BASIC ASSESSMENT (BA) FOR THE PROPOSED CONSTRUCTION AND OPERATION OF THE 200 MWac KAREE WIND ENERGY FACILITY (WEF), BATTERY ENERGY STORAGE SYSTEM (BESS), GRID CONNECTION AND ASSOCIATED INFRASTRUCTURE LOCATED NEAR CERES IN THE WITZENBERG LOCAL MUNICIPALITY, CAPE WINELANDS DISTRICT, IN THE WESTERN CAPE PROVINCE OF SOUTH AFRICA

SOCIAL IMPACT ASSESSMENT

DFFE Reference: TBA

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

SOCIAL impact assessors
URL: https://socialimpactassessors.co.za/

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SiVEST SA (PTY) LTD

BASIC ASSESSMENT (BA) FOR THE PROPOSED CONSTRUCTION AND OPERATION OF THE 200 MWac KAREE WIND ENERGY FACILITY (WEF), BATTERY ENERGY STORAGE SYSTEM (BESS), GRID CONNECTION AND ASSOCIATED INFRASTRUCTURE LOCATED NEAR CERES IN THE WITZENBERG LOCAL MUNICIPALITY, CAPE WINELANDS DISTRICT, IN THE WESTERN CAPE PROVINCE OF SOUTH AFRICA.

SOCIAL IMPACT ASSESSMENT

INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as "Mainstream"), has appointed SiVEST SA (Pty) Ltd (hereafter referred to as "SiVEST"), to undertake the required BA Processes for the proposed construction of the 200 MWac Karee Wind Energy Facility (WEF), Battery Energy Storage System (BESS) and associated grid infrastructure near Touws River in the Western Cape Province. SiVEST subsequently appointed Dr Neville Bews & Associates to undertake the Social Impact Assessment for the project.

PROJECT DESCRIPTION

The purpose of the Karee WEF, BESS and associated grid infrastructure is to generate electricity through renewable energy technology, capturing wind energy, to feed into the National Grid.

Project Location

The proposed WEF and associated grid infrastructure is located approximately 12 km and 20 km north (respectively) of Touws River in the Western Cape Province and is located within the Witzenberg Local Municipality, in the Cape Winelands District Municipality.

Wind Energy Facility

The WEF, which extending over an area of approximately 11 841 hectares, incorporating the following farm portions:

Farm Sadawa No 239[1]
Farm Tierberg No 258; and
Farm Voetpads Kloof No 253.

[1] *Note whilst Mainstream will no longer be proceeding with turbines on Sadawa 239 (northernmost land parcel), it will remain part of the Development Area / Envelop but not the Development Footprint.*

A smaller buildable area (1753.1 ha) has however been identified as a result of a preliminary suitability assessment undertaken by Mainstream 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 BA process.

Grid Connection

At this stage, it is proposed that the 132 kV power lines will connect the Karee WEF on-site substation to the national grid via Kappa Substation.

ALTERNATIVES

Although there are constraints associated with the location and technological alternatives, various design and layout alternatives, as well as a No-Go Alternative, are considered as part of the assessment.

IMPACTS IDENTIFIED

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

Planning Phase

- Political and social resources
    - Corruption.

Construction Phase

- Community resources
    - Availability of community services
    - Cultural and historic resources
    - Social and community infrastructure.
- Individual and family changes
    - Annoyance, dust and noise
    - Crime and security
    - Daily living patterns
    - Employment and business opportunities
    - Farming operations
    - Fire hazard
    - Hazard exposure
    - STDs, HIV and AIDS
    - Risk to livestock.
- Population characteristics
    - Temporary influx of construction workers
    - Informal development and settlements.

Operational Phase

- Community resources
    - Vulnerability of small enterprises

  - Land use
  - Livelihoods and ecosystem services
  - Blade glint (only applicable to WEF)
  - Electromagnetic field (EMFs).
- Individual and family changes
  - Employment after construction
  - Shadow flicker (only applicable to WEF)
  - Transformation of the sense of place.
- Political and social resources
  - Security of electricity supply.

Cumulative Impacts

- Community resources
  - Vulnerability of small enterprises
  - Availability of community services
  - Cultural and historic resources
  - Land use
  - Livelihoods and ecosystem services
  - Social and community infrastructure
- Individual and family changes
  - Annoyance, dust and noise
  - Blade glint
  - Crime and security
  - Daily living patterns
  - Electromagnetic field (EMFs)
  - Employment after construction
  - Employment and business opportunities
  - Farming operations
  - Fire hazard
  - Hazard exposure
  - Shadow flicker
  - STDs, HIV and AIDS
  - Risk to livestock
  - Transformation of the sense of place
- Political and social resources
  - Corruption
  - Security of electricity supply
- Population characteristics
  - Temporary influx of construction workers
  - Informal development and settlements.

A pre- and post-mitigation comparison of the impacts is presented below.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									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
Planning Phase																			
Political and social resources	Corruption	4	2	2	3	4	2	30	-	Medium	4	2	2	3	4	2	30	-	Medium
Construction Phase																			
Community resources	Availability of community services	2	1	1	2	1	1	7	-	Low	2	1	1	2	1	1	7	-	Low
	Cultural and historic resources	1	3	4	2	4	2	28	-	Medium	1	2	4	2	4	2	26	-	Medium
	Social and community infrastructure	2	2	1	2	3	2	20	-	Low	2	1	1	2	3	2	18	-	Low
Individual and family changes	Annoyance, dust and noise	1	4	1	2	1	2	18	-	Low	1	3	1	2	1	2	16	-	Low
	Crime and security	2	3	2	2	2	2	22	-	Medium	2	2	2	2	1	2	18	-	Low
	Daily living patterns	1	3	1	2	1	2	16	-	Low	1	2	1	2	1	2	14	-	Low
	Employment and business opportunities	2	4	1	2	1	2	20	+	Low	2	4	1	2	1	2	20	+	Low
	Farming operations	1	2	1	2	1	2	14	-	Low	1	2	1	2	1	2	14	-	Low
	Fire hazard	2	2	2	2	1	2	18	-	Low	2	1	2	2	1	2	16	-	Low
	Hazard exposure	2	3	2	2	2	2	22	-	Low	2	2	2	2	2	2	20	-	Low
	STDs, HIV and AIDS	2	3	2	2	4	2	26	-	Medium	2	2	2	2	4	2	24	-	Medium
	Risk to livestock	1	2	1	2	1	2	14	-	Low	1	1	1	2	1	2	12	-	Low
Population characteristics	Temporary influx of construction workers	2	3	1	2	1	2	20	-	Low	2	2	1	2	1	2	18	-	Low
	Informal development and settlements	2	2	1	2	1	2	16	-	Low	2	1	1	2	1	2	16	-	Low
Operational Phase																			
Community resources	Vulnerability of small enterprises	2	2	2	2	2	2	20	-	Low	2	2	2	2	2	2	20	-	Low
	Land use	1	4	1	2	3	2	22	-	Low	1	4	1	2	3	2	22	-	Low
	Livelihoods and ecosystem services	2	2	1	2	3	2	20	-	Low	2	1	1	2	3	2	18	-	Low
	Blade glint (only applicable to WEF)	2	4	1	2	3	2	24	-	Low	2	2	1	2	3	2	20	-	Low
	Electromagnetic field (EMFs)	1	3	1	2	3	2	20	-	Low	1	2	1	2	3	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									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
Individual and family changes	Employment after construction	2	4	1	2	1	2	20	-	Low	2	3	1	2	1	2	18	-	Low
	Shadow flicker (only applicable to WEF)	1	3	1	2	3	2	20	-	Low	1	2	1	2	3	2	18	-	Low
	Transformation of the sense of place	2	4	4	2	4	2	32	-	Medium	2	4	4	2	4	2	32	-	Medium
Political and social resources	Security of electricity supply	4	4	1	3	3	3	45	+	High	4	4	1	3	3	3	45	+	High

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S	
Cumulative Impacts											
Community resources	Vulnerability of small enterprises	2	3	2	3	3	3	39	-	Medium	Regarding 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. It may be pertinent to consider a similar initiative in the Witzenberg Region.
	Availability of community services	2	3	2	3	3	3	39	-	Medium	
	Cultural and historic resources	2	4	4	3	4	3	51	-	Medium	
	Land use	2	4	2	3	3	3	42	-	Medium	
	Livelihoods and ecosystem services	2	2	2	2	3	2	22	-	Low	
	Social and community infrastructure	2	3	1	2	3	2	22	-	Low	
Individual and family changes	Annoyance, dust and noise	2	4	1	2	3	2	24	-	Medium	
	Blade glint	2	4	1	2	3	2	24	-	Medium	
	Crime and security	2	3	2	3	3	2	26	-	Medium	
	Daily living patterns	2	3	1	2	3	2	22	-	Low	

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S	
	Electromagnetic field (EMFs)	2	3	1	2	3	2	22	-	Low	
	Employment after construction	3	4	1	3	3	3	42	-	Medium	
	Employment and business opportunities	3	4	1	3	3	3	42	+	Medium	
	Farming operations	2	4	1	3	3	3	39	-	Medium	
	Fire hazard	2	3	2	3	3	3	39	-	Medium	
	Hazard exposure	2	3	2	3	3	3	39	-	Medium	
	Shadow flicker	2	4	1	2	3	2	24	-	Medium	
	STDs, HIV and AIDS	3	3	2	3	4	3	45	-	High	
	Risk to livestock	2	4	2	3	3	3	42	-	Medium	
	Transformation of the sense of place	2	4	4	3	4	3	51	-	Medium	
Political and social resources	Corruption	4	3	3	3	4	3	51	-	Medium	
	Security of electricity supply	4	4	3	4	3	3	54	+	High	
Population characteristics	Temporary influx of construction workers	2	4	1	3	3	3	39	-	Medium	
	Informal development and settlements	2	4	1	3	3	3	39	-	Medium	

COMPARATIVE ASSESSMENT OF LAYOUT ALTERNATIVES

Although alternatives apply to both the WEF,BESS and grid connection Infrastructure, there are certain limitations regarding the WEF.

WEF

The only alternative in respect of the WEF, applies to the layout of the wind turbines, which will be considered as part of the basic assessment process. Due to the nature of the project, the location and technological alternatives are restricted.

Grid Connection Alternative

There are two (2) alternatives under consideration regarding the siting of the substations, and two (2) route alternatives associated with the power lines.

Substation Alternatives

Both substation alternatives cover an area of approximately 25 hectares, with Option 1 being to the north-northwest of Option 2.

Grid Connection Alternative

The power line corridor is 150 m wide, with the following alternatives being considered.

- **Power Line Corridor Option 1** is between 8.5 km and 10.5 km in length, linking either Substation Option 1 or Substation Option 2 to Kappa Substation; and
- **Power Line Corridor Option 2** is between 10.4 km and 11.4 km in length, linking either Substation Option 1 or Substation Option 2 to Kappa Substation.

With regard to both the substation and power line alternatives, no clear preference emerges on a social basis, as illustrated below.

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	No preference	
POWER LINE ROUTE ALTERNATIVES		
Power Line Route Alternative Option 1	No preference	
Power Line Route Alternative Option 2	No preference	

SUMMARY AND CONCLUSION

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 "[in 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. 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).

IMPACT STATEMENT

Considering all social impacts associated with the project, it is evident that, at the social level, the positive elements outweigh the negative and that the project carries with it a significant social benefit at a national level and is therefore supported. In addition, no compelling preference emerges in respect of the alternatives and it would be socially acceptable for the authorisation of either power line alternative.

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 7, 8 and 9
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 4, 8, 9 and 10
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 9, 10 and 12
k) any mitigation measures for inclusion in the EMPr;	Section 11
l) any conditions for inclusion in the environmental authorisation;	N/A
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 11
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 12
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
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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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
DC	District Municipality
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
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

SiVEST SA (PTY) LTD

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SOCIAL IMPACT ASSESSMENT

1 INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as "Mainstream"), has appointed SiVEST SA (Pty) Ltd (hereafter referred to as "SiVEST"), to undertake the required BA Processes for the proposed construction of the 200 MWac Karee Wind Energy Facility (WEF), Battery Energy Storage System (BESS) and associated grid infrastructure near Touws River in the Western Cape Province. SiVEST subsequently appointed Dr Neville Bews & Associates to undertake the Social Impact Assessment for the project.

1.1 Terms of Reference

To undertake a Basic Social Impact Assessment (SIA) in respect of the proposed Karee WEF, BESS and associated grid infrastructure near Touws River 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

- The project description prepared by South Africa Mainstream Renewable Power Developments (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 social impacts were assessed according to the following best practice criteria2 and in accordance with SiVEST Environmental Division's assessment criteria, attached as Appendix 1.

SOCIAL PARAMETERS

Community and institutional structures: This category includes aspects such as industrial diversification in an area, the level of organisation of a local government, the activity of non-profit organisations, religious organisations, political structures, and how different community organisations relate to each other.

Community resources: This category often includes the environmental resources and other community resources of the affected area.

Individual and family changes: Individual and family changes include impacts on the daily life of the people in the area being assessed. This category can include a wide variety of different impacts such as employment, health and safety and attitudes.

Population characteristics: This category includes impacts to the present population numbers, ethnic or racial diversity, and any changes to seasonal or temporary residents.

Political and social resources: This category of impact relates to the power authority in an area and distribution of power. This would include leadership capability and leadership capacity, as well as relationships between power authorities and people.

IMPACT ASSESMENT CRITERIA

[2]

Nature of Impact
- Positive
- Negative.

Level of Impact
- High
- Mid
- Low
- TBD (to be determined).

Is Impact Reversible or Permanent?
- Reversible
- Permanent
- TBD (to be determined).

Level of Certainty About the Impact
- Strong Certainty
- Some Certainty
- Little Certainty
- Unknown Certainty.

Project Stage - When Impact Will Happen
- Planning/Policy Development
- Construction/Implementation
- Operation/Maintenance
- Decommissioning/Abandonment.

Area Type Impacted
- Country
- Metropolitan Municipality
- District Municipality
- Local Municipality
- Ward
- Main Place Census 2021
- Sub Place Census 2021
- Small Place Census 2021.

Size of Impacted Population
- Number
- Population Density.

Public Awareness of Impact
- High
- Mid
- Low
- TBD (to be determined).

