SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KOUP 1 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

Social Impact Assessment

DEFF Reference: 14/12/16/3/3/2/2120

Report Prepared by: Dr Neville Bews & Associates
Social Impact Assessors

Issue Date: 13 April 2022
Version No.: Final

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SOCIAL IMPACT ASSESSMENT

EXECUTIVE SUMMARY

INTRODUCTION

Genesis Enertrag Koup 1 Wind (Pty) Ltd appointed SiVEST Environmental to undertake the required EIA / BA Processes for the proposed construction of the Koup 1 Wind Energy Facility (WEF) and associated grid connection infrastructure near Beaufort West in the Western Cape Province of South Africa. Dr Neville Bews & Associates was subsequently contracted by SiVEST to undertake the social impact assessment for the project.

PROJECT DESCRIPTION

The overall objective of the development is to generate electricity by means of renewable energy technology, capturing wind energy to feed into the National Grid. It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

ALTERNATIVES

The grid connection infrastructure proposals include 2 switching and collector substation site alternatives and 3 power line route alignment alternatives illustrated in Figure 3. All three 3 power line route alignments are assessed within a 300m wide assessment corridor (150m on either side of power line) and are described below.

- Power Line Corridor Option 1 is approximately 1.3km in length, linking either substation / collector Option 1 or Option 2 to the existing 400kV transmission lines.
- Power Line Corridor Option 2 is approximately 9.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the south, adjacent to the existing 400kV transmission lines.
- Power Line Corridor Option 3 is approximately 12.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the north, adjacent to the existing 400kV transmission lines.

IMPACTS IDENTIFIED

The potential social impacts associated with the project are as follows.

Construction Phase

- Health and social wellbeing impact

        - Air quality
        - Noise
        - Increase in crime
        - Increased risk of HIV infections
        - Influx of construction workers
        - Hazard exposure.
- Quality of the living environment
    - Disruption of daily living patterns
    - Disruptions to social and community infrastructure.
- Economy
    - Job creation and skills development
    - Socio-economic stimulation.

Operational Phase

- Health and wellbeing:
    - Noise
    - Shadow flicker
    - Blade glint
    - Electromagnetic field and RF interference
    - Hazard exposure
- Quality of the living environment:
    - Transformation of the sense of place.
- Economic:
    - Job creation and skills development
    - Socio-economic stimulation.

Cumulative Impacts

- Health and social wellbeing
    - Noise
    - Shadow flicker
    - Blade glint
    - Risk of HIV and AIDS
- Quality of the living environment
    - Sense of place
    - Service supplies and infrastructure and
- Economic
    - Job creation and skills development
    - Socio-economic stimulation.

A pre- and post-mitigation comparison of the impacts is presented in a tabular format below.

The no project option would mean that the social environment is not affected as the status quo remains. On a negative front, it would also mean that all the positive aspects associated with the project would not materialise.

COMPARATIVE ASSESSMENT OF LAYOUT ALTERNATIVES

The grid connection infrastructure proposals include 2 switching and collector substation site alternatives and 3 power line route alignment alternatives illustrated in Figure 3. All three 3 power line

route alignments are assessed within a 300m wide assessment corridor (150m on either side of power line) and are described below.

- Power Line Corridor Option 1 is approximately 1.3km in length, linking either substation / collector Option 1 or Option 2 to the existing 400kV transmission lines.
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Key		
PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact	
FAVOURABLE	The impact will be relatively insignificant	
LEAST PREFERRED	The alternative will result in a high impact / increase the impact	
NO PREFERENCE	The alternative will result in equal impacts	
Alternative	**Preference**	**Reasons (incl. potential issues)**
SUBSTATION SITE ALTERNATIVES		
Substation Option 1	No preference	
Substation Option 2	Least preferred	Least preferred from a heritage perspective
CONSTRUCTION LAYDOWN AREA SITE ALTERNATIVES		
Construction Laydown Area Option 1	No preference	
Construction Laydown Area Option 2	Least preferred	Least preferred from a heritage perspective
POWER LINE ROUTE ALTERNATIVES		
Power Line Route Alternative 1A	Favourable	
Power Line Route Alternative 1B	Favourable	
Power Line Route Alternative 2A	Least preferred	Least preferred from a heritage perspective
Power Line Route Alternative 2B	Least preferred	Least preferred from a heritage perspective
Power Line Route Alternative 3A	Least preferred	Least preferred from a heritage perspective
Power Line Route Alternative 3B	Least preferred	Least preferred from a heritage perspective

Construction Phase			
Environmental parameter	**Issues**	**Rating prior to mitigation**	**Rating post-mitigation**
Health & social wellbeing	Air quality	-14	-7
	Noise	-6	-6
	Increase in crime	-18	-18
	Increased risk of HIV infections	-48	-26
	An influx of construction workers	-16	-16
	Hazard exposure.	-22	-18
Quality of the living environment	Disruption of daily living patterns	-22	-20
	Disruptions to social and community infrastructure	-22	-20
Economic	Job creation and skills development	+24	+24
	Socio-economic stimulation	+26	+26
Operational Phase			
Health & Wellbeing	Noise	-12	-10
	Shadow flicker	-18	-18
	Blade glint	-20	-16
	Electromagnetic fields and RF interference	-18	-18
	Hazard exposure	-22	-22
Quality of the living environment	Transformation of the sense of place	-48	--48
Economic	Job creation and skills development	+26	+26
	Socio-economic stimulation	+32	+32
Decommissioning Phase			
Considering a time period of 20 years prior to decommissioning and the dynamics of social variables, it would be rather meaningless to attach assessment criteria to decommissioning at this point due to the high level of uncertainty such assessment would be based upon.			
No Project Alternative			
No project		-51	No mitigation measures
Cumulative Impacts			
Health & social wellbeing	Noise	-22	-22
	Shadow flicker	-22	-22
	Blade glint	-24	-22
	Risk of HIV	-54	-42
Quality of the living environment	Sense of place	-51	-51
	Services, supplies & infrastructure	-22	-20
Economic	Job creation and skills development	+26	+26
	Socio-economic stimulation	+68	+68

DISCUSSION

While the project will create employment for local communities during the construction and operational phases, the more significant positive impact of the project will be the contribution it will make towards renewable energy infrastructure. Research recently published by Meridian Economics, in collaboration with the CSIR, indicates that "[i]*n all realistic mitigation scenarios, the majority of new build capacity is wind and solar PV*" (Roff, et al., 2020, p. 52), and highlights an urgent need for the country to accelerate the RE build pathway. In addition, the South African Climate Change Coordinating Commission, is considering a more ambitious emissions target and is suggesting changes to the country's energy plan (Paton, 2021).

Considering the impacts discussed above, it is evident that the cumulative impacts associated with changes to the social environment of the region are more significant than those attached to any one project. On a negative front, there are two issues associated with developments in the region that are of most concern.

1. The first of these issues is the change to the sense of place of an area that was once considered a pristine region of South Africa.
2. The second is the potential, through an influx of labour and an increase in transportation to construction sites, of the risk for the prevalence of HIV increasing in an area that, at 8.7% in 2017, had the second lowest HIV prevalence rate in the country.

The initiative to address these cumulative impacts lies at a far higher level than at an individual project level. In this regard, the Western Cape Government has undertaken an exercise to address intergovernmental readiness for the large development scenarios in the Central Karoo; which is a positive step towards addressing the cumulative impact of these developments (Western Cape Government Environmental Affairs and Development Planning, 2019).

CONCLUDING STATEMENT

The sensitive areas associated with the layout have been identified by various specialists and adjustments have been made to the Koup 1 layout by withdrawing all turbines associated with sensitive areas. Subsequently, the Grid Option 2 has been chosen as the proposed layout to be forwarded for approval. The Grid Option 1 was not feasible as Eskom will permit two collectors within a small radius and Grid Option 3 is ruled out as a result of bird nests.

Impact Statement

Considering these adjustments, and that the positive social impacts associated with the project outweigh the negative, with a significant social benefit at a national level, the project is supported on a social basis.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.2 and Appendix 3
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix 4
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6 and 7
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.3
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 7 and 8
g) an identification of any areas to be avoided, including buffers;	N/A
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 1, 2 and 3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section 7 and 9
k) any mitigation measures for inclusion in the EMPr;	Section 8

l) any conditions for inclusion in the environmental authorisation;	N/A
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	**N/A** -No feedback has yet been received from the public participation process regarding the visual environment
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	**N/A**. No information regarding the visual study has been requested from the competent authority to date.
q) any other information requested by the competent authority.	**N/A**
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 1.2 and Appendix 3

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SOCIAL IMPACT ASSESSMENT

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List of Abbreviations

AIDS	Acquired immunodeficiency syndrome
AC	Alternating current
BESS	Battery energy storage system
BID	Background Information Document
dB	Decibel
DBSA	Development Bank of South Africa
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DWS	Department of Water and Sanitation
DM	District Municipality
EIA	Environmental Impact Assessment
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPPPP	Independent Power Producers Procurement Programme
IRP	Integrated Resource Plan
IRR	Issues and Response Report
kV	Kilovolt
LM	Local Municipality
MW	Megawatt
NEMA	National Environmental Management Act (No. 107 of 1998)
NERSA	The National Energy Regulator of South Africa
NGO	Non-Governmental Organisation
OHS	Occupational Health and Safety
O&M	Operation and maintenance
PA	Per Annum (Yearly)
PGDS	Provincial Growth and Development Strategy
PV	Photovoltaic
PPP	Public Participation Process
REIPPPP	Renewable Energy Independent Power Producer Procurement Program
SACPVP	South African Council for the Property Valuers Profession
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SIPs	Strategic Integrated Projects
SMME	Small Medium and Micro Enterprises
Stats SA	Statistics South Africa
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
WEF	Wind Energy Facility
WHO	World Health Organisation
WWF	World Wide Fund for Nature

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SOCIAL IMPACT ASSESSMENT

1. INTRODUCTION

Genesis Enertrag Koup 1 Wind (Pty) Ltd (hereafter referred to as “Genesis”), has appointed SiVEST Environmental (hereafter referred to as “SiVEST”) to undertake the required EIA / BA Processes for the proposed construction of the Koup 1 Wind Energy Facility (WEF) and associated grid connection infrastructure near Beaufort West in the Western Cape Province of South Africa. Dr Neville Bews & Associates has been contracted to undertake the social impact assessment for the project.

The overall objective of the development is to generate electricity by means of renewable energy technology capturing wind energy to feed into the National Grid.

It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

In terms of the Environmental Impact Assessment (EIA) Regulations, which were published on 04 December 2014 [GNR 982, 983, 984 and 985) and amended on 07 April 2017 [promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017], various aspects of the proposed development are considered listed activities under GNR 327 and GNR 324 which may have an impact on the environment and therefore require authorisation from the National Competent Authority (CA), namely the Department of Environment, Forestry and Fisheries (DEFF), prior to the commencement of such activities. Specialist studies have been commissioned to assess and verify the project under the new Gazetted specialist protocols.

1.1 Terms of Reference

To undertake a Basic Social Impact Assessment (SIA) in respect of the proposed Koup 1 Wind Energy Facility (WEF) and associated grid connection infrastructure near Beaufort West in the Western Cape Province. On this basis, to consider the extent of the proposed project and its likely effect on the social environment within which the project will be placed.

General requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended.
- Adherence to all appropriate best practice guidelines, relevant legislation and authority requirements.
- Provide a thorough overview of all applicable legislation, guidelines.
- Cumulative impact identification and assessment as a result of other renewable energy (RE) developments in the area (including; a cumulative environmental impact table(s) and statement, review of the specialist reports undertaken for other Renewable Energy developments and an indication of how the recommendations, mitigation measures and conclusion of the studies have been considered).
- Identification of sensitive areas to be avoided.
- Assessment of the significance of the proposed development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative.
    - Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
    - Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity.
    - Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- Comparative assessment of impacts.
- Recommend mitigation measures in order to minimise the impact of the proposed development. and
- Implications of specialist findings for the proposed development.

1.2 Specialist Credentials

Social Specialist	Dr Neville Bews & Associates – Neville Bews
Contact Details	bewsco@netactive.co.za
Qualifications	University of South Africa: B.A. (Honours) – 1984 Henley Management College, United Kingdom: The Henley Post-Graduate Certificate in Management – 1997 Rand Afrikaans University: M.A. (cum laude) – 1999 Rand Afrikaans University: D. Litt. et Phil. – 2000
Expertise to carry out the Social Impact Assessment.	**Mining** • Afrimat, Glen Douglas Dolomite Burning Project. • Afrimat, Lyttelton Dolomite Mine Lime Burning Project. • Gold Fields West Wits Project. • Grootegeluk Open Cast Coal Mine, Lephalale. • Limpopo Chrome Mine, Thabazimbi. • Leeuwpan Coal Mine, Delmas. • Paardekraal Project, Belfast. • Sekoko Wayland Iron Ore, Molemole. • Sishen Iron Ore Mine, Kathu Northern Cape. • Sishen South Project, Postmasburg, Northern Cape. • Vlakpoort Open Cast Mine, Thabazimbi, Limpopo. **Infrastructure** **Pipelines** • Mokolo and Crocodile River (West) Water Augmentation Project (MCWAP), (Grinaker LTA), Social Impact Assessment. • Social Monitoring of the Mokolo and Crocodile River (West) Water Augmentation Project. • Transnet New Multi-Product Pipeline (Commercial Farmers), Aveng (Africa) Group Limited. • Wilmar Vegetable Oil Pipeline, Richards Bay, Kwa Zulu-Natal. **Power plants** • Eskom's Nuclear 1 Power Plant assessed with the SIA on behalf of Arcus GIBB Engineering & Science. • Moatize Power Plant, Tete. • Ankerlig Transmission, Koeberg - Specialist input for the 2nd Supply Project. • Vale Moatize Power Plant Project, Mozambique. **Substations, powerlines and grid infrastructure** • Ubertas 88/11kV Substation, Eskom Holdings Limited. • Neptune-Poseidon 400 kV Power Line, Eskom Holdings Limited. • Maphutha 1 X 400 kV Witkop 170 km Powerline, Eskom Holdings Limited. • Foskor-Merensky 400 kV Line Deviation, Eskom Holdings Limited. • Secunda, Mulalo Main Transmission Substation and Power Line Integration Project, Eskom Holdings Limited. • Tubatse Strengthening Phase 1 Senakangwedi B Integration, Limpopo Province.

	Railways • Expansion of Railway Loops at Arthursview; Paul; Phokeng and Rooiheuwel Sidings in the Bojanala Platinum District Municipality in the North West Province. • Gautrain Rapid Rail Link. **Roads** • Gauteng Freeway Improvement Project (GFIP). • National Road 3: Keeversfontein to Warden (de Beers Pass Section). • N2 Wild Coast Toll Highway. **Renewable Energy** • Allepad PV 1, 2, 3 & 4 Northern Cape Province. Addendum to the Social Impact Assessment – Scoping Report. • Aggeneys 1 X 100 MW PV Facility, Northern Cape Province. • Bloemhoek 1 Grid Connection and Infrastructure for the Aggeneys 1 Solar PV Facility. • Lephalale Solar Project near Lephalale, Limpopo. • Hyperion Solar PV Development 1, 2, 3 & 4 and Associated Infrastructure, Northern Cape Province. Addendum to the Social Impact Assessment – Scoping Report. • Mierdam 3 Solar Photovoltaic (PV) Energy Facility. • Rondekop 325 MW Wind Farm Project, Northern Cape Provinces. • Umsobomvu Solar PV Facilities and Associated Grid Infrastructure. • Witberg Wind Energy Facility Amendments. • Establishment of 132 kV Grid Connection Infrastructure for the Hyperion Hybrid Facility Near Kathu, Northern Cape Province. • Social Impact Assessment of the installation of a Battery Energy Storage System (BESS) for the: Mierdam 3 Solar Photovoltaic (PV) Energy Facility. Droogfontein 3 Solar Photovoltaic (PV) Energy Facility. Dwarsrug Wind Energy Facility. Loeriesfontein 3 Solar Photovoltaic (PV) Energy Facility. Platsjambok East 3 Solar Photovoltaic (PV) Energy Facility.Oya 132 kV Power line near Matjiesfontein, Western and Northern Cape Province. **Housing Development** • Dingleton Resettlement Project at Sishen Iron Ore Mine. • Jozini Nodal Expansion Implementation Project. • Kennedy Road Housing Project, eThekwini Metropolitan Municipality. • Retirement Village on the Farm Sweet Vale No 15257 Margate, Ray Nkonyeni Municipality, KwaZulu-Natal Province. • Waterfall Wedge Housing and Business Development, Midrand, Gauteng. **Social Research** • Australia – Africa 2006 Sport Development Program as a research associated at the University of Johannesburg.

	• University of Johannesburg – Research into research outputs of the University. **Social Services and Recreational Facilities** • The Model Yacht Pond at Blue Lagoon, Stiebel Place, Durban DM/0003/10. Social Impact Assessment on the Infilling of this Yacht Pond for the eThekwini Municipality Strategic Project Unit. • The United Nations Office on Drugs and Crime – Evaluation of a Centre for Violence Against Women in Upington. **Commercial Enterprises** • Cato Ridge Crematorium, KwaZulu-Natal Province. • Redevelopment of a fuel service station in Munster, Ray Nkonyeni LM, Kwazulu-Natal Province. **Waste Management** Athlone Refuse Transfer Station Area, City of Cape Town, Western Cape Province.

1.3 Assessment Methodology

Data was gathered through the following techniques:

1.3.1 Collection of Data

Data was gathered through.

- The project description prepared by Genesis Enertrag Koup 1 Wind (Pty) Ltd.
- Statistics South Africa, Census 2011 and other relevant demographic data generated by Stats SA such as the Quarterly Labour Force Survey and Mid-year population estimates.
- Discussions with the project proponents and Environmental Impact Assessment Consultants.
- A literature review of various documents such as the relevant Municipal Integrated Development Plans (IDPs) and other specialist reports and documents.
- A broader literature scan.

1.3.2 Assessment Technique

The assessment technique used to evaluate the social impacts was provided by SiVEST Environmental Division and is attached in Appendix 1.

2. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations apply in respect of this report.

2.1 Assumptions

It is assumed that the technical information provided by the project proponent, Genesis Enertrag Koup 1 Wind (Pty) Ltd and the environmental consultants SiVEST, is credible and accurate at the time of compiling the report. It is also assumed that the data provided by the various specialists as used in this report are credible and accurate.

2.2 Limitations

The demographic data used in this report was sourced from Statistics South Africa and is based on data gathered during Census 2011 and Community Survey, 2016. This data is somewhat outdated but where possible is supplemented with the latest Stats SA's survey data such as the Mid-year population estimates and the Quarterly Labour Force Survey. The limitation of this is that this survey data is restricted to a provincial level and does not extend down to a municipal level.

The study was undertaken during Stage 2 of the State of National Disaster declared in South Africa as a result of the COVID-19 pandemic, at a time when the country was experiencing a third wave of the pandemic with a daily rise in the infection rates. Accordingly, the need for social distancing and limiting unnecessary interpersonal contact and travel was respected throughout this study. Consequently, no site visit was undertaken as the region was sparsely populated and where necessary information could be obtained from the environmental consultants.

3. TECHNICAL DESCRIPTION

3.1 Project Location

The proposed WEF and associated grid connection infrastructure is located approximately 55km south of Beaufort West in the Western Cape Province and is within the Beaufort West and Prince Albert Local Municipalities, in the Central Karoo District Municipality(Figure 1).

