprise Development Funds and Community Trust allocations, the developer should take into account the IDP for the Makana Local Municipality.	Plan 8 Infinite	Operational period
Performance Indicator	<ul style="list-style-type: none"> Percentage of contract values allocated to the local SME's and companies Percentage of workers that were employed from local communities A three-year social and economic development programme that takes into account local policies, priorities and needs Consultation with local authorities and communities on the social and economic needs and priorities 	
Monitoring	Checklists and annual reports inclusive of other performance assessments	

OBJECTIVE 2: Contribute to skills development in the area		
Project component/s	Operation and maintenance activities	
Potential Impact	Loss of opportunities to develop skills in operating a wind energy facility in the area	
Activity/risk source	<ul style="list-style-type: none"> Operations and maintenance 	
Mitigation: Target/Objective	Contribute to the development of skills required to operate and maintain a wind energy facility	
Mitigation: Action/control	Responsibility	Timeframes
The developer should establish vocational training programmes for the local labour force to promote the development of skills required by the wind energy industry and thereby provide opportunities for the local community to be employed in other similar facilities elsewhere around the province and the country	Plan 8 Infinite	Operational period
Performance Indicator	<ul style="list-style-type: none"> Number of people attending vocational training on an annual basis 	
Monitoring	Annual reports inclusive of other performance assessments	

OBJECTIVE 3: Reduce the visual and noise disturbances during both daytime and at night		
Project component/s	Operation and maintenance of the facility and associated infrastructure	
Potential Impact	Changes in the sense of place that also leads to negative impacts on the local tourism, game farming and associated industries	
Activity/risk source	<ul style="list-style-type: none"> Wind turbines and associated infrastructure 	
Mitigation: Target/Objective	Reduce the visual and noise disturbance to minimise the losses to the sense of place and the potential decline in business activity of tourism and game farm/hunting establishments	
Mitigation: Action/control	Responsibility	Timeframes
Natural areas that are not affected by the facilities footprint should be retained as such and avoided during operations	Plan 8 Infinite	Operational period
Mitigation proposed by the visual specialist should be adhered to	Plan 8 Infinite	Operational period
Mitigation proposed by the noise specialist should be adhered to	Plan 8 Infinite	Operational period
Performance Indicator	<ul style="list-style-type: none"> Adhere to mitigation measures proposed by the visual specialist (checklist) Routine inspection of the lighting conditions 	

	<ul style="list-style-type: none"> Annual meeting with the affected property owners
Monitoring	Checklists and annual reports inclusive of other performance assessments during operations

OBJECTIVE 4: Minimise the negative impact on households dependent on the local tourism, game farming/hunting and associated industries

Project component/s	Operation and maintenance
Potential Impact	Loss of employment and income leading to the deterioration of the standard of living of the affected households
Activity/risk source	<ul style="list-style-type: none"> Wind turbines and associated infrastructure
Mitigation: Target/Objective	Reduce the potential losses of income and employment resulting from the visual disturbances associated with the proposed facility

Mitigation: Action/control	Responsibility	Timeframes
Implement all measures suggested to mitigate the impact on the sense of place	Plan 8 Infinite	Operational period
In the case when employees of the nearby farms are retrenched and that there is a strong causal link between these retrenchments and the project's activities, the developer should assist the retrenched workers to find alternative employment by either recruiting them to work at the facility, through the enterprise development programme or through social development funding allocations prescribed by government	Plan 8 Infinite	Operational period
In order to avoid exerting the negative impact on the families dependent on the local tourism and game farming/hunting industry, the developer should seek to partner with these industries in order to support these families and ensure that the aid given to them is retained at the same level	Plan 8 Infinite	Operational period

Performance Indicator	<ul style="list-style-type: none"> Partnership agreement with local tourism and game farming businesses or other proof that indicates the support of families dependent on these industries Number of retrenched workers assisted
Monitoring	Annual reports inclusive of other performance assessments

OBJECTIVE 5: Address the potential adverse effects on land, property and business values

Project component/s	Operation and maintenance of the wind energy facility and associated infrastructure
Potential Impact	Reduced land, property and business values
Activity/risk source	<ul style="list-style-type: none"> Wind turbines and associated infrastructure
Mitigation: Target/Objective	Reduce the impact on land, property and business values

Mitigation: Action/control	Responsibility	Timeframes
Mitigation measures to reduce the impact on the sense of place should be implemented	Plan 8 Infinite	Operational period
Ensure that the periods of maintenance of the servitude are negotiated with the land owners beforehand to align it with the periods of the lowest tourist activity	Eskom	Operational period
Ensure that property owners are adequately compensated for the use of their land for hosting associated wind infrastructure	Eskom	Operational period

Performance Indicator	<ul style="list-style-type: none"> • Negotiate with the affected land owners for the formal agreement concerning the compensation approaches in the case when property values are negatively affected and it can be clearly linked to the facility's operation • Mitigation measures proposed to address the impacts on sense of place implemented • Compensation and servitude maintenance schedule agreement signed between Eskom and the owners of the land that would be traversed
Monitoring	Checklists and reporting

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-

APPENDIX I: VISUAL SPECIALIST OPINION

Plan 8 Grahamstown Wind Energy Facility

VISUAL IMPACT ASSESSMENT OF THE PROPOSED AMENDMENTS

Prepared by:

EOH

Coastal & Environmental Services

EOH Coastal & Environmental Services

The Point, Suite 408, 4th Floor
76 Regent Road, Sea Point
Cape Town, 8060
South Africa

*Also in Grahamstown, Port Elizabeth, East London,
Johannesburg and Maputo*

www.cesnet.co.za

Prepared for:

 **PLAN8**
INFINITE ENERGY

Plan 8 Infinite Energy (Pty) Ltd.

100 New Church St
Cape Town, 8001
South Africa

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REPORT TITLE:

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REPORT VERSION:

FINAL

PROJECT NUMBER:

P40700363

NAME	RESPONSIBILITY	DATE
Mr. M. Johnson	Report compilation	August 2018
Dr. A. Carter	Review and Quality control	September 2018

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THE AUTHOR AND SPECIALIST

Mr Michael Johnson, author

Michael holds a BSc in Geoinformatics, a BSc (Hons) cum laude in Geoinformatics and an MSc in Geoinformatics from Stellenbosch University. Michael’s Master’s thesis examined the use of Remote Sensing and computer vision technologies for the extraction of near-shore ocean wave characteristic parameters. For the duration of his Master’s, he was based at the CSIR in Stellenbosch. During this time, in addition to his Master’s studies, he conducted work in collaboration with the CSIR Coastal Systems Research Group and provided GIS and Remote Sensing tutoring and technical assistance to the junior staff and fellow students. Michael graduated in March 2018 and has been working for CES since.

Relevant VIA experience:

Project	Responsibility
SANBI Kwelera National Botanical Garden	Viewshed Analysis
Bayview WEF	Author
Rietkloof WEF	Author

Dr Alan Carter, reviewer

Alan is an Executive of the East London Office, and has over 25 years of experience in both environmental science and financial accounting disciplines including with international accounting firms in South Africa and the USA. He holds a PhD in Plant Sciences and a BCom Honours degree in financial accounting. Alan is a member of a number of professional bodies including American Institute of Certified Public Accountants (AICPA), South African Council for Natural Scientific Professions (SACNASP) and Institute of Waste Management South Africa (IWMSA). He is also certified as an Environmental Assessment Practitioner in South Africa (EAPSA) and as an ISO14001 EMS auditor with the American National Standards Institute. Areas of specialization include: environmental impact assessment, coastal management, waste management, climate change and emissions inventories, aquaculture, environmental accounting and auditing and visual impact assessment. Alan has been involved in numerous VIAs, where his responsibility has included author, reviewer and project leader.

Relevant VIA experience:

Project	Responsibility
Waaihoek WEF	Project Leader/Reviewer
Chaba WEF	Project Leader/Reviewer
Great Kei WEF	Project Leader/Reviewer
Tomas River WEF	Project Leader/Reviewer
Peddie WEF	Project Leader/Reviewer
Qunu WEF	Project Leader/Reviewer
Bayview WEF	Review and Quality Control
Rietkloof WEF	Review and Quality Control
Nqanakwe WEF	Project Leader/Author
SANBI Kwelera National Botanical Garden	Project Leader/ Reviewer
East London IDZ Solar PV Facility	Project Leader/ Author
Langa Energy Solar PV Facility	Project Leader/ Author
Theza Langa Solar PV Facility	Project Leader/ Author
Zulu Dam (Lusikisiki Regional Bulk Water Scheme)	Project Leader/ Author
Blacklight Solar PV Facility	Project Leader/ Author
Peddie Solar PV Facility	Project Leader/ Author

EXECUTIVE SUMMARY

Plan 8 (Pty) Ltd. received Environmental Authorisation (DEA Ref number: 12/12/20/2523) from the DEA to construct the Plan 8 Grahamstown WEF near Grahamstown in the Eastern Cape Province.

Plan 8 (Pty) Ltd. now wishes to increase the turbine size from 3 MW turbines to 4.5MW turbines, resulting in an increase in hub height (125m) and rotor diameter (149m). There have been no proposed changes in the number of turbines or the layout.

In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, as amended on 2017, Plan 8 (Pty) Ltd. wishes to apply for an amendment to the EA issued.

One of the significant environmental issues identified during the scoping phase for the previous, EIA process was the visual impact of the proposed development on the landscape. A Visual Impact Assessment (VIA), conducted by Henry Holland of Map(this), was therefore included as one of the specialist studies.

This report provides specialist input to assess the proposed changes in the context of the former 2012 VIA (amended 2013) in order to determine the visual impacts resulting from the proposed amendments. This VIA is to be read in conjunction with the original 2012/2013 VIA, as it does not repeat information that is still relevant.

From a visual impact assessment perspective, the most significant changes are the proposed increase in the hub height (91.5m to 125m) and rotor diameter (117m to 149m). Two viewsheds (one as per the EA and a second as per the proposed changes) were created, followed by an analysis looking at the number of potentially affected buildings.

The following impacts were identified and assessed:

Impact	Pre-Mitigation	Post Mitigation
Impact 1: Impact of introducing highly visible wind turbines into a rural-agricultural landscape	MODERATE-	MODERATE-
Impact 2: Intrusion of large and highly visible construction activity on sensitive viewers	MODERATE-	MODERATE-
Impact 3: Intrusion of large wind turbines on the existing views of sensitive visual receptors	HIGH-	HIGH-
Impact 4: Impact of night lights on the existing nightscape	MODERATE-	MODERATE-
Impact 5: Impact of shadow flicker	MODERATE-	LOW-

It was found that the proposed changes will increase the visibility, exposure and visual intrusion of the project. However, the proposed changes will not introduce any new visual impacts, nor significantly alter the visual impacts as assessed in the original 2012/2013 VIA Report, for which the original project received Environmental Authorisation.

Concluding Remarks

The Plan 8 Grahamstown WEF will undoubtedly impose the visual landscape for nearby visual receptors. While the HIGH residual visual impacts cannot be completely mitigated, these should be considered within the context of the following:

- The wind farm is not permanent and the turbines and other superstructure will be removed on decommissioning of the wind farm;

- The landscape can be restored through rehabilitation prior to decommissioning;
- Although limited, certain mitigation recommendations can mitigate the impacts to some extent;
- Although there are local losses in terms of visual impacts, there will also be local, regional and national environmental, social and economic gains in the form:
 - Economic investment
 - Job creation and skills development,
 - Energy security
 - Climate change mitigation
- In terms of the REIPPPP, certain benefits will accrue to:
 - Local communities through the establishment of local community trusts.
 - BBBEE partners through shareholding targets.

It is also very important to note that renewable energy (including wind) forms an integral part of the National Development Plan (NDP), both in terms of energy security and climate change mitigation.

It is concluded that potential losses of scenic resources are not sufficiently significant to present a fatal flaw to the proposed changes. Therefore, there is no reason, in terms of visual concerns, why the amended project should not receive authorisation.

TABLE OF CONTENTS

1. Introduction	171
1.1. Scope of Study	171
1.2. Limitations and Assumptions	171
1.3. Methodology	172
2. Project Description	172
2.1. Overview of Project	172
2.2. Previously-approved Project Components and Activities	173
2.3. Proposed Amendments	175
3. Description of the Environment	176
4. Assessment of the proposed changes	176
4.1. Visual impact criteria	177
4.1.1. <i>Visibility and Exposure</i>	177
4.1.2. <i>Visual Intrusion</i>	181
4.2. Significance of visual impact on the landscape	181
4.2.1. <i>Impact 1: Introduction of highly visible wind turbines into a rural-agricultural landscape</i>	181
4.3. Significance of visual impact on viewers	181
4.3.1. <i>Impact 2: Intrusion of large and highly visible construction activity on sensitive viewers</i>	182
4.3.2. <i>Impact 3: Intrusion of large wind turbines on the existing views of sensitive visual receptors</i>	182
4.3.3. <i>Impact 4: Impact of night lights on the existing nightscape</i>	182
4.3.4. <i>Shadow flicker effect</i>	183
4.3.5. <i>Cumulative visual impacts</i>	185
5. ConclusionS & Recommendations	187
5.1. Concluding Statement	188
6. References	188

LIST OF FIGURES

Figure 3: Location of the Plan 8 Grahamstown WEF	173
Figure 4: Schematic comparison of approved and proposed turbine sizes	175
Figure 5: Construction and upgrade of the N2 highway	176
Figure 6: Conceptual example of the diminishing visual effect of a wind turbine	178
Figure 7: Cumulative viewshed 1 (approved: hub height 91.5m; rotor diameter 117m)	180
Figure 8: Cumulative viewshed 2 (proposed: hub height 125m; rotor diameter 149m)	180
Figure 9: Potential shadow flicker zone in the southern hemisphere	184
Figure 8: Renewable energy projects in the general area of the proposed Plan8 WEF	186
Figure 9: Location of the proposed Albany WEF in relation to the Plan 8 WEF	187

LIST OF TABLES

Table 1: Approved coordinates of wind turbines	173
Table 2: Viewshed analyses for the two scenarios	178
Table 3: Significance of the visual impact of wind turbines on the landscape	181
Table 4: Significance of the visual impact of construction activities on sensitive viewers (as per the original 2012/2013 VIA)	182
Table 5: Significance of the visual impact of the proposed wind farm on sensitive viewers (as per the original 2012/2013 VIA)	182
Table 6: Significance of the visual impact of night lighting on sensitive viewers	183
Table 7: Significance of the visual impact of shadow flicker	185

1. INTRODUCTION

In 2011, EOH Coastal and Environmental Services (CES) was appointed by Plan 8 (Pty) Ltd. as independent environmental assessment practitioners (EAP) to conduct the Full Scoping and Environmental Impact Assessment (EIA) for the proposed Plan 8 Grahamstown Wind Energy Facility (WEF). Subsequently, in October 2015, Plan 8 (Pty) Ltd. received Environmental Authorisation (EA), dated 22 October 2015, from the Department of Environmental Affairs (DEA) to construct and operate the Grahamstown WEF. The EA authorised Plan 8 (Pty) Ltd. to develop a 66MW WEF which included authorisation to construct 22 wind turbines, each with a hub height of 91.5m above ground level and a rotor diameter of 100m-117m.