Public Perception of Project
- High Positive
- Mid Positive
- Low Positive
- High Negative
- Mid Negative
- Low Negative
- Neutral.

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, Mainstream 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 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 1 & 2 of the State of National Disaster declared in South Africa because of the COVID-19 pandemic, 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 PROJECT DESCRIPTION

The purpose of the Karee WEF, BESS and associated grid infrastructure is to generate electricity through renewable energy technology, capturing wind energy, to feed into the National Grid.

3.1 Project Location

The proposed WEF and associated grid infrastructure is located approximately 12 km and 20 km north (respectively) of Touws River in the Western Cape Province and is located within the Witzenberg Local Municipality, in the Cape Winelands District Municipality.

3.1.1 Wind Energy Facility

The Wind Energy Facility (WEF) application site is placed within a regional context in Figure 1. The locality of the project is illustrated in Figure 2, which illustrates the project extending over an area of approximately 11 841 hectares (ha) and incorporating the following farm portions:

- Farm Sadawa No 239
- Farm Tierberg No 258; and
- Farm Voetpads Kloof No 253.

A smaller buildable area (1753.1 ha) has however been identified as a result of a preliminary suitability assessment undertaken by Mainstream 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 BA process.

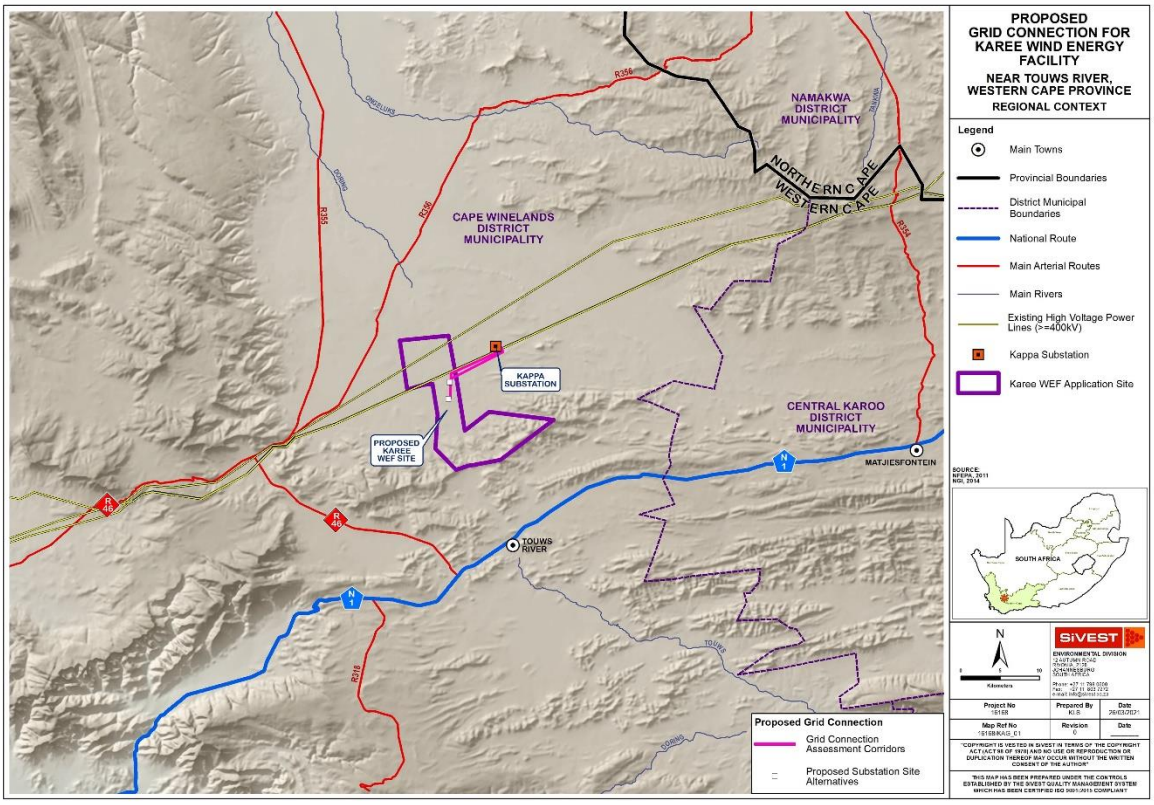


Figure 1: Regional Context

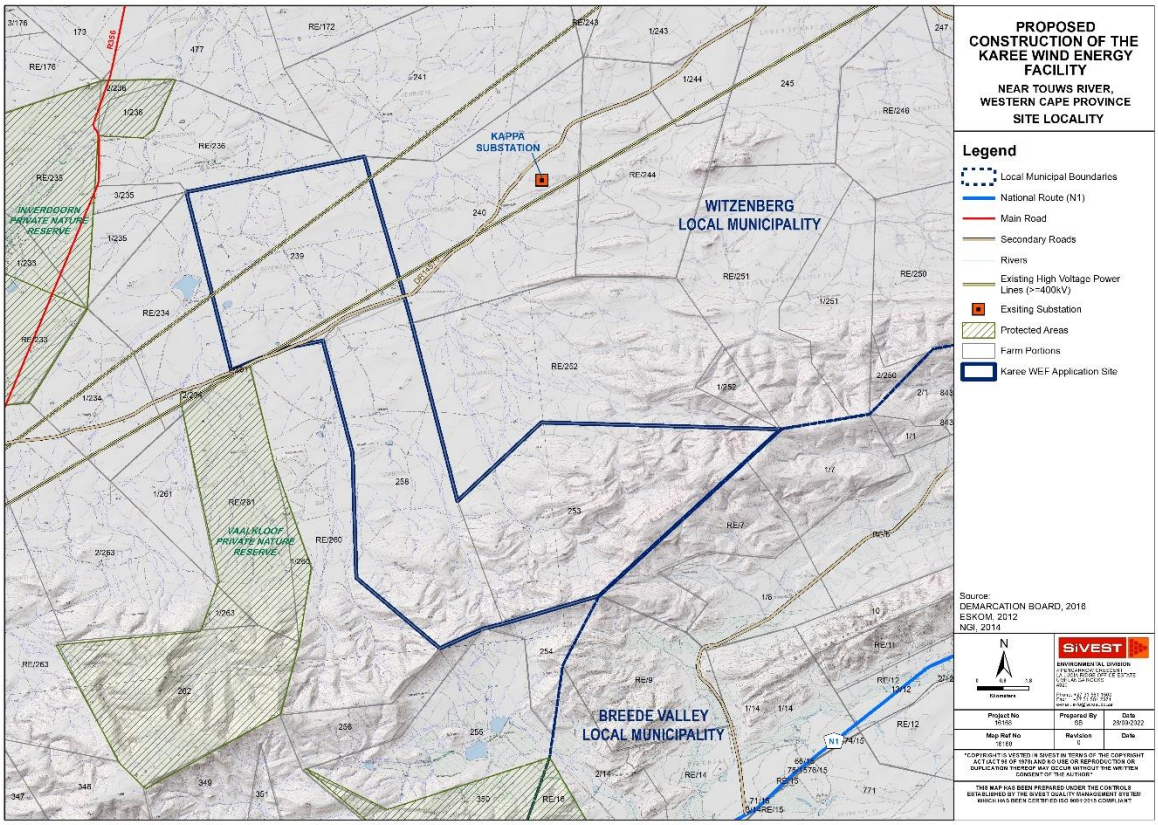


Figure 2: Karee WEF Site Locality

3.1.2 Grid Connection

At this stage, it is proposed that the 132 kV power lines will connect the Karee WEF on-site substation to the national grid via Kappa Substation (**Figure 3**).

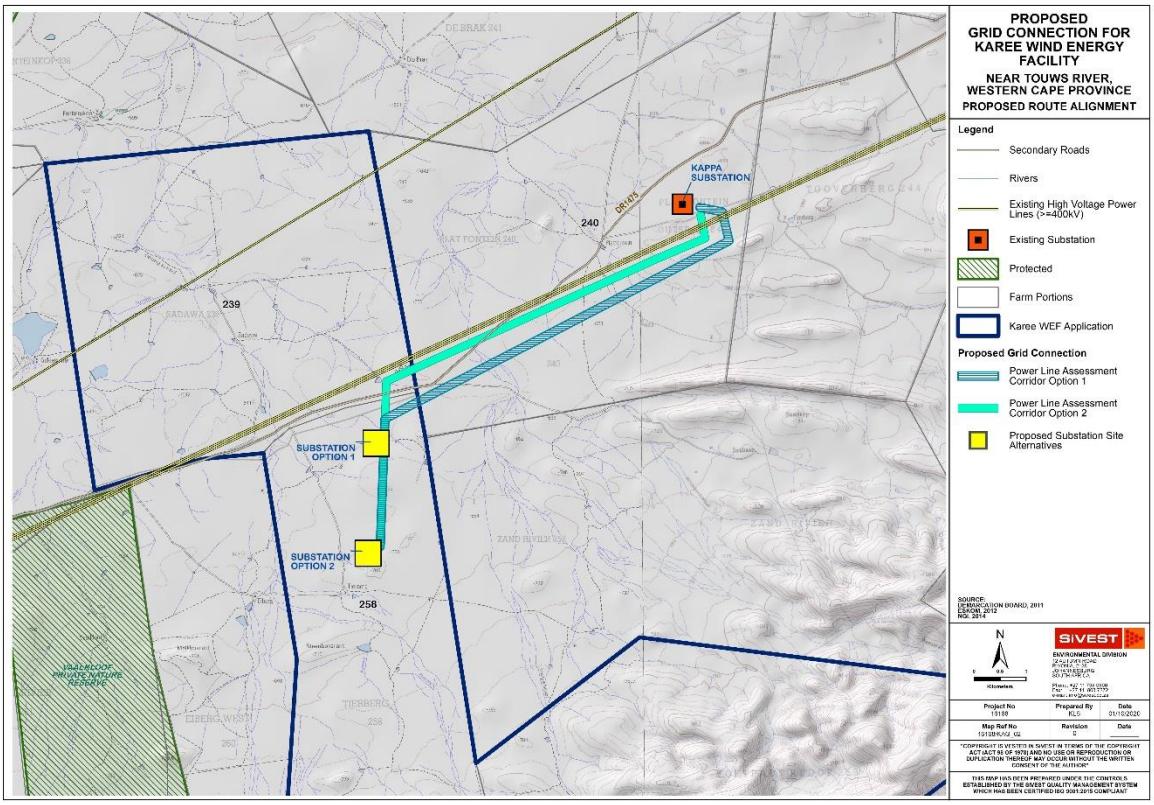


Figure 3: Proposed 132 kV Power Line Route Alignment

3.2 Wind Farm Components

It is currently anticipated that the proposed Karee WEF will comprise up to thirty-five (35) wind turbines with a maximum total energy generation capacity of up to approximately 200 MWac. The electricity generated by the proposed WEF development will be fed into the national grid via a 132 kV overhead power line. The 132 kV overhead power line will, however, require a separate EA and is subject to a separate BA process, which is currently being undertaken in parallel to the WEF BA process. In summary, the proposed Karee WEF will include the following components:

- Up to 35 wind turbines, with a maximum export capacity of approximately 200 MWac. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).;
- Each wind turbine will have a hub height of between 120 m and 200 m and rotor diameter of up to approximately 200 m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 100 m x 100 m (total footprint of approx. 10000 m^2) per turbine during construction and for ongoing maintenance purposes for the lifetime of the proposed development;
- Each wind turbine will consist of a foundation of up to approximately 30 m in diameter. In addition, the foundations will be up to approximately 3 m in depth;

- Electrical transformers (690V/33 kV) adjacent to each wind turbine (typical footprint of up to approximately 2 m x 2 m) to step up the voltage to between 11 kV and 33 kV;
- One (1) new 11kV - 33/132kV on-site substation consisting of two (2) portions: IPP portion / yard (33kv portion of the shared 33kv/132kv portion) and an Eskom portion (132kv portion of the shared 33kv/132kv portion) including associated equipment and infrastructure, occupying a total area of approximately 25ha (i.e. 250 000m2) i.e. 12.5 ha for the IPP Portion and 12.5 ha for the Eskom Portion. The Eskom portion will be ceded over to Eskom once the IPP has constructed the onsite substation. The necessary Transfer of Rights will be lodged with DFFE when required;
- A Battery Energy Storage System (BESS) will be located next to the IPP portion / yard of the shared onsite 33/132kV substation and will be included as part of the 12.5ha. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely comprise an array of containers, outdoor cabinets and/or storage tanks;
- The wind turbines will be connected to the proposed substation via 11 to 33 kV underground cabling and overhead power lines.
- Road servitude of 8 m and a 20 m underground cable or overhead line servitude.
- Internal roads with a width of up to approximately 5 m wide 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 50 m 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 the DR1475 District Road and DR1475, MR316 and MR319 WCG provincial Roads;
- One (1) construction laydown / staging area of up to approximately 3 ha to be located on the site identified for the substation. 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;
- Operation and Maintenance (O&M) buildings, including offices, a guard house, operational control centre, O&M area / warehouse / workshop and ablution facilities to be located on the site identified for the substation. This will be included in the 33kv portion/yard of the substation area i.e.12.5 ha of the IPP portion of the onsite substation;
- A wind measuring lattice (approximately 120 m 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 1-1.5 m in height. Fencing might be upgraded (if required) to be up to approximately 2 m 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.
- Optic fibre overhead or underground line from the Adamskraal Substation to the proposed on-site substation.

3.3 Grid Connection Components

Two (2) options have been identified for the 33kv portion/yard of the shared 33/132kV onsite substation:

- **Option 1:** The location of the 33kv portion/yard of the shared 33/132kV onsite substation is located near an existing gravel road, making access to the onsite substation easier. (Preferred).

- **Option 2:** The location of the 33kv portion/yard of the shared 33/132kV onsite substation is located central to the land parcel, thereby reducing the energy loss associated with the wind turbines.

Two (2) grid corridors have been identified for the 132kv overhead line and 132kv portion/yard of the shared 33kv/132kv onsite substation – these applications will be prepared and assessed under separate BA application processes.