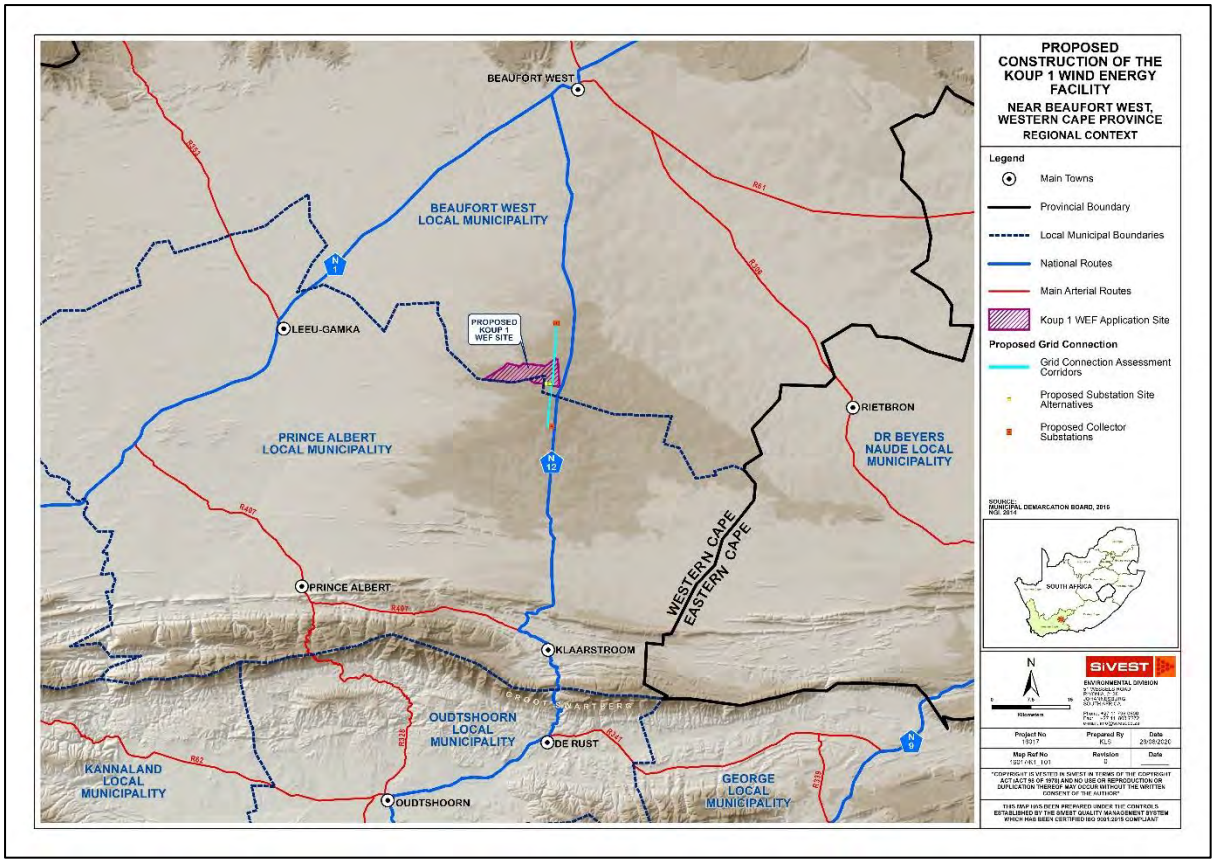


Figure 1: Regional Context Map

3.1.1 WEF

The WEF application site, as shown on the locality map below (Figure 2) is approximately 4279.398 hectares (ha) in extent and incorporates the following farm portions:

- The Farm Riet Poort No 231
- Portion 11 Of The Farm Brits Eigendom No 374
- Portion 15 Of The Farm Brits Eigendom No 374
- Portion 5 Of Farm 380
- Portion 10 Of Farm 380
- Portion 11 Of Farm 380

A smaller buildable area (2445.667 ha) has however been identified as a result of a preliminary suitability assessment undertaken by Genesis and this area is likely to be further refined with the exclusion of sensitive areas determined through various specialist studies being conducted as part of the EIA process.

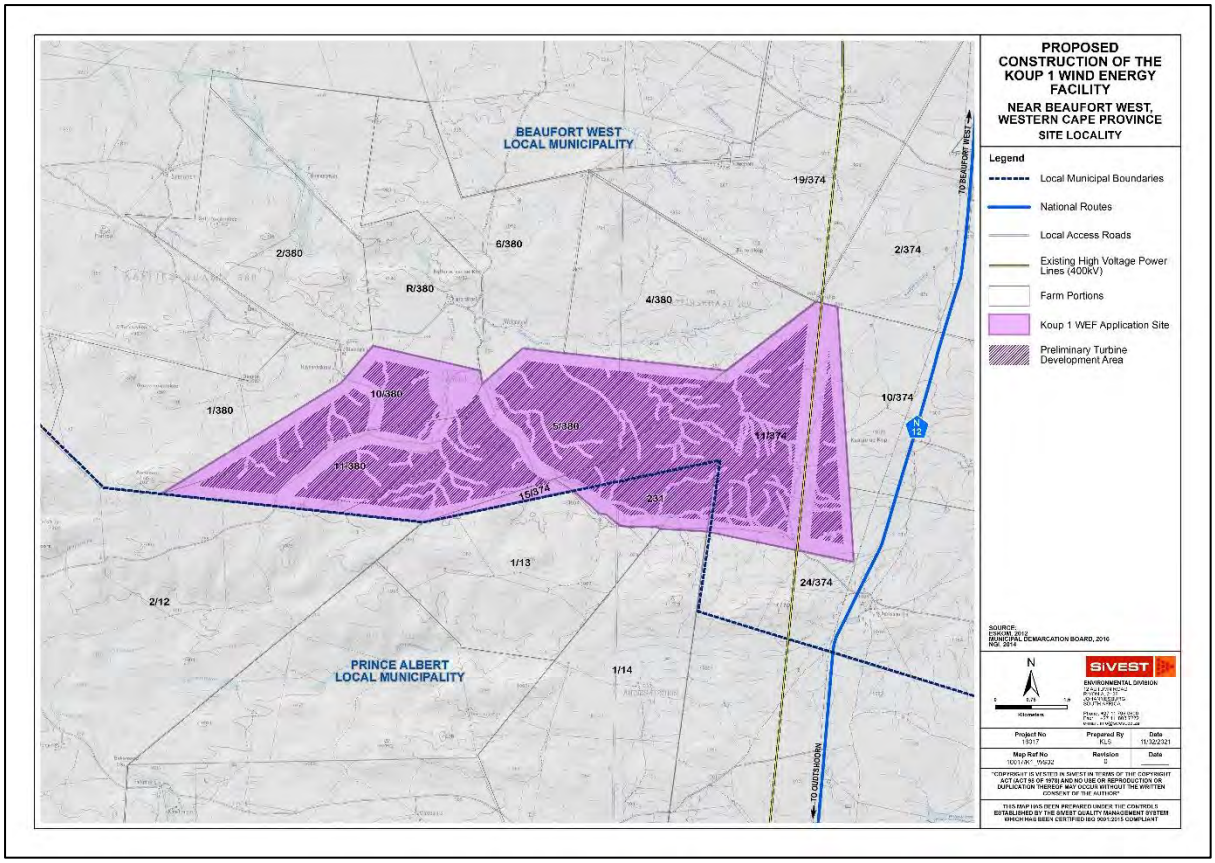


Figure 2: Koup 1 WEF Site Locality

3.1.2 Grid Connection

At this stage, it is proposed that a 132kV overhead power line will connect the Koup 1 WEF on-site switching substation / collector to the national grid either by way of an off-site collector substation, or via a direct tie-in to existing 400kV transmission lines that traverse the Koup 1 WEF project site (Figure 3).

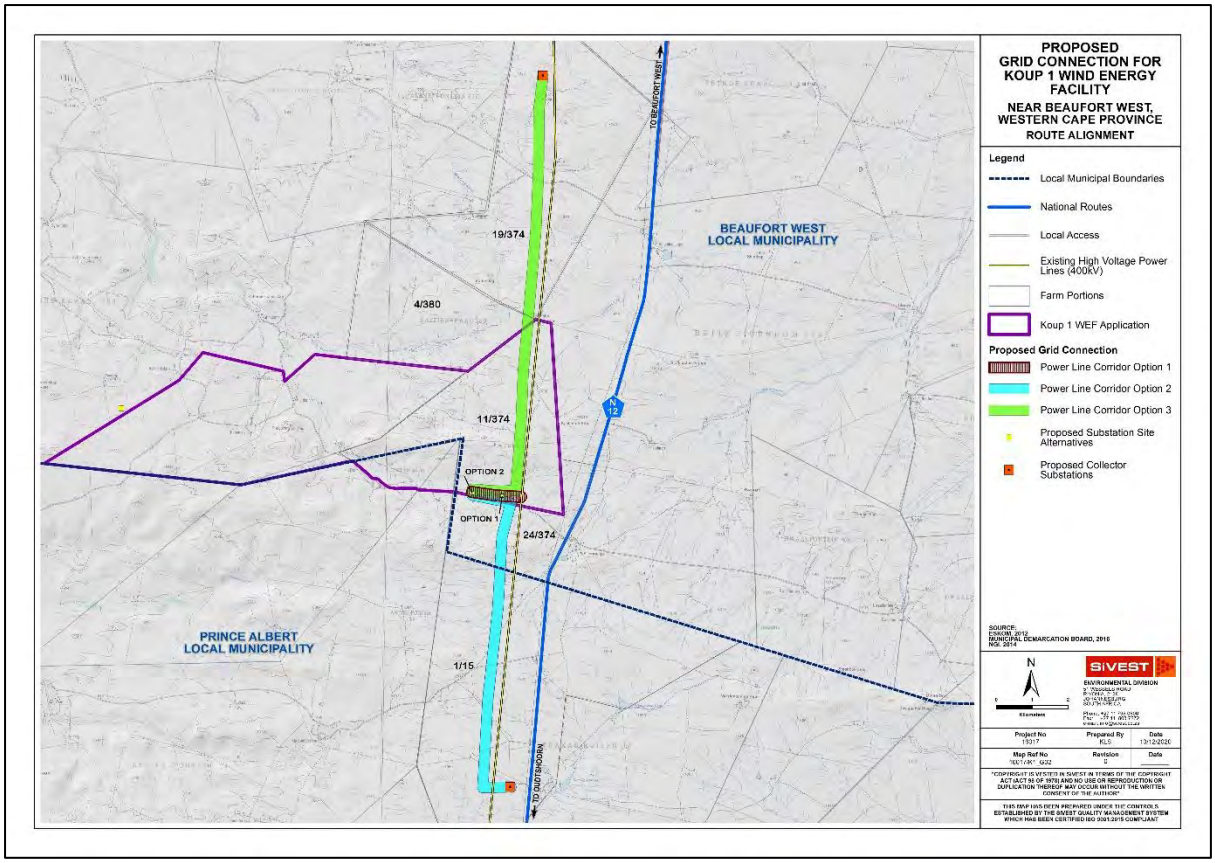


Figure 3: Proposed 132kV Power Line Route Alignment

3.2 Project Description

It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The storage capacity and type of technology will be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

3.2.1 Wind Farm Components

- Up to 28 wind turbines, each between 5.6MW and 6.6MW, with a maximum export capacity of approximately 140MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Program (REIPPPP). The final number of turbines and layout of the WEF will, however, be dependent on the outcome of the Specialist Studies conducted during the EIA process;
- Each wind turbine will have a hub height and rotor diameter of up to approximately 200m;

- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 90m x 50m (total footprint of approx. 4 500m2) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development;
- Each wind turbine will consist of a foundation of up to approximately 15m x 15m in diameter. In addition, the foundations will be up to approximately 3m in depth;
- Electrical transformers adjacent to each wind turbine (typical footprint of up to approximately 2m x 2m) to step up the voltage to 33kV;
- One (1) new 33/132kV on-site substation and/or combined collector substation, occupying an area of approximately 1.5 ha. The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in the WEF EIA and in the grid infrastructure BA (substation and 132kV overhead power line) to allow for handover to Eskom. Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction;
- The wind turbines will be connected to the proposed substation via medium voltage (33kV) cables. Cables will be buried along access roads wherever technically feasible.
- A Battery Energy Storage System (BESS) would be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks;
- Internal roads with a width of between 8m and 10m will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via an existing gravel road from the N12 National Route;
- One (1) construction laydown / staging area of up to approximately 2.25ha. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town;
- One (1) permanent Operation and Maintenance (O&M) building, including an on-site spares storage building, a workshop and an operations building to be located on the site identified for the construction laydown area.
- A wind measuring lattice (approximately 120m in height) mast has already been strategically placed within the wind farm application site in order to collect data on wind conditions;
- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height; and
- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited.

3.2.2 Grid Components

The proposed grid connection infrastructure to serve the Koup 1 WEF will include the following components:

- One (1) new 33/132kV on-site substation and/or collector substation, occupying an area of up to approximately 1.5 ha. The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in both the EIA for the WEF and in the BA for the grid infrastructure to allow for handover to Eskom. The applicant will remain in control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction; and
- One (1) new 132kV overhead power line connecting the on-site and/or collector substation either to an off-site collector substation, or via a direct tie-in to the existing 400kV overhead power lines and thereby feeding the electricity into the national grid. Power line towers being considered for this development include self-supporting suspension monopole structures for relatively straight sections of the line and angle strain towers where the route alignment bends to a significant degree. Maximum tower height is expected to be approximately 25m.

3.3 Layout Alternatives

3.3.1 Wind Energy Facility

Design and layout alternatives will be considered and assessed as part of the EIA. These include alternatives for the Substation locations and also for the construction / laydown area. The proposed site alternatives are shown in Figure 4 below.

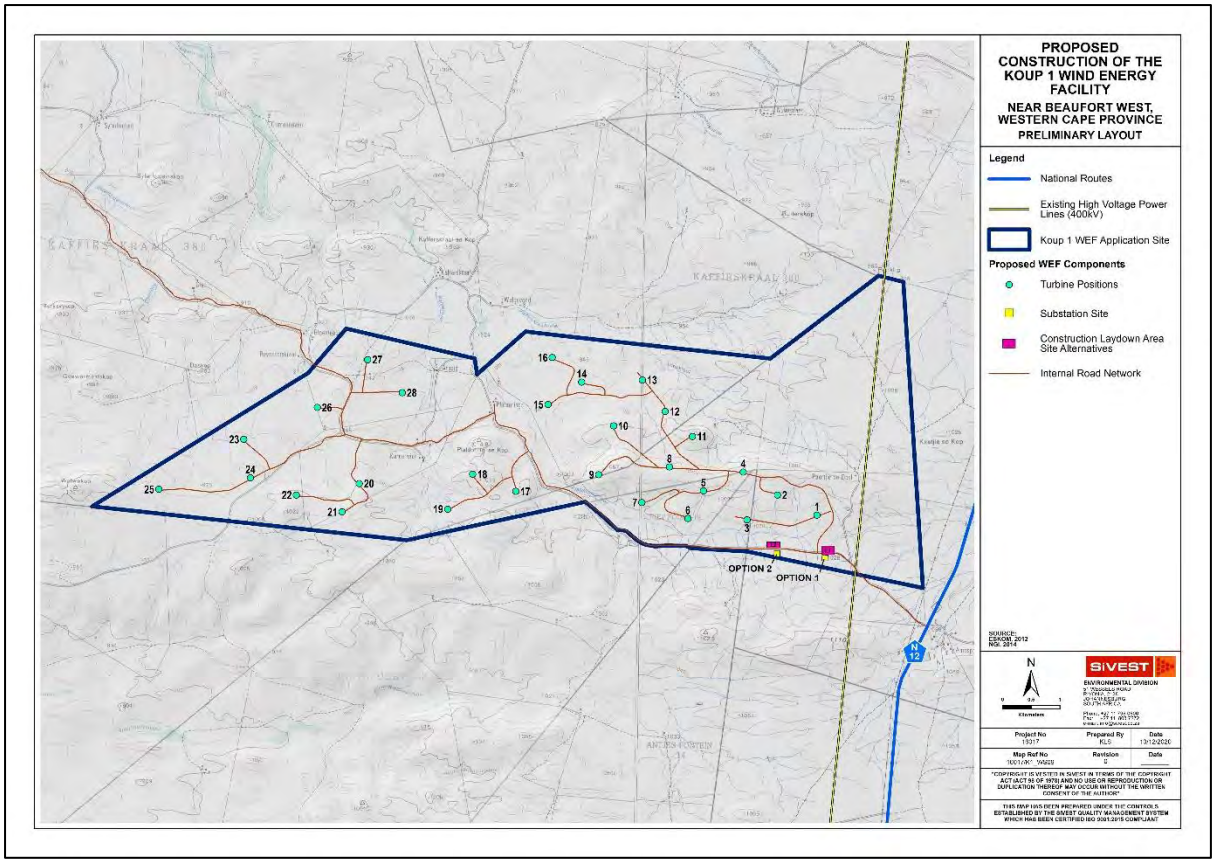


Figure 4: Alternatives Proposed as part of the Koup 1 WEF

3.3.2 Grid Components

The grid connection infrastructure proposals include two (2) switching and collector substation site alternatives and three (3) power line route alignment alternatives (Figure 3). These alternatives will be considered and assessed as part of the BA process and will be amended or refined to avoid identified environmental sensitivities.

All three (3) power line route alignments will be assessed within a 300m wide assessment corridor (150m on either side of power line). These alternatives are described below:

- Power Line Corridor Option 1 is approximately 1.3km in length, linking either substation / collector Option 1 or Option 2 to the existing 400kV transmission lines.
- Power Line Corridor Option 2 is approximately 9.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the south, adjacent to the existing 400kV transmission lines.
- Power Line Corridor Option 3 is approximately 12.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the north, adjacent to the existing 400kV transmission lines.

3.3.3 No-Go Alternative

The ‘no-go’ alternative is the option of not undertaking the proposed WEF and / or grid connection infrastructure projects. Hence, if the ‘no-go’ option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

4. LEGAL REQUIREMENT AND GUIDELINES

Legislation and policy serve to guide the authorities in undertaking and agreeing on projects that are in the interest of the country as a whole. Consequently, the fit of the project with the relevant national, provincial and municipal legislation and policy is an important consideration. In this respect, the following legislation and policy applies to the project.

4.1 International

- Climate Change Action Plan, 2016-2020, World Bank Group (2016)
- Renewable Energy Vision 2030 – South Africa; World Wildlife Fund for Nature-SA (formerly World Wildlife Fund-SA) (2014)
- REthinking Energy 2017: Accelerating the global energy transformation. International Renewable Energy Agency, (2017)
- Renewable Energy Policies in a Time of Transition. International Renewable Energy Agency (2018)
- Global Warming of 1.5 °C. An IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Summary for Policymakers. Subject to copy edit: Intergovernmental Panel on Climate Change (2018).

4.2 National

- White Paper on the Energy Policy of the Republic of South Africa (2003)
- White Paper on Renewable Energy (2003)
- The Constitution of South Africa (1996)
- A National Climate Change Response Strategy for South Africa (2004)
- National Energy Act (2008)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- The Environmental Impact Assessment and Management Strategy for South Africa (2014)

- Government Gazette Vol. 632; 16 February 2018 No. 41445. Department of Environmental Affairs, No. 114, Page No. 92 (2018)
- Department of Mineral Resources and Energy – Integrated Resource Plan 2019 (2019)
- Department of Mineral Resources and Energy's Independent Power Producers Procurement Programme (2020)
- New Growth Path Framework (2011)
- The National Development Plan (2011)
- National Infrastructure Plan (2012).

4.3 Provincial

- Western Cape Green Economy Strategy Framework (2013)
- Western Cape Provincial Strategic Plan (2019 – 2024)
- Western Cape Climate Change Response Strategy (2014)
- Department of Mineral Resources and Energy's Independent Power Producers Procurement Programme – Focus on Western Cape Provincial Report, Volume 3, March | 2020.

4.4 District and Local

- Central Karoo District Municipality Integrated Development Plan (2021)
- Prince Albert Municipality Integrated Development Plan (2018)
- Beaufort West Integrated Development Plan (2018).

4.5 Policy and Legislation Fit

Considering the nature and location of the project, there is a clear fit with international, national, provincial and local, at both district and municipal levels, policy and legislation. For instance, the World Wide Fund for Nature (WWF).