Plan 8 (Pty) Ltd. now wishes to increase the turbine size from 3 MW turbines to 4.5MW turbines, resulting in an increase in hub height (125m) and rotor diameter (149m). There have been no proposed changes in the number of turbines or the layout.

In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations 2014, as amended, Plan 8 (Pty) Ltd. wishes to apply for an amendment to the EA issued. Regulation 31 (Part 2) of the 2014 NEMA EIA Regulations states that:

“An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorisation where such change will result in an increased level or nature of impact where such level or nature of impact was not -

- (a) assessed and included in the initial application for environmental authorisation; or*
- (b) taken into consideration in the initial environmental authorisation; and the change does not, on its own, constitute a listed or specified activity.”*

As per sub-regulation (a) the proposed application for the amended changes were not considered as part of the in the initial EIA process, therefore these (potential) impacts need to be assessed according to the change in level or nature of impact.

1.1. Scope of Study

One of the significant environmental issues identified during the scoping phase for the former EIA process was the visual impact of the proposed development on the landscape. A Visual Impact Assessment (VIA), conducted by Henry Holland of Map(this) in June 2012 (amended March 2013), was therefore included as one of the specialist studies.

This report provides specialist input to assess the proposed changes in the context of the former 2012/3 VIA in order to determine the visual impacts resulting from the proposed amendments. This VIA is to be read in conjunction with the former 2012/3 VIA as it does not repeat information that is still relevant. The Terms of Reference were therefore to review the visual impacts of the proposed larger turbines, compare them with the impacts of the approved machines and, if necessary, identify new impacts and mitigation measures to be included in the EMPr.

1.2. Limitations and Assumptions

This report is based on currently available information and, as a result, the following limitations and assumptions are implicit:

- It is assumed that the project information provided by the client is accurate.

- The original 2012/2013 VIA comprehensively described the baseline information, such as description of the site and surrounding area. The emphasis of this VIA is thus placed on the impact assessment of the proposed amendments.
- Spatial data used for visibility analysis originate from various sources and scales. Inaccuracy and errors are, therefore, inevitable. Where relevant, these are highlighted in the report. Every effort was made to minimise their effect.
- The following relates to the Viewshed Calculations:
 - Calculation of the viewsheds is based on the use of the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Digital Elevation Models (DEMs) downloaded from the USGS Earth Explorer Website. These raster images have a resolution of 30 metres, which means that each pixel of the raster covers an area of 30 m x 30 m (900 m²), and is assigned a single height value.
 - Calculation of the viewsheds does not take into account the potential screening effect of vegetation and buildings. Due to the size and height of the wind turbines, and the relatively low vegetation cover in the region, the screening potential of vegetation is likely to be minimal over most distances.

1.3. Methodology

A GIS was used to calculate two viewsheds for the project. The first was based on the components that received EA and the second was based on components of the proposed changes. These viewsheds, as well as information gathered by the original 2012/2013 VIA and site photographs were used to define criteria such as visibility, viewer sensitivity, visual exposure and visual intrusion for the proposed changes. These criteria are, in turn, used to determine the intensity of potential visual impacts on sensitive viewers. All information and knowledge acquired as part of the assessment process were then used to determine the potential significance of the impacts according to the standardised rating methodology as described in the previous EIA.

2. PROJECT DESCRIPTION

2.1. Overview of Project

Plan 8 (Pty) Ltd. received EA (DEA Ref number: 12/12/20/2523) from the DEA to construct the Plan 8 Grahamstown WEF. The site is located approximately 30 kilometres from Grahamstown along the N2 in an easterly direction towards East London, in the Eastern Cape Province of South Africa.

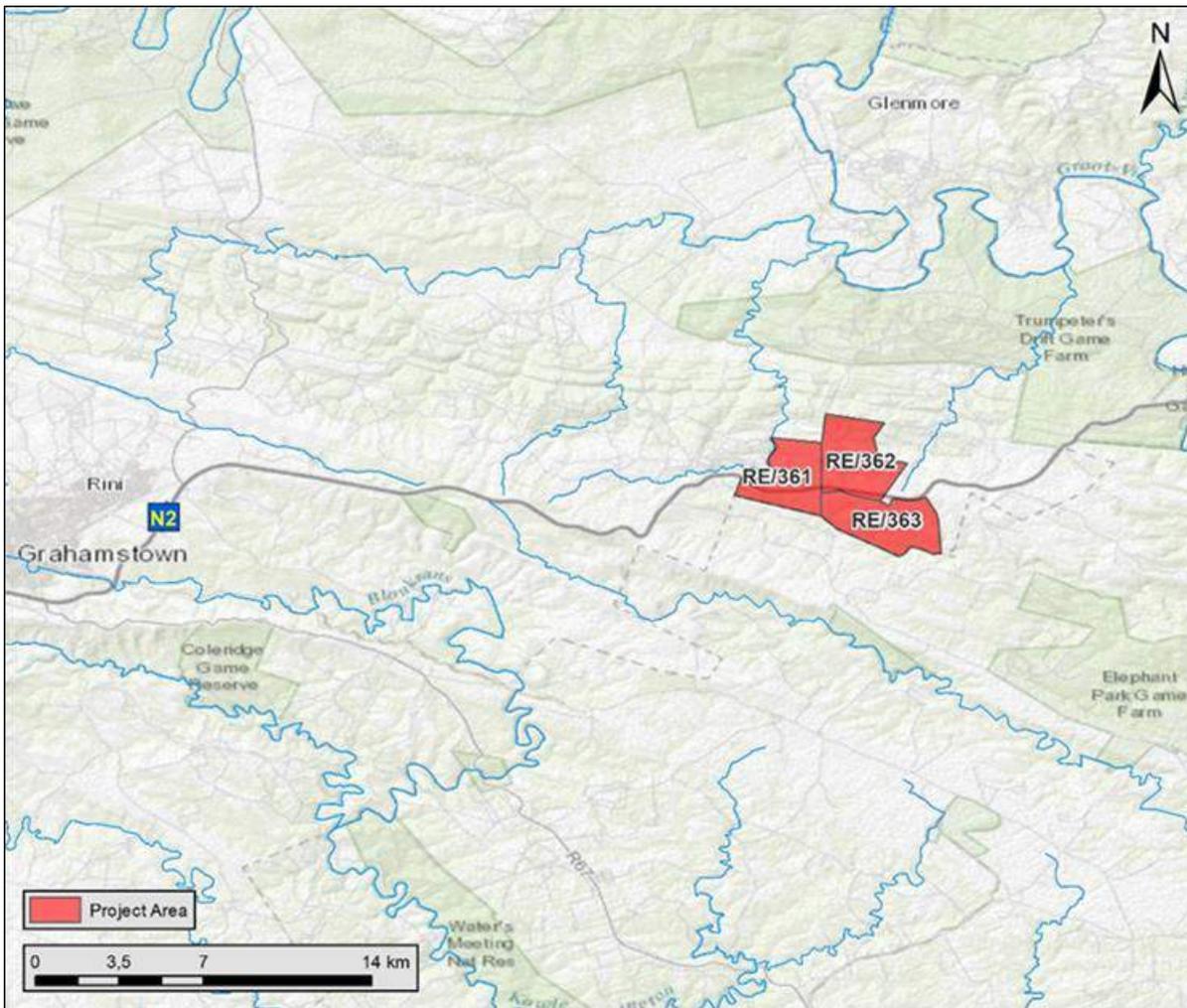


Figure 3: Location of the Plan 8 Grahamstown WEF

2.2. Previously-approved Project Components and Activities

The previously-approved components of the Plan 8 Grahamstown WEF include, the following:

- **Farm Properties**
 - Farm Gilead 361 (SG C00200000000036100000)
 - Farm Tower Hill 363 (SG C00200000000036300000)
 - Farm Peynes Kraal 362 (SG C00200000000036200000)

Total area of properties is approximately 2 550ha
- **Number of Turbines**

Up to 22 turbines
- **Turbine Locations**

Turbine locations are set out in Figure 2.4 - Layout of Project Infrastructure on a 1:50000 topocadastral map – p19, in CES 2015a, the approved EIA Report.

Table 1: Approved coordinates of wind turbines

Turbine No	Latitude (°S)	Longitude (°E)
1	33° 16' 50.06" S	26° 49' 29.08" E
2	33° 16' 48.24" S	26° 49' 47.62" E
3	33° 16' 46.58" S	26° 51' 29.70" E
4	33° 17' 08.37" S	26° 50' 12.87" E

Turbine No	Latitude (°S)	Longitude (°E)
5	33° 17' 07.94" S	26° 50' 32.60" E
6	33° 17' 34.26" S	26° 50' 38.22" E
7	33° 17' 40.50" S	26° 51' 08.92" E
8	33° 17' 29.75" S	26° 51' 52.93" E
9	33° 17' 49.21" S	26° 51' 44.26" E
10	33° 17' 41.18" S	26° 52' 06.07" E
11	33° 17' 47.59" S	26° 52' 22.01" E
12	33° 17' 53.91" S	26° 52' 32.16" E
13	33° 17' 05.47" S	26° 49' 39.80" E
14	33° 17' 02.96" S	26° 49' 55.44" E
15	33° 16' 52.52" S	26° 51' 01.32" E
16	33° 16' 57.28" S	26° 51' 22.41" E
17	33° 17' 07.54" S	26° 49' 20.57" E
18	33° 16' 11.01" S	26° 50' 11.37" E
19	33° 16' 01.21" S	26° 49' 37.07" E
20	33° 16' 07.21" S	26° 49' 52.78" E
21	33° 16' 03.14" S	26° 50' 51.31" E
22	33° 16' 07.17" S	26° 51' 06.54" E

- **Total Generating Capacity**

Each turbine 2.5–3MW; total up to 66MW

- **Hub height**

Up to 91.5m above ground level

- **Rotor Diameter**

100m–117m

- **Foundation Size:**

Plan Size: 20m x 20m

Base Thickness: 2 – 6m

- **Turbine Interconnections**

Underground cables connecting the wind turbines

- **Access and Site Roads**

Internal site roads between 4.7 and 8m wide

- **Substation**

Alternative, Option 2:

Centre point 33.276784°S, 26.831437°E

Plan area approximately 100m by 65m

- **Development Footprint (disturbed area)**

Estimated disturbed area during construction: 9.8 ha (includes roads, material laydown / hardstanding areas, turbine bases and substation)

Estimated disturbed area during operation: 7.8 ha (includes roads, turbine bases and substation)

- **Evacuation Power Line**

Alternative, Option 2:

Start: 33°16'34.59"S, 26°49'51.89"E

End: 33°16'23.56"S, 26°49'51.17"E

Connection, via 132kV overhead power line, 350m long, to existing Eskom 132kV overhead

line from Pembroke to Albany sub-station (shown in Figure 2.4, CES 15a)

2.3. Proposed Amendments

The proposed changes to the development description entail the following components:

- **Total Generating Capacity**
Each turbine up to 4.5MW; total up to 99MW
- **Hub height**
Up to 125m above ground level
- **Rotor Diameter**
Up to 149m

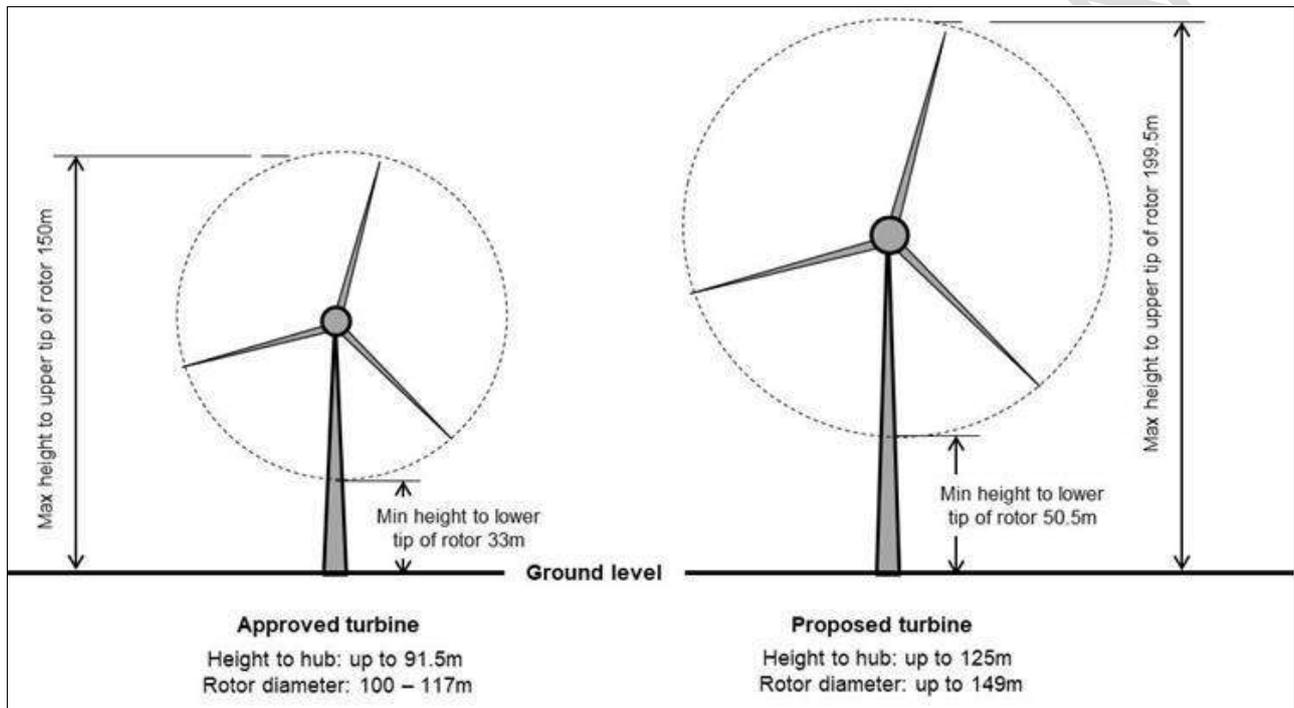


Figure 4: Schematic comparison of approved and proposed turbine sizes
(Dimensions are internally consistent)