- **Option 1:** The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a north easterly direction for about 7.5 km, then turns sharply in a north north westerly directly for about 0.5km and then turns left for about 0.5km in a west north westerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is shorter i.e. approximately 8.5km – 10.5km in length (Preferred).
- **Option 2:** The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a northerly direction for about 3.2km, turning right in a north easterly direction for about 6.7 km and then left for about 0.5km in a northerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is slightly longer i.e. approximately 10.4km to 11.4km in length.

4 WEF BA ALTERNATIVES

4.1 Location Alternatives

Several key aspects played a role in determining the location of the proposed Karee WEF ,Battery Energy Storage System (BESS) and shared 33/132kV on-site substation (this application) and associated 132kV Power Line development. These include resource, grid availability and capacity, environmental, competition, topography and access.

The Project Sites are micro-sited in terms of environmental sensitivities and a suitable development area identified. Thus, the development area proposed avoids sensitive environmental areas ensuring the development has the least possible impact on the land on which it will be built.

Only one Project Site was identified, however, within the development area itself, two (2) locations of the proposed 33/132kv shared on-site substation are considered. The on-site substation will be a step-up substation and will include an Independent Power Producer (IPP) portion (33kv portion/yard of the shared 33/132kv onsite substation) and an Eskom portion (132kv portion/yard of the shared 33kv/132kv onsite substation – this portion will be ceded to Eskom once the onsite substation is constructed and the necessary transfer of rights undertaken), hence the IPP portion (33kv portion/yard of the shared 33/132kv onsite substation) has been included in the WEF BA process (i.e. this application) and the Eskom portion (132kv portion/yard of the shared 33kv/132kv onsite substation) and associated 132kv overhead line, included in grid connection infrastructure BA process. This will facilitate an ease of transfer over to Eskom once the onsite substation is constructed.

4.2 Technology Alternatives

No other activity / technology alternatives are being considered. The choice of technology selected for the Karee WEF is based on environmental constraints and technical and economic considerations. No other technology alternatives are being considered, as wind energy facilities are more suitable for the site than other forms of renewable energy due to the high wind resource.

The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage.

4.3 Layout Alternatives

Layout alternatives have been considered and assessed as part of the BA process. The alternatives which have been considered and assessed as part of the grid connection infrastructure application include two (2) substation site alternatives (as discussed above) and two (2) power line corridor route alignment alternatives. All alternatives have been comparatively assessed by the respective specialists and assessed against the 'no-go' alternative (i.e. status quo). The various alternatives are described below:

4.4 No-Go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF infrastructure project. 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.

5 GRID CONNECTION BA ALTERNATIVES

The grid connection infrastructure proposals include two (2) substation site alternatives, each of which are 25 hectares in extent, and two (2) 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.

5.1 Route Alternatives

All power line route alignments will be assessed within a 150 m wide assessment corridor (75 m on either side of power line).

Two (2) grid corridors have been identified for the 132kv overhead line and 132kv portion/yard of the shared 33kv/132kv onsite substation. These are being assessed in a separate Grid Infrastructure BA Process:

- Option 1: The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a north easterly direction for about 7.5 km, then turns sharply in a north- north westerly directly for about 0.5km and then turns left for about 0.5km in a west north westerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is shorter i.e. approximately 8.5km – 10.5km in length (Preferred).

- Option 2: The line from the 132kv portion/yard of the 33/132kv onsite substation moves in a northerly direction for about 3.2km, turning right in a north easterly direction for about 6.7 km and then left for about 0.5km in a northerly direction before terminating at the Kappa MTS. The associated grid connection route to the Kappa Main Transmission Substation is slightly longer i.e. approximately 10.4km to 11.4km in length.

Power line corridors are being assessed to allow flexibility when determining the final route alignment. As mentioned, the power line corridors which are being assessed are up to approximately 300m wide (150m on either side of power line) to allow for flexibility to route the power line within the assessed corridor. Based on the specialist assessments, a few potentially sensitive and/or 'no-go' areas have been identified within the application site. These areas were used to inform the development area for the substation within the application site as well as the routing of the power line corridors. The identified sensitive / 'no-go' areas were also used to perform a comparison of substation site alternatives and the route alternatives. The substation site alternatives and power line route alternatives and results of the comparative assessment of alternatives have been discussed in more detail below.

5.2 No-Go Alternative

The 'no-go' alternative is the option of not undertaking the proposed 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.

6 APPLICABLE POLICY AND LEGISLATION

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 is applicable to the project.

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).

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).

Provincial

- Guidelines for the Management of Development on Mountains, Hills and Ridges in the Western Cape (2003)
- Integrated Energy Plan for the Republic of South Africa (2003)
- Long Term Mitigation Scenarios (2007)
- White Paper on Sustainable Energy for the Western Cape (2008)
- Western Cape Green Economy Strategy Framework (2013)
- Western Cape Provincial Strategic Plan (2014 – 2019)
- 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.

District and local

- Cape Winelands District Municipality – Regional Socio-Economic Development Strategy (2019)
- Cape Winelands District Municipality – Climate Change Adaptation Summary Report (Draft Version) (2017)
- Cape Winelands District Municipality – Integrated Development Plan 2020-2021 (May 2020)
- Cape Winelands District Municipality – Spatial Development Framework: District Management Area (2007)
- Cape Winelands District Municipality – Strategic Environmental Assessment (2006)
- Witzenberg Local Municipality – Spatial Development Framework Final Report (2020)
- Witzenberg Local Municipality – Towards an LED Strategy for Witzenberg (2005)
- Witzenberg Local Municipality – Amended Integrated Development Plan 2017 – 2022 (2021).

6.1 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.

In terms of the capacity determinations of the Minister of Energy, in consultation with the National Energy Regulator (NERSA), it has been established that South Africa required

> "*The technological composition of additional new capacity to be added between 2019 and 2030 is as follows:*
> *Wind: 14400 MW (45.7%);*
> ***Solar photovoltaic (PV):** 6000 MW (19.1%);*
> ***Gas and/or diesel:** 3000 MW (9.5%);*
> *Hydroelectricity: 2500 MW (7.9%);*
> ***Energy storage:** 2088 MW (6.6%);*
> ***Coal:** 1 500 MW (4.8%); and*
> ***Range of energy technologies to fill the short-term capacity gap:** 2000 MW (6.4%)"* (Independent Power Producer Office, 2020a, p. 5).

With the Western Cape contributing 5 832 GWh to the National Grid of which 1 189 GWh is through Solar PV (20%) (Independent Power Producers Procurement Office, 2020b, p. 3).

On 16 February 2018 the boundaries of eight Renewable Energy Zones (REZs) that are of strategic importance for large scale wind and solar photovoltaic for the country were gazetted (Government Gazette No. 41445, 2018). In respect of these zones the project is located within the Renewable Energy Development Zone 2 which is located in the Komsberg region, Western Cape Province.

In the Western Cape's Provincial Strategic Plan 2014 – 2019 (Western Cape Government, 2014, pp. 49-50) it is indicated that in its response to climate change " …*the province focuses on key areas of potential impact namely renewable energy,*" amongst other areas.

On a municipal level support is also evident across both the district and local municipalities.

The 2019/2024 Cape Winelands District Spatial Development Framework indicates that

> "*The provincial energy focus is on lowering carbon emissions and local generation (e.g. renewable and greater use of gas)*" (Cape Winelands District Municipality, 2020, p. 49).

Both the Witzenberg Municipal Spatial Development Framework and Amended Integrated Development Plan 2017 – 2022 indicate that

> "*The Witzenberg Municipality forms part of the Komsberg REDZ. Any projects or renewable energy developments in the municipal area should preferably be located inside of this boundary*…" (Witzenberg Municipality Local Municipality, 2020, p. 65; Witzenberg Local Municipality, 2020, p. 54)

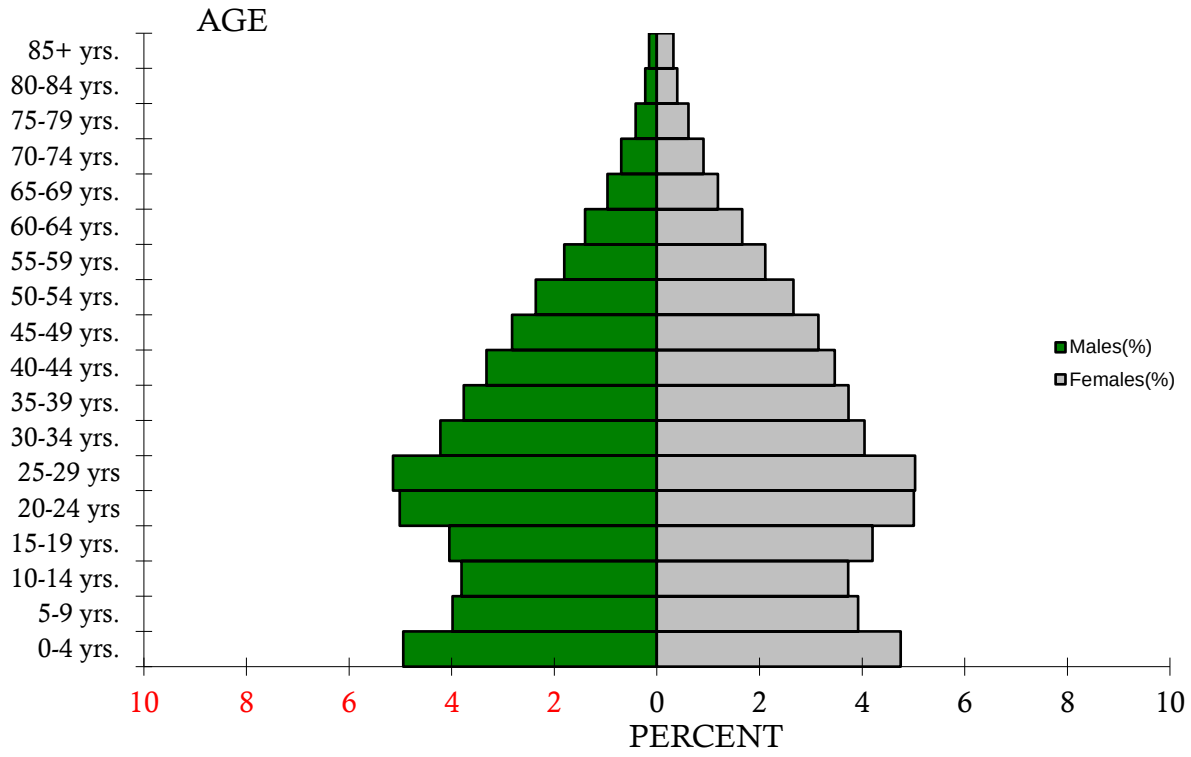
Considering the policy and legislation referred to above, the project fits this framework as the project falls within one of the eight Renewable Energy Zones (REDZs 2 Komsberg) allocated by National Government. Notwithstanding this, however, the provision that the project also conforms to appropriate scale and form, particularly considering the cumulative impacts associated with similar such projects in the area, will need to be considered on a broader basis than can be done as far as this report is concerned. In this regard, attention will need to be given to the cumulative impacts at a later point in this report in as far as they relate to the social environment. In the following section, a description of the affected environment is provided.

7 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The project falls within Small Area 1650094 (Census, 2011) and Ward 12 of the Witzenberg Local Municipality, which is located within the Cape Winelands District Municipality and the Western Cape Province. Witzenberg LM, which is classified as a Category B municipality, incorporates the towns of Alfred's Hamlet; Ceres; Op-die-Berg; Prince Wolseley and Tulbagh as well as the rural areas of Agter-Witzenberg; the northern portion of the Breede River Valley (Het Land van Waveren); the Koue Bokkeveld and Warm Bokkeveld. The demographics pertaining to the provincial and municipal areas, as sourced from Statistics South Africa, are described below.

7.1 Provincial

The 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-2021 the population of the Western Cape was estimated at 7 113 776 (Statistics South Africa, 2021) resulting in the Western Cape having the third highest population across the country below Gauteng (15 810 388) and KwaZulu-Natal (11 513 575) 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 somewhat 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 4**.



Source: (Statistics South Africa, 2011)

Figure 4: Population pyramid Western Cape Province

In respect of 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. The majority 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 2nd Quarter of 2021, the official unemployment rate in the province increased to 25.8%. 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:*

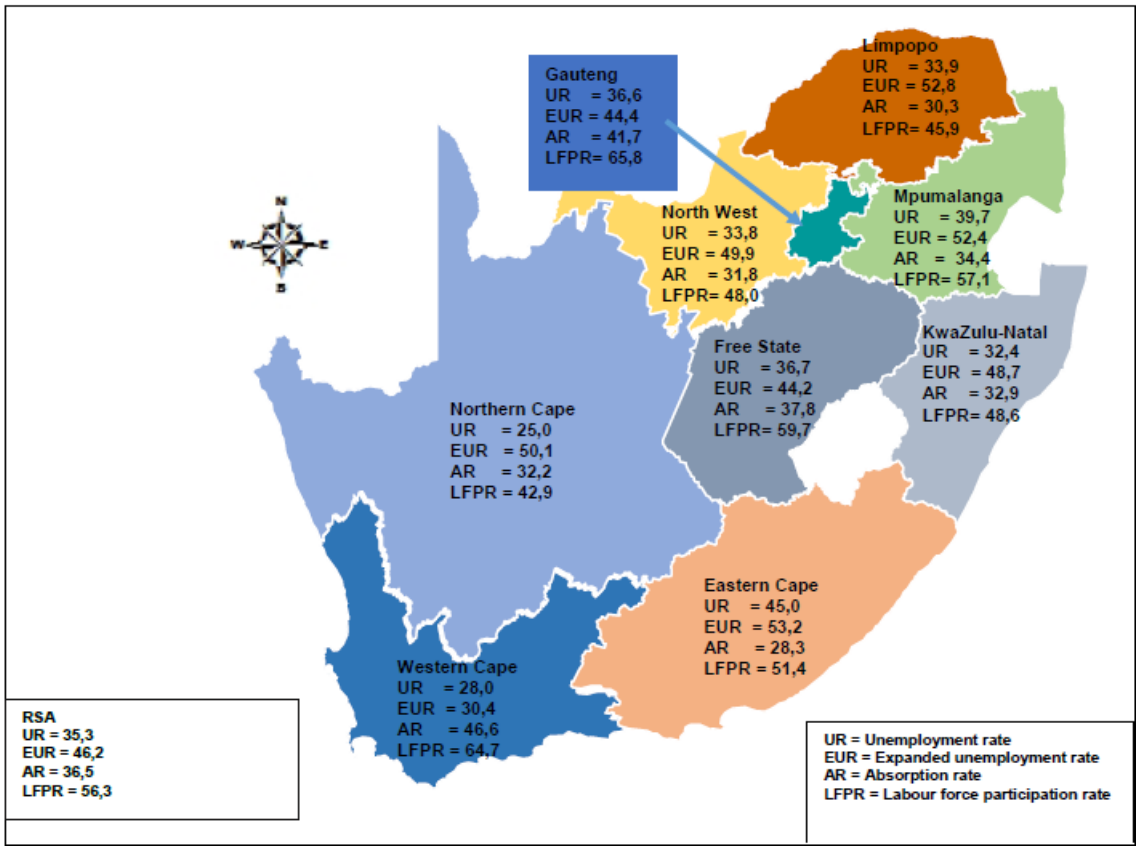
a) Were not employed in the reference week and;

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. 24)

In the last 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 on a comparative basis across South Africa is provided in **Figure 5**.