> "…*calls for a more ambitious plan, suggesting that the IRP [Integrated Resource Plan for Electricity] should provide for an 11-19% share of electricity capacity by 2030, depending on the country's growth rate over the next fifteen years*" (Sager, 2014, p. 5).

The issue of climate change is high on the agenda of all levels of government in South Africa with the Department of Environmental Affairs and Tourism (DEAT) indicating that.

> "*The efforts of all stakeholders will be harnessed to achieve the objectives of the Government's White Paper on Renewable Energy (2003) and the Energy Efficiency Strategy, promoting a sustainable development path through coordinated government policy (Department of Environmental Affairs and Tourism, 2004, p. 23) "*
>
> *DEAT goes further in specifically listing renewable energy sources, including wind power, solar power and biomass, as a tool in promoting mitigation against climate change*.

The Western Cape Strategic Plan 2019-2024, highlights the need for energy security and for diversification of the regional energy mix, emphasising support for the Green Economy and stating that.

> "*The growth of the renewable energy sector has the potential for high labour absorption and can also link to increased opportunities for SMMEs, especially for SSEG*" (Western Cape Government, 2020, p. 48).

The Central Karoo DM has identified the *"[p]otential and impact of renewable energy resource generation,* as part of the district's economic profile (Central Karoo District Municipality, 2019, pp. 16, 79, 80 & 81)

The Beaufort West Integrated Development Plan 2018/19 Review lists Clean Energy as its Sustainable Development Goal 7 (Beaufort West District Municipality, 2018, p. 20 & 21).

The Prince Albert Local Municipality recognises that the area has " …*vast land, long Karoo sunshine days and high quality of sunrays inspires the development of solar parks* (Prince Albert Municipality, 2018, p. 123). Although not specifically mentioned in the IDP, the potential to expand this resource to encompass wind energy is likely to be a viable option.

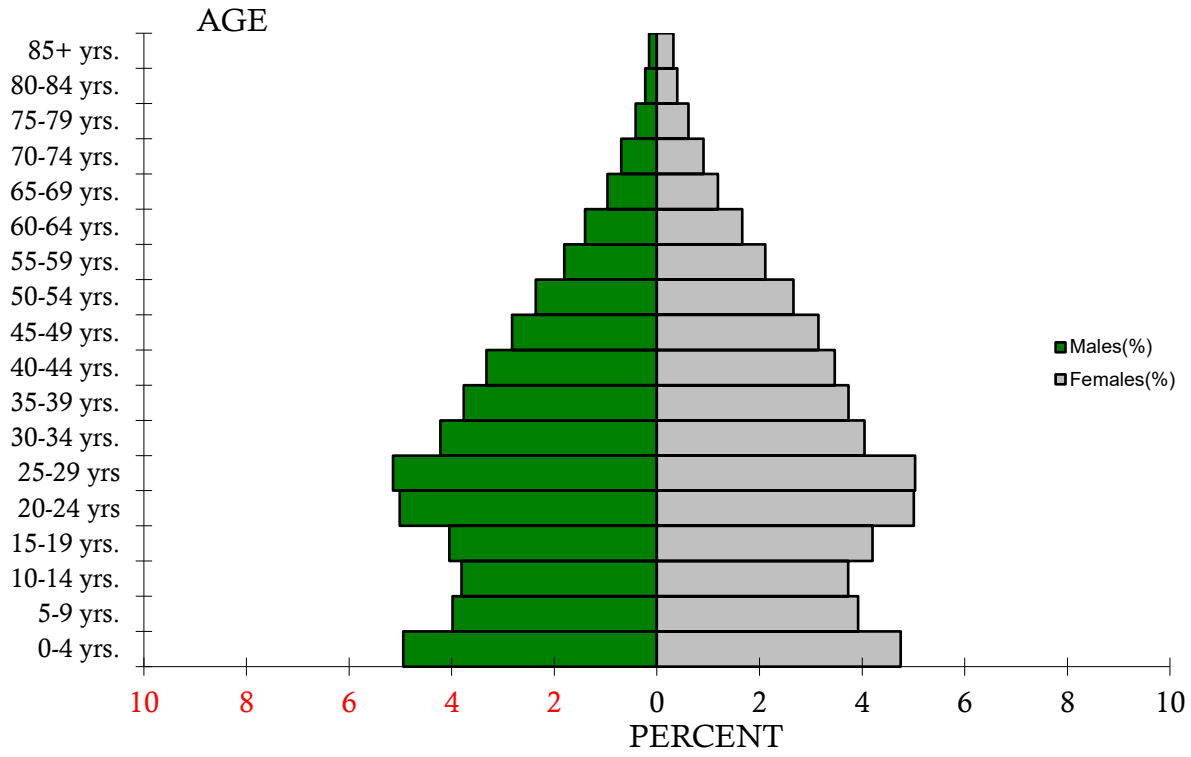
The project seems to fit with the policy and legislation discussed above.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

The receiving environment will be described at a provincial, district and municipal level.

5.1 Provincial

Western Cape is on the south-western tip of Africa, stretching northwards in the west along the Atlantic Ocean towards Namibia and eastwards along the Indian Ocean towards the Eastern Cape Province. The province is bordered in the north by the Northern Cape and covers a geographical area of 129 462.21 km² and, with a population of 5 822 734 people in 2011, had a population density of 44.98 people per km² (Statistics South Africa, 2011). By mid-2020 the population of the Western Cape was estimated at 7 005 741 (Statistics South Africa, 2020) resulting in the Western Cape having the third-highest population across the country below Gauteng (15 488 137) and KwaZulu-Natal (11 531 628) and marginally above the Eastern Cape (6 734 001). As the Mid-year population estimates remain at a provincial level and are not projected to the district and local municipal levels, for comparative purposes, data gathered during Census 2011 and Community Survey 2016 will be used where appropriate notwithstanding it being outdated. On this basis, in respect of age structure, 30% (32% in 2016) of the population of the Western Cape were below 18 years while 64% (61% in 2016) were between 18 and 64 years of age and 6% (6%) were above 64 years in 2011. The population pyramid of the Western Cape Provinces is illustrated in **Figure 5**.



Source: (Statistics South Africa, 2011)

Figure 5: Population Pyramid Western Cape Province

Regarding population grouping, the dominant population group in the Western Cape are coloured people at 49% (48% in 2016) followed by black African people at 33% (36% in 2016), white people at 16% (16% in 2016) with Indian or Asian people accounting for 1% (1% in 2016) of the population. Most of this population, 48% (46% in 2016), speak Afrikaans followed by isiXhosa at 24% (31% in 2016) and English at 20% (19% in 2016).

In 2011 the official unemployment rate in the Western Cape was 21.6% with the official unemployment rate amongst the youth, aged between 15 and 34 years, coming in at 29%. In the 1st Quarter of 2021, the official unemployment rate in the province was 23.7%. These figures must, however, be considered with caution as the official unemployment rate is defined by Stats SA as follows:

"*Unemployed persons are those (aged 15–64 years) who:*

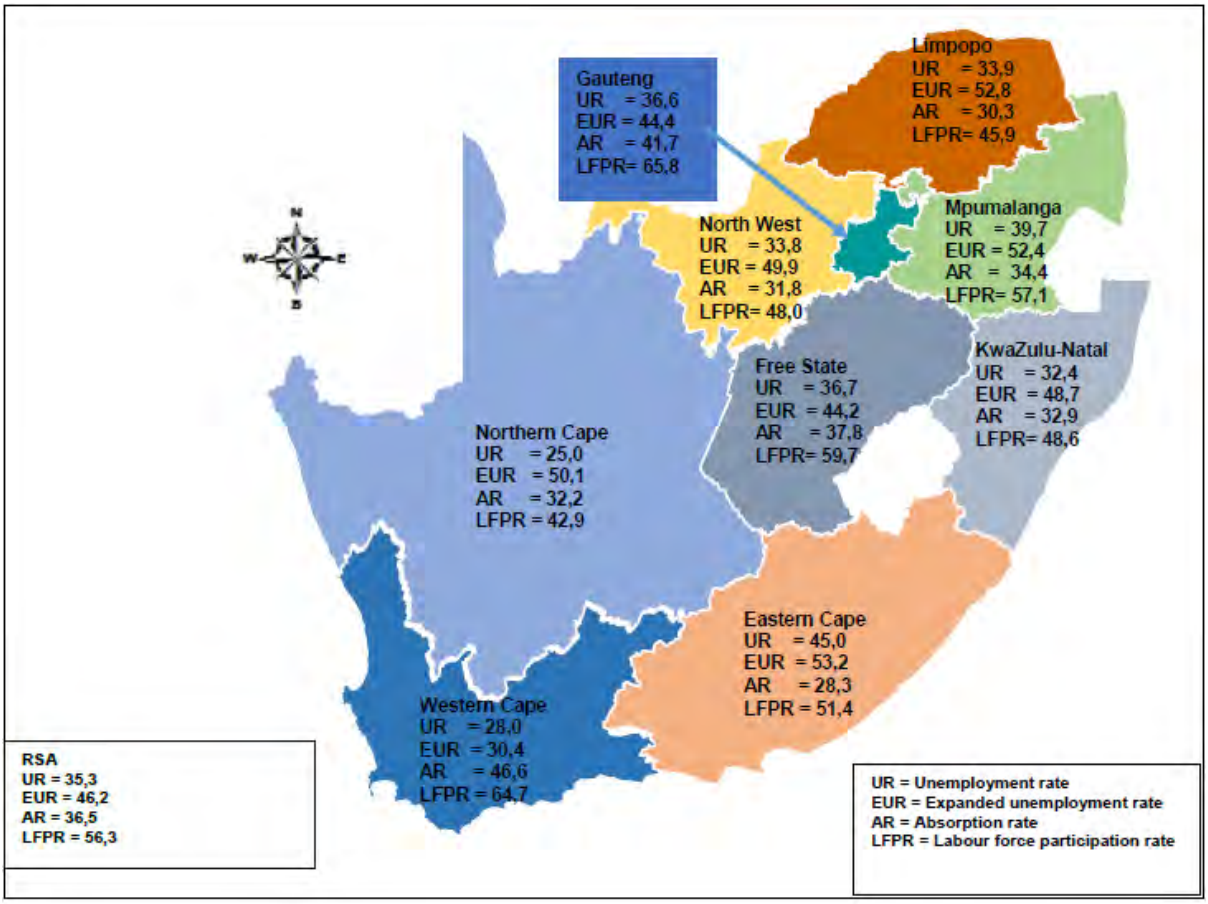
a) Were not employed in the reference week and;

b) Actively looked for work or tried to start a business in the four weeks preceding the survey interview and;

c) Were available for work, i.e. would have been able to start work or a business in the reference week or;

d) Had not actively looked for work in the past four weeks but had a job or business to start at a definite date in the future and were available" (Statistics South Africa, 2022, p. 16).

In the first quarter of 2021 the expanded unemployment rate of the Western Cape stood at 30.4%; the labour absorption rate at 46.6% and the labour force participation rate at 64.7%. A summary of the labour market indicators illustrated comparatively across South Africa is provided in **Figure 6**.



Source: (Statistics South Africa, 2022, p. 19)

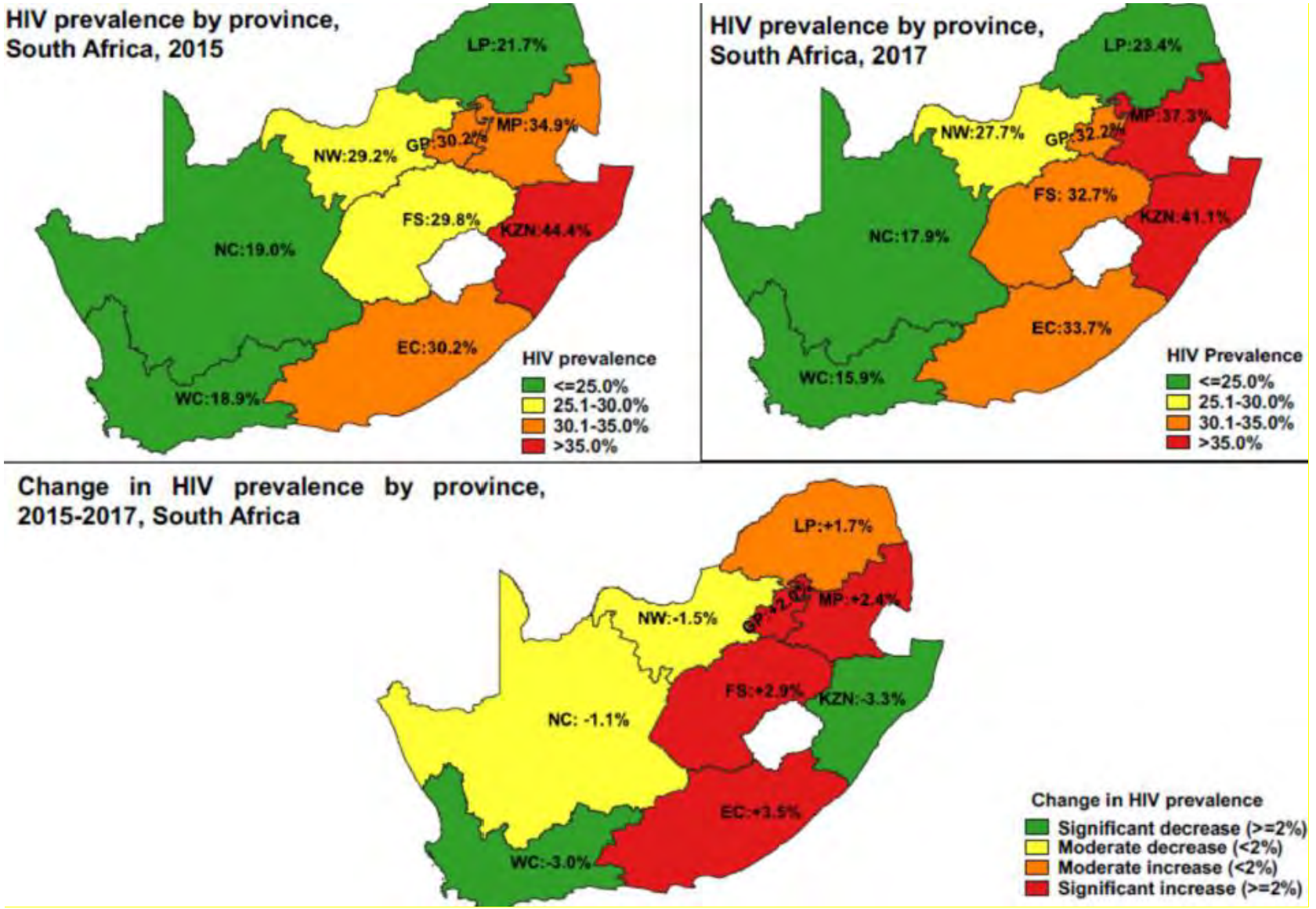
Figure 6: Labour Market Indicators 4th Quarter 2021

In respect of households, the 2011 Census indicated that there were 1 634 000 (1 933 876 in 2016) households in the Western Cape. Of these households, 36.3% were female-headed, 80.4% lived in formal dwellings, and 52.4% either owned or were paying off their dwelling.

Regarding household services in 2011, 85.6% of households in the Western Cape had flush toilets connected to the sewerage system, 89.9% had their refuse removed weekly, 75.1% had piped water delivered inside the dwelling and 93.4% used electricity as a means of energy for lighting.

Concerning HIV prevalence, the Northern Cape had the lowest prevalence rate across South Africa at 8.3% in 2017, followed by the Western Cape with a prevalence rate of 8.9%. KwaZulu-Natal, with a prevalence rate of 18.1% had the highest rate with the national HIV prevalence rate at 14.0% in 2017. HIV prevalence rate between 2012 and 2017 as it stood across all South African provinces is illustrated in **Figure 7**.

The 2017 National Antenatal Sentinel HIV Survey extended to the district level which showed that, at the time the survey was undertaken, the HIV prevalence amongst antenatal women in the Western Cape Province was 15.9% with the Cape Town Metropolis having the highest incidence at 20.9%. In 2012 the Cape Winelands recorded an HIV prevalence rate amongst ante natal women of 14.5% which had marginally decreased to 14.2% by 2017. The corresponding figures for the West Coast were 9.5% in 2012, increasing to 11.1% in 2017. The incidence of HIV prevalence amongst antenatal women as it occurred between 2012 and 2017 across the Western Cape is illustrated in **Figure 7** and Error! Reference source not found.Error! Reference source not found.**Table 1** (Woldesenbet, et al., 2019, p. 91).



Source: (Woldesenbet, et al., 2019, p. 73)

Figure 7: HIV by Province – South Africa 2015 – 2017

Table 1: HIV Prevalence by District – Western Cape Province; 2012–2017

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Cape Winelands	14.5	99.6 – 21.2	15.0	10.0 – 22.0	14.8	9.9 – 21.6	15.2	11.4 – 19.9	14.2	11.9 – 16.9
Central Karoo	14.9	9.1 – 23.4	6.9	4.4 – 10.6	4.9	1.5 – 14.7	11.8	6.9 – 19.3	8.7	5.6 – 13.3
Eden	14.3	10.3 – 19.5	15.6	10.0 – 23.5	18.2	12.4 – 25.6	15.7	10.8 – 22.4	12.6	9.7 – 16.1
Cape Town Metro	18.6	14.2 – 23.9	21.7	16.6 – 27.7	21.2	16.6 – 26.8	21.6	17.8 – 26.0	20.9	18.5 – 23.5
Overberg	17.8	11.5 – 26.5	13.9	7.4 – 24.6	15.2	8.8 – 25.1	19.8	11.4 – 32.2	23.9	13.2 – 39.4
West Coast	9.5	5.9 – 14.5	9.6	5.0 – 17.3	14	10.6 – 18.2	13.8	10.6 – 17.8	11.1	9.2 – 13.3
Western Cape	16.9	13.8 – 20.5	18.7	15.1 – 23.0	18.7	15.7 – 22.3	18.9	16.4 – 21.7	15.9	14.2 – 17.8

Source: (Woldesenbet, et al., 2019, p. 91)

Attention is now turned towards a demographic describing of the municipalities and wards affected by the project.

5.2 Municipal

Central Karoo District Municipality (DC5): Central Karoo is the largest district in the province, making up a third of its geographical area and covering an area of 39 073.1 km^2 in 2016. The district is bordered by the Pixley Ka Seme DM in the north, Namakwa DM in the north-west, Garden Route DM in the south, Sarah Baartman DM in the east and Cape Winelands DM in the west and incorporated the following local municipalities.

- Beaufort West Local Municipality
- Laingsburg Local Municipality
- Prince Albert Local Municipality.