- **Foundation Size:**
Plan Size: Circular base 26.5m diameter (area = 550 square metres)
Base Thickness: approx 3m, but depends on substrate conditions
Exposed area after rehabilitation: 6m diameter (area = 28.3m²)
- **Development Footprint (disturbed area)**
Turbine bases: 22No circular bases 26.5m dia – total area **1.21ha**
Laydown areas/hardstandings: 22No laydown areas/hardstandings 80mx50m (includes 25m² for turbine transformer) – total area **8.8ha**
Roads: 16.35km of roads average width 4.8m – total area **7.68ha**
Substation: 100mx65m (includes operations instrument/control centre and store) – total area **0.65ha**
Estimated area of disturbance for construction and operation is therefore **18.35ha** (0.72% of the total project area of 2 550 ha). This assumes that materials laydown areas/hardstandings used during construction will remain in place as hardstandings during operation to facilitate repairs and maintenance activities, including the use of large mobile cranes. The total disturbed area for the proposed amendment is about 45% greater than the approved project, which is accounted for by the increased area of the laydown areas/hardstandings and the

larger turbine bases.

From a visual impact assessment perspective, the most significant changes are those to the hub height and rotor diameter, as described above and seen in Figure 2. The assessment of these changes is therefore the focus of this report.

3. DESCRIPTION OF THE ENVIRONMENT

The description of the environment in the original 2012/2013 VIA remains the same except for the following:

- Since the original VIA by Henry Holland the construction and upgrade of the N2 national highway, which dissects the study area, has commenced.



Figure 5: Construction and upgrade of the N2 highway

4. ASSESSMENT OF THE PROPOSED CHANGES

Oberholzer (2005) notes that thresholds of significance define the level or limit at which point an impact changes from low to medium significance, or medium to high significance. These thresholds are often determined by current societal values, which define what would be acceptable or unacceptable to society and may be expressed in the form of legislated standards, guidelines or objectives. However, unlike water quality or air quality, thresholds for visual or scenic quality cannot be easily quantified, as they tend to be abstract, and often relate to cultural values or perceptions. A second difficulty is that natural, rural and urban landscapes are constantly

changing, and the assessment will therefore need to consider this in determining the significance of impacts. A third difficulty may be the divergence of opinion on what constitutes 'acceptable' change, by the individual, the community or society in general.

The visual assessment should recognise that some change to the landscape over time is inevitable with the expansion of urban areas and introduction of new technologies, such as communication masts. This will have a bearing on significance ratings, particularly in identified growth areas.

4.1. Visual impact criteria

Two viewsheds were calculated in order to assess the impacts of the proposed changes to the Plan 8 Grahamstown WEF.

- Viewshed 1 was calculated as per the EA (i.e. hub height of 91.5m and a rotor diameter of 117m)
- Viewshed 2 was calculated as per the proposed changes (i.e. hub height of 125m and a rotor diameter of 149m)

4.1.1. Visibility and Exposure

The visibility of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed size and is an indication of how much of a region will potentially be affected visually by the development. A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors.

Visual exposure is defined as the relative visibility of a project or feature in the landscape, and is related to the distance between the observer and the project. Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view (as seen in Figure 4). The visual exposure of buildings in the surrounding landscape for each scenario was calculated using the viewsheds and distances from the proposed turbines. Visual exposure is classified as follows:

- High – dominant or clearly noticeable;
- Moderate – recognisable to the viewer; and
- Low – not particularly noticeable to the viewer

In this report the following distances from the site are used as proxy for categories of exposure:

- High exposure – 0 to 5km from the development.
- Moderate exposure – 5km to 10km from the development.
- Low exposure – 10km to 20km from the development.

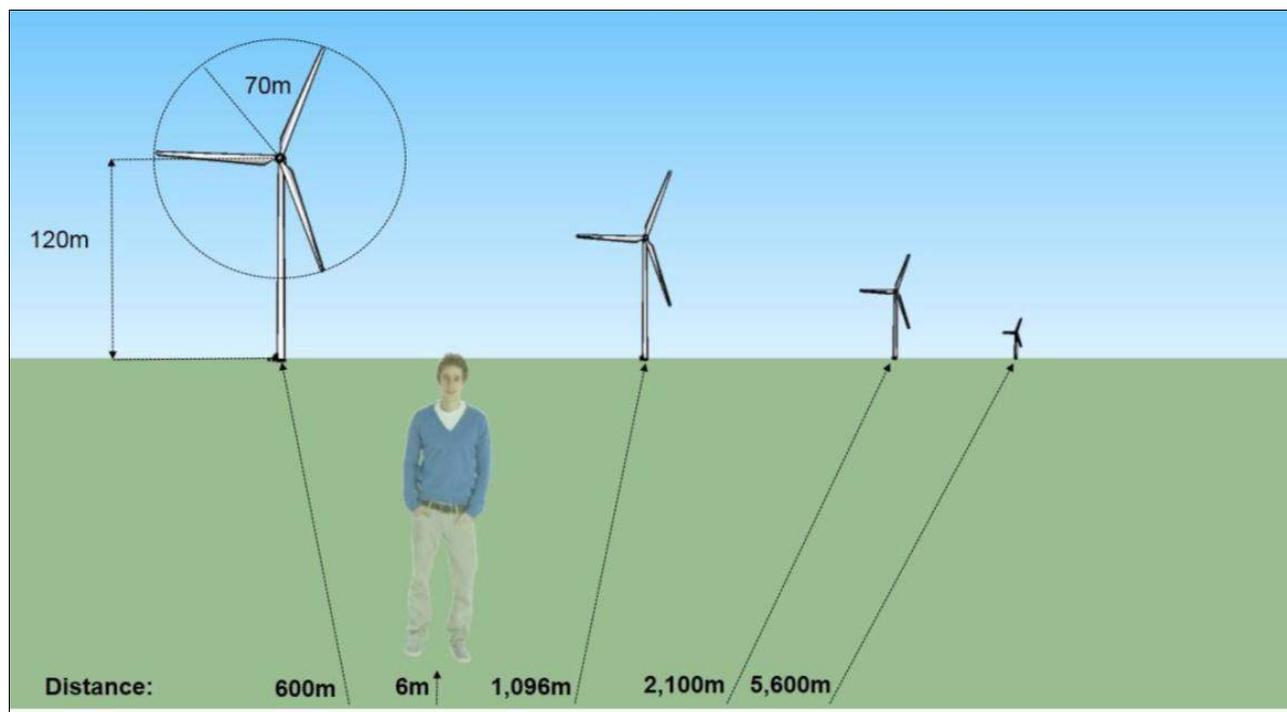


Figure 6: Conceptual example of the diminishing visual effect of a wind turbine
(120m high turbine, 140m rotor diameter)

Wind turbines are highly visible structures in most landscapes due to their height, colour (in contrast with most background colours) and motion of the blades. Their visibility is also a function of the layout and the topography of the landscape. Table 1 shows the viewshed areas for the two scenarios – approved and proposed turbine size - as well as the number of buildings² that will potentially have views of wind turbines. The screening effect of buildings and vegetation is not taken into account.

Table 2: Viewshed analyses for the two scenarios

WEF Layout	Viewshed Area (within 20 km distance from the turbines)	Visual Exposure (Number of buildings affected)			
		Low	Medium	High	Total
Viewshed 1 (approved)	490.5 km ²	2 992	122	168	3 282
Viewshed 2 (proposed)	545.2 km ²	3 331	148	184	3 663

The viewshed analysis shown in Table 1, and in the figures below (Figures 5 and 6), provides an indication of the potential effect that a change in turbine height and rotor diameter may have on the significance of visual impacts as discussed in the original 2012/2013 VIA Report. It is clear from the results that there will be an increase of approximately 55km² (an 11% increase) in viewshed area, as well as a slight increase in the number of potential sensitive visual receptors that may be highly or moderately exposed to the wind turbines.

The increase in the number of buildings (as proxy for sensitive visual receptors) for moderate and high visual exposure is mainly limited to buildings located on the surrounding farms. Many of these buildings are not residences but are other farm buildings. The most significant change occurs at distances beyond 10 km from the turbines. In general, due to topography and the number of wind turbines, an increase in turbine height will mainly affect visual receptors further away in that the

² The number of buildings was estimated using the Dwelling Frame Update dataset, 1st February to 31st March 2016, part of the South African Demographic and Health Survey, 2016, compiled by Stats SA.

rating might change from 'Not Visible' to 'Low' visual exposure. The topography of the region, although highly varied, cannot efficiently hide structures of this height and number.

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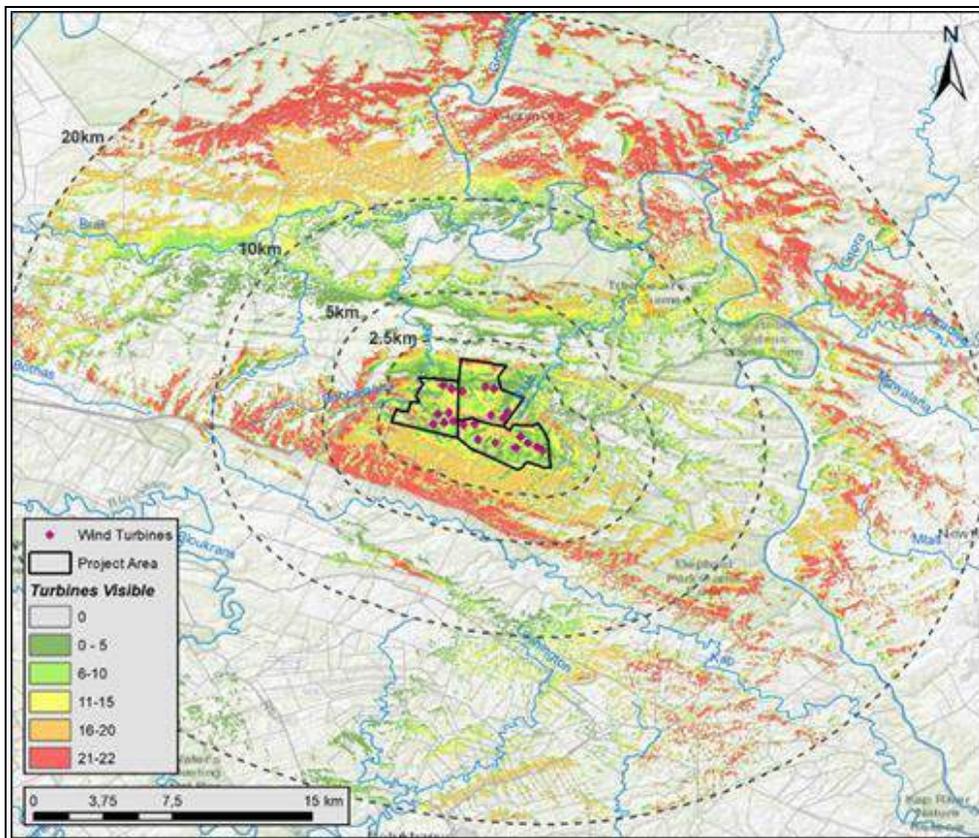


Figure 7: Cumulative viewshed 1 (approved: hub height 91.5m; rotor diameter 117m)

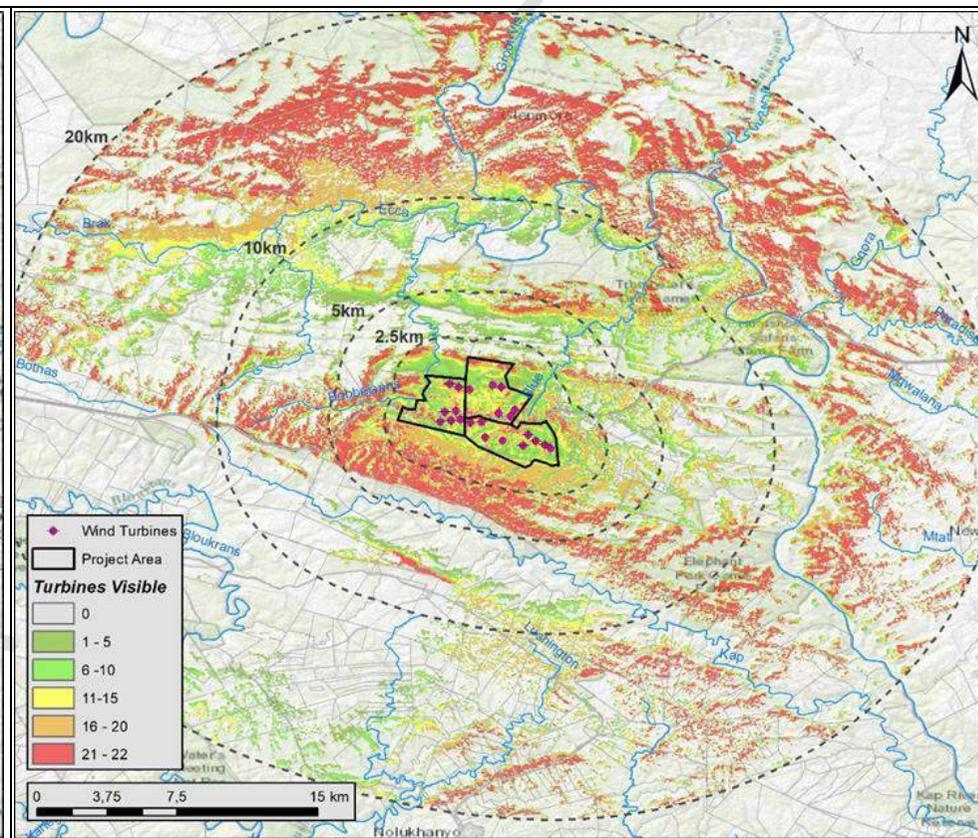


Figure 8: Cumulative viewshed 2 (proposed: hub height 125m; rotor diameter 149m)

DRAFT

4.1.2. Visual Intrusion

Visual intrusion is the level of compatibility or congruence of the project with the particular qualities of the area, or its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

- High visual intrusion – results in a noticeable change or is discordant with the surroundings;
- Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable;
- Low visual intrusion – minimal change or blends in well with the surroundings.