Source: (Statistics South Africa, 2022, p. 15)

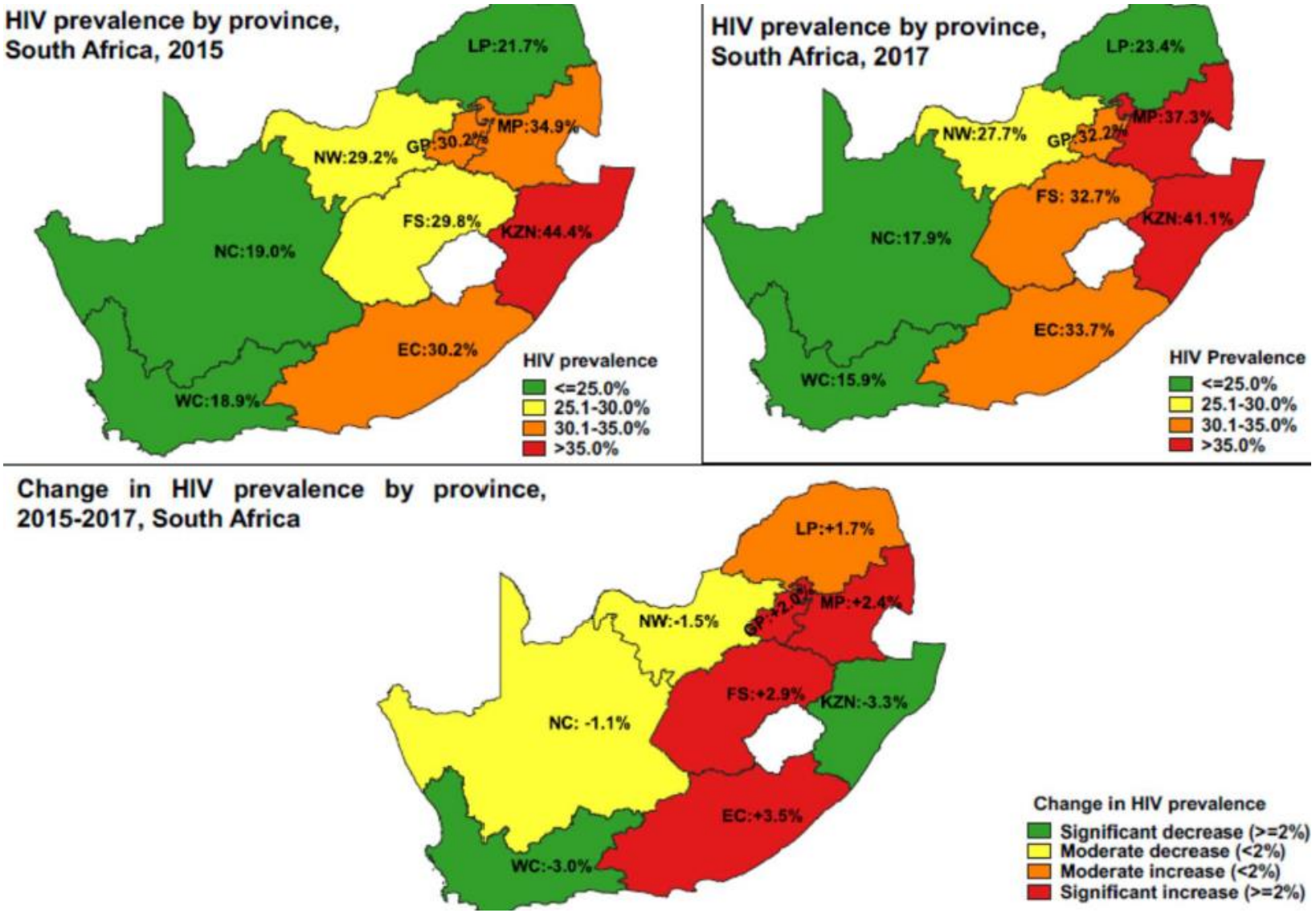
Figure 5: Labour market indicators 4th Quarter 2021

Regarding households, the 2011 Census showed 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 on a weekly basis, 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 6**.

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 antenatal 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 6** 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 6: 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, ward and small area affected by the project.

7.2 Municipal

Cape Winelands District Municipality: The district, which covers an area of 21 472.67 km^2, incorporates the following local municipalities:

- Breede Valley
- Drakenstein
- Langeberg
- Stellenbosch and
- Witzenberg.

The following towns are also located within the Cape Winelands:

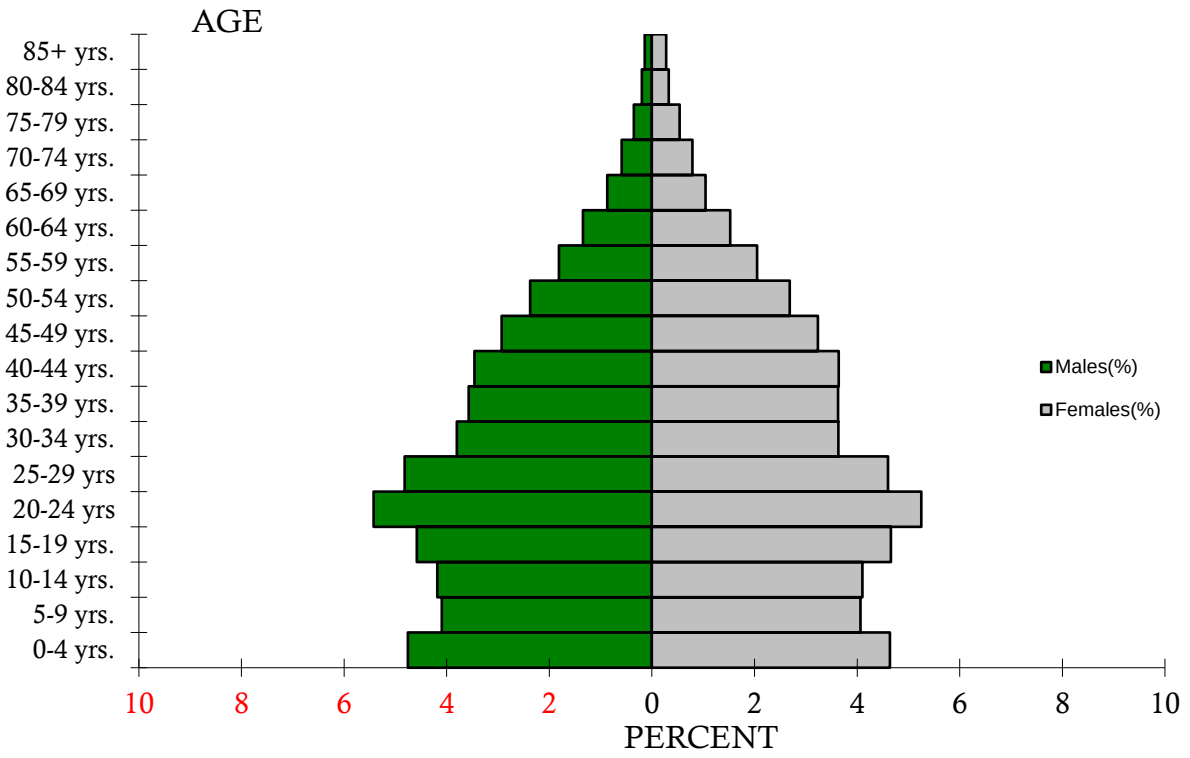
- Ashton
- Bonnievale
- Ceres
- De Doorns
- Franschhoek
- Gouda
- Klapmuts
- McGregor
- Montagu
- Op-Die-Berg
- Paarl
- Pniel
- Prince Alfred Hamlet
- Rawsonville
- Robertson
- Saron
- Stellenbosch
- Stellenbosch Farms
- Touws River
- Tulbagh
- Wellington
- Wolseley
- Worcester

The district is regarded as the premier wine growing area with an ideal microclimate created by the mountains surrounding the towns of Stellenbosch and Franschhoek. The following sectors contribute economically to the district:

- Finance and business services (23.9%)
- Manufacturing (19.6%)
- Wholesale and retail trade (15.2%)
- Agriculture, forestry and fishing (13.1%)
- Transport and communication (9%)
- Construction (4.5%).

The district also attracts a large number of tourists.

With a population of 787 490 people, the Cape Winelands DM has a population density of 36.7/km^2. According to Census, 2011 the district has a sex ratio of 97.2 with 25.8% of the population being under 15 years; 69.0% being between 15 and 65 years and 5.1% being over 65 years of age. The population pyramid of the Cape Winelands District Municipality is illustrated in **Figure 7**.



Source: (Statistics South Africa, 2011)

Figure 7: Population pyramid Cape Winelands District

The demographic data pertaining to the Cape Winelands District Municipality, based on both Census 2011 and Community Survey 2016, is presented below.

	Community Survey 2016	**Census 2011**
Population	866 001	787 486
Age Structure		
Population under 15	26.6%	25.8%
Population 15 to 64	68.9%	69.0%
Population over 65	4.4%	5.1%
Dependency Ratio		
Per 100 (15-64)	45.1	44.9
Sex Ratio		
Males per 100 females	98.3	97.2
Population Growth		
Per annum	2.16%	n/a

	Community Survey 2016	Census 2011
Labour Market		
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
Education (aged 20 +)		
No schooling	2.5%	4.2%
Matric	30.0%	23.5%
Higher education	9.0%	10.0%
Household Dynamics		
Households	235 906	198 258
Average household size	3.7	3.7
Female headed households	34.2%	33.2%
Formal dwellings	81.0%	82.3%
Housing owned	48.7%	41.2%
Household Services		
Flush toilet connected to sewerage	93.5%	86.7%
Weekly refuse removal	81.8%	79.9%
Piped water inside dwelling	77.3%	75.9%
Electricity for lighting	94.1%	92.8%

Witzenberg Local Municipality: Situated some 150 km north-east of Cape Town and covering an area of 10 753 km^2 Witzenberg is the largest of the local municipalities within the Cape Winelands district. The following towns are within Witzenberg:

- Op-die-Berg
- Prince Alfred Hamlet
- Tulbagh and
- Wolseley.

The municipality also administers the following rural areas:

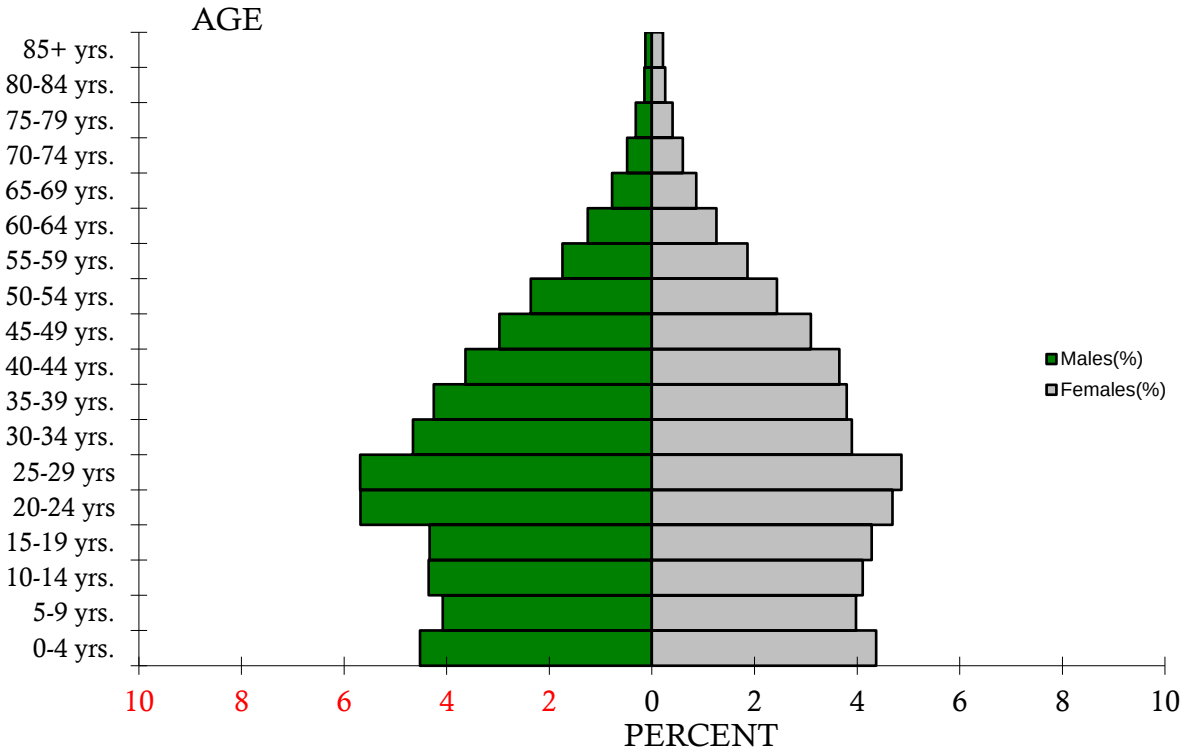
- Agter-Witzenberg
- The northern portion of the Breede River Valley (Het Land van Waveren)
- Koue Bokkeveld and
- Warm Bokkeveld.