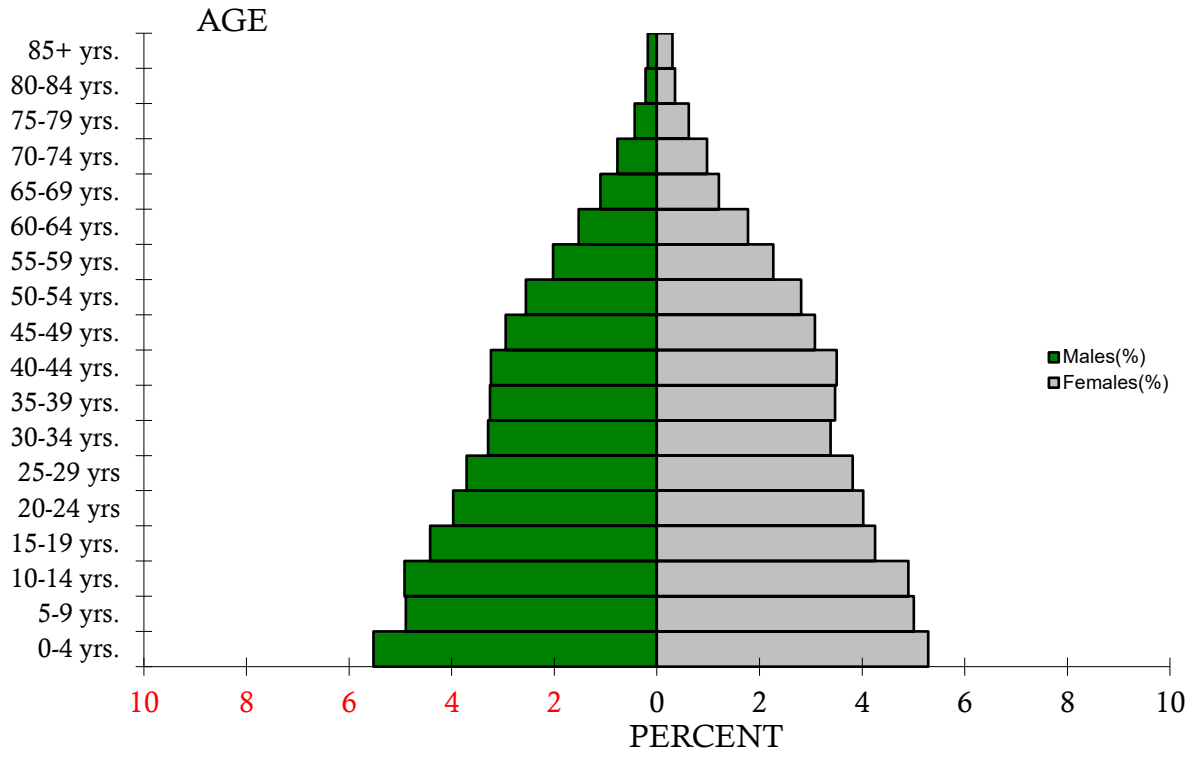
The following cities/towns are also located within the Central Karoo district.

- Beaufort West
- Klaarstroom
- Laingsburg
- Leeu Gamka
- Matjiesfontein
- Merweville
- Murraysburg
- Nelspoort
- Prince Albert
- Welgemoed

The main economic sectors of the district are.

- Agriculture (47%)
- Finance and business services (22%)
- Community services (19%)
- Construction (7%).

With a population of 74 247 people, the Central Karoo district has a population density of 1.9/km^2. According to the Community Survey, 2016; the district has a sex ratio of 93.8 with 25.4% of the population being under 15 years; 67.4% being between 15 and 65 years and 7.2% being over 65 years of age. The population pyramid of the Central Karoo District Municipality is illustrated in **Figure 8**.



Source: (Statistics South Africa, 2011)

Figure 8: Population Pyramid Central Karoo District Municipality

The demographic data pertaining to the Central Karoo district, based on both Census 2011 and Community Survey 2016, is presented below.

	2016	**2011**
Population	74 247	71 011
Age Structure		
Population under 15	25.4%	30.5%
Population 15 to 64	67.4%	63.3%
Population over 65	7.2%	6.2%
Dependency Ratio		
Per 100 (15-64)	48.3	58.0
Sex Ratio		
Males per 100 females	93.8	95.9
Population Growth		

	2016	2011
Per annum	1.01%	n/a
Labour Market		
Unemployment rate (official)	n/a	23.1%
Youth unemployment rate (official) 15-34	n/a	30.9%
Education (aged 20 +)		
No schooling	5.8%	10.1%
Matric	29.5%	21.5%
Higher education	3.2%	7.1%
Household Dynamics		
Households	21 980	19 076
Average household size	3.4	3.6
Female headed households	40.8%	38.2%
Formal dwellings	97.8%	97.0%
Housing owned	68.1%	56.9%
Household Services		
Flush toilet connected to sewerage	93.7%	77.6%
Weekly refuse removal	90.8%	78.7%
Piped water inside dwelling	73.8%	77.2%
Electricity for lighting	95.1%	89.4%

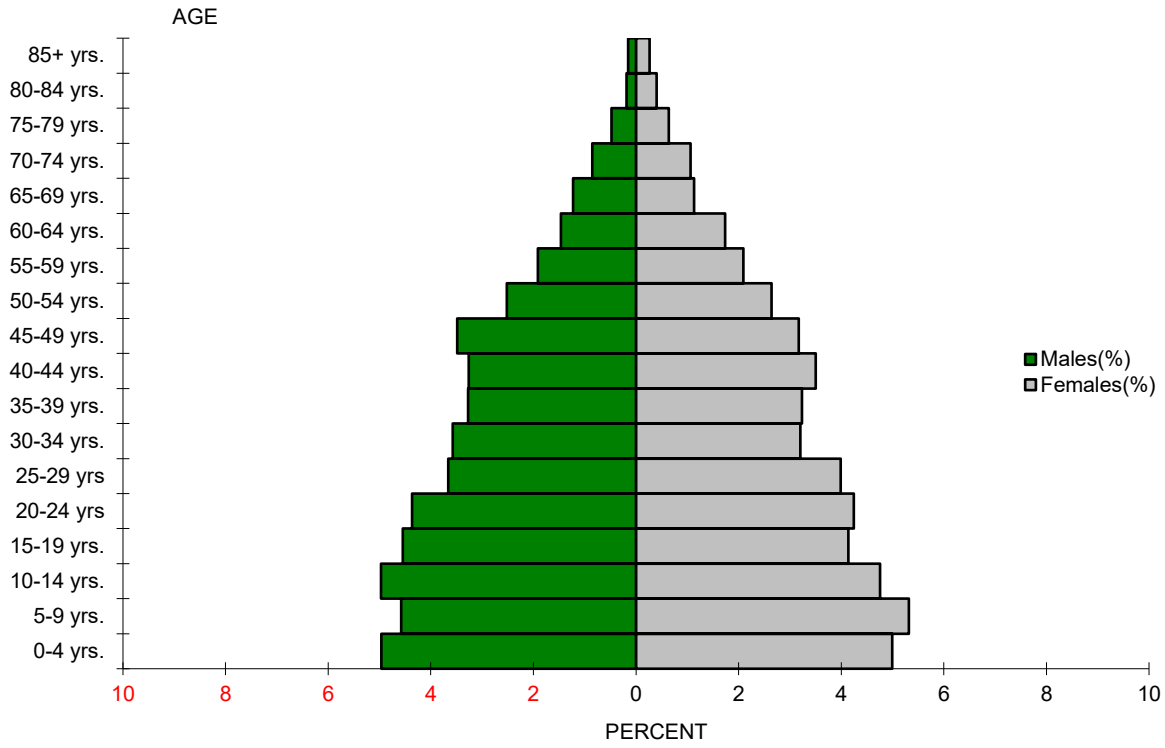
Prince Albert Local Municipality (WC052): Covered a geographical area of 8 156.9/km^2 making it the smallest of the 3 municipalities in the district. The following towns are within the municipal area.

- Klaarstroom
- Leeu Gamka
- Prince Albert and
- Prince Albert Road.

The main economic sectors of the municipality are.

- Agriculture and
- Tourism.

With a population of 14 272 people, the Prince Albert LM has a population density of 1.7/km^2. According to Census, 2016 the district has a sex ratio of 94.8 with 23.5% of the population being under 15 years; 69% being between 15 and 64 years and 7.5% being over 65 years of age. The population pyramid of the Prince Albert Local Municipality is illustrated in **Figure 10**.



Source: (Statistics South Africa, 2011)

Figure 9: Population Pyramid Prince Albert Local Municipality

The demographic data pertaining to the Prince Albert Local Municipality, based on both Census 2011 and Community Survey 2016, is presented below.

	2016	**2011**
Population	14 272	13 136
Age Structure		
Population under 15	23.5%	29.6%
Population 15 to 64	69.0%	64.0%
Population over 65	7.5%	6.4%
Dependency Ratio		
Per 100 (15-64)	44.9	56.2
Sex Ratio		

	2016	2011
Males per 100 females	94.8	97.8
Population Growth		
Per annum	1.89%	n/a
Labour Market		
Unemployment rate (official)	n/a	19.4%
Youth unemployment rate (official) 15-34	n/a	25.4%
Education (aged 20 +)		
No schooling	4.8%	9.1%
Matric	23.7%	16.9%
Higher education	2.4%	8.5%
Household Dynamics		
Households	4 183	3 578
Average household size	3.4	3.6
Female headed households	50.3%	44.9%
Formal dwellings	91.8%	93.9%
Housing owned	78.9%	56.8%
Household Services		
Flush toilet connected to sewerage	95.6%	63.6%
Weekly refuse removal	95.4%	73.4%
Piped water inside dwelling	70.9%	69.7%
Electricity for lighting	95.9%	86.4%

Beaufort West Local Municipality (WC053): Covered a geographical area of 21 931.6/km^2 making it the largest of the 3 municipalities in the district. The following towns are within the municipal area.

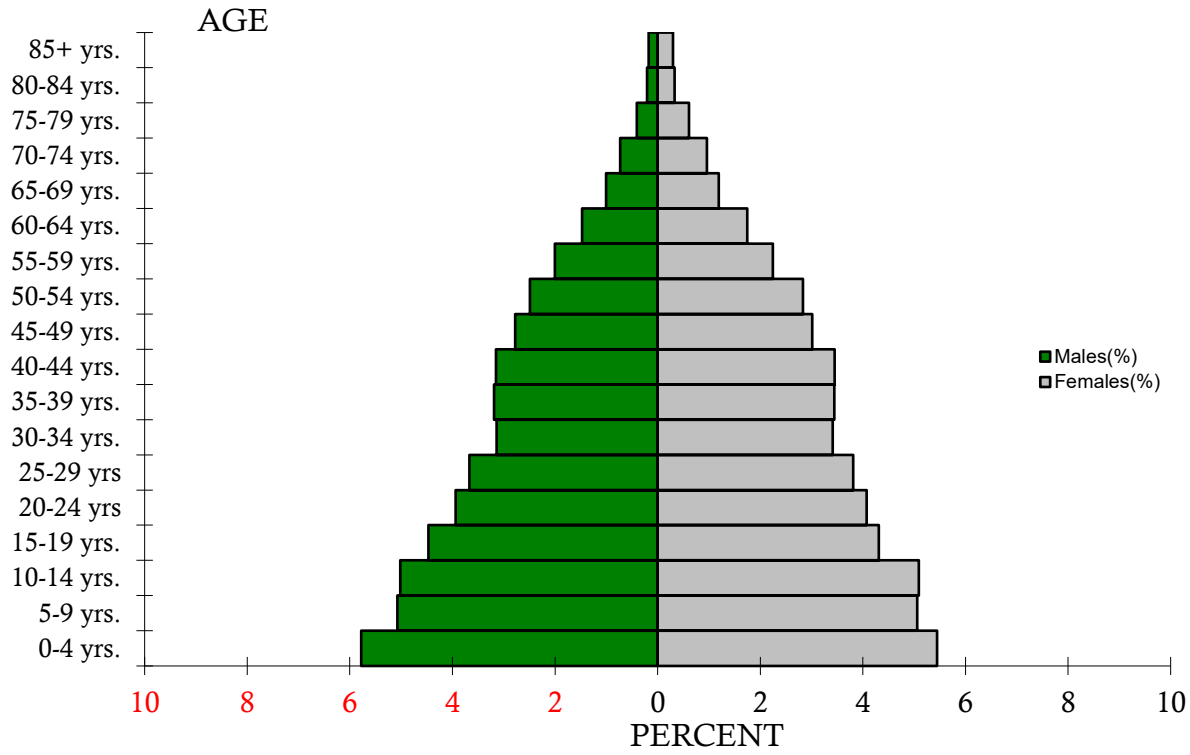
- Beaufort West
- Merweville
- Murraysburg and
- Nelspoort.

The main economic sectors of the municipality are.

- Transport and communication (25.3%)

- Wholesale and retail trade (16.8%)
- General government services (14.4%)
- Manufacturing (10.9%)
- Agriculture (7.7%).

With a population of 51 080 people, the Beaufort West LM has a population density of 2.3/km^2. According to Census, 2016 the district has a sex ratio of 92.7 with 26.6% of the population being under 15 years; 66.5% being between 15 and 64 years and 6.9% being over 65 years of age. The population pyramid of the Beaufort West Local Municipality is illustrated in **Figure 10**.



Source: (Statistics South Africa, 2011)

Figure 10: Population Pyramid Beaufort West Local Municipality

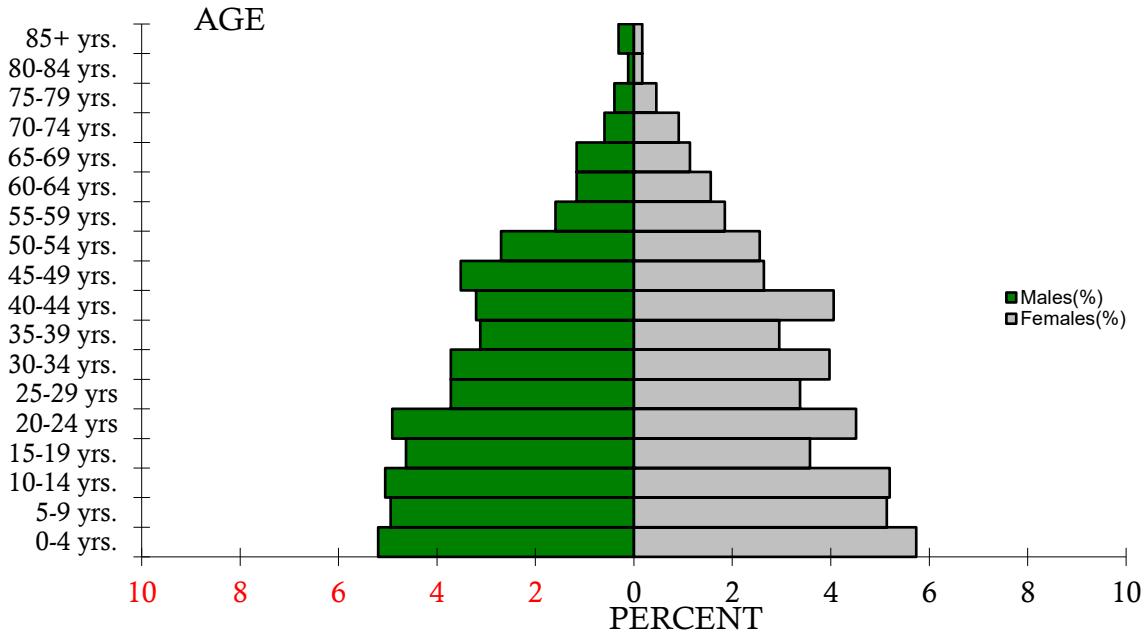
The demographic data pertaining to the Beaufort West Local Municipality, based on both Census 2011 and Community Survey 2016, is presented below.

	2016	**2011**
Population	51 080	49 586
Age Structure		
Population under 15	26.6%	31.5%
Population 15 to 64	66.5%	62.6%

	2016	2011
Population over 65	6.9%	5.9%
Dependency Ratio		
Per 100 (15-64)	50.5	59.7
Sex Ratio		
Males per 100 females	92.7	94.8
Population Growth		
Per annum	0.67%	n/a
Labour Market		
Unemployment rate (official)	n/a	25.5%
Youth unemployment rate (official) 15-34	n/a	34.5%
Education (aged 20 +)		
No schooling	5.4%	10.1%
Matric	31.8%	23.6%
Higher education	3.8%	6.5%
Household Dynamics		
Households	14 935	13 089
Average household size	3.4	3.6
Female headed households	39.8%	37.7%
Formal dwellings	99.6%	97.9%
Housing owned	66.4%	60.7%
Household Services		
Flush toilet connected to sewerage	95.3%	83.2%
Weekly refuse removal	91.7%	83.7%
Piped water inside dwelling	77.9%	81.3%
Electricity for lighting	96.0%	92.0%

Ward 1 Prince Albert Local Municipality (10502001): Statistics SA data available for Ward 1 of Prince Albert LM is only available in respect of Census 2011. On this basis, Ward 1 covers an area of 3 108.7 km^2

and has a population of 3 522 resulting in a population density of 1.1/km^2. The median age of the population is 25 years, with 36.1% being under 18; 58.5% being between 18 and 64 and 5.4% being 65 and over. With a sex ratio of 100.1, there is a virtually an equal distribution of males to females across the ward. The population pyramid for Ward 1 is illustrated in **Figure 11**.



Source: (Statistics South Africa, 2011)

Figure 11: Population Pyramid Ward 1 of Prince Albert Local Municipality

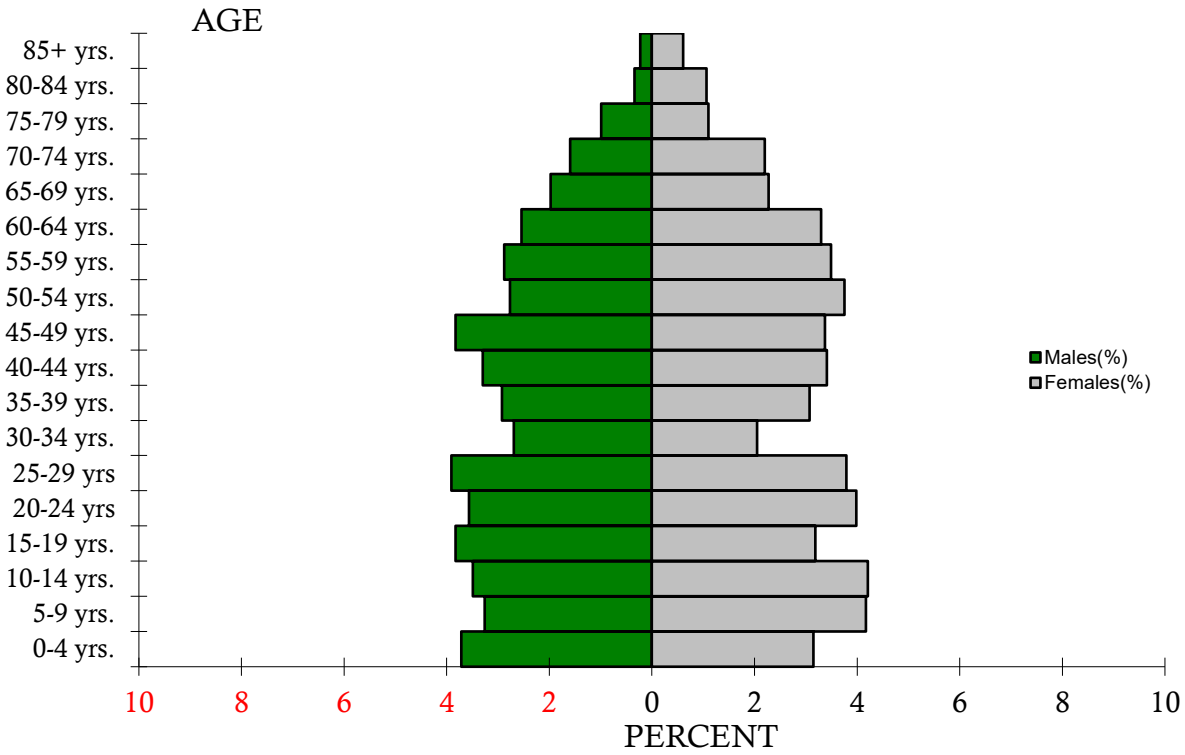
Regarding population group, at 85.5% coloured people are the most prevalent population group in the ward followed by white people at 7.8%, black African people at 4.9% and Indian Asian at 0.8%. At 93.4%, Afrikaans is the predominant home language spoken across the ward, followed by English at 2.2% and isiXhosa at 1.5%. Concerning levels of education, 44.8% of the population has completed Grade 9 or higher and 20% have completed Matric or higher with 87.6% of school-aged children, between 5 and 17 years, attending school.

There are 966 households within Ward 1 of which 2.6% live within informal dwellings; 49.4% of dwellings are fully owned or are being paid off and 17.5% are occupied rent-free. The average annual household income of the ward is R26 400. Of these households, 68.6% receive water from a regional or local service provider; 74.14% have access to flush or chemical toilets; 76% are receiving a refuse disposal service from a local authority or private company.

In 2011 38.1% of the population was employed, of which 88.2% was employed within the formal and 6% within the informal sectors.