Sense of place is defined by Oberholzer (2005) as: 'The unique quality or character of a place ... relates to uniqueness, distinctiveness or strong identity.' It describes the distinct quality of an area that makes it memorable to the observer.

In general, the proposed increase in turbine size will increase the visual intrusion of the wind turbines as they will be more noticeable.

4.2. Significance of visual impact on the landscape

4.2.1. Impact 1: Introduction of highly visible wind turbines into a rural-agricultural landscape

The original 2012/2013 VIA identified three main landscape types: rural villages, stock and game farms, and crop farms. These were all identified as having a low sensitivity to the proposed wind farm development, since they were regarded as not pristine or prized for their natural beauty. This is because much of the land has been transformed in some way, resulting in man-made structures, activities and effects being present in most views of the landscape.

The likelihood of the impact is definite, and the overall significance is rated as Moderate negative. As mentioned in the original 2012/2013 VIA there are no mitigation measures that will change the significance of the landscape impact, other than avoiding the site entirely.

Table 3: Significance of the visual impact of wind turbines on the landscape

Impact (Operation Phase only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Regional	Moderate	Definite	Moderate Negative
With Mitigation	Long Term	Regional	Moderate	Definite	Moderate Negative

4.3. Significance of visual impact on viewers

Although the sensitivity of the general landscape in the area to changes, such as the introduction of a wind energy facility into the area, is considered to be low, the same cannot necessarily be said of all viewers/ visual receptors in the area. Sensitive viewers are considered to be residents in urban areas, rural villages and on nearby farms, visitors to scenic viewpoints and protected areas and, in this particular case, trophy hunters in game hunting areas in the surrounding area. Impacts

relate to the construction and operation phases of the project.

4.3.1. Impact 2: Intrusion of large and highly visible construction activity on sensitive viewers

The overall significance of this impact during the construction of the facility has been changed from High negative in the original 2012/2013 VIA to Moderate negative in the current VIA. This is because the temporal scale of the impact is short term, and because construction activities and large vehicles on busy roads in the region are currently a familiar occurrence and will therefore not seem out of place.. This is particularly so in the immediate vicinity of the project due to the upgrade of the N2 highway. Mitigation measures for this impact as proposed in the original 2012/2013 VIA remain relevant and must be implemented.

Table 4: Significance of the visual impact of construction activities on sensitive viewers (as per the original 2012/2013 VIA)

Impact (Construction Phase only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Short Term	Regional	Moderate	Definite	Moderate Negative
With Mitigation	Short Term	Regional	Slight	Definite	Moderate Negative

4.3.2. Impact 3: Intrusion of large wind turbines on the existing views of sensitive visual receptors

Although the proposed amendment will increase the overall size of the turbines, the changes are not sufficient to affect the overall significance of Impact 3, as described in the original 2012/2013 VIA by Henry Holland, which remains High negative. As before, there are no mitigation measures that will change the significance of the impact, other than avoiding the site entirely.

Table 5: Significance of the visual impact of the proposed wind farm on sensitive viewers (as per the original 2012/2013 VIA)

Impact (Operation Phase only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Regional	Severe	Definite	High Negative
With Mitigation	Long Term	Regional	Severe	Definite	High Negative

4.3.3. Impact 4: Impact of night lights on the existing nightscape

Wind farms are required by law to be lit at night, as they represent potential hazards to low-flying aircraft due to the height of the turbines. Marking of turbines depends on wind farm layout and not all turbines need to be lit. Marking consists of a red flashing light of medium intensity (2 000 candela).

As described in Section 4.1 the proposed changes will increase the visibility of the Plan 8 Grahamstown WEF. This will, therefore, potentially increase the number of night lights that will be visible from the surrounding areas.

While light pollution does exist in the form of single or multiple lights related to farmsteads, communication towers, vehicles travelling along the N2 and the background glow caused by towns such as Grahamstown, Peddie and the rural villages spread out along the north bank of the Fish River, the sight of a large number of closely, albeit irregularly spaced synchronised flashing lights is unique to wind energy facilities, and can be quite conspicuous, with the bright red of the lights contrasting highly with the nearly black backdrop.

The severity of Impact 4 has thus been increased from slight in the original 2012/2013 VIA to moderate in terms of the current VIA. However, the change in severity will not increase the overall significance of this impact. Mitigation measures as proposed in the original 2012/2013 VIA remain relevant and must be implemented.

Table 6: Significance of the visual impact of night lighting on sensitive viewers

Impact (Operation Phase only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Study Area	Moderate	Probable	Moderate Negative
With Mitigation	Long Term	Study Area	Moderate	Probable	Moderate Negative

4.3.4. Shadow flicker effect

Shadow flicker results from the shade cast by a wind turbine and its rotating blades. The shade cast by the blades “flicker” from the point of view of a stationary observer as the blades rotate. This is most pronounced when the shadow is cast through an opening in a building’s wall, such as a window, especially when the window is one of the main sources of light in a room.

The impact of shadow flicker caused by wind turbines appears to be a minor issue in most countries where wind farms are common. There are no official regulations governing the levels of exposure to shadow flicker, and it is unclear what, if any, the health risks may be. Most reports on shadow flicker suggest that the threshold for a significant impact is 30 hours per year or more, and many countries have adopted this as an informal regulation, following a court judgement made in Germany (EDR 2009).

England’s Companion Guide to PPS22 (2004) and Northern Ireland’s Best Practice Guidance to PPS18 (2009) state that only properties within 130 degrees either side of north of a particular

turbine can be affected by shadows (Parsons Brinckerhoff, 2011). It is therefore assumed for the purpose of this report that the situation in South Africa is opposite, that is, only properties within 130 degrees either side of south of a particular turbine can be affected by shadows.

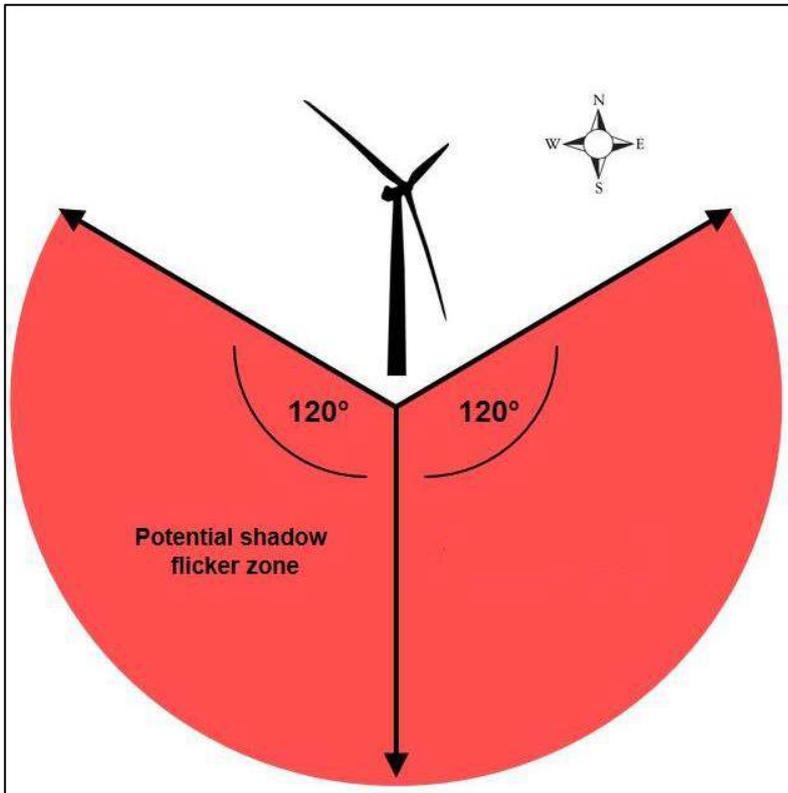


Figure 9: Potential shadow flicker zone in the southern hemisphere

When considering shadow flicker, local conditions also need to be taken into account. These include:

1. The latitude of the sight

Turbines at lower latitudes will cast longer shadows because the sun spends more time closer the horizon. In Australia the South Australian Planning Bulletin (2002) notes that shadow flicker is unlikely to be a significant issue at distances greater than 500 m. Australia lies within approximately the same lines of latitude as South Africa (South Africa: 22°S to 35°S; Australia: 10°S to 44°S).

2. The hub height

When the hub is higher, the same shadow will be spread over a larger area resulting in a reduced intensity of shadow in the vicinity of the turbine. The proposed changes to Plan 8 Grahamstown WEF are to increase the hub height from 91.5m to 125m.

3. Intervening vegetation

Vegetation may screen shadows. In the study area, vegetation is not dense or tall enough to reduce potential shadow flicker impacts.

Shadow flicker only needs to be considered relevant to buildings that are occupied most of the time: residential dwellings and places-of-work. It is not relevant to unoccupied structures, such as storage sheds. Furthermore, shadow flicker is only relevant to occupied buildings that have a window which faces the turbine. Shadow flicker cast against a wall will not impact occupants. As stated previously, it will only be a nuisance to occupants when that shadow temporarily blocks light

streaming through a window, resulting in the “flicker” effect.

According to the original 2012/2013 VIA, shadow flicker modelling indicated that only one building (a homestead) is at a slight risk of being affected more often than international guidelines suggest as the threshold (30 hours/year, or 30 minutes on the worst affected day) at which mitigation measures should be implemented to reduce the impact. Residents of the house own the property on which the turbines will be installed. As discussed above the increase in hub height is likely to cause a reduction in the severity of this impact. Therefore the proposed changes to the previously-approved Plan 8 Grahamstown WEF would not affect Impact 3 as the severity was already classified as slight in the original 2012/2013 VIA by Henry Holland. Mitigation measures proposed in the original 2012/2013 VIA remain relevant and must be implemented.

Table 7: Significance of the visual impact of shadow flicker

Impact (Operation Phase only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Study Area	Slight	May Occur	Moderate Negative
With Mitigation	Long Term	Study Area	Slight	Unlikely	Low Negative

4.3.5. Cumulative visual impacts

At the time of submission of the Second Final Amended EIA Report for the Plan 8 Grahamstown WEF, in April 2015, there were a number of facilities in the general area of the Plan 8 site that were operational (or close to operational), had been approved, or had been proposed by their developers. The facilities that were within 70km of the Plan 8 site were as follows:

Operational:

- Grahamstown Wind Energy Facility: 36km from the Plan 8 site.

Approved:

- Peddie Wind Energy Facility: 25km from the Plan 8 site.
- Canyon Springs Wind and Solar Facility: approximately 45km from the Plan 8 site.
- Uncedo Lwethu Wind Energy Facility: approximately 50km from the Plan 8 site.
- Riverbank Wind Energy Facility: adjacent to Uncedo Lwethu, approximately 50km from the Plan 8 site.
- Lushington Park WEF: approximately 65 km from the Plan 8 site.

Proposed:

- The proposed Terra Power Solutions Riebeeck East WEF (approximately 30 km away)
- The Spitskop WEF (approximately 45 km away)
- The Amakhala Emoyeni WEF (approximately 70 km away)

The locations of these facilities, and other facilities further than 70km from the Plan 8 site, are shown on Figure 8.