The following economic sectors form the basis of the municipal economy:

- Agriculture, forestry and fishing (29.1%)
- Finance, insurance
- Real estate and business services (22%)
- Manufacturing (16.2%)
- Wholesale and retail trade, catering and accommodation (10%)
- General government (8.4%)
- Transport, storage and communication (8%)

- Community, social and personal services (3.5%).

With a population of 115 946 people the Witzenberg LM has a population density of 1 078/km^2. According to Census, 2011 the district has a sex ratio of 105.6 with 25.4% of the population being under 15 years; 70.4% being between 15 and 65 years and 4.2% being over 65 years of age. The population pyramid of Witzenberg Local Municipality is illustrated in Figure 8.



Source: (Statistics South Africa, 2011)

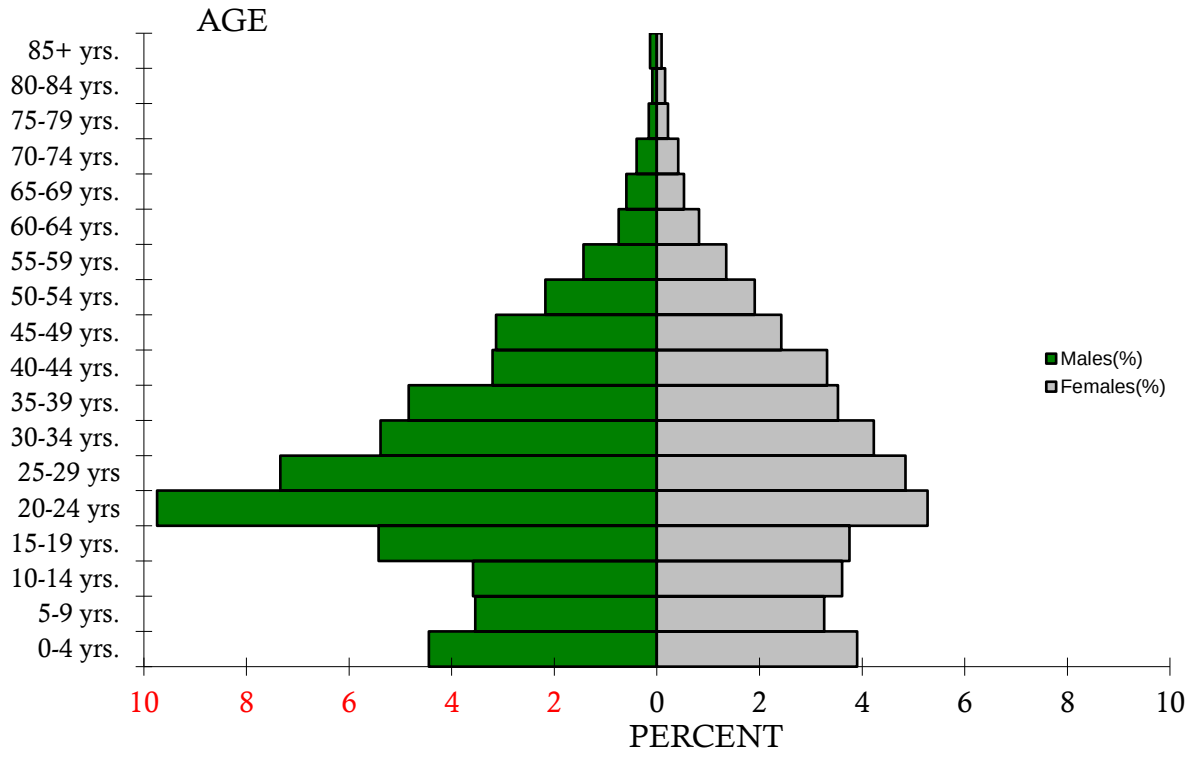
Figure 8: Population pyramid Witzenberg Local Municipality

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

	Community Survey 2016	**Census 2011**
Population	130 548	115 946
Age Structure		
Population under 15	25.5%	25.4%
Population 15 to 64	70.9%	70.4%
Population over 65	3.5%	4.2%
Dependency Ratio		
Per 100 (15-64)	41.0	42.0
Sex Ratio		
Males per 100 females	108.4	105.6
Population Growth		

	Community Survey 2016	Census 2011
Per annum	2.70%	n/a
Labour Market		
Unemployment rate (official)	n/a	7.6%
Youth unemployment rate (official) 15-34	n/a	9.9%
Education (aged 20 +)		
No schooling	3.7%	6.6%
Matric	24.7%	18.2%
Higher education	5.9%	5.8%
Household Dynamics		
Households	35 976	27 419
Average household size	3.6	3.4
Female headed households	29.3%	28.9%
Formal dwellings	83.3%	86.2%
Housing owned	42.8%	34.5%
Household Services		
Flush toilet connected to sewerage	92.4%	86.9%
Weekly refuse removal	87.1%	69.9%
Piped water inside dwelling	82.2%	78.8%
Electricity for lighting	94.5%	93.4%

Ward 12 Witzenberg Local Municipality: Statistics SA data available for Ward 12 of Witzenberg LM is only available in respect of Census 2011. On this basis the Ward 12 covers an area of 6 551.2 km^2 and has a population of 8 096 people, resulting in a population density of 1.2/km^2. The median age of the population is 26 years, with 27% being under 18; 70% being between 18 and 64 and 3% being 65 and over. With a sex ratio of 126.5 there are a higher proportion of males to females across the ward. The population pyramid for Ward 12 is illustrated in **Figure 9**.



Source: (Statistics South Africa, 2011)

Figure 9: Population pyramid Ward 12 of Witzenberg Local Municipality

In respect of population group, at 49% coloured people are the most prevalent population group in the ward, followed by black African and white people at 42% and 8% respectively. At 54% Afrikaans is the predominant home language spoken across the ward, followed by isiXhosa at 31%. Regarding levels of education, 41.8% of the population has completed Grade 9 or higher and 15% have completed Matric or higher with 82.6% of school-aged children, between 5 and 17 years, attending school.

There are 2 275 households within Ward 12, of which 13.1% live within informal dwellings; 9.5% of dwellings are fully owned or are being paid off and 49% are occupied rent free. The average annual household income of the ward is R29 400. Of these households, 42.5% receive water from a regional or local service provider; 92% have access to flush or chemical toilets; 39.9% are receiving a refuse disposal service from a local authority or private company, while 45% utilise their own refuse dump.
In 2011, 63% of the population was employed, of which 33% was employed within the informal and 63% within the formal sectors.

7.3 Project footprint

At a more project footprint specific level, the project is located within the Witzenberg non-urban (NU) area, Small Area 1650094 (Census, 2011). The area is sparsely populated, having a population density of 0.13 people per square kilometre. The demographic data regarding this area is:

Geographic area = 4,615.38 km²

Population = 581 people

Population density = 0.13/km²

Households = 175

Household density = 0.04/km²

Gender	**People**	**Percentage**
Male	315	54.22%
Female	266	45.78%
Age	**People**	**Percentage**
0–4	49	8.29%
5–9	36	6.09%
10–14	29	4.91%
15–19	53	8.97%
20–24	59	9.98%
25–29	74	12.52%
30–34	49	8.29%
35–39	46	7.78%
40–44	48	8.12%
45–49	58	9.81%
50–54	30	5.08%
55–59	20	3.38%
60–64	14	2.37%
65–69	4	0.68%
70–74	8	1.35%
75–79	4	0.68%
80–84	4	0.68%
85+	6	1.02%
Population group	**People**	**Percentage**
Coloured	401	69.02%
Black African	104	17.90%
White	52	8.95%
Indian or Asian	14	2.41%
Other	10	1.72%
First language	**People**	**Percentage**
Afrikaans	441	81.22%
Sesotho	33	6.08%
isiXhosa	31	5.71%
Other	10	1.84%
English	8	1.47%
Xitsonga	8	1.47%
Setswana	6	1.10%
Sepedi	4	0.74%
isiZulu	2	0.37%

Not applicable 40

The project will be situated along various ridges and will affect the farm portions and landowners as illustrated on the map in **Figure 2**.

8 IDENTIFICATION OF POTENTIAL IMPACTS

Having considered the wind farm and grid connection components against the social environment and applicable policy and legislation, the following impacts have emerged.

These impacts are clustered under the following main categories and are assessed under best practice protocol[3]:

1. Community and institutional structures
2. Community resources
3. Individual and family changes
4. Political and social resources
5. Population characteristics.

These categories are not exclusive and may overlap, as certain processes may have an impact within more than one category.

8.1 Community and institutional structures

Impacts listed under community and institutional structures include:

- Social tensions and community conflict
- Threat to vulnerable groups
- Vulnerability of small enterprises.

8.1.1 Social tensions and/or community conflict

At this point no social tension and/or community conflict have been identified and consequently this impact will not be perused any further. If, however, any tension or conflict arises, this impact will be reviewed.

8.1.2 Threat to vulnerable groups

No threat to any vulnerable group is identified and this impact will also not be taken any further, but may be reviewed at a later stage.

8.1.3 Vulnerability of small enterprises

Small enterprises associated with farming or tourism would most likely be at greatest risk, however, no vulnerable small enterprises have been identified.

[3] Copyright © 2019-2021. AGS - Airiodion Global Services (All Rights Reserved) - Organizational Change Management and Project Management Publisher. 1900 Camden Ave, San Jose, CA 95124AGS.

8.2 Community resources

Impacts listed under community and institutional structures include:

- Availability of community services
- Cultural and historic resources
- Land use
- Livelihoods and ecosystem services
- Social and community infrastructure.

8.2.1 Availability of community services

It is most unlikely that the project will place astrain on community services as, although there will be an influx of workers, this will be limited to a workforce of approximately 400 workers and, stretching over the construction phase of the project, will be temporary. The operational phase will have no significant effect on the availability of community services as the workforce will be limited.

8.2.2 Cultural and historic resources

At a social level, it is likely that any cultural impacts would be associated with sensitive archaeological and/or heritage sites.

8.2.3 Land use

The project is unlikely to result in a change in land use as, once construction is complete, most activities can resume in the vicinity of the wind farm components and beneath the power lines. However, certain exceptions apply regarding buildings, trees and mining, depending on the voltage of the line.

8.2.4 Livelihoods and ecosystem services

With most activities, such as the collection of wood, grazing of livestock and hunting and gathering being able to continue within the vicinity of the of the wind farm components and beneath the power lines, it is most unlikely that livelihoods and ecosystem services will be disrupted. The construction of the power line should also have a minimal effect in this regard.

8.2.5 Social and community infrastructure

With the workforce peaking at approximately 400 workers over the construction phase and 12 workers over the operational phase, it is unlikely that the project will have any significant effect on social and community infrastructure in the area.

8.3 Individual and family changes

Impacts listed under community and institutional structures include:

- Annoyance, dust and noise
- Blade glint
- Crime and security
- Daily living patterns
- Electromagnetic field (EMFs)

- Employment after construction
- Employment and business opportunities
- Farming operations
- Fire hazard
- Hazard exposure
- Shadow flicker
- STDs, HIV and AIDS
- Risk to livestock
- Transformation of the sense of place.

8.3.1 Annoyance, dust and noise

Annoyance, dust and noise will be more evident during the construction phase of the project, as construction activities will cause disruptions and the generation of dust and noise from construction vehicles and equipment. Site-specific activities such as site clearance and the deliveries of materials, equipment, plant and the transportation of the workforce along unsealed access roads will generate the most dust and noise. Over the operational phase of the project, far less disruption, dust and noise is expected as this will be associated with repair and maintenance activities that will be infrequent.

The noise specialist found that.

> "*Considering the low significance of the potential noise impacts (with mitigation, inclusive of cumulative impacts) for the proposed WEF and associated infrastructure, it is recommended that the proposed Karee WEF be authorized.*" (Enviro-Acoustic Research, 2021, p. 89).

8.3.2 Blade Glint

Light reflected off the turbine blades may cause a flickering sensation which can affect residents in their homes and distract motorists travelling along nearby roads. 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.

8.3.3 Crime and security

The project falls under the Ceres Police Precinct, which covers both rural and urban areas, and recorded 2 542 crimes across the precinct in 2021[4]. 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 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.

8.3.4 Daily living patterns

As the area is remote and sparsely populated, disruptions to daily living patterns are likely to be minimal and restricted to the construction phase of the project. This impact will mainly be associated with the

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

site and the main access roads. These disruptions are most likely to be associated with the delivery of materials and machinery to site and the transportation of workers to and from the site.

8.3.5 Electromagnetic field (EMFs)

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 EMF exposure at ground level. “Thus, wind turbines are not considered a significant source of EMF exposure” (Rideout, Copes, & Bos, 2010).

8.3.6 Employment after construction

Most employment opportunities are associated with the construction phase of the project. Once construction is completed, those jobs will no longer exist. It is important to take the opportunity, over the construction period, to upskill works so they have a better chance of finding employment once the contract ends.

8.3.7 Employment and business opportunities

The project will lead to the creation of both direct and indirect jobs, which will have a positive economic benefit within the region. The workforce will be broken down as follows:

- **Construction**
  - Skilled = 100
  - Low skilled = 300

  Total = 400.
- **Operational**
  - Skilled = 6
  - Low skilled = 6

  Total = 12.

Construction will stretch over a 12 to 18-month period, with the operational phase lasting over 20 years.

The project will also stimulate the local economy, which is likely to be most significant at a cumulative level. There will be a significant economic contribution attached to the project. 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 Touws River and Matjiesfontein area. The capital expenditure (CAPEX) during construction is estimated at R1 billion, with the operational phase estimated at 3% of CAPEX.

Apart from job creation and procurement spend, the project will also have broader positive socio-economic benefits, at a national level, regarding the potential to contribute towards the National Grid requirements as part of the Government’s vision to source 22.53% of the country’s energy through wind power by 2030 (Department of Energy Republic of South Africa, 2019, p. 42). It is also indicated that, although the project are being prepared for both private offtake agreements and / or REI4P, the intension is to aligned the projects with the REIPPP BID guidelines, which will carry a socio-economic benefit.

8.3.8 Farming operations

There is some risk that farming operations may be temporarily disrupted during the construction phase of the project. However, farming activities can continue near the turbines and beneath the power lines over the operational phase.

8.3.9 Fire hazard

The presence of construction workers and construction related activities in the area will increase the risk of fire. Construction workers are likely to light fires for cooking while construction activities, such as welding and metal cutting using a blowtorch, will increase the risk of fires. This risk is likely to be highest over the construction phase of the project but will be significantly reduced during the operational phase, as maintenance and repair activities will be less frequent.