Ward 2 Prince Albert Local Municipality (10502002): Statistics SA data available for Ward 2 of Prince Albert LM is only available in respect of Census 2011. On this basis, Ward 2 covers an area of 4 187.7 km^2

and has a population of 2 714, resulting in a population density of 0.6/km^2. The median age of the population is 32 years, with 27.7% being under 18; 63.1% being between 18 and 64 and 9.2% being 65 and over. With a sex ratio of 105,7 there is a higher proportion of males to females across the ward. The population pyramid for Ward 2 is illustrated in **Figure 12**.



Source: (Statistics South Africa, 2011)

Figure 12: Population Pyramid Ward 2 of Prince Albert Local Municipality

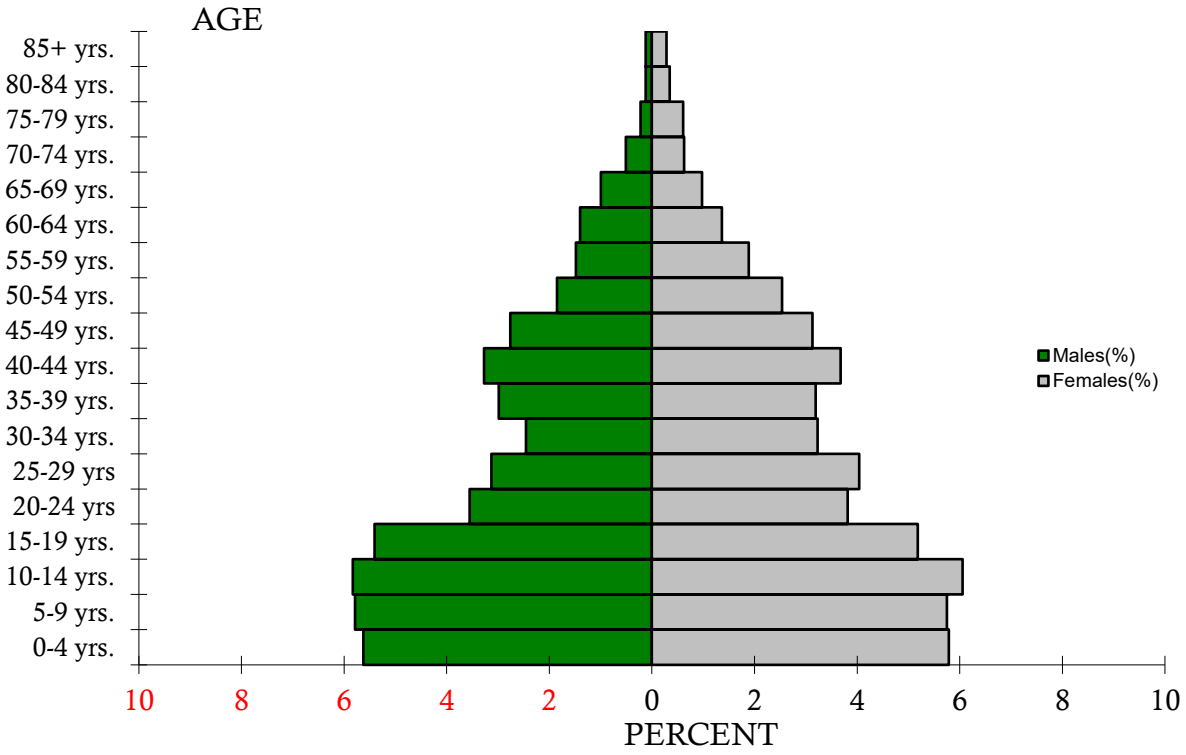
In respect of population group, at 65.7% coloured people are the most prevalent population group in the ward followed by white people at 32%, black African people at 1.9% and Indian or Asian people at 0.1%. At 86.6%, Afrikaans is the predominant home language spoken across the ward, followed by English at 7.2% and isiXhosa at 0.4%. Concerning levels of education, 53.9% of the population has completed Grade 9 or higher and 38.7% have completed Matric or higher with 78.5% of school-aged children, between 5 and 17 years, attending school.

There are 893 households within Ward 2 of which 88.8% live within formal dwellings; 37.6% of dwellings are fully owned or are being paid off and 20.5% are rented. The average annual household income of the ward is R29 400. Of these households, 46% receive water from a regional or local service provider; 71.3% have access to flush or chemical toilets; 44.4% are receiving a refuse disposal service from a local authority or private company.

In 2011 53.3% of the population was employed, of which 80% was employed within the formal and 9.9% within the informal sector.

Ward 6 Beaufort West Local Municipality (10403006): Statistics SA data available for Ward 6 of Beaufort West LM is only available in respect of Census 2011. On this basis, Ward 6 covers an area of 2 293.2 km^2 and has a population of 6 349, resulting in a population density of 2.8/km^2. The median age of the population is 24 years, with 40.1% being under 18; 54.5% being between 18 and 64 and 5.4% being 65 and over. With a sex ratio of 93.7, there is a higher proportion of females to males across the ward. The population pyramid for Ward 6 is illustrated in **Figure 13**.

In respect of population group, at 92.7% coloured people are the most prevalent population group in the ward followed by black African people and white people both at 3.2% and Indian or Asian people at 0.6%. at 94.7%, Afrikaans is the predominant home language spoken across the ward followed by English at 1.8% and isiXhosa at 0.6%. Concerning levels of education, 43.4% of the population has completed Grade 9 or higher and 18.1% have completed Matric or higher with 88.3% of school-aged children, between 5 and 17 years, attending school.



Source: (Statistics South Africa, 2011)

Figure 13: Population Pyramid Ward 6 of Beaufort West Local Municipality

There are 1 588 households within Ward 6 of which 97.5% live within formal dwellings; 56.4% of dwellings are fully owned or are being paid off, and 14.3% are rented. The average annual household income of the ward is R29 400. Of these households, 86.2% receive water from a regional or local service provider; 92.3%

have access to flush or chemical toilets; 88.2% are receiving a refuse disposal service from a local authority or private company.

In 2011 27.8% of the population was employed, of which 75.9% was employed within the formal and 12.6% within the informal sectors.

5.3 Project Footprint

The project footprint covers an area of approximately 4279.398 ha incorporating the following farm portions:

- The Farm Riet Poort No 231
- Portion 11 Of The Farm Brits Eigendom No 374
- Portion 15 Of The Farm Brits Eigendom No 374
- Portion 5 Of Farm 380
- Portion 10 Of Farm 380
- Portion 11 Of Farm 380.

Most of the project falls within Beaufort West Non Urban (NU); Main Place 183004 from Census 2011 with a small portion falling within Prince Albert NU; Main Place 182003.

The demographic data in respect of **Prince Albert NU; Main Place 182003**; Main Place 183004 in respect of Census 2011 is as follows:

Geographic area = 8 100.45 km²
Population = 2 771 people
Population density = 0.34/km²
Households = 912
Household density = 0.11/km²

Gender	**People**	**Percentage**
Male	1,460	52.69%
Female	1,311	47.31%
Population group		
Coloured	1,999	72.11%
White	680	24.53%
Black African	89	3.21%
Other	4	0.14%
First language	**People**	**Percentage**
Afrikaans	2,604	95.28%
English	62	2.27%

isiXhosa	21	0.77%
Setswana	12	0.44%
Sesotho	10	0.37%
isiZulu	10	0.37%
Tshivenda	6	0.22%
isiNdebele	6	0.22%
SiSwati	2	0.07%

Other data	
Young (0-14)	23,6%
Working Age (15-64)	69,7%
Elderly (65+)	6,7%
Dependency ratio	43,5
Sex ratio	111,4
Population density	0.34 persons/km^2
No schooling aged 20+	11,6%
Higher education aged 20+	14,4%
Matric aged 20+	15,4%
Number of households	912
Average household size	3
Female headed households	29,8%
Formal dwellings	94,4%
Housing owned/paying off	22,6%
Flush toilet connected to sewerage	14,3%
Weekly refuse removal	3,7%

6. IDENTIFICATION OF IMPACTS

The social impact variables considered across the project are in accordance with Vanclay's list of social impact variables clustered under the following main categories as adapted by Wong (Vanclay, 2002; Wong, 2013) and include:

1. Health and social well-being
2. Quality of the living environment (Liveability)
3. Economic
4. Cultural.

These categories are not exclusive and at times tend to overlap as certain processes may have an impact within more than one category. It is also important to note the multi- and interdisciplinary nature towards a

better understanding and management of the environmental effects of certain renewable energy installations (Hamed & Alshare, 2021).

6.1 Health and Social Wellbeing

The health and social wellbeing impacts related to the project include.

- Air quality
- Noise
- Shadow flicker
- Blade glint
- Electromagnetic field and RF interference
- Increase in crime
- Increased risk of HIV infections
- Influx of construction workers
- Hazard exposure.

Each of these impacts is addressed separately below.

6.1.1 Air Quality

Construction activities are likely to result in the generation of dust and exhaust emissions. Although air quality is subject to a separate specialist study, it is noted here as a factor that may have health consequences.

6.1.2 Noise

The operation of the wind turbines has the potential to result in the generation of noise levels that could have nuisance and health impacts for surrounding communities (Michaud, et al., 2016). In research undertaken in Denmark (Poulsen, et al., 2019) it was found that there was a positive association in the redemption of sleep medication and antidepressants regarding the exposure to high levels of out-door night-time noise; particularly amongst the elderly, >65 years of age. However, no consistent association with low-frequency indoor night-time wind turbine noise was found. Suggestive evidence, to be interpreted with caution, was found linking atrial fibrillation to long-term exposure to wind turbine noise amongst female nurses above 44 years (Bräuner, et al., 2019). The Sensitivity Screening Report undertaken in respect of the project and attached as Appendix 2, rates the noise sensitivity as very high level. However, the noise specialist indicates that:

> "*Considering the **low** significance of the potential noise impacts (with mitigation, inclusive of cumulative impacts) for the proposed WEF and associated infrastructure, there is no reason that the proposed Koup 1 WEF should not be authorized*" (Enviro Acoustics Research, 2021, p. 100).

6.1.3 *Shadow Flicker*

The rotation of the blades during operation could result in the blades momentarily casting shadows that create a strobe effect which can be seen as annoying and regarded a health hazard by some people. Several studies have identified a link between shadow flicker and high announce (Freiberg, Schefter, Hegewald, & Seidler, 2019). Due to the nature and timing of the flicker, it is unlikely that it will result in photosensitive epilepsy if three blade turbine rotation speeds are maintained below 60 rpm (Harding, Harding, & Wilkins, 2008, p. 1098; Rideout, Copes, & Bos, 2010, p. 3). The Sensitivity Screening Report rates the flicker theme in the area as very high.

6.1.4 *Blade Glint*

Light reflected off the turbine blades may result in a flickering sensation which can affect residents in their homes and distract motorists travelling along nearby roads such as the N12. Although blade glint is not highlighted in the sensitivity report, the proximity of the project to inhabited areas and various road traffic routes is likely to result in the risk of blade glint being very high. This effect will vary, according to time and season, and can be mitigated through the careful positioning of turbines and coating blades with non-reflective paint.

6.1.5 *Electromagnetic Field and Radio Frequency Interference*

Electromagnetic fields (EMFs) and radio frequency interference (RFI) have been associated with grid connection power lines and wind turbine generators; although the exact extent of this risk remains unclear (Krogh & Harrington, 2019). As with all power lines, the grid connection lines emit relatively low level EMFs while wind turbine generators are elevated to a height that is likely to result in little or no EMFs exposure at ground level. "*Thus, wind turbines are not considered a significant source of EMF exposure*" (Rideout, Copes, & Bos, 2010). With the nearest radio frequency sensitive installation being a weather radar facility located over 60 km from the site, the RFI theme has been rated as low in the site environmental sensitivity screening report attached as Appendix 2.

6.1.6 *Increase in Crime*

The larger portion of the project falls under the Beaufort West Police Precinct, which recorded 3 412 crimes across the precinct in 2020[1] and which covers both rural and urban areas. A small section of the project crosses over into the Prince Albert Police Precinct, which also covers both urban and rural areas, and which recorded 556 crimes in 2020. It is often opportunistic crime, stock theft, the abuse of alcohol and relationship related crime that is associated with construction activities.

Considering the relative remoteness of the project it is unlikely that the project will lead to any significant increase in crime levels in the area, however, it would be pertinent for the developers to ensure that processes are put in place through which any suspected criminal activities associated with the project can be easily

[1]According to Crime Stats SA as at 19 July 2020 https://www.crimestatssa.com/index.php

communicated and swiftly addressed. The construction phase carries with it a higher risk of associated criminal activities than is likely to be associated with the operational phase of the project.

6.1.7 Increased Risk of HIV Infections

The project is located in the Central Karoo district, which had the second lowest HIV prevalence in the country at 8.7% in 2017. This is just 0.2% above the Namakwa district with a prevalence rate of 8.5% over the same time period (Woldesenbet, et al., 2019). That sexually transmitted diseases tend to be spread by construction and transport workers, together with the high prevalence of HIV across the rest of South Africa, opens the area to a high risk of HIV infections (Singh & Malaviya, 1994; Ramjee & Gouws, 2002; Meintjes, Bowen, & Root, 2007; World Bank Group, 2016; Bowen, Dorrington, Distiller, Lake, & Besesar, 2008; Bowen P. , Govender, Edwards, & Cattell, 2016; Kikwasi & Lukwale, 2017; Bowen P. , Govender, Edwards, & Lake, 2018). This risk is likely to be at its highest during the construction phase of the project as the construction workforce increases and material and equipment is delivered to the site and it is likely to subside during the operational phase.

It is important that this issue be given serious attention and that the mitigation measures are implemented, and that the situation is closely monitored throughout the construction and operational phases of the project. The risk of the spread of HIV is most prevalent cumulatively and is addressed under section 7.6: Cumulative Impacts below.

6.1.8 Influx of Construction Workers

It is estimated that over the construction period, which will stretch over a 12 to 24-month period, the peak construction workforce will reach approximately 250 workers. Of these, 211 (85%) will probably be recruited locally while 38 (15%) will come from outside of area and will be at a professional level. The influx of workers could lead to the disruption of social networks with the formation of temporary relationships and an increase in pregnancy which may place pressures on local family units. Apart from this, the arrival of construction workers may result in the formation of a subculture that could manifest in antisocial behaviour, which conflicts with the expectations of local communities. This may result in these local communities, who are accustomed to a quiet, rural environment, becoming dissatisfied with the neighbourhood. These disruptions are, however, more likely to occur in the nearby urban area of Beaufort West, when workers seek recreational activities. Due to population sparsity, the risk to the families of local farm workers in the vicinity of the site should be negligible.

During the operational phase of the project, the workforce will consist of 20 workers who will be accommodated off site. Consequently, the risks associated with disruptions to social networks will be minimal over the operation phase of the project.

6.1.9 Hazard Exposure

The highest risks associated with wind energy facilities occur during transportation and construction (Aylin, Çolak, & Dağdeviren, 2018). Over the construction period, the use of heavy equipment and vehicles and an increase in vehicle traffic along the N1 and N12 and within the vicinity of all construction sites will result in an increased risk to the personal safety of people and animals. Of particular concern are increased hazards faced by pedestrians, cyclists and motorists with emphasis on vulnerable groups such as children and the elderly. The Transportation Study indicates that:

> "*The construction phase of this development will typically generate the highest number of additional vehicles. It will however be temporary and impacts are considered to be minimal / low*" (SiVEST SA (Pty) Ltd, 2021a, p. 35).

Excavation work and trenches also pose a hazard to the safety of people, particularly children and animals, who may fall into these works and who may have difficulty in getting out. There is also likely to be an increased risk of fires brought about through construction workers lighting fires for cooking and warmth during cold periods.

Because of climatic conditions in the area, there is a risk of ice forming on the turbine blades in winter. This could place site personnel and the public at risk due to ice throw and ice shed. There is also the risk of personal injury as a result of structural damage, such as blade failure and turbine collapse (Palmer, 2018). Although the data linked to turbine failures is still limited (Brouwer, Al-Jibouri, Cárdenasc, & Halman, 2018; Palmer, 2018) it is likely that mitigation measure such as damage detection techniques, can significantly reduce this risk. In this regard, see "*Damage detection techniques for wind turbine blades: A review*" (Du, et al., 2020). These risks can also be mitigated through the careful siting of turbines to ensure that they are a safe distance from any occupied or utilised structure, roads, or public areas. Fencing the turbines off and erecting warning notices around the turbines will also reduce these risks.

6.2 Quality of the Living Environment

The following quality of the living environment impacts are related to the project.

- Disruption of daily living patterns
- Disruptions to social and community infrastructure
- Transformation of the sense of place.

6.2.1 Disruption of Daily Living Patterns

If there are any disruptions to daily living patterns, these are likely to be minimal and restricted to the construction phase of the project. This impact will be mainly associated with the site and the main access roads. These disruptions are only likely to be associated with the delivery of materials and machinery to site and the transportation of workers to and from site.

6.2.2 Disruption to Social and Community Infrastructure

With the workforce associated with the construction phase peaking at 250 people, of which 211 are likely to be recruited locally, it is unlikely that, in isolation, the project will have any significant effect on social and community infrastructure in the area. However, on a cumulative basis, considering the activities taking place in, and being planned for the area, there is likely to be a significant impact in this regard. This impact is dealt with in greater depth under section 7.6: Cumulative Impacts below.

6.2.3 Transformation of the Sense of Place

The wind energy facility will be highly visible and will result in the landscape being transformed from that of a rural setting to what would be considered by some to have more of an industrial aura. This issue remains controversial as a sense of place is personal and subjective with some people accepting the visual changes to the landscape and embracing them to support renewable energy, while others may reject them (Firestone, Bidwell, Gardner, & Knapp, 2018; Schneider, Mudra, & Kozumplíková, 2018). One of the most striking descriptions of the subjective nature of public opinion towards the aesthetic value of wind farms appears in the "Siting Guide for Wind Farms in Australia" (Coy, Sadaka, & Lamborn, 2004).

> "*The aesthetic value of wind farms is debateable and subjective. At the time of construction The Eiffel Tower and the Sydney Opera House were two of the most outrageous and criticised structures. Today the Sydney Opera House and the Eiffel Tower form the northern and southern hemispheres' most recognisable icons.*
>
> *The French media, artists and intellectuals alike in 1889 described the Eiffel Tower as 'this truly tragic street lamp,' (Léon Bloy) 'this belfry skeleton,' (Paul Verlaine) 'this mast of iron gymnasium apparatus, incomplete, confused and deformed' (François Coppée) (Official site of the Eiffel Tower 2003). Sydney Opera House Designer Jørn Utzon left Australia disgraced mid construction.*
>
> *Only the North Sea separates Denmark and The United Kingdom, yet the acceptance of wind farms in both countries are poles apart. In Denmark wind farms are a source of national pride. One of Denmark's most recognisable exports, Thyholmer Pilsner beer, depicts wind farms on its label as a symbol of its country. Conservative British MP Sir Bernard Ingham described wind farms as "Lavatory brushes in the sky" (Gipe 1995)."*

The visual environment and noise are both important elements through which a sense of place is constructed, and both these criteria are subject to separate specialist studies in which they will be evaluated and mitigated. In addition, the significance of a sense of place is highest at a cumulative level and is addressed as such under section 7.6 Cumulative Impacts.

The Visual Impact Statement in the Visual Report reads as follows:

> "*It is SiVEST's opinion that the potential visual impacts associated with the proposed Koup 1 WEF and associated grid infrastructure development are negative and of moderate significance. Given the low*

level of human habitation and the absence of sensitive receptors however, the project is deemed acceptable from a visual perspective and the EA should be granted. SiVEST is of the opinion that the impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented" (SiVEST SA (Pty) Ltd, 2021b, p. 95).

6.3 Economic

The economic impacts related to the project include.

- Job creation and skills development
- Socio-economic stimulation.