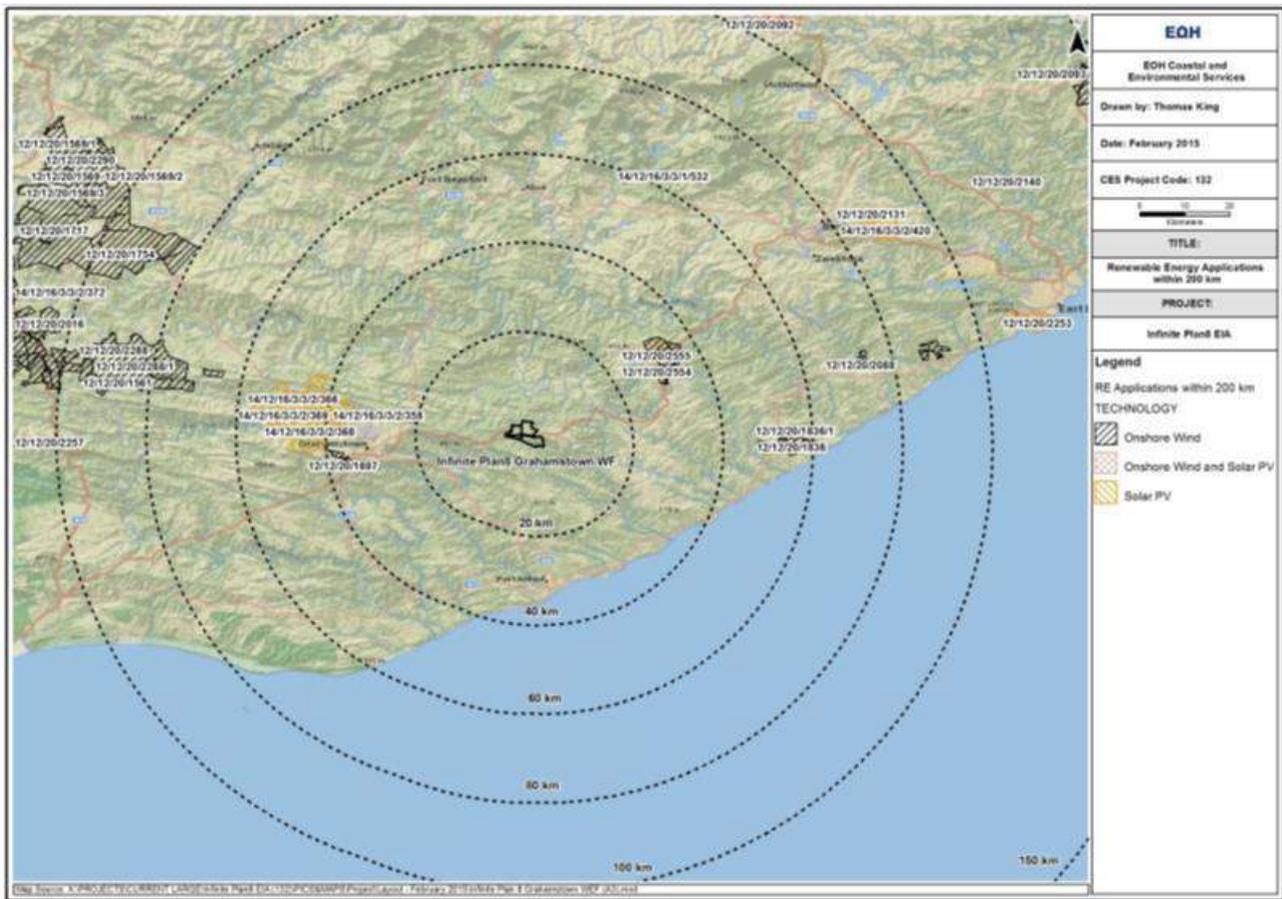


Figure 8: Renewable energy projects in the general area of the proposed Plan8 WEF

Source: Figure 7.1, Second Final Amended EIA Report, CES 2015

Since the nearest facility (the Peddie WEF) is 25km away, the contribution of the Plan 8 facility to cumulative impacts was considered to be negligible.

However, in recent months an EIA has been commenced for the proposed Albany Wind Energy Facility, the site for which is situated between the Plan 8 site and Grahamstown. The Albany facility will comprise up to 66 turbines, with a total installed capacity of up to 297MW. The hub height of the turbines is planned to be up to 150m, with blade lengths of up to 75m. The location of the proposed Albany facility in relation to the Plan 8 facility is shown on Figure 9. The closest turbines on the two sites will be separated by about 6km.

The visual impact of the Albany facility will be considerable. Given that there will be up to 66 turbines on the Albany site (compared with 22 on the Plan 8 site), and the maximum height from ground level to the tip of the blades will be up to 225m (compared with up to 199m for the Plan 8 facility), the visual impact will be significantly higher.

The cumulative visual impacts of the two facilities will be high, with the proposed Albany WEF making the largest contribution to the impact.

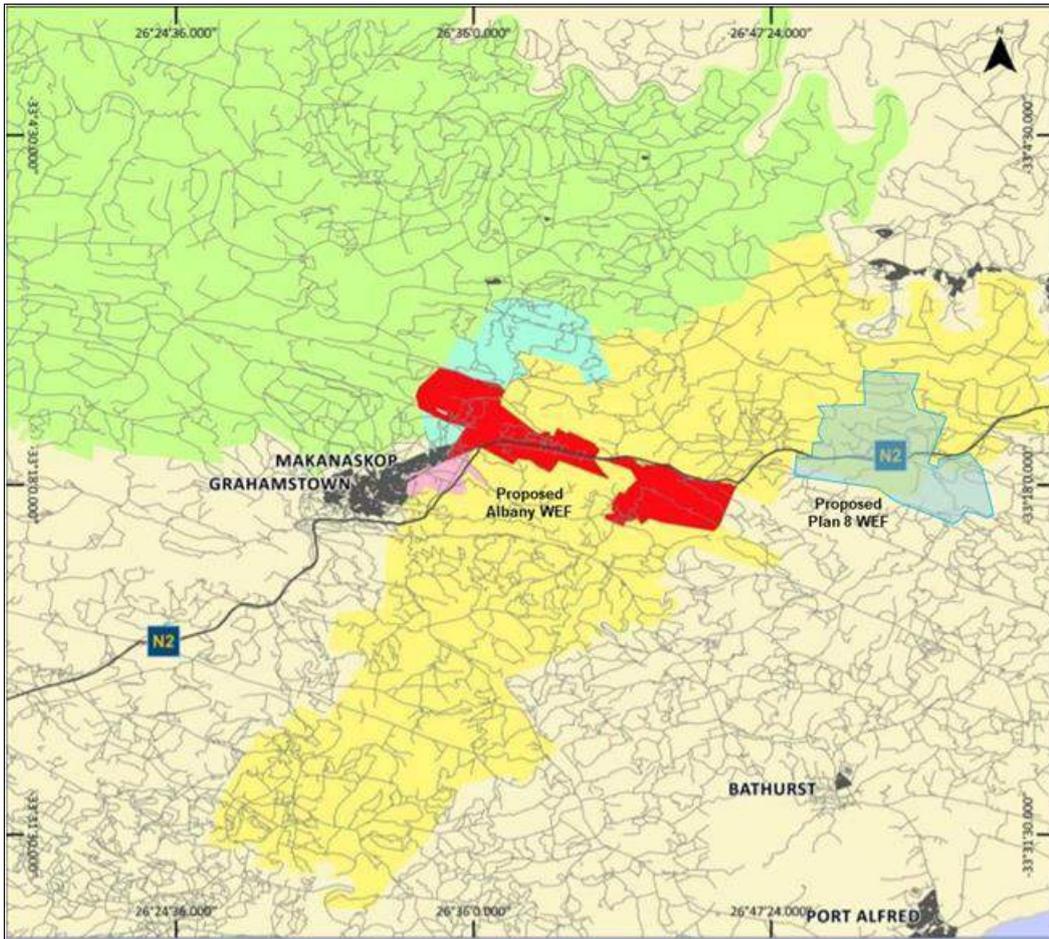


Figure 9: Location of the proposed Albany WEF in relation to the Plan 8 WEF

5. CONCLUSIONS & RECOMMENDATIONS

Plan 8 (Pty) Ltd. received EA (DEA Ref number: 12/12/20/2523) from the DEA to construct the Plan 8 Grahamstown WEF. In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, as amended. Plan 8 (Pty) Ltd. wishes to apply for an amendment to the EA issued. From a visual impact assessment perspective, the most significant changes are the proposed increase in the hub height (91.5m to 125m) and rotor diameter (117m to 149m). There have been no proposed changes in the number of turbines or the layout.

Summary of Impacts:

Impact	Pre-Mitigation	Post Mitigation
Impact 1: Impact of introducing highly visible wind turbines into a rural-agricultural landscape	MODERATE-	MODERATE-
Impact 2: Intrusion of large and highly visible construction activity on sensitive viewers	MODERATE-	MODERATE-
Impact 3: Intrusion of large wind turbines on the existing views of sensitive visual receptors	HIGH-	HIGH-
Impact 4: Impact of night lights on the existing nightscape	MODERATE-	MODERATE-
Impact 5: Impact of shadow flicker	MODERATE-	LOW-

In assessing the direct impacts to visual resources, it has been recognised that, although the lifespan of the project is likely to extend for 20-25 years, all of the components of the superstructures can be removed on decommissioning, after which the landscape will be rehabilitated back to a near natural state. This means that although the proposed facility will undoubtedly have an impact on the visual resources of the area, it does not represent a completely irreversible loss of scenic resources.

The change in turbine height and rotor diameter for the proposed Plan 8 WEF will not introduce any new visual impacts, nor significantly alter the visual impacts as assessed in the original 2012/2013 VIA Report, for which the original project received Environmental Authorisation. The changes will however increase the visibility, exposure and visual intrusion of the project.

5.1. Concluding Statement

The Plan 8 Grahamstown WEF will undoubtedly impose the visual landscape for nearby visual receptors. While the HIGH residual visual impacts cannot be completely mitigated, these should be considered within the context of the following:

- The wind farm is not permanent and the turbines and other superstructure will be removed on decommissioning of the wind farm;
- The landscape can be restored through rehabilitation prior to decommissioning;
- Although limited, certain mitigation recommendations can mitigate the impacts to some extent;
- Although there are local losses in terms of visual impacts, there will also be local, regional and national environmental, social and economic gains in the form:
 - Economic investment
 - Job creation and skills development,
 - Energy security
 - Climate change mitigation
- In terms of the REIPPPP, certain benefits will accrue to:
 - Local communities through the establishment of local community trusts.
 - BBBEE partners through shareholding targets.

It is also very important to note that renewable energy (including wind) forms an integral part of the National Development Plan (NDP) both in terms of energy security and climate change mitigation.

It is concluded that potential losses of scenic resources are not sufficiently significant to present a fatal flaw to the proposed changes. Therefore, there is no reason, in terms of visual concerns, why the amended project should not receive authorisation.

6. REFERENCES

CES 2015a: Second Final Amended Environmental Impact Assessment Report: Proposed Plan 8 Grahamstown Wind Energy Project, Makana Municipality. Volume 3, CES, Grahamstown, April 2015.

CES 2015b: Addendum to Second Final Amended EIA Report, CES, Grahamstown, April 2015.

DEA 2015: Environmental Authorisation in terms of Regulation 36 of the Environmental Impact Assessment Regulations, 2010,: Establishment of the Plan 8 Grahamstown Wind energy Facility (WEF) and its associated infrastructure within the Makana Local Municipality, Eastern Cape, Cacadu District Municipality, Department of Environmental Affairs, 22nd October 2015.

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Holland, H (MapThis). 2012. Visual Impact Assessment of Proposed Plan 8 Grahamstown Wind Energy

Facility. (Revised March 2013)

Oberholzer, B. 2005. Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Parsons Brinckerhoff. 2011. Update of UK Shadow Flicker Evidence Base - Final Report, London, England: Department of Energy and Climate Change.

Plan 8, July 2018: Personal communications via e-mail, Zuben Jessa, July 2018.

APPENDIX A: CURRICULA VITAE OF STUDY TEAM

MICHAEL JOHNSON

CONTACT DETAILS

Name of Company EOH Coastal & Environmental Services
Designation Environmental Consultant
Profession Environmental Consultant

E-mail michael.johnson@eoh.com
m.johnson@cesnet.co.za

Office number 082 746 43610

Nationality South African

Key areas of expertise

- Remote Sensing
- Geographic Information Systems

PROFILE

Michael holds a BSc in Geoinformatics, a BSc (Hons) cum laude in Geoinformatics and an MSc in Geoinformatics from Stellenbosch University. Michael's Master's thesis examined the use of Remote Sensing and computer vision technologies for the extraction of near-shore ocean wave characteristic parameters. For the duration of his Master's, he was based at the CSIR in Stellenbosch. During this time, in addition to his Master's studies, he conducted work in collaboration with the CSIR Coastal Systems Research Group and provided GIS and Remote Sensing tutoring and technical assistance to the junior staff and fellow students. Michael graduated in March 2018 and has been working for CES since.

EMPLOYMENT EXPERIENCE

Consultant, EOH Coastal and Environmental Services
May 2018 - present

Sub consultant, EOH Coastal and Environmental Services
April 2018 – May 2018

Student/Junior project researcher, CSIR
February 2016 – November 2018

Course tutor, Stellenbosch University
February 2016 – November 2018

ACADEMIC QUALIFICATIONS	Stellenbosch University, 2016- March 2018 MSc: Geoinformatics
	Stellenbosch University, 2015 BSc (Hons) cum laude: Geoinformatics
	Stellenbosch University, 2012-2014 BSc: Geoinformatics
COURSES	Rhodes University and CES, Grahamstown EIA Short Course 2017
CONFERENCE PROCEEDINGS	37th Symposium of Remote Sensing of the Environment Extracting near-shore ocean wave characteristic parameters using remote sensing and computer vision technologies March 2017
	Society of South African Geographers Student Conference Deriving bathymetry from multispectral Landsat 8 imagery in South Africa September 2016
	CSIR NRE Science week Detection of coastal ocean wave characteristics from remotely sensed imagery April 2016
CONSULTING EXPERIENCE	King Cetshwayo Environmental management Framework, 2018. -Creating, updating and mapping Landcover
	Buffalo City Metropolitan Municipality Invasive Alien Species Plan, 2018. -Mapping of alien plant species using remote sensing
	Swartland Municipality Invasive Alien Plant Species Plan, 2018. -Mapping of alien plant species
	Northcliff Nature Reserve, 2018. -Environmental Management Plan
	Bayview WEF, 2018. -Visual Impact Assessment
	Rietkloof WEF, 2018. -Visual Impact Assessment
	SANBI Kwelera National Botanical Gardens, 2018. -Viewshed analysis for visual impact study

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Michael Johnson

Date: 18th August 2018

ALAN CARTER

CONTACT DETAILS

Name of Company	EOH Coastal & Environmental Services
Designation	Executive
Profession	Environmental Consultant
Years with firm	16 Years
E-mail	alan.carter@eoh.co.za a.carter@cesnet.co.za
Office number	043-726 7809 / 8313
Nationality	South African
Professional body	SACNASP: South African Council for Natural Scientific Profession EAPSA: Environmental Assessment Practitioners Southern Africa IWMSA: Institute Waste Management Southern Africa TSBPA: Texas State Board of Public Accountancy (USA)
Key areas of expertise	Marine Ecology Environmental and coastal management Waste management Financial accounting and project feasibility studies Environmental management systems, auditing and due-diligence

PROFILE

Alan has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants (licensed in Texas) and holds a PhD in Plant Sciences. He is also a certified ISO14001 EMS auditor with the American National Standards Institute. Alan has been responsible for leading and managing numerous and varied consulting projects over the past 25 years.