8.3.10 Hazard exposure

Using heavy equipment and vehicles, as well as an increase in vehicle traffic 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. 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. The risk of hazard exposure is likely to be insignificant during the operational phase, although there is some risk of exposure to electromagnetic fields (EMFs).

8.3.11 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 is regarded a health hazard by some people. Several studies have identified a link between shadow flicker and high annoyance (Freiberg, Schefter, Hegewald, & Seidler, 2019). Because of the nature and timing of the flicker, it is unlikely that it will cause 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). Also see 7.1.1 Shadow Flicker of the visual impact assessment (SiVEST SA (Pty) Ltd, 2021a, p. 56).

8.3.12 STDs, HIV and AIDS

The project is within the Cape Winelands District Municipality, which had an HIV prevalence rate of 14.2% in 2017, just above the provincial prevalence rate of 15.9% over the same period. The lowest rate in the Western Cape, at 8.7%, is in the Central Karoo district and the highest, at 23.9%, in Overberg (Woldesenbet, et al., 2019).

As sexually transmitted diseases are spread by construction and transport workers, considering the high prevalence of HIV across the rest of South Africa, this opens the area to the 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 over the operational phase of the project.

It is important that this issue be given serious attention, that the mitigation measures are implemented, and that the situation is closely monitored throughout the construction and operational phases of the project.

8.3.13 Risk to livestock

There is some concern regarding the activities along the length of the servitude, that these activities, and the easier access into the area because of these activities, could lead to an increase in stock theft. There is also some risk of gates being left open and/or fencing being damaged, which may result in stock losses.

8.3.14 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 Far*ms 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 are evaluated and mitigated. In addition, the significance of a sense of place is highest at a cumulative level.

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 Karee WEF and associated grid infrastructure development are negative and of moderate significance. Given the low level of human habitation and the relative 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, 2021a, p. 92).

8.4 Political and social resources

Impacts listed under community and institutional structures include:

- Corruption and
- Security of electricity supply.

8.4.1 Corruption

There is some risk that the project could be subject to corruption, and although South Africa's Independent Power Producers Office (IPP Office) manages the process, recent events surrounding the Risk-Mitigation Independent Power Producer Procurement Programme (RMIPPPP) regarding the awarding of the Karpowership contracts is somewhat disturbing. The risk of corruption therefore needs to be considered.

8.4.2 Security of National Grid

In order to support economic growth, government faces a dual crisis in securing the supply of electricity, while changing the country's generation mix to be more reliant on renewable energy. With the Integrated Resources Plan (IRP) being a key electricity policy planning instrument, the project fits National and Regional policy, and is likely to positively contribute towards economic stability and growth.

8.5 Population characteristics

Impacts listed under community and institutional structures include:

- Temporary influx of construction workers and
- Informal development and settlements.

8.5.1 Temporary influx of construction workers

With an influx of construction workers, there will be a temporary change in the population characteristics of the area. This is likely to be limited to the 12 to 18-month period associated with the construction phase. The workforce associated with the operational phase will not have a significant effect on the population characteristics of the area.

8.5.2 Informal development and settlements

There is some risk, if not carefully managed, that an influx of job seekers could occur, resulting in the growth of informal development and settlements. This risk is of greater concern at a cumulative level considering the various projects planned for the area and would need to be addressed at regional, rather than project specific level.

9 ASSESSMENT OF IMPACTS

An analysis of the social impacts is undertaken in **Table 2**, with the results being discussed below and illustrated in **Error! Reference source not found.** to **Table 5** and **Figure 10** to **Figure 13**.

Table 2: Analysis of social impacts

Category of Impact	Description of Impact	Is Impact Positive or Negative?	Level of Impact?	Is Impact Reversible or Permanent?	Level of Certainty About the Impact	Project Stage When Impact Will Happen	Area Type Impacted	Name of Area	# and Density of Impacted Population	Public Awareness of This Impact	Public Perception of This Impact	Mitigation Recommendations for Negative Impacts
Community & Institutional Structures	Vulnerability of small enterprises	Negative	Low	Reversible	Unknown Certainty	Operation/Maintenance	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Where workable, support local business by making use of their services.
Community Resources	Availability of community services	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km²)	Mid	Low Negative	Ensure that where communities' access is obstructed, that this access is restored to an acceptable state.
Community Resources	Cultural and historic resources	Negative	Mid	Permanent	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Low	Low Negative	Follow the recommendations in the heritage, archaeological and palaeontological reports.
Community Resources	Land use	Negative	Low	Reversible	Strong Certainty	Operation/Maintenance	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Low	Low Negative	Ensure that the infrastructure does not clash with existing land use patterns that may result in health, safety, environmental, and/or economic concerns. Apply "Best Practice Mitigation Strategies" at all times and allow the public the opportunity to inform the final positioning of the infrastructure that may clash with other modes of land usage.
Community Resources	Livelihoods and ecosystem services	Negative	Low	Reversible	Strong Certainty	Operation/Maintenance	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Low	Low Negative	Where workable, provide access to areas that were formerly used and are safe to graze livestock, gathering herbs, food, wood and may be of cultural importance. The safety of the public must, however, remain paramount.
Community Resources	Social and community infrastructure	Negative	Low	Reversible	Strong Certainty	Construction/Implementation	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km²)	Mid	Low Negative	Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the relevant authorities.
Individual & Family Changes	Annoyance, dust and noise	Negative	Low	Reversible	Strong Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Apply an appropriate dust suppression protocol to limit the generation of dust through construction activities and traffic on unsealed roads. Ensure that all construction vehicles are maintained to manufacturer's specifications.
Individual & Family Changes	Blade glint	Negative	Low	Reversible	Strong Certainty	Operation/Maintenance	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km²)	Mid	Mid Negative	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, and where appropriate adjust the angle of turbine blades to reduce blade glint.

Category of Impact	Description of Impact	Is Impact Positive or Negative?	Level of Impact?	Is Impact Reversible or Permanent?	Level of Certainty About the Impact	Project Stage When Impact Will Happen	Area Type Impacted	Name of Area	# and Density of Impacted Population	Public Awareness of This Impact	Public Perception of This Impact	Mitigation Recommendations for Negative Impacts
Individual & Family Changes	Crime and security	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km²)	Mid	High Negative	Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing. Fence off the construction site 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.
Individual & Family Changes	Daily living patterns	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Ensure that, at all times, people have access to their properties as well as to social facilities. Ensure that the provincial and local authorities are alerted to heavy loads being transported to site. Avoid transporting these loads during peak traffic periods.
Individual & Family Changes	Electromagnetic fields	Negative	Low	Reversible	Some Certainty	Operation/Maintenance	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	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 (within 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 radio frequency interference (RFI).
Individual & Family Changes	Employment after construction	Negative	Low	Reversible	Strong Certainty	Operation/Maintenance	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km²)	Mid	High Negative	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.
Individual & Family Changes	Employment and business opportunities	Positive	Low	Reversible	Strong Certainty	Construction/Implementation	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km²)	High	High Positive	Wherever workable, local residents should be recruited to fill semi- and unskilled jobs. Women should be given equal employment opportunities and encouraged to apply for positions.

Category of Impact	Description of Impact	Is Impact Positive or Negative?	Level of Impact?	Is Impact Reversible or Permanent?	Level of Certainty About the Impact	Project Stage When Impact Will Happen	Area Type Impacted	Name of Area	# and Density of Impacted Population	Public Awareness of This Impact	Public Perception of This Impact	Mitigation Recommendations for Negative Impacts
Individual & Family Changes	Farming operations	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Ensure that landowners have access to their property at all times. If fencing, crops or farm equipment is damaged by contractors, ensure that the damage is repaired or adequately compensated.
Individual & Family Changes	Fire hazard	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Ensure that fire safety and prevention rules are adequately covered at induction. Ensure that fire safety refresher sessions are regularly presented during toolbox talks. Ensure that any open fires used for cooking or heating purposes are restricted to designated areas. Ensure that a smoking policy is implemented, communicated to the workforce, monitored and enforced. • Smoking should be carefully controlled and confined to a designated area. • Do not allow smoking in areas of high fire risk or outside of any designated smoking areas. • Dispose of matches and cigarette ends carefully. At all times, store combustible material safely. Keep the construction site clear of waste. Ensure that all electrical connections are only installed by competent qualified electricians. Avoid undertaking 'hot work', such as using blow torches and welding in high wind conditions. If such activities cannot be avoided, ensure that extra safety precautions are put in place to manage the risk of fire. Stop 'hot work' well before knock-off to allow time for adequate cooling to take place. Ensure that the correct fire equipment is available at all times. Key staff members should be trained in firefighting procedures. Compile and implement a Fire Management and Emergency Preparedness and Response Plan.
Individual & Family Changes	Hazard exposure	Negative	Low	Reversible	Strong Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	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.

Category of Impact	Description of Impact	Is Impact Positive or Negative?	Level of Impact?	Is Impact Reversible or Permanent?	Level of Certainty About the Impact	Project Stage When Impact Will Happen	Area Type Impacted	Name of Area	# and Density of Impacted Population	Public Awareness of This Impact	Public Perception of This Impact	Mitigation Recommendations for Negative Impacts
Community & Institutional Structures	Shadow flicker	Negative	Low	Reversible	Strong Certainty	Operation/Maintenance	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km^2)	Mid	Mid Negative	Identify receptor points and apply 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.
Community & Institutional Structures	STDs, HIV and AIDS	Negative	Mid	Permanent	Some Certainty	Construction/Implementation	District Municipality	Cape Winelands District Municipality (DC2)	866 001 people (40.1, per km^2)	Mid	Mid Negative	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 programme. Extend the HIV/AIDS program into the community with a specific focus on schools and youth clubs.
Community & Institutional Structures	Risk to livestock	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km^2)	Low	Mid Negative	Employ a multiple lock gate security system to provide access for landowner and construction teams to ensure that security is not breached. Compensate farmers for stock losses due to theft associated with the project.
Individual & Family Changes	Transformation of the sense of place	Negative	Mid	Permanent	Strong Certainty	Operation/Maintenance	Local Municipality	Witzenberg Local Municipality (WC022)	130 548 people (12.1 per km^2)	Mid	High Negative	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.
Political & Social Resources	Corruption	Negative	Mid	Reversible	Strong Certainty	Planning/Policy Development	Country	South Africa	60 142 978 people (49.3/km^2)	High	High Negative	Immediately report any corruption or suspected attempt at corruption to the authorities.
Political & Social Resources	Security of National Grid	Positive	High	Permanent	Strong Certainty	Operation/Maintenance	Country	South Africa	60 142 978 people (49.3/km^2)	High	High Positive	Ensure that the project complies with National, Provincial and Municipal policy

Category of Impact	Description of Impact	Is Impact Positive or Negative?	Level of Impact?	Is Impact Reversible or Permanent?	Level of Certainty About the Impact	Project Stage When Impact Will Happen	Area Type Impacted	Name of Area	# and Density of Impacted Population	Public Awareness of This Impact	Public Perception of This Impact	Mitigation Recommendations for Negative Impacts
Population Characteristics	Temporary influx of construction workers	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors.
Population Characteristics	Informal development and settlements	Negative	Low	Reversible	Some Certainty	Construction/Implementation	Main Place Census 2011	Witzenberg NU	52 200 people (4.91 per km²)	Mid	Mid Negative	Together with the local authorities, develop a protocol for dealing with any unauthorised informal structures erected on and around the project site. Ensure that the construction of informal structures is monitored and immediately reported to the local authorities.

9.1 Analysis of impact assessment

Of the 22 impacts associated with the project, 2 are positive and 21 are negative, as illustrated in **Table 3**.

Table 3: Breakdown of positive and negative impacts

Total Social Positive Impacts
2
Total Social Negative Impacts
22

Eighteen impacts are rated as low, with 5 falling within the midrange, and 1 being rated as high. This data is illustrated in **Figure 10**.

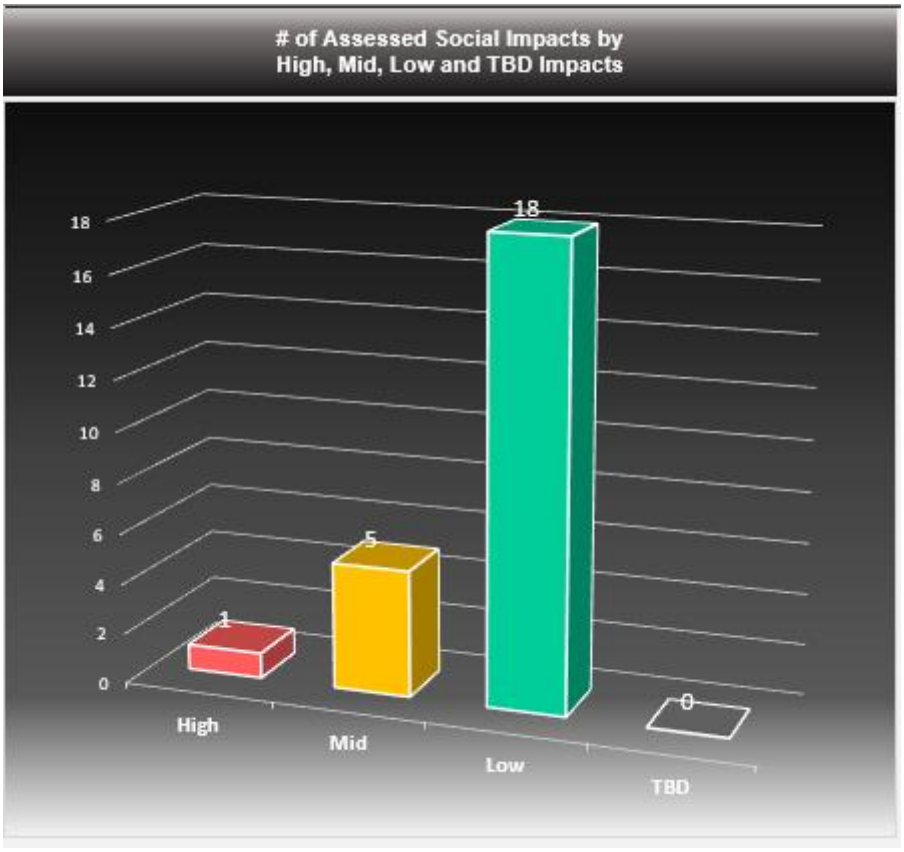


Figure 10: Breakdown by level of impact

As **Figure 11** illustrates, 20 impacts are considered to be reversible, with 4 considered to be permanent and 0 to be determined.