6.3.1 Job Creation and Skills Development

The project will lead to the creation of both direct and indirect jobs which will have a positive economic benefit within the region. In this regard, there are 300-400 jobs associated with the construction phase of the project and 20 with the operational phase. Of these jobs approximately 165-220 (55%) of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 90-120 (30%) to semi-skilled workers (drivers, equipment operators etc.), and 45-60 (15%) for skilled personnel (engineers, land surveyors, project managers etc.). Many of the low and semi-skilled employment opportunities will probably be available to residents in the area, specifically residents from Beaufort West and Prince Albert. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills amongst these people. The operational phase will employ approximately 20 people full time for a period of up to 20 years. Of this, approximately 4 are low skilled, 10 are semi-skilled and 6 are skilled.

6.3.2 Socio-economic Stimulation

Apart from these jobs the project is also likely to stimulate the local economy, which is likely to be most significant at a cumulative level. Nevertheless, there will be a significant economic contribution attached to the Genesis Enertrag Koup 1 Wind Facility. This contribution will be in the form of disposable salaries and the purchases of services and supplies from the local communities in and around the towns of Beaufort West and Prince Albert. The capital expenditure on completion of the project is anticipated to be in the region of R 2.5 billion.

Apart from job creation and procurement spend; the project will also have broader positive socio-economic impacts as far as socio-economic development contributions are concerned. Although, at the point of writing, the project developer had not as yet put a corporate social responsibility plan in place, the intention is to either fall in line with the REIPPP BID guidelines or to put an equivalent plan in place. This will create an opportunity to support the local community over the life span of the operational phase of the project, which will stretch over a 25-year period. At a national level the project also has the potential to contribute towards the national

grid requirements as part of the Government's vision to source 15.1% of the country's energy through wind power (Department of Energy Republic of South Africa, 2018, p. 41).

6.4 Cultural Impacts

At a social level, it is likely that any cultural impacts would be associated with sensitive archaeological and/or heritage sites that may be found. In this regard, a Heritage and Palaeontology Impact Assessment was undertaken, and it was indicated that:

> "*Construction of the facility may adversely affect potential archaeological and fossil heritage within the development footprint by damaging, destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good. The possible pre-construction impacts calculated on the tangible cultural heritage resources is overall MODERATE NEGATIVE rating but with the implementation of the recommend buffers and management guidelines will be reduced to a LOW NEGATIVE impact* (PGS Heritage (Pty) Ltd, 2021).

7. IMPACT ASSESSMENT

The impacts are assessed below in respect of the following phases of the project.

- Planning or pre-construction
- Construction
- Operation and
- Decommissioning.

Mitigation and optimisation measures are also suggested under this section.

7.1 Planning and Pre-construction

An investigation was undertaken to assess the viability of the choice of site through which it was established that the site was best suited to a wind energy facility due to the:

- Nature of the terrain
- Climatic conditions, and
- Current land use.

In addition, the project fits with legislation and key planning and policy documentation. Consequently, there are no social issues related to the planning and pre-construction phase of the project.

7.2 Construction Phase

The impacts listed below apply in respect of both the WEF and grid infrastructure over the short-term, regarding the construction phase of the project, and include:

- Air quality
- Noise

- Increase in crime
- Increased risk of HIV infections
- Influx of construction workers
- Hazard exposure
- Disruption of daily living patterns
- Disruptions to social and community infrastructure
- Job creation and skills development
- Socio-economic stimulation.

Each of these impacts is assessed below with mitigation and optimisation measures will be suggested in **Table 3**.

7.3 Operational Phase

The impacts listed below apply over the long-term, to the operational phase of the project, and include:

- Noise (WEF only not applicable to grid infrastructure)
- Shadow flicker (WEF only not applicable to grid infrastructure)
- Blade glint (WEF only not applicable to grid infrastructure)
- Electromagnetic field and RF interference
- Hazard exposure
- Transformation of the sense of place
- Job creation and skills development
- Socio-economic stimulation.

All impacts apply in respect of the WEF, however, noise; shadow flicker and blade glint are not applicable to the grid infrastructure. Each of these impacts is assessed below with mitigation and optimisation measures being suggested in **Table 4**.

7.4 No Go Option

The no project option would mean that the social environment is not affected as the status quo remains. On a negative basis, it also means that all the positive aspects associated with the project would not materialise. Consequently, there would be no job creation, no revenue streams into the local economy and municipal coffers, and a lost opportunity to enhance the National Grid with a renewable source of energy. Considering that Eskom's coal-fired power stations are a huge contributor to carbon emissions, the loss of a chance to supplement the National Grid through renewable energy would be significant at a national, if not at a global level. The Intergovernmental Panel on Climate Change (6 October 2018, p. 15) has warned that the Co^2 emissions need to be reduced by 45% from the 2010 levels by 2030 and to zero by 2050, which means that coal must go in the immediate future. The no-project alternative is assessed in **Table 5**.

7.5 Decommissioning

It is estimated that the project will have a lifespan of approximately 25 years and that there is a possibility that after this period the facility could be replaced with more up-to-date technology, extending the project lifespan even further. Considering this time period, and that between commissioning and decommissioning a great deal of social change is certain to occur, it will be meaningless to assess the social impact of decommissioning as the social variables that are likely to be in play at the point of decommissioning are rather uncertain. It is, however, assumed that decommissioning will result in the loss of permanent jobs and consequently the following mitigation measures are suggested.

Decommissioning mitigation measures

- Ensure that a retrenchment package is in place.
- Ensure that staff are trained to provide them with saleable skills within the job market.
- Ensure that the site is cleared responsibly and left in a safe condition.

7.6 Cumulative Impacts

The project borders the Renewable Energy Development Zone (REDZ) 11 – Beaufort West. With the renewable energy projects being built and planned for the area, there is likely to be a cumulative impact on the region. In this regard, the projects listed in Table 2 and illustrated in Figure 14 and **Figure 15** fall within a 35 km radius of the Koup 1 WEF and Grid Infrastructure site.

Table 2: Existing and Proposed Renewable Energy Projects within 35km of Site

Project	DEA Reference No	Technology	Capacity	Status of Application / Development
Proposed Beaufort West Wind Farm	12/12/20/1784/1	Wind	140 MW	Approved
Proposed Trakas Wind Farm	12/12/20/1784/2	Wind	140 MW	Approved
Proposed Wind and Solar Facility on the Farm Lombardskraal 330	14/12/16/3/3/2/406	Solar	20 MW	EIA in Process
Proposed Leeu Gamka Solar Power Plant	12/12/20/2296	Solar		Withdrawn/Lapsed
Kwagga Wind Energy Facility 1 (Pty) Ltd	Pending	Wind	279 MW	EIA in Process
Kwagga Wind Energy Facility 2 (Pty) Ltd	Pending	Wind	341 MW	EIA in Process
Kwagga Wind Energy Facility 3 (Pty) Ltd	Pending	Wind	204.6 MW	EIA in Process
Proposed Koup 2 WEF	TBA	Wind	140 MW	EIA in Process

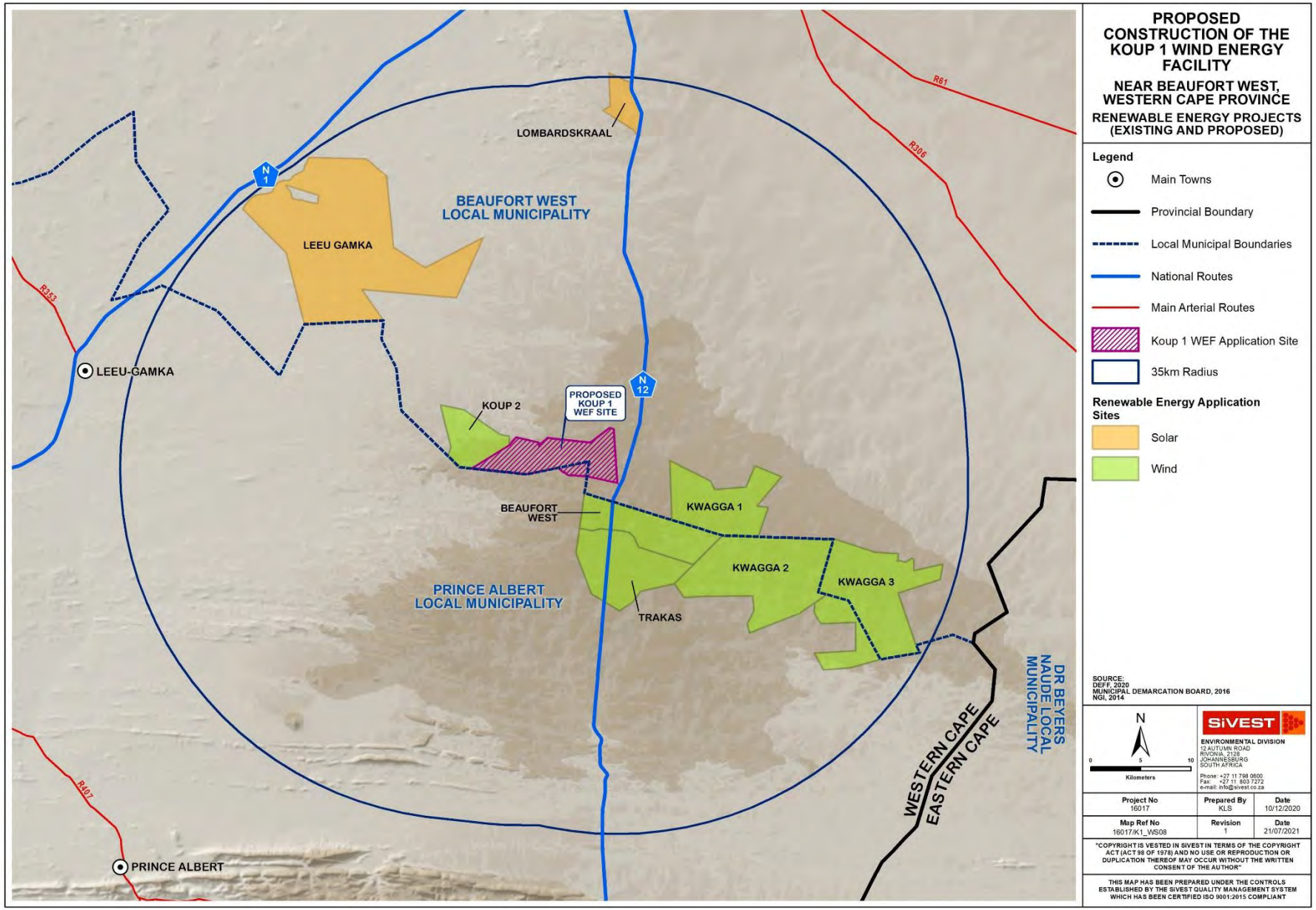


Figure 14: Existing & Proposed Renewable Energy Projects within 35km of WEF

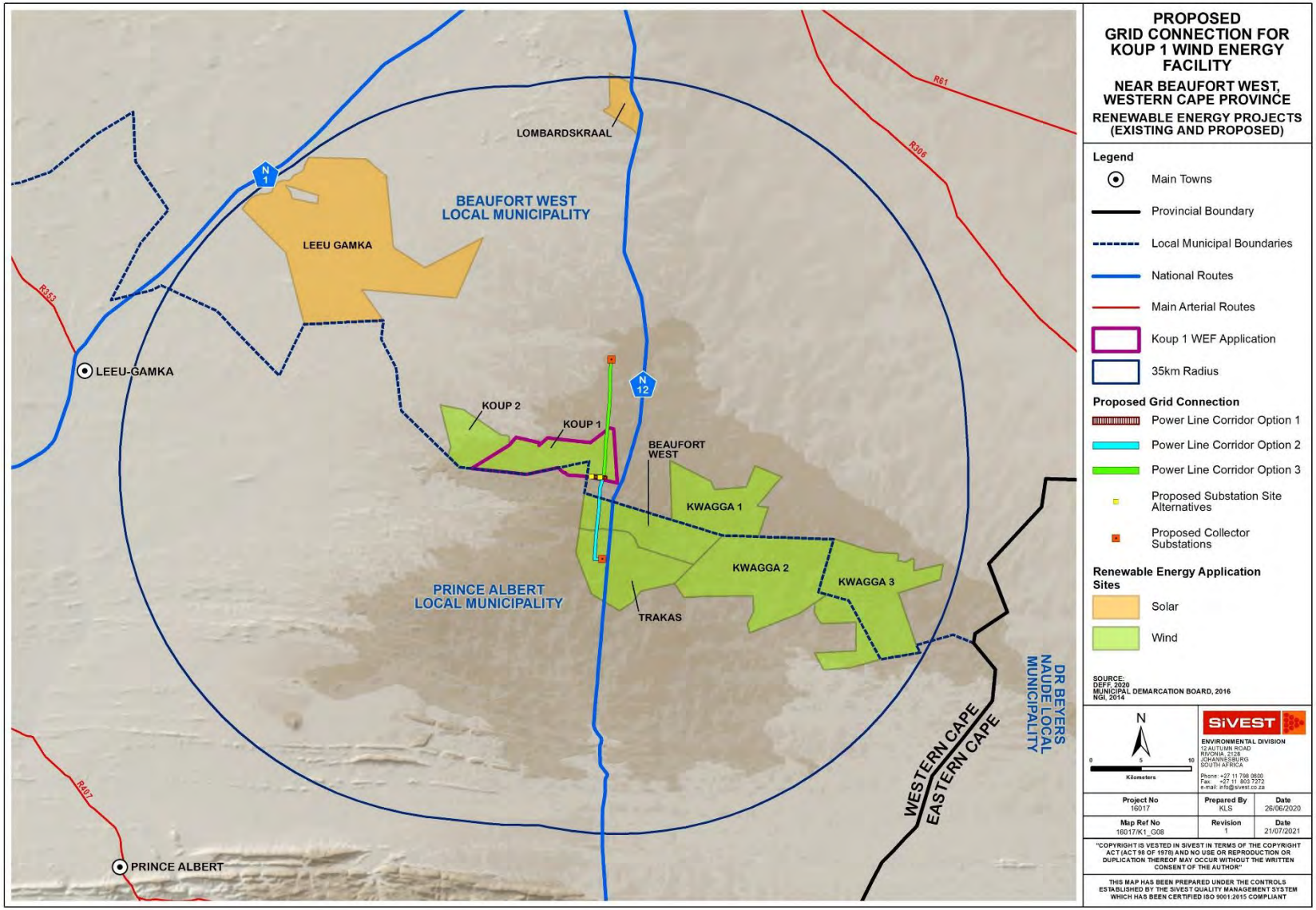


Figure 15: Existing & Proposed Renewable Energy Projects within 35km of Grid

The following social issues were raised in the specialist reports pertaining to some of the renewable energy initiatives identified above:

- **Positive impacts**
  - Stimulation of economy
  - Job creation; impacts associated with the construction phase are generally short term
  - Increased demand for services
  - Increased government revenue
  - Skills development
  - Local upliftment initiatives
  - Sustainable household income
  - Establishment of renewable energy infrastructure.
- ***Negative impacts***
  - Potential increase in criminal activity
  - Impact on surrounding land uses
  - Sense of place
  - An influx of construction workers
  - Impact on family and community relations – STDs and HIV
  - Risk of stock theft, poaching, and damage to farm infrastructure.
- **Indirect impacts**
  - Skills and development – increased employability
- **Decommissioning Phase**
  - Local economy stimulation
  - Temporary increase in employment and income.
- **Cumulative impacts**
  - Stimulation of economy
  - Impact associated with increases in traffic
  - Development of additional renewable energy facilities – the increased potential for job creation
  - Impact on family and community relations – STDs and HIV
  - Sense of place
  - Pressure on municipal and social services
- **No-Go option**
  - Loss of renewable energy infrastructure
  - High carbon emissions
  - Unsustainable way to produce electricity

In response to the various developments within the Karoo, there has been a counter-reaction amongst some communities opposed to this relatively sudden change to what was previously an isolated, tranquil and pristine environment. In this regard, the Heritage Association of South Africa published an undated appeal to the

Department of Environment Forestry and Fisheries to consider the need for a cumulative impact assessment with regard to the cumulative effect of mining and energy developments within the area[2]. Another article cited in the Karoo News Group appeal is a criticism of the cumulative effects of the renewable energy sector, highlighting environmental questions regarding wind farms[3]. Apart from the general reaction towards the cumulative effects of renewable energy projects, the following more specific social issues need to be considered, these relate to the effects on.

- Noise
- Shadow flicker
- Blade glint
- Risk of HIV
- Sense of place
- Service supplies and infrastructure and
- The economy.

The environmental sensitivity screening report, generated for the project and attached as Appendix 2, identifies noise, flicker and landscape (wind) as areas of very high sensitivity. The landscape (wind) theme is addressed under a sense of place.

7.6.1 Noise

With a high number of wind turbines in the area, sound pressure waves may cause noise pollution that could be detrimental to health, particularly where sited too close to homes and guest houses. Although noted at the social level, the issue of noise pollution from wind turbines is addressed by the noise specialist. From a social perspective, the placing of turbines away from residential structures will help in mitigating the problem.

7.6.2 Shadow Flicker

The shadow flicker effect may also have health-related issues attached that would need to be considered. This effect can be mitigated through the careful siting of wind turbines to avoid residential areas and locations frequented by tourist such as guest houses.

7.6.3 Blade Glint

Blade glint will affect travellers along the N1 and N12 and may affect residents and visitors to the area at different time of the day. Blade glint can, however, be successfully mitigated by using non reflective coatings and by appropriately angling the blades to limit the amount of reflection.

[2] Heritage Association of South Africa: Karoo News Group – Undated, Appeal to Minister. http://heritagesa.org/wp/2222-2/

[3] Tilting at windmills: Power politics and Wind farms in South Africa. http://reprobate.co.za/tilting-at-windmills-power-politics-and-wind-farms-in-south-africa/

7.6.4 Risk of HIV Infections[4]

With an HIV prevalence rate of 15.9% in 2017, the Western Cape Provinces had the lowest HIV prevalence rates across the country, while at a district level, the Namaqua district had the lowest HIV prevalence rate at 8.5% with the Central Karoo having the second-lowest HIV prevalence rate at 8.7%.

These prevalence rates are significantly low compared to other areas of the country which range between 17.9% across the Northern Cape Province, which had the second lowest provincial prevalence rate, and 41.1% in KwaZulu-Natal, with the uMgungundlovu District Municipality having an HIV prevalence rate of 46.6% in 2017. The Eastern Cape, which together with the Northern Cape, shares provincial borders with the Western Cape, had an HIV prevalence rate of 33.7% in 2017 (Woldesenbet, et al., 2019).

With the influx of labour, particularly following the construction of the various renewable energy projects within the region, the risk of HIV infections in the area is likely to rise significantly. It is well documented on both an international and local basis that the construction industry carries a high level of HIV infections (Meintjes, Bowen, & Root, 2007; Bowen, Dorrington, Distiller, Lake, & Besesar, 2008; Wasie, et al., 2015; Bowen P. , Govender, Edwards, & Cattell, 2016; Kikwasi & Lukwale, 2017; Bowen P. , Govender, Edwards, & Lake, 2018) which can be spread amongst the local communities, particularly through the spread of prostitution that follows the availability of disposable income. It is also well documented on both an international and local level that HIV is also spread by truck drivers (Singh & Malaviya, 1994; Ramjee & Gouws, 2002; Strauss, et al., 2018) and there is likely to be an increase in truck drivers in the area as equipment and materials are delivered to the various construction sites.

These issues associated with the area being extremely poor and the associated disposable income that will follow the construction workers and truck drivers to the area will heighten the risk of the spread of HIV infections across what is a rather remote region. In this regard, The World Bank (2009, pp. 367-368) had showed a strong link between infrastructure projects and health as:

> "*Transport, mobility, and gender inequality increase the spread of HIV and AIDS, which along with other infectious diseases, follow transport and construction workers on transport networks and other infrastructure into rural areas, causing serious economic impacts.*"

7.6.5 Sense of Place

There is also a concern amongst various interest groups that the proliferation of renewable energy facilities, particularly when considered in association with other industrial activities such as mining, will have a significant and negative cumulative social impact on the area[5]. In this regard issues such as the noise from

[4] HIV prevalence rates are at 2013 figures based on The 2013 National Antenatal Sentinel HIV Prevalence Survey, South Africa.