Employment Experience

- October 2013 – Present: Executive (EOH Coastal & Environmental Services, East London, South Africa)
- January 2002 – September 2013: Director (Coastal & Environmental Services, East London, South Africa)
- January 1999 – December 2001: Manager (Arthur Andersen LLP, Public Accounting Firm, Chicago, Illinois USA)
- December 1996 – December 1998: Senior Accountant/Auditor (Ernst & Young LLP, Public Accounting Firm, Austin, Texas, USA.)
- January 1994 – December 1996: Senior Accountant/Auditor (Ernst & Young, Charteris & Barnes, Chartered Accountants, East London, South Africa)

Academic Qualifications

- Africa)
- July 1991 – December 1994: Associate Consultant (Coastal & Environmental Services, East London, South Africa)
- March 1989 – June 1990: Data Investigator (London Stock Exchange, London, England, United Kingdom)
- Ph.D. Plant Science (Marine) Rhodes University 1987
- B. Compt. Hons. Accounting Science University of South Africa 1997
- B. Com. Financial Accounting Rhodes University 1995
- B.Sc. Hons. Plant Science Rhodes University 1983
- B.Sc. Plant Science & Zoology Rhodes University 1982

Courses

- Environmental Management Systems Lead Auditor Training Course - American National Standards Institute and British Standards Institute (2000)
- ISO 14001:2015 Implementing Changes - British Standards Institute (2015)
- Numerous other workshops and training courses

CONSULTING EXPERIENCE

Environmental Impact Assessment, Feasibility and Pre-feasibility Assessments

- Managed numerous projects and prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc. (2002 – present).
- Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining licence /permit applications.
- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.
- Managed project for the East London Industrial Development Zone (ELIDZ) to develop a Conceptual Framework for a Mariculture Zone within the ELIDZ (2009).
- Managed pre-feasibility study to establish a Mariculture Zone within the Coega Industrial Development Zone (2014).
- Assisted City of Johannesburg in the process to proclaim four nature reserves in terms of relevant legislation (2015-2016).
- Acted as Environmental Control Officer (ECO) for numerous projects including solar and wind farms, roads, industrial processes, etc.

Strategic Environmental Assessment

- Managed Strategic Environmental Assessment (SEA) project toward the development of a Biofuel Industry in the Eastern Cape Province of South Africa (2014-2016)
- Managed Strategic Environmental Assessment (SEA) projects for two South African ports (2006 – 2007).
- Managed Strategic Environmental Assessment (SEA) projects for five (5) local municipalities in the Eastern Cape as part of the municipal Spatial Development Framework plans (2004 – 2005).
- Involved in the financial assessment of various land-use options and carbon credit potential as part of a larger Strategic Environmental

Assessment (SEA) for assessing forestry potential in Water Catchment Area 12 in the Eastern Cape of South Africa (2006).

Climate change, emissions trading and renewable energy

- Provided specialist peer review services for National Department of Environmental Affairs relating to climate change impact assessments for large infrastructure projects (2017-2018).
- Conducted climate change impact assessment for a proposed coal-fired power station in Africa (2017-2018).
- Participated in the development of a web-based Monitoring & Evaluation (M&E) system for climate change Mitigation and Adaptation in South Africa for National Department of Environmental Affairs (DEA) (2015-2016).
- Managed project to develop a Climate Change Strategy for Buffalo City Metro Municipality (2013).
- Managed projects to develop climate change strategies for two district municipalities in the Eastern Cape Province (2011).
- Conducted specialist carbon stock and greenhouse gas emissions impact and life cycle assessment as part of the Environmental, Social and Health Impact Assessment for a proposed sugarcane to ethanol project in Sierra Leone (2009 - 2010) and a proposed Jatropha bio-diesel project in Mozambique (2009 - 2010).
- Managed project to develop the Eastern Cape Province Climate Change Strategy (2010).
- Managed project to develop a Transnet National Ports Authority Climate Change Risk Strategy (2009)
- Participated in a project to develop a Renewable Energy roadmap for the East London Industrial Development Zone (ELIDZ) (2013).
- Participated in a project for the East London Industrial Development Zone (ELIDZ) and Eastern Cape Government to prepare a Renewable Energy Strategy (2009).
- Contributed to the development of Arthur Andersen LLP's International Climate Change and Emissions Trading Services (2001).
- Conducted carbon credit (Clean Development Mechanism - CDM) feasibility assessment for a variety of renewable energy projects ranging from biogas to solar PV.
- Participated in the preparation of CDM applications for two solar PV projects in the Eastern Cape.

Waste Management

- Managed project to develop Integrated Waste Management Plans for six local municipalities on behalf of the Sarah Baartman District Municipality in the Eastern Cape Province (2016).
- Managed project to develop Integrated Waste Management Plans for four local municipalities on behalf of Alfred Nzo District Municipality in the Eastern Cape Province (2015).
- Managed project to develop Integrated Waste Management Plans for eight local municipalities on behalf of Chris Hani District Municipality in the Eastern Cape Province (2011).
- Managed a project to develop a zero-waste strategy for a community development in the Eastern Cape Province (2010).
- Managed waste management status quo analysis for a District Municipality in the Eastern Cape Province (2003).
- For three consecutive years, managed elements of the evaluation of the environmental financial reserves of the three largest solid waste companies (Waste Management, Inc., Republic Services, Inc., Allied

Waste, Inc.) and number of smaller waste companies in the USA as part of the annual financial audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.

- Managed elements of the evaluation of the environmental financial reserves of the largest hazardous waste company in the USA (Safety-Kleen, Inc.), as part of the audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.

Environmental Due Diligence and Business Risk

- Participated in the
- Conducted environmental due diligence projects on behalf of the German Development Bank for a forestry pulp and paper operation in Swaziland (2010) and for a large diversified South African agricultural/agro-processing company (2011)
- Managed project for the Transnet National Ports Authority to identify the environmental risks and liabilities associated with the operations of the Port of Durban as part of a broader National initiative to assess business and financial risks relating to environmental management (2006).
- Managed project to determine the financial feasibility of various proposed tourism developments for the Kouga Development Agency in the Eastern Cape Province (2006)
- Contributed significantly to a study to determine the financial and environmental feasibility of three proposed tourism development projects at Coffee Bay on the Wild Coast (2004).
- Conducted sustainability and cost/benefit analysis of various waste water treatment options (including a marine pipeline at Hood Point) for the West Bank of East London (2004).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).
- Involved in the determination of the historical cost element of environmental remediation insurance claims for a number of multinational companies, including Dow Chemicals, Inc. and International Paper, Inc.
- Evaluated the environmental budgeting process of the US Army and provided best practice guidance for improving the process.

Policy and Guidelines

- Development of Administration / Application Fee Structure for the Reclamation of Land, Coastal Use Permits, Coastal Waters
- Discharge Permits, Dumping Of Waste at Sea, Off-Road Vehicle Regulations Promulgated in Terms of the National Environmental Management Act: Integrated Coastal Management Act (Act No. 24 Of 2008) (2017).
- Managed project to develop an Estuarine Management Plan for the Buffalo River Estuary for the National Department of Environmental Affairs (2017).
- Managed project to develop a Coastal Management Programme for Amathole District Municipality, Eastern Cape (2015 – 2016).
- Managed project to develop a sustainability diagnostic report as part of the development of the Eastern Cape Development Plan and Vision 2030 (2013).
- Managed project for the Department of Environmental Affairs and Tourism, Marine & Coastal Management to determine the cost implications associated with the implementation of the Integrated Coastal Management Act (2007).
- Managed project to develop a Conservation Plan and Municipal Open

Space System (MOSS) for Buffalo City Municipality (2007)

- Managed project to develop a Sanitation Policy and Strategy for Buffalo City Municipality, Eastern Cape (2004 – 2006).
- Managed project to develop an Integrated Environmental Management Plan and Integrated Coastal Zone Management Plan for Buffalo City Municipality, Eastern Cape (2004 – 2005).
- Managed projects to develop and implement an Environmental Management System (EMS) for the Chris Hani and Joe Gqabi (formerly Ukhahlamba) District Municipalities in the Eastern Cape generally in line with ISO14001 EMS standards (2004 – 2005).
- Managed project to develop a State of the Environment Report and Environmental Implementation Plans for Amathole, Chris Hani, OR Tambo and Joe Gqabi District Municipalities in the Eastern Cape Province (2005 – 2010).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).

Environmental auditing and compliance

- Conducted environmental legal compliance audit for various large Transnet Freight Rail facilities (2018).
- Managed projects to develop Environmental & Social Management Systems (ESMS) in line with IFC Performance Standards for three (3) wind farms in South Africa (2015-2018).
- Managed project to develop an Environmental & Social Management System (ESMS) in line with IFC Performance Standards for a telecoms company in Zimbabwe on behalf of the German Development Bank (2013)
- Participated in numerous ISO14001 Environmental Management System (EMS) audits for large South African corporations including SAPPI, BHP Billiton, SAB Miller, Western Platinum Refinery, Dorbyl Group and others (2002 – present).
- Reviewed the SHE data reporting system of International Paper, Inc. (IP) for three successive years as part of the verification of the IP SHE Annual Report, which included environmental assessments of 12 IP pulp and paper mills located throughout the USA.
- Conducted Environmental Management System (EMS) reviews for a number of large US corporations, including Gulfstream Aerospace Corporation

Public financial accounting

- While with Ernst & Young LLP, (USA), functioned as lead financial auditor for various public and private companies, mostly in the technology business segment of up to \$200 million in annual sales. Client experience included assistance in a \$100 million debt offering, a \$100 million IPO and SEC annual and quarterly reporting requirements.
- Completed three years of articles (training contract) in fulfilment of the certification requirements of the South African Institute of Chartered Accountants which included auditing, accounting and preparation of tax returns for many small to medium sized commercial entities.

Publications

Refereed Publications

- Carter, A.R. 1985. Reproductive morphology and phenology, and culture studies of *Gelidium pristoides* (Rhodophyta) from Port Alfred in South Africa. *Botanica Marina* 28: 303-311.
- Carter, A.R. 1993. Chromosome observations relating to bispore production in *Gelidium pristoides* (Gelidiales, Rhodophyta). *Botanica Marina* 36: 253-256.
- Carter, A.R. and R.J. Anderson. 1985. Regrowth after experimental harvesting of the agarophyte *Gelidium pristoides* (Gelidiales: Rhodophyta) in the eastern Cape Province. *South African Journal of Marine Science* 3: 111-118.
- Carter, A.R. and R.J. Anderson. 1986. Seasonal growth and agar contents in *Gelidium pristoides* (Gelidiales, Rhodophyta) from Port Alfred, South Africa. *Botanica Marina* 29: 117-123.
- Carter, A.R. and R.H. Simons. 1987. Regrowth and production capacity of *Gelidium pristoides* (Gelidiales, Rhodophyta) under various harvesting regimes at Port Alfred, South Africa. *Botanica Marina* 30: 227-231.
- Carter, A.R. and R.J. Anderson. 1991. Biological and physical factors controlling the spatial distribution of the intertidal alga *Gelidium pristoides* in the eastern Cape Province, South Africa. *Journal of the Marine Biological Association of the United Kingdom* 71: 555-568.

Published reports

- Water Research Commission. 2006. Profiling Estuary Management in Integrated Development Planning in South Africa with Particular Reference to the Eastern Cape. Project No. K5/1485.
- Turpie J., N. Sihlophe, A. Carter, T. Maswime and S. Hosking. 2006. Maximising the socio-economic benefits of estuaries through integrated planning and management: A rationale and protocol for incorporating and enhancing estuary values in planning and management. Un-published Water Research Commission Report No. K5/1485

Conference Proceedings

- Carter, A.R. 2002. Climate change and emission inventories in South Africa. Invited plenary paper at the 5th International System Auditors Convention, Pretoria. Held under the auspices of the South African Auditor & Training Certification Association Conference (SAATCA).
- Carter, A.R. 2003. Accounting for environmental closure costs and remediation liabilities in the South African mining industry. Proceedings of the Mining and Sustainable Development Conference. Chamber of Mines of South Africa, Vol. 2: 6B1-5
- Carter, A.R. and S. Fergus. 2004. Sustainability analysis of wastewater treatment options on the West Bank of East London, Buffalo City. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate: Pages 295-301.
- Carter, A., L. Greyling, M. Parramon and K. Whittington-Jones. 2007. A methodology for assessing the risk of incurring environmental costs associated with port activities. Proceedings of the 1st Global Conference of the Environmental Management Accounting Network.
- Hawley, GL, McMaster AR and Carter AR. 2009, Carbon, carbon stock and life-cycle assessment in assessing cumulative climate change impacts in the environmental impact process. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate.

- Hawley, GL, McMaster AR and Carter AR. 2010. The Environmental and Social Impact Assessment and associated issues and challenges. African, Caribbean and Pacific Group of States (ACP), Science and Technology Programme, Sustainable Crop Biofuels in Africa.
- Carter, A.R. 2011. A case study in the use of Life Cycle Assessment (LCA) in the assessment of greenhouse gas impacts and emissions in biofuel projects. 2nd Environmental Management Accounting Network- Africa Conference on Sustainability Accounting for Emerging Economies. Abstracts: Pages 69-70.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.



ALAN CARTER

Date: 18th August 2018

APPENDIX J: TELKOM – CONDITIONAL APPROVAL LETTER



Office of the Executive Integrated Network
Planning

Telkom SA SOC Limited

Private Bag X74

Pretoria

0001, South Africa

Tel : +27 12 311 2012

Fax : +27 12 311 1686

Email : Shawls@telkom.co.za

17 September 2018

Pan 8 Infinite Energy (Pty) Ltd
4 Bideford Rd
Woodstock
Cape Town
7925

Dear Zuben Jessa

RE: APPLICATION FOR APPROVAL OF THE GRAHAMSTOWN WIND ENERGY FACILITY

The above matter refers.