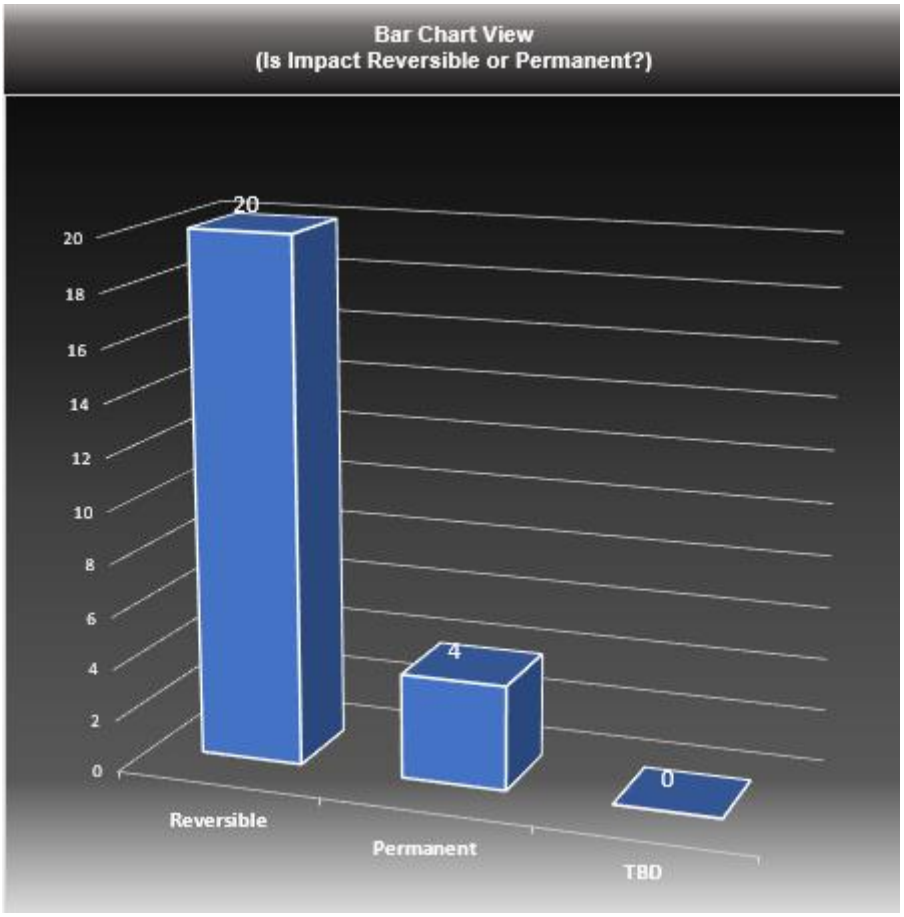


Figure 11: Reversibility of impact

Regarding the level of certainty that the impacts are assessed with, no impacts are assessed with little certainty, 12 are assessed with some certainty and 12 with strong certainty, as illustrated in **Figure 12**.

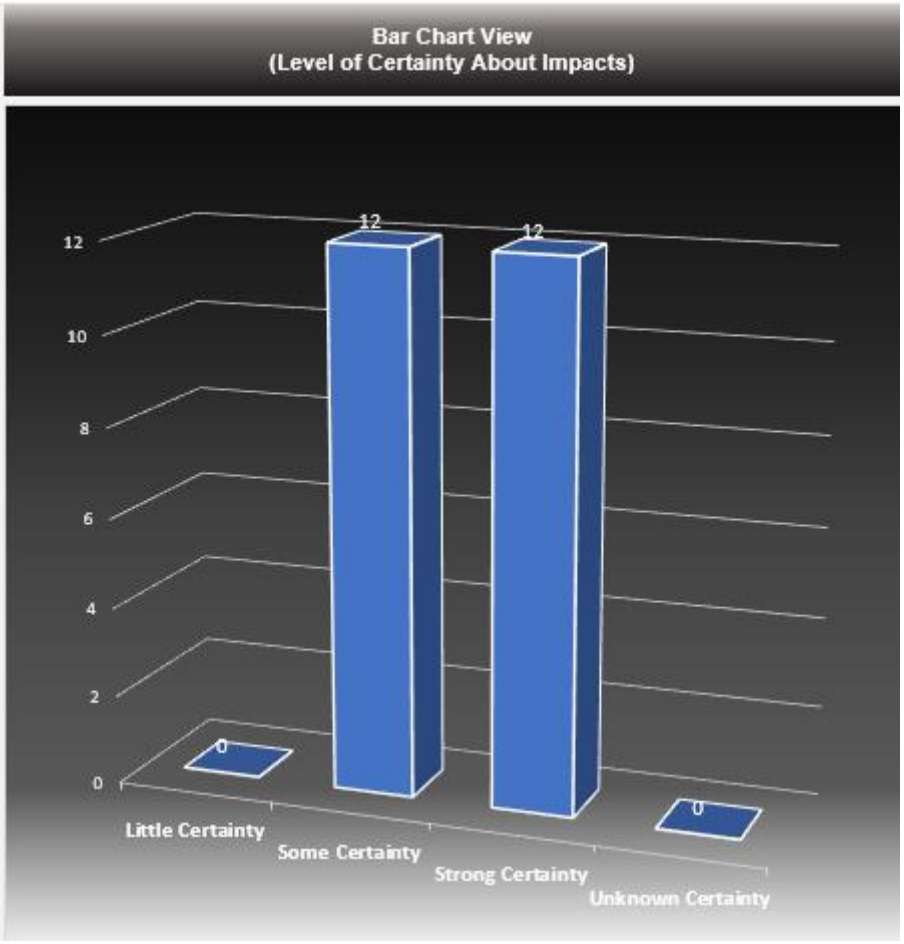


Figure 12: Level of certainty about impact

Of the 24 impacts, 1 is associated with the planning/policy development phase and is of low impact. Fourteen are associated with the construction/implementation phase, with 11 being of low impact and 3 falling within the midrange. Nine impacts are associated with the operational/maintenance phase, of which 7 are of low impact, 1 falls within the midrange and 1 is rated high. This data is illustrated in Table 4.

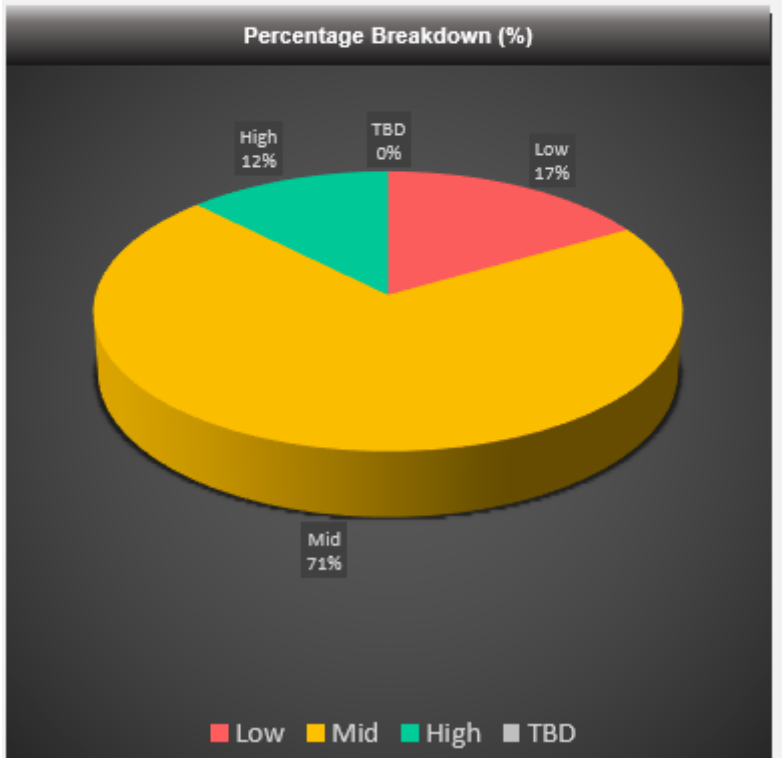
Table 4: Impacts across project stages

Total # of Impacts Per Project Stage				
Project Stage	# of Assessed Impacts			
	# of Low Impacts	# of Mid Impacts	# of High Impacts	TBD
Planning/Policy Development	0	1	0	0
Construction/Implementation	11	3	0	0
Operation/Maintenance	7	1	1	0
Decommissioning/Abandonment	0	0	0	0

As **Table 5** illustrated, there seems to be a moderate to high level of public awareness regarding the impacts associated with the project.

Table 5: Public awareness of impacts

Awareness Category	# of Impacts Per Awareness Category
Low	4
Mid	17
High	3
TBD	0



Public perceptions regarding employment and business opportunities and the contribution towards the security of the National Grid are likely to be rated as high positive. The concern about crime, the loss of employment after construction, the transformation of a sense of place and corruption over the planning/development phase are likely to be rated as high negative. While the rest of the impacts are regarded as mid to low negative. Public perceptions of the impacts are illustrated in **Figure 13**.

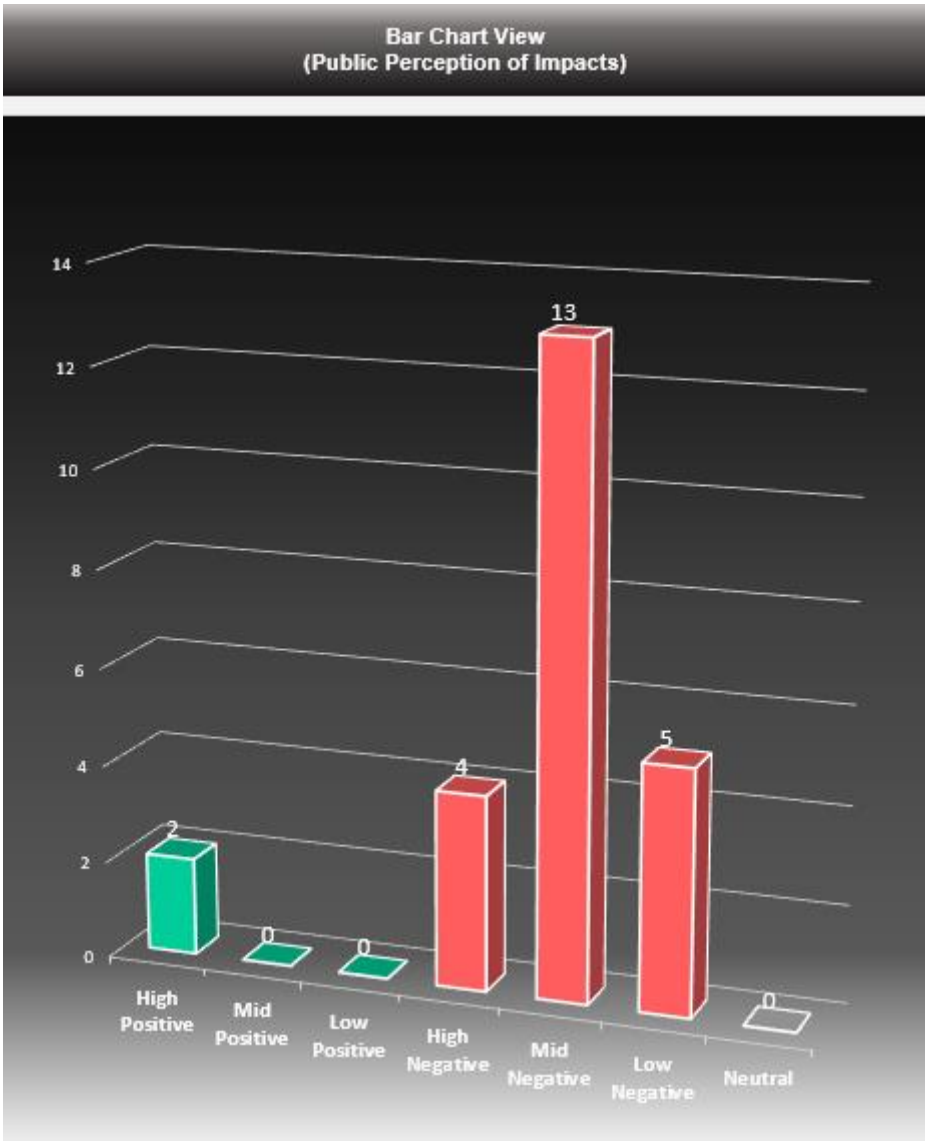


Figure 13: Public awareness of impacts

9.2 Assessment in accordance with SiVEST's Assessment Criteria

The impacts are assessed below according to the methodology and rating matrix provided by SiVEST and appended in Appendix 1.

9.2.1 Planning, construction and operational phases

These ratings apply across both the WEF and Grid Infrastructure, except for blade glint and shadow flicker, which only apply in respect of the WEF.