[5] Amongst others see for instance:
1. Heritage South Africa's Karoo News Group http://heritagesa.org/wp/2222-2/
2. Alternative sources of energy for South Africa in various shades of green **Invalid source specified.**

blades; aesthetic associated with highly visible wind farms; solar parks and mines; the loss of bird and bat life and its effect on tourism; as well as the disruption of social networks have all been cited as concerns.

This is, however, a complex issue as there are varying opinions in respect of the aesthetic appearance of solar PV facilities and wind farms with some regarding them in a far more positive light than others (Firestone, Bidwell, Gardner, & Knapp, 2018; Schneider, Mudra, & Kozumplíková, 2018; Bergquist, Konisky, & Kotcher, 2020). In a study of public attitudes towards onshore wind farms in south-west Scotland, it was found that many regarded the visual impact of these developments in a positive light. It must, however, be noted that this was linked with community ownership having a positive impact on public attitudes towards wind farm developments in Scotland (Warren & McFadyen, 2010). The same is also likely to be true regarding solar PV facilities (Carley, Konisky, Atiq, & Land, 2020). A further and important consideration in this regard is of an ethical nature associated with community acceptance and energy justice and raises the question of the incorporation of public acceptance, particularly that of the underrepresented, into energy policy (Roddisa, Carvera, Dallimerb, Normana, & Ziva, 2018, pp. 362-363; Bergquist, Konisky, & Kotcher, 2020).

7.6.6 Services, Supplies and Infrastructure

With the proliferation of renewable energy facilities in the area, it is quite likely that the local authorities, currently hard-pressed to deliver services, will find it difficult to keep up with these developments. The influx of construction workers is likely to place pressure on accommodation and the need for both services and supplies. Beaufort West and Prince Albert, being within the 60 km radius of these projects, are likely to experience a high demand for accommodation, services and supplies. On this basis market demands could inflate costs that may have a negative effect on local communities, particularly the poor, who may be forced to pay higher prices for essential supplies resulting in an escalation of the cost of living in the area. Social services such as medical and educational facilities could also be placed under pressure because of increased demand. Although this may reach its peak during the construction phase, it should be mitigated somewhat by the fact that the construction of the various projects will be spread across different timelines, with some projects beginning while others reach completion. Where numerous projects are entering the construction phase simultaneously, the project companies should engage to align efforts. Employing local people across the various projects and project phases may also assist in reducing the stress placed on services, supplies and infrastructure in the area.

During the operational phases, it is likely that these demands will continue as operational staff take up more long-term residency in the area and are supported by service and maintenance personnel who may spend some time on site contractually. An influx of temporary maintenance and service workers is likely to last over the operational phase of the projects but is likely to settle within the medium term as the economy adjusts and the municipal authorities can respond to this growth.

3. Social media sites such as the Facebook Karoo Energy Debate https://www.facebook.com/TheKarooEnergyDebate/
4. Why the Karoo.**Invalid source specified.**.

7.6.7 Economic

The cumulative economic impact of the project will be both positive and negative. The negative economic impacts, associated with a possible rise in living costs driven by market demand, are considered under the section above. In this section, the positive economic impacts will be addressed.

From a positive perspective, the proliferation of renewable energy facilities within the region is likely to result in significant and positive cumulative impacts in the area in terms of both direct and indirect job creation, skills development, training opportunities, and the creation of business opportunities for local businesses. In this regard it is indicated in the REIPPPP Quarterly Report, as at 30 September 2020, that in respect of South Africa that,

> " ..*the REIPPPP is targeting broader economic and socio-economic developmental benefits*"… "[t]*o date, a total of 55 217 job years have been created for South African citizens, of which 44 290 were in construction and 10 927 in operations*" (Independent Power Producer Office, 2020a, p. 24 & 28). In addition to this "[t]*he combined (construction and operations) procurement value is projected as R149.9 billion, of which R82.7 billion has been spent to date. For construction, of the R71.2 billion already spent to date, R60.0 billion is from the 71 projects which have already been completed. These 71 projects had planned to spend R54.6 billion. The actual procurement construction costs have therefore exceeded the planned costs by 10% for completed projects.*"

The district and local municipalities within the area have identified renewable energy as a strategic economic opportunity in a region that previously had few such opportunities. This is indicated in the various IDPs and LEDs pertaining to the affected municipalities.

7.6.8 Assessment of Cumulative Impacts

The cumulative impacts discussed above are assessed in Table 6**Error! Reference source not found.**. It must, however, be noted that this assessment is at a superficial level, as any in-depth investigation of the cumulative effects of the various developments being planned for the region are beyond the scope of this study, as they would require a broad-based investigation on a far larger scale. In this regard the Draft Consolidated Intergovernmental Readiness Report for large development scenarios in the Central Karoo (Western Cape Government Environmental Affairs and Development Planning, 2019) acknowledges the need to prepare for large-scale, or regional, development proposals and to enlist national government, private sector and public participation and support. In the light of this initiative, the risk of any fatal flaws associated with the cumulative social impacts of similar development in the area should be limited.

Table 3: Construction: Rating of Impacts & Mitigation/Optimisation Measures[6]

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction/ Decommissioning Phase																				
Health and social wellbeing	Air quality	1	3	1	1	1	2	14	-	Low	Where appropriate apply dust suppression measures on a regular basis. Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. Ensure that all vehicles are roadworthy and drivers are qualified and made aware of the potential noise and dust issues. Appoint a community liaison officer to deal with complaints and grievances from the public.	1	3	1	1	1	1	7	-	Low
	Noise	1	1	1	1	3	1	6	-	Low	Refer to the mitigation measures suggested by the noise specialist.	1	1	1	1	1	1	6	-	Low
	Increase in crime	2	2	3	2	2	2	18	-	Low	Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing. Fence off the construction sites and control access to these sites. Appoint an independent security company to monitor the site; Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum. Prevent loitering within the vicinity of the construction camp as well as construction sites.	2	2	3	2	2	2	18	-	Low
	Increased risk of HIV infections	3	4	3	3	3	3	48	-	High	Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms. Expose workers to a health and HIV/AIDS awareness educational program. Extend the HIV/AIDS program into the community with a specific focus on schools and youth clubs.	3	3	2	2	3	2	26	-	Medium
	Influx of construction workers	1	4	1	1	1	2	16	-	Low	Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors.	1	4	1	1	1	2	16	-	Low

[6] Ratings apply to both the WEF & Grid Infrastructure.

											Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.									
	Hazard exposure	2	4	2	2	1	2	22	-	Low	Ensure that all construction equipment and vehicles are properly maintained at all times. Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population such as children and the elderly. Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to. Make staff aware of the dangers of fire during regular toolbox talks.	2	2	2	2	1	2	18	-	Low
Quality of the living environment	Disruption of daily living patterns	2	4	2	2	1	2	22	-	Low	Ensure that, at all times, people have access to their properties as well as to social facilities.	2	3	2	2	1	2	20	-	Low
	Disruptions to social and community infrastructure	2	4	2	2	1	2	22	-	Low	Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority. Ensure that where communities' access is obstructed that this access is restored to an acceptable state.	2	3	2	2	1	2	20	-	Low
Economic	Job creation and skills development	2	4	2	3	1	2	24	+	Medium	Wherever feasible, local residents should be recruited to fill semi and unskilled jobs. Women should be given equal employment opportunities and encouraged to apply for positions. A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere post-construction.	2	4	2	3	1	2	24	+	Medium
	Socio-economic stimulation.	3	4	2	3	1	2	26	+	Medium	A procurement policy promoting the use of local business should, where possible, be put in place to be applied throughout the construction phase.	3	4	2	3	1	2	26	+	Medium

Table 4: Operational: Rating of Impacts & Mitigation/Optimisation Measures[7]

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Operation Phase																				
Health and social wellbeing	Noise WEF only	2	3	2	2	3	1	12	-	Low	Refer to the mitigation measures suggested by the noise specialist.	2	2	2	1	3	1	10	-	Low
	Shadow flicker WEF only	1	2	1	2	3	2	18	-	Low	Identifying receptor points and applying appropriate technical measures such as computer modelling in siting the wind turbines to limit the effect of shadow flicker. Where necessary and appropriate apply tracking technology that will automatically shutoff and restart the affecting wind turbine to eliminate shadow flicker. Consider the application of appropriate screening measures to reduce the effect of shadow flicker.	1	2	1	2	3	2	18	-	Low
	Blade glint WEF only	2	2	1	2	3	2	20	-	Low	Calculate and factor in the risk of blade glint in siting the wind turbines. Coat wind turbine blades with non-reflective coating to reduce blade glint. Where appropriate adjust the angle of turbine blades to reduce blade glint.	2	2	1	2	1	2	16	-	Low
	Electromagnetic field and RF interference	2	2	1	2	2	2	18	-	Low	Wind turbine mechanisms will be elevated and the risk of EMFs will be minimal. Notwithstanding this, it would be pertinent to regularly monitor the levels of EMFs emitted by the turbines and, if necessary, make the appropriate adjustments to ensure that these levels remain within acceptable parameters. Ensure that power lines are not routed in close proximity (with 300 meters) of residential areas to limit the effect off EMFs. Consult with the appropriate telecommunication authorities to ensure that the telecommunication installations identified within the vicinity of the project are not compromised through RFI.	2	2	1	2	2	2	18	-	Low
	Hazard exposure	1	2	2	2	3	2	22	-	Low	Install early detection techniques to avoid or reduce structural damage.	1	2	2	2	3	2	22	-	Low

[7] Ratings apply to both the WEF & Grid Infrastructure except for 1. Noise; 2. Shadow flicker and 3. Blade glint, which apply only to the WEF and not the Grid Infrastructure.

											Install lighting protection systems. Install fire prevention and control measures.									
Quality of the living environment	Transformation of the sense of place	3	4	3	3	3	3	48	-	High	Apply the mitigation measures suggested in the Visual Impact Assessment Report. Communicate the benefits associated with renewable energy to the broader community. Ensure that all affected landowners and tourist associations are regularly consulted. A Grievance Mechanism should be put in place and all grievances should be dealt with transparently. The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.	3	4	3	3	3	3	48	-	High
Economic	Job creation and skills development	2	4	2	2	3	2	26	+	Medium	Implement a training and skills development programme for locals. Work closely with the appropriate municipal structures regarding establishing a social responsibility programme.	2	4	2	2	3	2	26	+	Medium
	Socio-economic stimulation.	4	4	2	3	3	2	32	+	Medium	Ensure that the procurement policy supports local enterprises. Establish a social responsibility programme either in line with the REIPPP BID guidelines or equivalent. Work closely with the appropriate municipal structures regarding establishing a social responsibility programme. Ensure that any trusts or funds are strictly managed in respect of outcomes and funds.	4	4	2	3	3	2	32	+	Medium

Table 5: No Go: Rating of Impacts & Mitigation/Optimisation Measures

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S	
The project does not proceed.	The status quo remains in place. No positive or negative impacts occur	4	4	2	4	3	3	51	-	High	The only mitigation measure would be to proceed with the project which would revise the negative impact to positive.

Table 6: Cumulative: Rating of Impacts & Mitigation/Optimisation Measures

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Cumulative Phase																				
Health and social wellbeing	Noise	1	3	2	2	3	2	22	-	Low	With regard to the cumulative impacts, mitigation can only be considered and implemented through a readiness action plan at a regional level and will need to be driven on a provincial and municipal basis; underpinned by national government, private sector and public support. In this regard the Draft Consolidated Intergovernmental Readiness Report for large development scenarios in the Central Karoo (Western Cape Government Environmental Affairs and Development Planning, 2019) acknowledges the need to prepare for large-scale, or regional, development proposals and to enlist national government, private sector and public participation.	1	3	2	2	3	2	22	-	Low
	Shadow flicker	1	3	2	2	3	2	22	-	Low		1	3	2	2	3	2	22	-	Low
	Blade glint	2	3	2	2	3	2	24	-	Low		2	3	1	2	3	2	22	-	Low
	Risk of HIV and AIDS	4	3	4	3	4	3	54	-	High		2	3	3	3	3	3	42	-	Medium
Quality of the living environment	Sense of place	2	4	4	3	4	3	51	-	High		2	4	4	3	4	3	51	-	High
	Service supplies and infrastructure	2	3	2	2	2	2	22	-	Low		2	2	2	2	2	2	20	-	Low
Economic	Job creation and skills development	4	4	3	3	3	4	68	+	Very high		4	4	3	3	3	4	68	+	Very high
	Socio-economic stimulation	2	4	2	2	3	2	26	+	Medium		2	4	2	2	3	2	26	+	Medium

Table 7: Decommissioning Phase and No Project Alternative

Decommissioning Phase			
Considering a time period of 20 years prior to decommissioning and the dynamics of social variables, it would be rather meaningless to attach assessment criteria to decommissioning at this point due to the high level of uncertainty such assessment would be based upon.			
No Project Alternative			
No project		-51	No mitigation measures

7.7 Overall Impact Rating

All impacts, as assessed across all project phases above, are summarised and a pre and post-mitigation comparison is presented below in **Error! Reference source not found.**

Table 8: Summary of Impacts

Construction Phase			
Environmental parameter	**Issues**	**Rating prior to mitigation**	**Rating post-mitigation**
Health & social wellbeing	Air quality	-14	-7
	Noise	-6	-6
	Increase in crime	-18	-18
	Increased risk of HIV infections	-48	-26
	An influx of construction workers	-16	-16
	Hazard exposure.	-22	-18
Quality of the living environment	Disruption of daily living patterns	-22	-20
	Disruptions to social and community infrastructure	-22	-20
Economic	Job creation and skills development	+24	+24
	Socio-economic stimulation	+26	+26
Operational Phase			
Health & Wellbeing	Noise	-12	-10
	Shadow flicker	-18	-18
	Blade glint	-20	-16
	Electromagnetic fields and RF interference	-18	-18
	Hazard exposure	-22	-22
Quality of the living environment	Transformation of the sense of place	-48	--48
Economic	Job creation and skills development	+26	+26
	Socio-economic stimulation	+32	+32

8. MEASURES TO INCLUDE IN EMPR / EA

It is recommended that the following measures are included in the EMPr and EA, should such authorisation be granted by DEFF.

Pre-Construction / Design Phase:

No measures are recommended to be included in the EMPr and EA for the pre-construction and/or design phase.

Construction Phase:

- **Air quality**
  - Where appropriate apply dust suppression measures on a regular basis. Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
  - Ensure that all vehicles are roadworthy and drivers are qualified and made aware of the potential noise and dust issues.
  - Appoint a community liaison officer to deal with complaints and grievances
  - from the public.
- **Noise**
  - The mitigation measures suggested by the noise specialist.
- **Increase in crime**
  - Ensure that construction workers are identifiable. All workers should carry identification cards and wear identifiable clothing.
  - Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum.
  - Prevent loitering within the vicinity of the construction camp and construction sites.
- **Increased risk of HIV infections**
  - Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms.
  - Expose workers to a health and HIV/AIDS awareness educational program.
- **An influx of construction workers**
  - Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors.
  - Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.
- **Hazard exposure**
  - Ensure all construction equipment and vehicles are properly maintained at all times.

- Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population, such as children and the elderly.
- Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to.
- Make staff aware of the dangers of fire during regular toolbox talks.

- **Disruption of daily living patterns**
  - Ensure that, at all times, people have access to their properties as well as to social facilities.
- **Disruptions to social and community infrastructure**
  - Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority.
  - Ensure that where communities' access is obstructed that this access is restored to an acceptable state.
- **Job creation and skills development**
  - Wherever feasible, local residents should be recruited to fill semi and unskilled jobs.
  - Women should be given equal employment opportunities and encouraged to apply for positions.
  - A skills transfer plan should be established at an early stage and workers should be given the opportunity to develop skills, which they can use to secure jobs elsewhere post-construction.
- **Socio-economic impacts**
  - A procurement policy promoting the use of local business should, where possible, be installed and applied throughout the construction phase.

Operational Phase:

- **Noise**
  - Refer to the mitigation measures suggested by the noise quality specialist.
- **Shadow flicker**
  - Identifying receptor points and applying appropriate technical measures such as computer modelling in siting the wind turbines to limit the effect of shadow flicker.
  - Where necessary and appropriate apply tracking technology that will automatically shutoff and restart the affecting wind turbine to eliminate shadow flicker.
  - Consider the application of appropriate screening measures to reduce the effect of shadow flicker.
- **Blade glint**
  - Calculate and factor in the risk of blade glint in siting the wind turbines.
  - Coat wind turbine blades with non-reflective coating to reduce blade glint.
  - Where appropriate, adjust the angle of turbine blades to reduce blade glint.
- **Electromagnetic fields and RF interference**

- Wind turbine mechanisms will be elevated and the risk of EMFs will be minimal. Notwithstanding this, it would be pertinent to regularly monitor the levels of EMFs emitted by the turbines and, if necessary, make the appropriate adjustments to ensure that these levels remain within acceptable parameters.
- Ensure that power lines are not routed in close proximity (with 300 meters) of residential areas to limit the effect of EMFs.
- Consult with the appropriate telecommunication authorities to ensure that the telecommunication installations identified within the vicinity of the project are not compromised through RFI.

- **Hazard exposure**
  - Install early detection techniques to avoid or reduce structural damage.
  - Install lighting protection systems.
  - Install fire prevention and control measures.
- **Transformation of the sense of place**
  - Apply the mitigation measures suggested in the Visual Impact Assessment Report;
  - Communicate the benefits associated with renewable energy to the broader community;
  - Ensure that all affected landowners and tourist associations are regularly consulted;
  - A Grievance Mechanism should be put in place and all grievances should be dealt with transparently;
  - The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.
- **Socio-economic stimulation**
  - Ensure that the procurement policy supports local enterprises;
  - Establish a social responsibility programme either in line with the REIPPP BID guidelines or equivalent;
  - Work closely with the appropriate municipal structures regarding establishing a social responsibility programme;
  - Ensure that any trusts or funds are strictly managed in respect of outcomes and funds.

8.1 Monitoring Measures for Include in the EMPr / EA

Monitoring measures to be included in the EMPr are considered below in respect of the construction, operational and decommissioning phases of the project and in regard to the cumulative impacts associated with the project.

Construction and Operational Phase Monitoring:

A public grievance and incident register should be established and should be monitored internally by the developer and made available for public scrutiny if requested. Any incident should be immediately recorded and reported to management and all actions pertaining to that incident, as well as the final outcome of the complaint, should be recorded and signed off by management. If an independent environmental monitor is appointed, this register should be audited on at least a monthly basis.

Decommissioning Phase:

The time lag between constructing and decommissioning the project is extensive and, as the social environment is highly dynamic, it would therefore be meaningless to attach measurements.

Cumulative Impacts:

No measures are suggested in respect of cumulative impacts as these impacts would, in large, need to be addressed by the responsible authorities as they are beyond the control of project developers. For instance, the policing authorities can only address an increase in crime, due to a proliferation of activity in the area as it is beyond the scope of individual project developers. In much the same vein, an increased risk of HIV in the area would need to be addressed by the relevant health authorities.

9. COMPARATIVE ASSESSMENT OF ALTERNATIVES

Project alternatives apply to the siting, design and technology of the wind farm and associated components and the grid connection components.

9.1 Wind Farm and Components

The siting of the Koup 1 WEF and available design and technology is limited and is unlikely to have any significant social affect. With the area being remote it is likely that the final positioning and design of the wind turbines will be informed by the findings of specialists studies relating to fauna and flora, visual and heritage among others. If these findings identify any issues that may have social consequences, then this will be noted in the EIA. The positioning and design of the turbines is flexible enough to allow for any adjustments to be made during the pegging process. In respect of the construction laydown site alternatives, there are 2 options, as illustrated in Figure 4.