Kindly take note that Telkom SA SOC Ltd ("Telkom") has received an application from Pan 8 Infinite Energy (Pty) Ltd, hereafter referred to as THE APPLICANT, who wishes to construct a wind farm approximately 28 km east of Grahamstown with a turbines layout as defined in annexure 1, hereafter referred to as the THE SITE, in accordance with the provisions of Section 29(1) (b) of Electronic Communications Act no. 36 of 2005 ("the Act").

Telkom has analysed the information provided by the Applicant in accordance with the provisions of Section 29(1)(c) of the Act, and specifically the location of the site. Telkom SA hereby grants the Applicant the approval to proceed with the construction of its energy project at the site subject to the following terms and conditions:

- Take note that the findings made by Telkom are based on simulation and calculated on a theoretical model, using available data and assumptions where no data was provided. Therefore, such findings may change at any time should any further information be made available to or come to Telkom's attention.
- At any time after the approval, and during construction of the project, should any radio transmissions be affected by construction activities, Telkom will give the Applicant 30 (thirty) days' written notice to minimise or reduce and/or remove the cause of the interference. Under no circumstances will Telkom be liable to the Applicant or any other third party for any damages, of any nature whatsoever, suffered as a consequence of the aforementioned request.
- Construction activities underneath, along, across or within close proximity to Telkom infrastructure must comply to the applicable Telkom guidelines relating to clearances between equipment and the proposed construction activity. Furthermore, the Applicant must strictly adhere to and all installations must be fully compliant with the Occupational Health and Safety Act, 1993 (Act 85 of 1993).

Telkom SA SOC Limited: Reg no 1991/005476/30

Directors: JA Mabuza (Chairman), SN Maseko (Group Chief Executive Officer), JH Schindehütte (Chief Financial Officer), S Botha, Dr. CA Fynn, N Kapila*, I Kgaboesele, K Kweyama, L Maasdorp, K Mzondeki, F Petersen, LL Von Zeuner.

Company Secretary: X Makasi

*India

- This approval is further subject to the submitted application's boundaries or structures listed in annexure 1 below, the materials used as well as the size and positioning of structures declared in the application. If any radio system is compromised by a deviation of this submission and the deviation cannot be reversed, the Applicant shall be liable for the cost to re-establish or relocate the service and under no circumstances will Telkom be liable to the Applicant or any other third party for any damages, of any nature whatsoever, suffered as a consequence.
- This approval is valid and applicable to and between Telkom and the Applicant. It does not include approval by other electronic communication operators that have a co-sharing agreement for use on Telkom radio masts.
- Any additions, amendments, additional structures to be built or change to the energy farm boundaries will require a fresh application to Telkom.
- The validity of this approval is for a period of 12 (twelve) months. If construction of the designed project commences after the expiry of the twelve month period, the application must be re-submitted to Telkom for evaluation and approval.
- This approval does not imply any right of access to Telkom property or use of Telkom's access roads for construction or maintenance of the design project. Permission must be obtained from Telkom in this regard. Furthermore Telkom reserves the right to claim damages in terms of Section 108 of the Post Office Act No. 44 of 1958, for any loss sustained as a result of damage to our electronic communications infrastructure.
- the Applicant shall, in the carrying out of any work or project take all necessary precautions for the safety of Telkom's employees, contractors, representatives and its property including the radio links on or near the Site against damages as result of construction of the Applicant's energy project. the Applicant shall be liable for all and any direct and / or indirect, and / or consequential damages or injury that may be caused by the Applicant, its contractors, subcontractors, employees or representatives to any employee, contractor, representative or property of Telkom including radio links or land which may have been disturbed.
- Any work in connection with the construction of the Applicant's energy project shall be carried out by the Applicant, in such a way as to avoid any possible loss or inconvenience to the Telkom, its customers or the public, and on completion of such work, any property of Telkom, including radio links or land which may have been disturbed shall be restored to the same condition which it was in before commencement of the construction of energy project.
- In no event will Telkom, its employees, contractors, subcontractors or representatives be liable to the Applicant or anyone else for special, collateral, exemplary, direct, indirect, incidental, consequential or any other damages (including without limitation, loss of goodwill, loss of profits or revenues, loss of savings, loss of use, interruptions of business, and claims of the Applicant or injury) whether or not such damages or injury occurred prior or subsequent to, or are alleged as a result of any Telkom radio links approved and/or not approved in terms of this letter or as result of delict, even if Telkom SA has been advised of the possibility of such damages or injury.

We trust you find the above in order.

Regards,

Leonard Shaw Pr. Tech (Eng.)
Specialist
Integrated Network Planning

Telkom SA SOC Limited: Reg no 1991/005476/30
Directors: JA Mabuza (Chairman), SN Maseko (Group Chief Executive Officer), JH Schindehütte (Chief Financial Officer), S Botha, Dr. CA Fynn, N Kapila*,
I Kgaboesele, K Kweyama, L Maasdorp, K Mzondeki, F Petersen, LL Von Zeuner.
Company Secretary: X Makasi

Annexure 1

Telkom has one radio link running through the wind farm and one link terminating in the wind farm. These radio links supply connectivity to Vodacom sites. The link running through the wind farm connects our site at Governorskop to Vodacom's site at Radiesvlei via our equipment. The link terminating in the wind farm at Houkoers, is linked with our radio equipment to a Vodacom site at Great Fish River Vodacom site. The turbines have been placed with the required 300m clearance from the radio paths to blade tip.

A simulation was run to test the effect of any back scatter on the radio links. No effect was detected on the calculated data provided with the 22 turbines. The turbines were modelled with a 100m mast and 58,5m blades. The location of the wind turbines are given below in decimal degree on the WGS84 datum. If any dispute arises with respect to the position of these points then the Chief Directorate National Geo-spatial Information trigonometrical system will be used to verify them.

Points	Longitude	Latitude
1	26.824745	-33.280571
2	26.829895	-33.280067
3	26.85825	-33.279606
4	26.836907	-33.285657
5	26.842388	-33.285538
6	26.84395	-33.29285
7	26.852479	-33.294584
8	26.864703	-33.291597
9	26.862294	-33.297003
10	26.868354	-33.294773
11	26.872781	-33.296554
12	26.8756	-33.298307
13	26.827722	-33.284853
14	26.832068	-33.284156
15	26.850367	-33.281256
16	26.856224	-33.282579
17	26.82238	-33.285427
18	26.836493	-33.269725
19	26.822089	-33.266331
20	26.8313271	-33.268669
21	26.847585	-33.267539
22	26.851818	-33.268658

End lists

Telkom SA SOC Limited: Reg no 1991/005476/30
 Directors: JA Mabuza (Chairman), SN Maseko (Group Chief Executive Officer), JH Schindehütte (Chief Financial Officer), S Botha, Dr. CA Fynn, N Kapila*,
 I Kgaboesele, K Kweyama, L Maasdorp, K Mzondeki, F Petersen, LL Von Zeuner.
 Company Secretary: X Makasi

APPENDIX K: SENTECH – CONDITIONAL APPROVAL LETTER



Private Bag X06
Honeydew
2040
Tel: (011) 471 - 4561
Enquiries:
motlhakes@sentech.co.za

Grahamstown Wind Energy Facility
Plan 8 Infinite Energy (Pty)
4 Bideford Road
Woodstock 7925

Email: zubenj@gmail.com
Office Tel: 021 207 2180

Date: 17 September 2018

Attention: Mr Zuben Jessa

Proposed establishment of Grahamstown Wind Energy Facility

1. The above matter refers.
2. We wish to advise that Sentech SOC Ltd ("Sentech") has received an application from Plan 8 Infinite Energy (Pty) Ltd ("the applicant"), which plans to construct Wind Energy Facility (WEF) farm as described in annexure 1 hereto, at Grahamstown hereafter referred to as "Grahamstown Wind Energy Facility", in accordance with the provisions of Section 29(1) (b) of the Electronic Communications Act no. 36 of 2005 ("the Act").
3. Sentech has analysed the information provided by the applicant in accordance with the provisions of Section 29(1) (c) of the Act, and specifically the location of the site and confirm that there would be limited degradation of Sentech transmitted Terrestrial UHF/VHF Television (TV), and/or FM radio services in the planned deployment area, as indicated in annexure 1.

DIRECTORS:

Mr. M Mello (Chairperson), Mr. M Bool (CEO), Mr. S Mthethwa CA (SA) (CFO), Mr. T Leshope (COO),
Ms. J Huntley, Ms. Z Mbele CA (SA), Mr. L Mtimde, Ms. L Ndlovu, D. S Malinga, Ms T Malaka
Company Secretary: Melanie Naidoo

SENTECH SOC Ltd Reg no: 1990/001791/30

4. Sentech hereby grants the applicant approval to proceed with the construction of its energy project at the site subject to the following terms and conditions:
 - 4.1 Due to the fact that the findings made by Sentech are based on simulations and calculated on a theoretical model, using available data and assumptions where no data was provided, such findings may change at any time should any further information be made available to or come to Sentech's attention;
 - 4.2 At any time after the approval, and during construction of the project, should any radio transmissions be affected by construction activities, Sentech will give the applicant 7 (seven) day's written notice to remove the cause of the interference.
 - 4.3 Under no circumstances whatsoever will Sentech be liable to the applicant or any third party for any damages, loss or costs, of any nature whatsoever or howsoever arising, suffered as a consequence of the aforementioned request and the applicant fully indemnify Sentech ;
 - 4.4 Sentech prior written consent must first be obtained before any construction activities underneath, along, across or within close proximity to Sentech infrastructure can begin and shall comply with the applicable Sentech guidelines relating to clearances between equipment and the proposed construction activity. Furthermore, the applicant shall clearly adhere to, and ensure all installations shall be fully compliant with the Occupational Health and Safety Act No. 85 of 1993.
5. This approval is further subject to the submitted applications boundaries or structures listed in annexure 1 hereto, the materials used, as well as the size and positioning of structures declared in the application. If the services of Sentech or its clients is in any way compromised by a deviation or change of this submission, the applicant shall be liable for all costs to re-establish, or relocate the services, and under no circumstances whatsoever will Sentech be liable to the applicant or any other third party for any damages, loss or costs, of any nature whatsoever or howsoever arising, suffered as a consequence.
6. This approval is valid and applicable between Sentech and the applicant only. It does not include any approval for any of the other electronic communication operators which have current co-sharing agreements to utilise Sentech's radio masts.
7. Any additions, amendments, additional structures to be built, or any change to the energy farm boundaries, will require a new application to Sentech.
8. The validity of this approval is for a period of 12 (twelve) months. If construction of the designed project commences after the expiry of the twelve month period, the application must be re-submitted to Sentech for further evaluation and approval.
9. This approval does not imply any rights of access whatsoever to Sentech property or use of Sentech's access roads for construction or maintenance of the design project. Separate permission must be obtained from Sentech in this regard. Furthermore, Sentech reserves the right to claim damages in terms of Section 29 of the Act, for any loss or damages sustained as a result of damages to any of Sentech's electronic broadcast and communications infrastructure.
10. The applicant shall, in carrying out any work or project, take all the necessary precautions for the safety of Sentech's employees, contractors, representatives and its property, including the radio transmitters and links on or near the site against damages as a result of construction of the applicant's energy project.



11. The applicant shall be liable for all and any direct and/or indirect, and/or consequential damages or injury that may be caused by the applicant, its contractors, subcontractors, employees, agents or representatives to any employee, contractor, representative or property of Sentech including radio network transmitters and/or links or land which may have been disturbed shall be restored to the same condition in which it was before commencement of the construction of the energy project.

12. In no event will Sentech, its employees, contractors, or representatives be liable to the applicant or any third party whatsoever for special, collateral, exemplary, direct, indirect, incidental, consequential or any other damages of any nature whatsoever or howsoever arising (including without limitation, loss of goodwill, loss of profits or revenues, loss of savings, loss of use, interruptions or noisiness, or injury) whether or not such damages or injury occurred prior or subsequent to, or are alleged as a result of any Sentech radio network approved and/or not approved in terms of this letter, even if Sentech has been advised of the possibility of such damages or injury.

All Sentech rights are fully reserved.

Regards.

Mr Serame Motlhake

Date

17 SEPTEMBER 2017

Manager: Broadcast Planning

DIRECTORS:

Mr. M Mello (Chairperson), Mr. M Bool (CEO), Mr. S Mthethwa CA (SA) (CFO), Mr. T Leshope (COO),
Ms. J Huntley, Ms. Z Mbele CA (SA), Mr. L Mtimde, Ms. L Ndlovu, Dr S Malinga, Ms T Malaka
Company Secretary: Melanie Naidoo

SENTECH SOC Ltd Reg no: 1990/001791/EO

ANNEXURE 1

The planned 22 Grahamstown Wind Energy Facility (WEF) will be located in the Grahamstown area according to the developer. The wind farm will be located ± 27 Km east of Grahamstown town. Grahamstown wind farm will be located ± 11 km east of the Grahamstown transmitter station (C9) and ± 100 km south-east of Bedford transmitter station (C17).

WTG interference calculations and predictions which included 22 planned WTG's was completed, the interference calculations and predictions indicated that the WTG's will have the potential to cause limited interferences on the existing UHF TV broadcast services. Analogue services that might be affected are SABC 3 and e-TV within the Grahamstown (C9) area, and SABC 2, 3 and e-TV in the Bedford (C17) transmitter stations coverage areas.

Digital services that might be affected are Mux1 and Mux2 within the Grahamstown (C9) area, and Mux1 and Mux2 in the Bedford (C17) transmitter stations coverage areas.

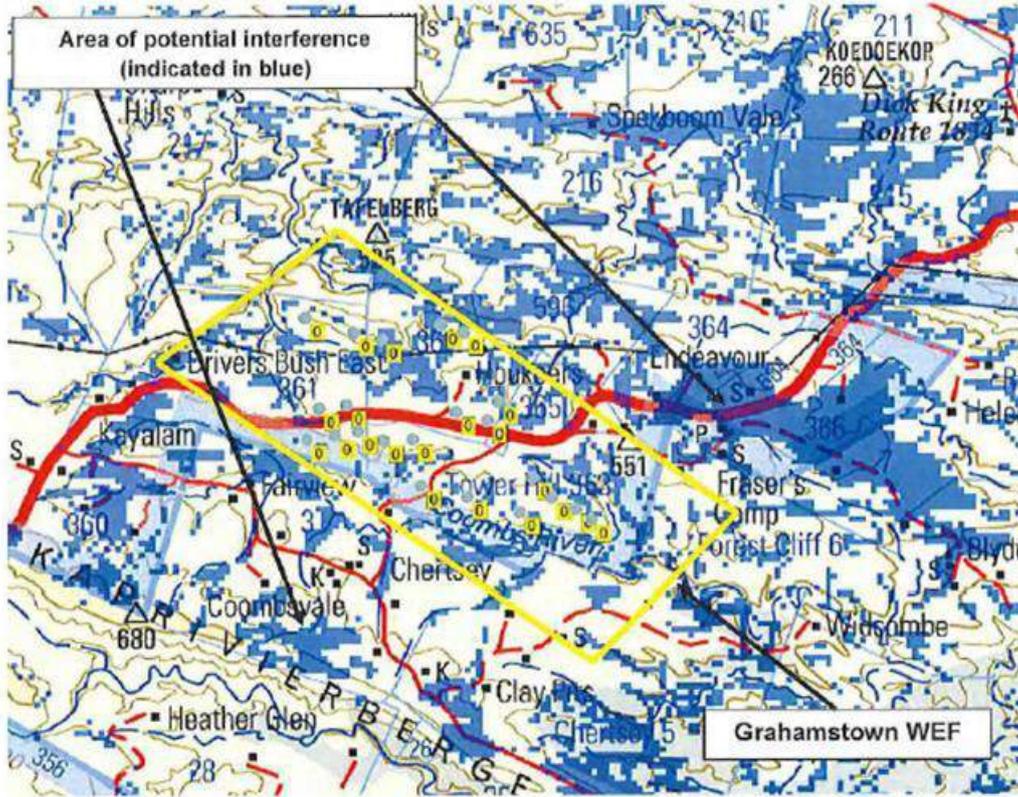
Conclusion on the results and findings of the planned 22 Grahamstown WTG's can be summarised as follow:

1. Potential interferences on analogue and DTT TV coverage will have the potential to affect the quality of viewer services in lodges (e.g. Bushmans Gorge Lodge and Coombs Lodge) and viewers staying north-east and east of the WTGs in villages namely: Ndlame, Sinqumeni, Nobumba, Ntloko, KwaGwalani and Emabaleni.
2. Most of the interferences are located in farming areas surrounding the WTG's.
3. None of the existing analogue or DTT RBR broadcast feeds in the area will be affected;
4. No interference on FM services will be experienced;
5. None of the existing FM RBR feeds broadcast feeds in the area will be affected.

The analogue and DTT service problem can technically be solved by implementing the following:

- Provide users in the interference areas with quality terrestrial TV installations with quality directional receive antennas.
- Provide viewers located in the identified potential interference areas with alternative service via Sentech's Direct-To-Home (DTH) satellite service.
- Provide additional 'gap-filling' transmitter stations to cover interference areas by using the exiting wind turbine farm infrastructure.

The potential interference problem should be discussed and an amicable solution found through a meeting amongst Sentech, the affected broadcasters SABC, Multichoice, e-TV and Grahamstown Wind Farm Company Ltd.

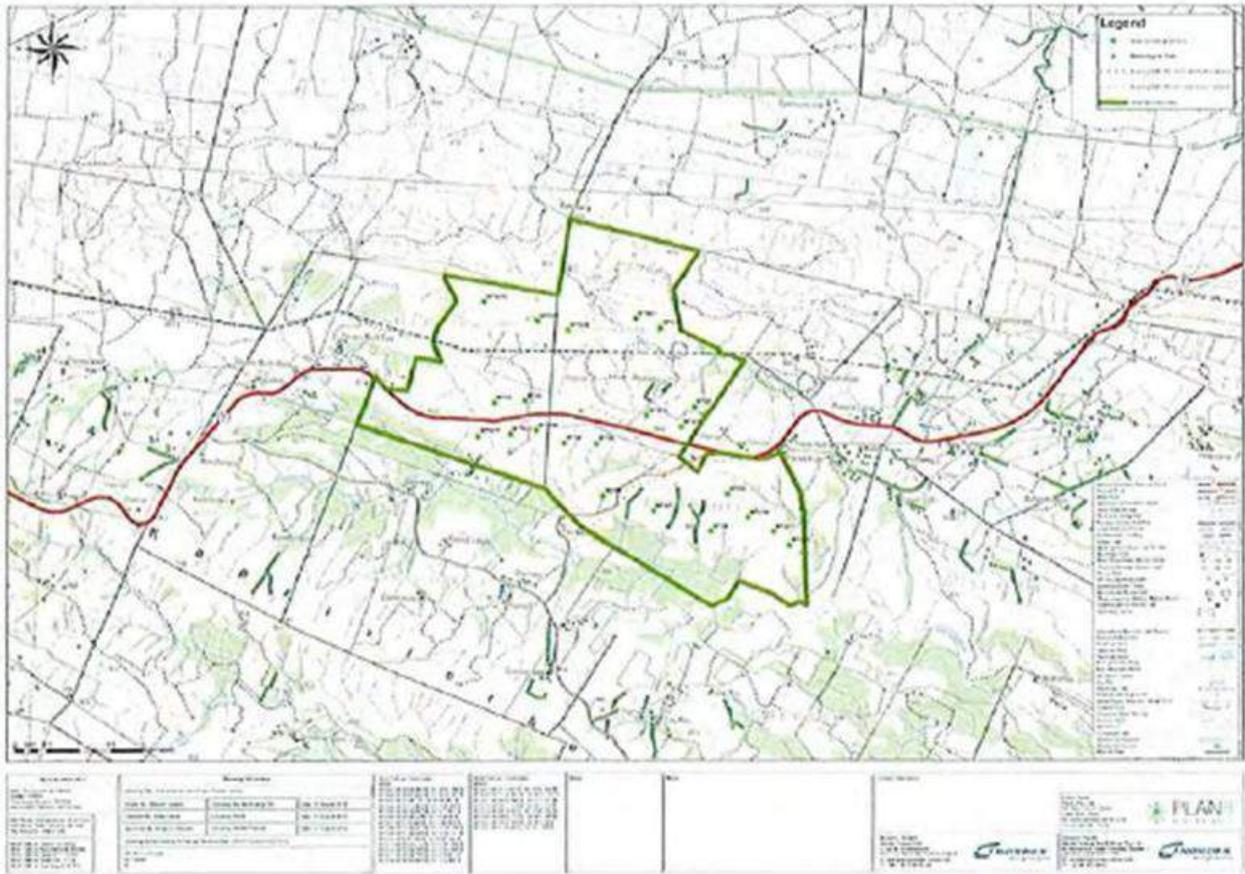


Map 1: Map indicating the cumulative interference affected area (blue) caused by 22 WTG's by both UHF TV transmitter stations (C17 & C9) coverage areas. (ATDI ICS Telecom map).

DIRECTORS:

Mr. M Mello (Chairperson), Mr. M Boozi (CEO), Mr. S Mithethwa CA (SA) (CFO), Mr. T Leshope (COO),
Ms. J Huntley, Ms. Z Mbele CA (SA), Mr. L Mtimde, Ms. L Ndlovu, Dr S Malinga, Ms T Malaka
Company Secretary: Melanie Naidoo

SENTECH SOC Ltd Reg no: 1990/001791/30



Map 2: Demarcated map indicating Grahamstown wind farm boundary area.

END DOCUMENT

DRAFT

APPENDIX L: DEPARTMENT OF MINERAL AFFAIRS APPROVAL (MPRDA S53) AND LETTER OF NO-OBJECTION FROM KAOLIN QUARRY OWNER

Note that the approval is valid for a period of five years.

DMR.10



mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X 6076, Port Elizabeth, 6000, 444 Govan Mbeki Avenue, 3rd Floor Pler 14, Port Elizabeth, 6001, Tel (041) 4036600, 3600, Ref No. EC 30/5/4/2/11049 SU, e-mail: Edwina.Stevens@dmr.gov.za, Enquiries: E.Stevens

Registered Mail
THE MANAGER
GRAHAMSTOWN WIND FARM (PTY) LTD
100 NEW CHURCH STREET
TAMBOERSKLOOF
CAPE TOWN
8001

Att: Zuben Jessa
Sir/Madam

APPLICATION FOR A SURFACE USE IN TERMS OF SECTION 53 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002) (HEREINAFTER REFERRED TO AS "the Act"): BY GRAHAMSTOWN WIND FARM (PTY) LTD ON FARM GILEAD 361, TOWER HILL 363 & PEYNES KRAAL 362, SITUATED IN THE MAGISTERIAL DISTRICT OF ALBANY.

According to the available information the proposed consolidation as shown on the accompanying plan EC 30/5/4/2/11049 SU will not interfere with mining or purposes incidental thereto. In terms of Section 53 of the Mineral and Petroleum Resources Development Act 2002 (Act 28 of 2002), we have no objection against the proposed wind farm development provided that the consent of the holders of the issued mining right and borrow pit over the same property as that of the proposed wind farm is obtained.

Should the proposed development however not be finalized within five years, you will be required to consult with this office again in respect of this matter.

Yours faithfully


REGIONAL MANAGER: MINERAL REGULATION
EASTERN CAPE REGION
DATE: 17/02/2016

Acting

Application For A Surface Use In Terms Of Section 53 Of The MPRDA, 2002 (Act 28 Of 2002): By Grahamstown Wind Farm (Pty) Ltd, Situated In The Magisterial District Of Albany, Ref No. 11049 SU ES.



AQUARELLA
INVESTMENTS 389 (PTY) LTD

AQUARELLA INVESTMENTS 389 (PTY) LTD
(Registration No. 2006/018898/07)

Farm 2
Old Potchefstroom Road
Vereeniging
Gauteng
South Africa

PO Box 2247
Vereeniging
1930
South Africa

Telephone : +27 (0)16 930 3600
Telefax : +27 (0)16 930 3650

To:- Zuben Jesse
From:- Victor Lupuwana
Date:- 08 Feb. 17

Dear Zuben,

RE -: APPLICATION FOR INSTALLATION OF WIND FARM

Aquarella Investments has no objections in your proposed development of wind farm, provided the distances specified by the regulator are adhered to.

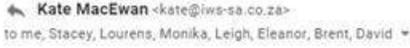
I hope all is in order.

Kind Regards,

Victor Lupuwana

Aquarella Investments (Pty) Ltd Reg. no. 2006/018898/07
Directors: L A Foxcroft, E Alli, V M Lupuwana

APPENDIX M: E-MAIL FROM MS KATE MACEWAN, CHAIRPERSON OF THE SOUTH AFRICAN BAT ASSESSMENT ASSOCIATION

 **Kate MacEwan** <kate@iws-sa.co.za>
to me, Stacey, Lourens, Monika, Leigh, Eleanor, Brent, David

Sat, 24 Nov, 10:02   Reply 

Dear Bill

Thank you again for your queries, as this shows commitment to develop sustainably and also helps us to understand where clarity is needed in the guidelines. We can consider these clarifications in future revisions.

Our responses to your email queries dated 21 November 2018 is as follows:

- All the Environmental Authorization conditions, as you sent to us on 21 November 2018 are important and must be adhered to. Special attention is drawn to No. 36 stating that there should be a 500 m [high sensitivity] buffer on all dams, reservoirs and farm buildings. I.e. no infrastructure, particularly turbines and their full rotor swept area, must encroach into any areas of high sensitivity and their associated buffers.
- Regarding the 50 m versus 200 m buffer on other bat important features:
 - If the development was to be built as per the original specifications in the EIA, we believe that the 50 m buffer would stand, as this is what was approved, and no changes have been made.
 - Seeing that the turbine specifications are now changing (more than 3 years after the original bat monitoring was completed), there are a number of guidelines clauses that come into play.
 1. Clause 3.5 – Validity.
 - Seeing that it is over 3 years but under 6 years, a bat specialist (preferably the original one) must submit a letter stating whether the study is still valid and whether there have been any major environmental or developmental changes to the site that may affect the validity.
 2. Clause 3.3 – Amendments to an EIA
 - Seeing the turbine dimensions and specifications are changing, an official statement from the original specialist who did the preconstruction monitoring is required as to whether the monitoring conducted was sufficient to assess such a change and whether the impact assessment and/ or the mitigation recommendations change.
 - If the specialist can give just reason as to why buffers should be changed from the approved 50 m buffer, based on new information that is available, then they do have the opportunity to do that at this stage, but such changes should only be made with valid justification. SABAAP would definitely support an increase in buffer size on all permanent water bodies and rivers, including man-made water sources, bat roosts and high potential foraging areas.
 3. Clause 3.4 – Which Guidelines are Applicable
 - The 2014 guidelines were applicable for the original monitoring and EIA, correct.
 - Seeing that an amendment is now taking place, there is scope to use knowledge gained subsequently and to apply it. Any changes to the original recommendations should only be made with valid justification.
 - This should be based on site specific information and be up to a bat specialist (preferably the original specialist) to determine.

I hope the above answers have helped you. If you still require further clarity, please do not hesitate to contact us.

Kind regards

Kate MacEwan
Chairperson
South African Bat Assessment Association (SABAA)
Mobile: +27 (0) 79 175 1758
Email: kate@iws-sa.co.za
Web: www.sabaa.org.za



APPENDIX N: SPECIALIST DECLARATIONS OF INTEREST

Will be added when received from specialists, and submitted with final report.

DRAFT FOR COMMENT