9.2 Grid Connection Components

The grid connection infrastructure proposals include 2 switching and collector substation site alternatives and 3 power line route alignment alternatives illustrated in **Figure 3**. All three 3 power line route alignments are assessed within a 300m wide assessment corridor (150m on either side of power line) and are described below.

- Power Line Corridor Option 1 is approximately 1.3km in length, linking either substation / collector Option 1 or Option 2 to the existing 400kV transmission lines.
- Power Line Corridor Option 2 is approximately 9.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the south, adjacent to the existing 400kV transmission lines.
- Power Line Corridor Option 3 is approximately 12.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the north, adjacent to the existing 400kV transmission lines.

Table 9: Comparative Assessment of Alternatives

Key	
PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION SITE ALTERNATIVES		
Substation Option 1	No preference	
Substation Option 2	Least preferred	Least preferred from a heritage perspective
CONSTRUCTION LAYDOWN AREA SITE ALTERNATIVES		
Construction Laydown Area Option 1	No preference	
Construction Laydown Area Option 2	Least preferred	Least preferred from a heritage perspective
POWER LINE ROUTE ALTERNATIVES		
Power Line Route Alternative 1A	Favourable	
Power Line Route Alternative 1B	Favourable	
Power Line Route Alternative 2A	Least preferred	Least preferred from a heritage perspective
Power Line Route Alternative 2B	Least preferred	Least preferred from a heritage perspective
Power Line Route Alternative 3A	Least preferred	Least preferred from a heritage perspective
Power Line Route Alternative 3B	Least preferred	Least preferred from a heritage perspective

10. DISCUSSION

While the project will create employment for local communities during the construction and operational phases, the more significant positive impact of the project will be the contribution it will make towards renewable energy infrastructure. Research recently published by Meridian Economics, in collaboration with the CSIR, indicates that "[i]*n all realistic mitigation scenarios, the majority of new build capacity is wind and solar PV*" (Roff, et al., 2020, p. 52), and highlights an urgent need for the country to accelerate the RE build pathway. In addition, the South African Climate Change Coordinating Commission, is considering a more ambitious emissions target and is suggesting changes to the country's energy plan (Paton, 2021).

Considering the impacts discussed above, it is evident that the cumulative impacts associated with changes to the social environment of the region are more significant than those attached to any one project. On a negative front, there are two issues associated with developments in the region that are of most concern.

1. The first of these issues is the change to the sense of place of an area that was once considered a pristine region of South Africa.
2. The second is the potential, through an influx of labour and an increase in transportation to construction sites, of the risk for the prevalence of HIV increasing in an area that, at 8.7% in 2017, had the second lowest HIV prevalence rate in the country.

The initiative to address these cumulative impacts lies at a far higher level than at an individual project level. In this regard, the Western Cape Government has undertaken an exercise to address intergovernmental readiness for the large development scenarios in the Central Karoo; which is a positive step towards addressing the cumulative impact of these developments (Western Cape Government Environmental Affairs and Development Planning, 2019).

11. CONCLUDING STATEMENT

The sensitive areas associated with the layout have been identified by various specialists and adjustments have been made to the Koup 1 layout by withdrawing all turbines associated with sensitive areas. Subsequently, the Grid Option 2 has been chosen as the proposed layout to be forwarded for approval. The Grid Option 1 was not feasible as Eskom won't permit two collectors within a small radius and Grid Option 3 is ruled out as a result of bird nests. The maps, indicate the final layouts and sensitivity layouts for both the WEF and Grid connection infrastructure, with the substation and laydown options being included in the maps, These are illustrated in **Figure 16** to **Figure 19**.

11.1 Impact Statement

Considering these adjustments, and that the positive social impacts associated with the project outweigh the negative, with a significant social benefit at a national level, the project is supported on a social basis.

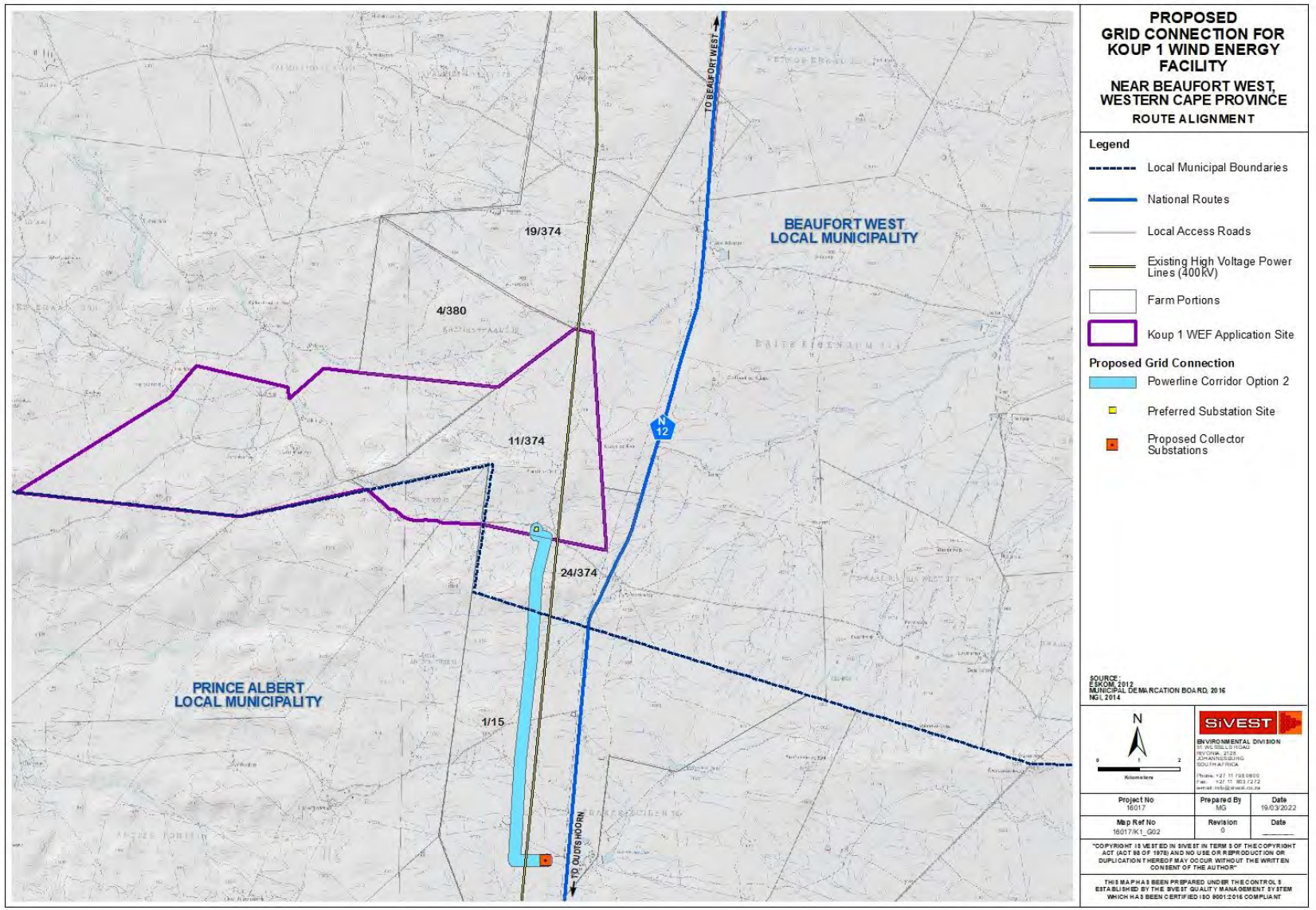


Figure 16: Finalised grid connection route alignment

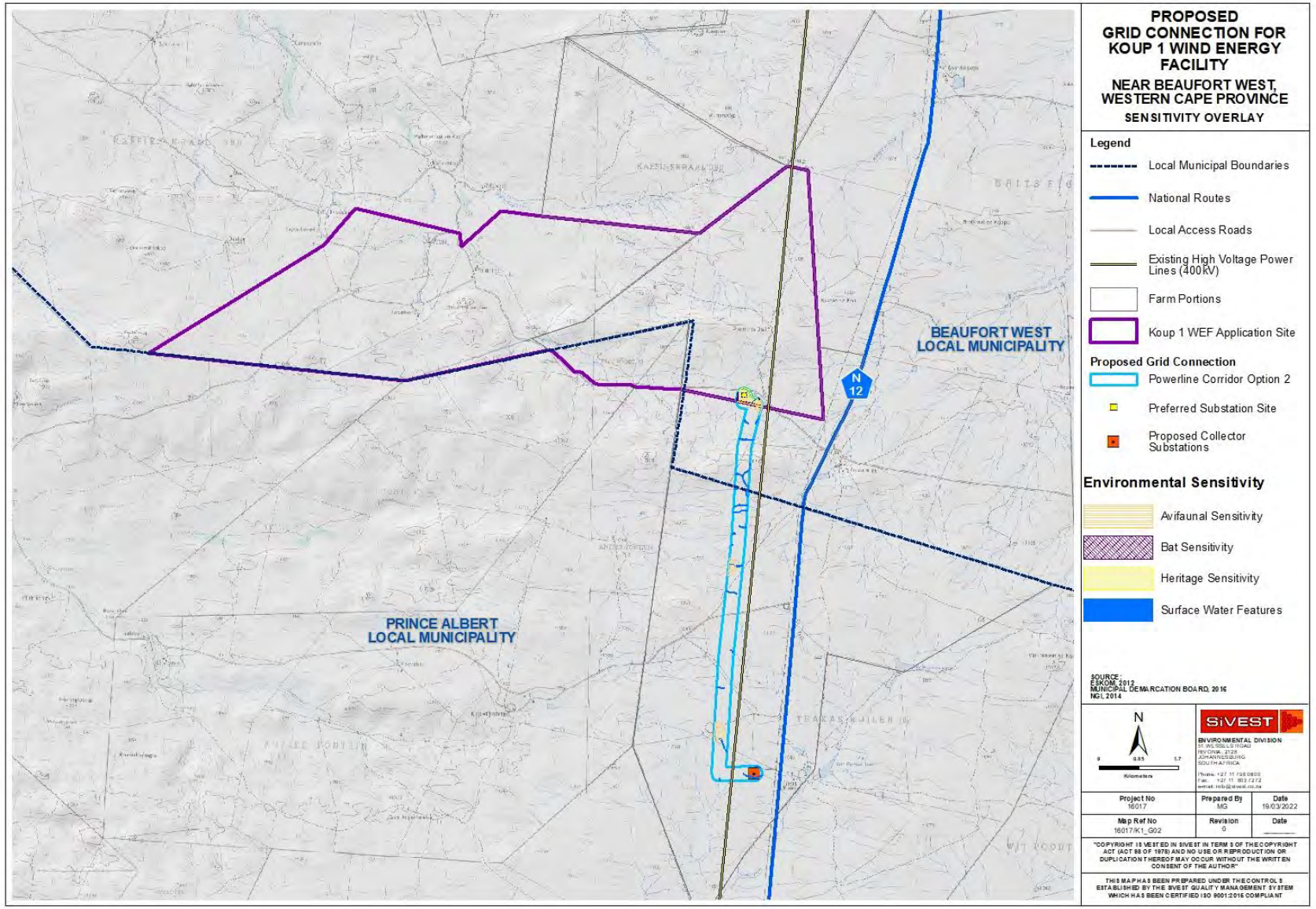


Figure 17: Finalised grid connection sensitivity overlay

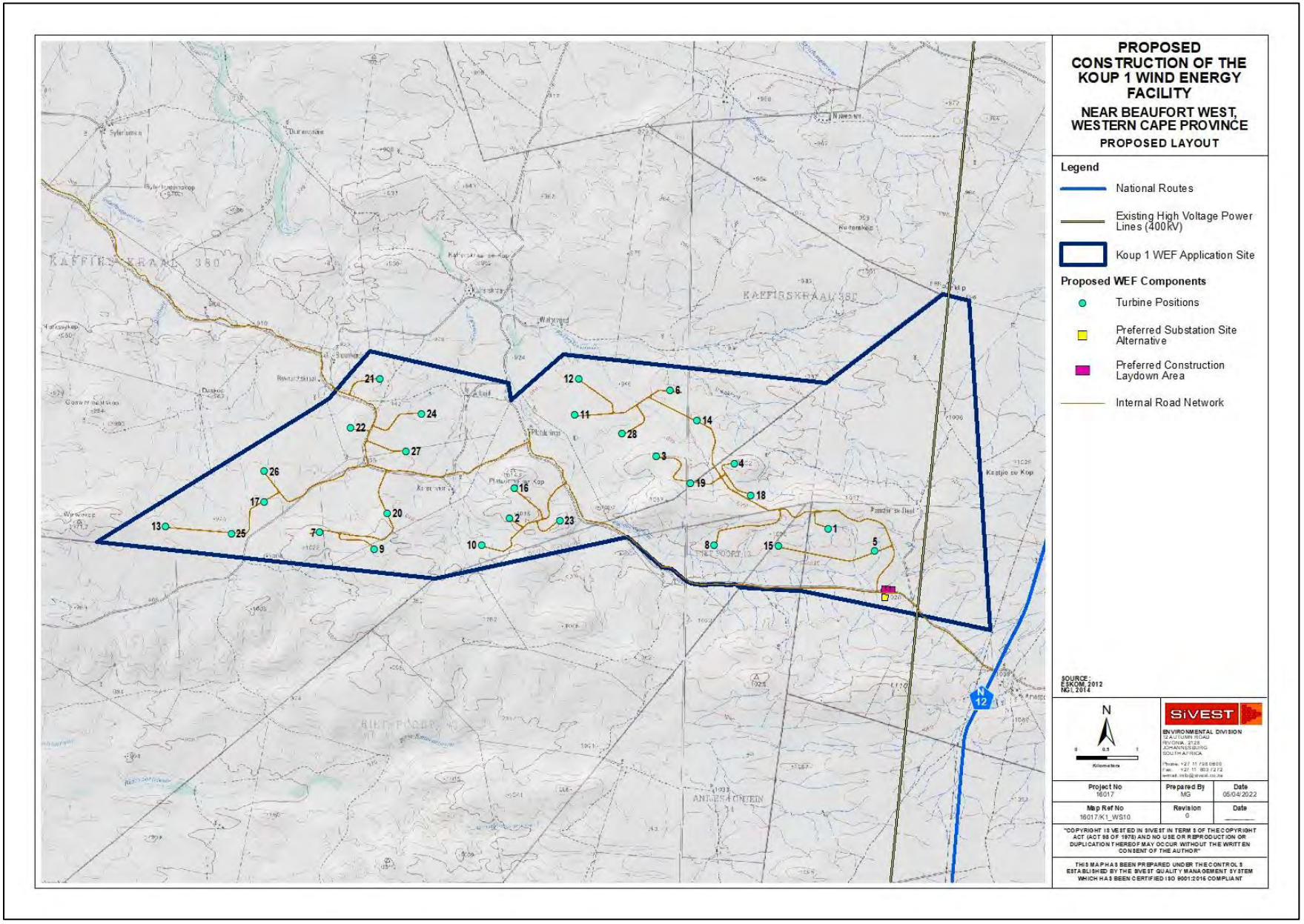


Figure 18: Finalised construction layout

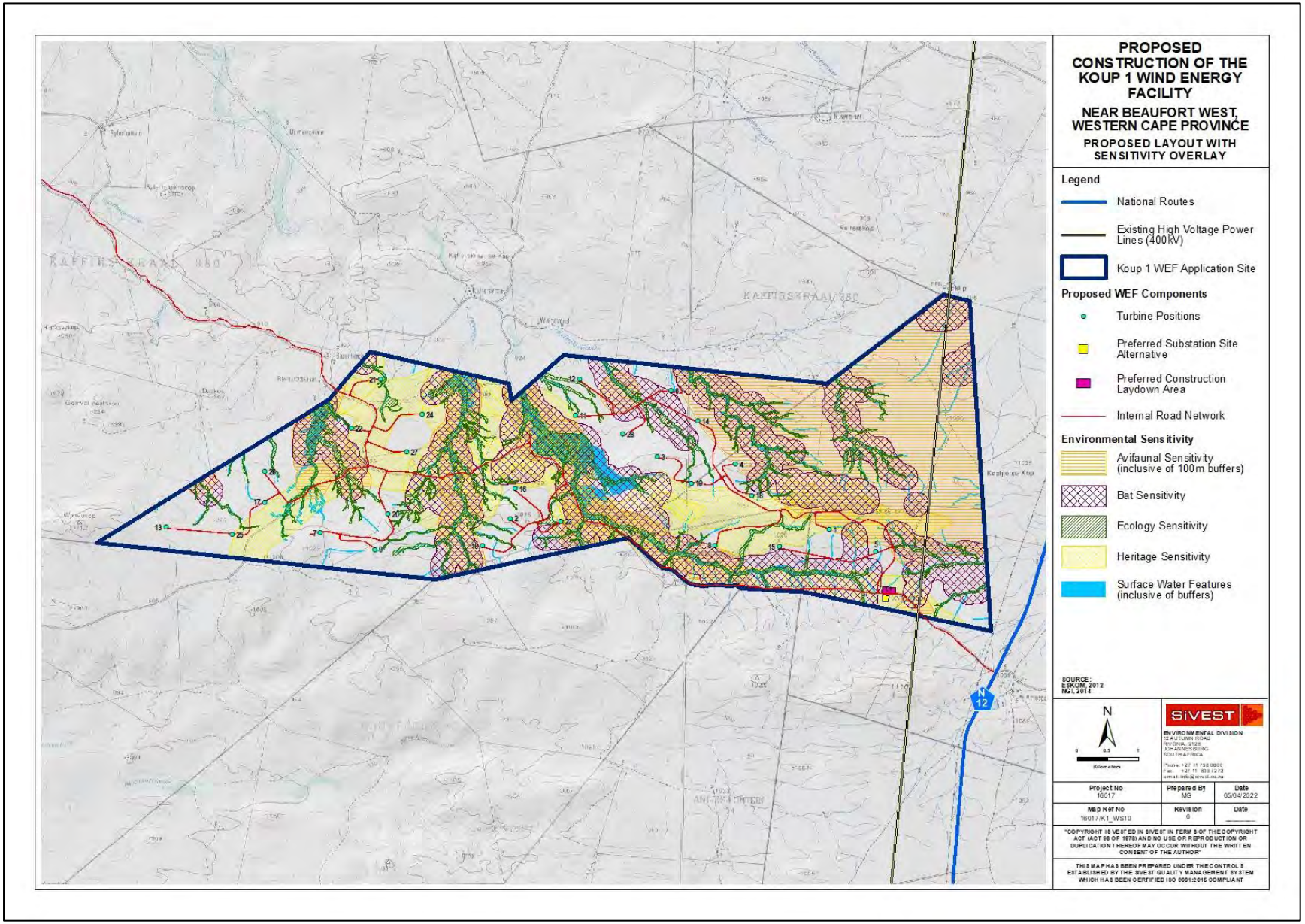


Figure 19: Finalised construction layout sensitivity overlay

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED CONSTRUCTION OF THE KOUP 1 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

Social Impact Assessment

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
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Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Dr Neville Bews & Associate			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	NA	Percentage Procurement recognition	NA
Specialist name:	Neville Bews			
Specialist Qualifications:	D Litt et Phil			
Professional affiliation/registration:	Non			
Physical address:	84 Hennie Alberts Street, Brackenhurst, Alberton			
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E-mail:	bewsco@netactive.co.za			

2. DECLARATION BY THE SPECIALIST

I, Neville Bews, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Dr Neville Bews & Associates

Name of Company:

02 October 2021

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Neville Bews, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Dr Neville Bews & Associates

Name of Company

02 October 2021

Date

6212995 6-1591

Signature of the Commissioner of Oaths

2021-10-02

Date

SOUTH AFRICAN POLICE SERVICE
FIREARM REGISTRATION CENTRE
02-10-2021
RANDJESFONTEIN
EASTRAND
SOUTH AFRICAN POLICE SERVICE