Table 6: Rating of Impacts in accordance with SiVEST's Assessment Criteria [5]

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									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
Planning Phase																			
Political and social resources	Corruption	4	2	2	3	4	2	30	-	Medium	4	2	2	3	4	2	30	-	Medium
Construction Phase																			
Community resources	Availability of community services	2	1	1	2	1	1	7	-	Low	2	1	1	2	1	1	7	-	Low
	Cultural and historic resources	1	3	4	2	4	2	28	-	Medium	1	2	4	2	4	2	26	-	Medium
	Social and community infrastructure	2	2	1	2	3	2	20	-	Low	2	1	1	2	3	2	18	-	Low
Individual and family changes	Annoyance, dust and noise	1	4	1	2	1	2	18	-	Low	1	3	1	2	1	2	16	-	Low
	Crime and security	2	3	2	2	2	2	22	-	Medium	2	2	2	2	1	2	18	-	Low
	Daily living patterns	1	3	1	2	1	2	16	-	Low	1	2	1	2	1	2	14	-	Low
	Employment and business opportunities	2	4	1	2	1	2	20	+	Low	2	4	1	2	1	2	20	+	Low
	Farming operations	1	2	1	2	1	2	14	-	Low	1	2	1	2	1	2	14	-	Low
	Fire hazard	2	2	2	2	1	2	18	-	Low	2	1	2	2	1	2	16	-	Low
	Hazard exposure	2	3	2	2	2	2	22	-	Low	2	2	2	2	2	2	20	-	Low
	STDs, HIV and AIDS	2	3	2	2	4	2	26	-	Medium	2	2	2	2	4	2	24	-	Medium
	Risk to livestock	1	2	1	2	1	2	14	-	Low	1	1	1	2	1	2	12	-	Low
Population characteristics	Temporary influx of construction workers	2	3	1	2	1	2	20	-	Low	2	2	1	2	1	2	18	-	Low
	Informal development and settlements	2	2	1	2	1	2	16	-	Low	2	1	1	2	1	2	16	-	Low

[5] Ratings apply to both the WEF & Grid Infrastructure except for blade glint and shadow flicker which only apply in respect of the WEF.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									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
Operational Phase																			
Community resources	Vulnerability of small enterprises	2	2	2	2	2	2	20	-	Low	2	2	2	2	2	2	20	-	Low
	Land use	1	4	1	2	3	2	22	-	Low	1	4	1	2	3	2	22	-	Low
	Livelihoods and ecosystem services	2	2	1	2	3	2	20	-	Low	2	1	1	2	3	2	18	-	Low
	Blade glint (only applicable to WEF)	2	4	1	2	3	2	24	-	Low	2	2	1	2	3	2	20	-	Low
	Electromagnetic field (EMFs)	1	3	1	2	3	2	20	-	Low	1	2	1	2	3	2	18	-	Low
Individual and family changes	Employment after construction	2	4	1	2	1	2	20	-	Low	2	3	1	2	1	2	18	-	Low
	Shadow flicker (only applicable to WEF)	1	3	1	2	3	2	20	-	Low	1	2	1	2	3	2	18	-	Low
	Transformation of the sense of place	2	4	4	2	4	2	32	-	Medium	2	4	4	2	4	2	32	-	Medium
Political and social resources	Security of electricity supply	4	4	1	3	3	3	45	+	High	4	4	1	3	3	3	45	+	High

9.2.2 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.

9.2.3 Cumulative impacts

The renewable energy projects listed in **Table 7** are within a 35 km radius of the Karee WEF.

Table 7: Renewable energy developments within a 35 km radius of the Karee WEF

Applicant	Project	Technology	Capacity	Status of Application / Development
Oya Energy (Pty) Ltd	Oya Energy Facility	Hybrid (Solar / Fuel-Based)	305 MW	EIA Process underway
Brandvalley Wind Farm (Pty) Ltd	Brandvalley WEF	Wind	140 MW	Approved
Kudusberg Wind Farm (Pty) Ltd	Kudusberg WEF	Wind	325 MW	Approved
South Africa Mainstream Renewable Power Perdekraal West (Pty) Ltd	Perdekraal West WEF & Associated Grid Connection Infrastructure	Wind	150 MW	Approved
South Africa Mainstream Renewable Power Perdekraal East (Pty) Ltd	Perdekraal East WEF & Associated Grid Connection Infrastructure	Wind	110 MW	Operational
South Africa Mainstream Renewable Power Developments (Pty) Ltd	Patatskloof WEF	Wind	250 MW	EIA Process underway
Rietkloof Wind Farm (Pty) Ltd	Rietkloof WEF	Wind	186 MW	Approved
ENERTRAG SA (Pty) Ltd	Tooverberg WEF & Associated Grid Connection Infrastructure	Wind	140 MW	Approved
Witberg Wind Power (Pty) Ltd	Witberg WEF	Wind	120 MW	Approved
Montgue Road Solar (Pty) Ltd	Montgue Road Solar	Solar PV	75 MW	Approved
Touwsrivier Solar	Touwsrivier Solar	Solar PV	36 MW	Approved

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 area, 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.

Although, on a general basis, 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, this will differ when more specific assessment criteria are applied. This difference is largely due to the general nature of the environmental sensitivity screening report, which does not consider such criteria as extent, reversibility and duration of impact amongst other criteria.

Table 8: Cumulative Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S	
Community resources	Vulnerability of small enterprises	2	3	2	3	3	3	39	-	Medium	Regarding 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. It may be pertinent to consider a similar initiative in the Witzenberg Region.
	Availability of community services	2	3	2	3	3	3	39	-	Medium	
	Cultural and historic resources	2	4	4	3	4	3	51	-	Medium	
	Land use	2	4	2	3	3	3	42	-	Medium	
	Livelihoods and ecosystem services	2	2	2	2	3	2	22	-	Low	
	Social and community infrastructure	2	3	1	2	3	2	22	-	Low	
Individual and family changes	Annoyance, dust and noise	2	4	1	2	3	2	24	-	Medium	
	Blade glint	2	4	1	2	3	2	24	-	Medium	
	Crime and security	2	3	2	3	3	2	26	-	Medium	
	Daily living patterns	2	3	1	2	3	2	22	-	Low	
	Electromagnetic field (EMFs)	2	3	1	2	3	2	22	-	Low	
	Employment after construction	3	4	1	3	3	3	42	-	Medium	
	Employment and business opportunities	3	4	1	3	3	3	42	+	Medium	
	Farming operations	2	4	1	3	3	3	39	-	Medium	
	Fire hazard	2	3	2	3	3	3	39	-	Medium	
	Hazard exposure	2	3	2	3	3	3	39	-	Medium	
	Shadow flicker	2	4	1	2	3	2	24	-	Medium	
	STDs, HIV and AIDS	3	3	2	3	4	3	45	-	High	

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S	
	Risk to livestock	2	4	2	3	3	3	42	-	Medium	
	Transformation of the sense of place	2	4	4	3	4	3	51	-	Medium	
Political and social resources	Corruption	4	3	3	3	4	3	51	-	Medium	
	Security of electricity supply	4	4	3	4	3	3	54	+	High	
Population characteristics	Temporary influx of construction workers	2	4	1	3	3	3	39	-	Medium	
	Informal development and settlements	2	4	1	3	3	3	39	-	Medium	

10 ALTERNATIVES

Although alternatives apply to both the WEF, BESS and grid connection Infrastructure, there are certain limitations regarding the WEF.

10.1 WEF

The only alternative in respect of the WEF, applies to the layout of the wind turbines, which will be considered as part of the basic assessment process. Due to the nature of the project, the location and technological alternatives are restricted.

10.2 Grid Connection Alternative

There are two alternatives under consideration regarding the siting of the substations, and two route alternatives associated with the power lines.

10.2.1 Substation Alternatives

Both substation alternatives cover an area of approximately 25 hectares, with Option 1 being to the north of Option 2, as illustrated in **Figure 3**.

10.2.2 Grid Connection Alternative

The power line corridor is 150 m wide, with the following alternatives being considered.

- **Power Line Corridor Option 1** is between 8.9 km and 10.9 km in length, linking either Substation Option 1 or Substation Option 2 to Kappa Substation; and
- **Power Line Corridor Option 2** is between 8.4 km and 10.3 km in length, linking either Substation Option 1 or Substation Option 2 to Kappa Substation.

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	No preference	
POWER LINE ROUTE ALTERNATIVES		
Power Line Route Alternative Option 1	No preference	
Power Line Route Alternative Option 2	No preference	

11 ENVIRONMENTAL MANAGEMENT PLAN

The following measures pertaining to the social impacts are to be included in the draft Environmental Management Plan.

OBJECTIVE: To ensure, as far as is reasonable and practical, an environment that is safe and without risk to the health of employees and the general public who come into contact with activities associated with the project.			
Project component/s	Project site including laydown areas and access road. Deliveries on public roads to and from the project site.		
Potential Impact	Hazard exposure to the public and employees associated with construction and operational activities and construction and operational related traffic.		
Activity/risk source	Construction and operational activities and project-related traffic.		
Mitigation: Target/Objective	Safety of the workforce, visitors to the site and the general public who may come into contact with project-related components and/or activities.		
Mitigation: Action/control		**Responsibility**	**Timeframe**
Restrict public access to construction areas. Only allow site access after appropriate induction and use of appropriate personal protective equipment. Impose vehicle speed restrictions and display appropriate signage. Ensure use and storage of hazardous materials is in accordance with Health and Safety regulations. Keep a record of all accidents or transgressions of safety in accordance with the OHS Act and implement corrective action. Ensure that fires are not lit on site. Engage a safety officer.		Project developer in association with contractors.	Over the construction and operational phase of the project
Performance Indicator	Accident and incident tally and compliance with the OHS Act.		
Monitoring	A comprehensive record of accidents and incidents and related investigations, findings and corrective action in accordance with the OHS Act.		

OBJECTIVE: To reduce the risk of noise, blade glint, shadow flicker and electromagnetic fields			
Project component/s	WEF and grid infrastructure.		
Potential Impact	Annoyance and health risks.		
Activity/risk source	Turbines, substations and power line.		
Mitigation: Target/Objective	To minimise the effect on local communities.		
Mitigation: Action/control		**Responsibility**	**Timeframe**
Plan the siting of turbines, substations and power lines so as to avoid sensitive areas such as dwellings. Consult with local communities and, if necessary, make adjustments during the site pegging stage of the project.		Project developer and contractors.	Over the planning phase of the project.
Performance Indicator	The frequency of complaints laid, and the time lag between notification of the complaint and resolution. Level of public satisfaction.		
Monitoring	Monitor and evaluate performance at weekly/monthly site meetings and report to the contract manager.		

<table>
<tr><td colspan="4">OBJECTIVE: Reduce dust generation and emissions from site works, plant and vehicle movements along access road.</td></tr>
<tr><td>Project component/s</td><td colspan="3">Clearing of site, construction activities, deliveries and daily traffic to and from the site.</td></tr>
<tr><td>Potential Impact</td><td colspan="3">Degraded air quality and potential impact on human and animal health and accumulation of dust on vegetation used for grazing.</td></tr>
<tr><td>Activity/risk source</td><td colspan="3">Site clearance, construction activities and project-related construction and operational traffic. Emissions from project-related traffic.</td></tr>
<tr><td>Mitigation: Target/Objective</td><td colspan="3">To reduce and manage the potential exhaust emissions and dust impacts associated with construction activities and traffic travelling to and from the site.</td></tr>
<tr><td colspan="2">Mitigation: Action/control</td><td>Responsibility</td><td>Timeframe</td></tr>
<tr><td colspan="2">Wet gravel roads regularly.
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.
Ensure that drivers adhere to speed limits.
Re-vegetate disturbed areas as soon as is practical after construction.
Appoint a community liaison officer to deal with complaints and grievances from the public.
If complaints reach unacceptable levels an air quality survey should be undertaken to assess the situation, identify the source and rectify.</td><td>Project developer in association with contractors.</td><td>Over the construction and operational phase of the project.</td></tr>
<tr><td>Performance Indicator</td><td colspan="3">Frequency of complaints from the public, and time-lapse between receiving and resolving complaints. Public satisfaction in having their complaints addressed. Overall public satisfaction.</td></tr>
<tr><td>Monitoring</td><td colspan="3">Maintain a record of complaints containing full details including dates and times of significant events.</td></tr>
</table>

<table>
<tr><td colspan="4">OBJECTIVE: Control of the nuisance factor for surrounding communities.</td></tr>
<tr><td>Project component/s</td><td colspan="3">Project site including laydown areas and access road.</td></tr>
<tr><td>Potential Impact</td><td colspan="3">General nuisance factor resulting from construction and operational activities and associated traffic.</td></tr>
<tr><td>Activity/risk source</td><td colspan="3">Movement of heavy vehicles in delivering plant, equipment and pylon components.</td></tr>
<tr><td>Mitigation: Target/Objective</td><td colspan="3">To minimise the nuisance factor experienced by surrounding communities.</td></tr>
<tr><td colspan="2">Mitigation: Action/control</td><td>Responsibility</td><td>Timeframe</td></tr>
<tr><td colspan="2">Schedule the delivery hours to avoid peak hour traffic, weekends and evenings.
Limit the need for transportation over long distances by sourcing as much materials and goods as is feasible from local suppliers.
Alert traffic authorities well in advance of any heavy loads that will be transported on local roads and elicit their assistance in controlling traffic associated with the transportation of these loads.
Alert the workforce to the need to behave in a socially responsible manner, being considerate towards local residents.
Establish a code of conduct for the workforce.
Restrict work activities that require power tools and plant that generates noise to normal working hours and limit such activities over weekends.
Ensure that local by-laws are always adhered to.
Appoint a community liaison officer.
Ensure that a grievance/complaint reporting procedure is in place, appropriately implemented and that all submissions received are managed by:
➢ Recording grievance submission date.
➢ Keeping complainant informed of progress towards corrective action.
➢ Keeping a record of corrective action taken and recording closure date.
Introduce an incident reporting system to be tabled at weekly/monthly project meetings.</td><td>Project developer in association with contractors.</td><td>Over the construction and operational phase of the project.</td></tr>
<tr><td>Performance Indicator</td><td colspan="3">The frequency of complaints laid and the time lag between notification of the complaint and resolution. Level of public satisfaction.</td></tr>
<tr><td>Monitoring</td><td colspan="3">Monitor and evaluate performance at weekly/monthly site meetings and report to the contract manager.</td></tr>
</table>

OBJECTIVE: Controlling the spread of STDs and HIV			
Project component/s	Migrant labour and transport workers.		
Potential Impact	The spread of STDs and HIV.		
Activity/risk source	The arrival of construction and transportation workers carrying STDs and/or HIV interacting with local communities during leisure hours. An increase in prostitution driven by an increase in disposable income in the area.		
Mitigation: Target/Objective	To minimise the risk of the spread of STDs and HIV in the area.		
Mitigation: Action/control		**Responsibility**	**Timeframe**
Implement an HIV/AIDS Awareness and Training Programme for the Contractor's workforce and, if feasible the local community, within two weeks of commencement of construction. Ensure that the HIV/AIDS Awareness and Training Programme is consistent with national guidelines and/or IFC's Good Practice. Focus on the recruitment of local labour which may help to stabilise the risk of the spread of HIV/AIDS by avoiding the need to introduce migrant labour during the construction phase. Provide voluntary and free counselling, free testing and condom distribution services.		Human resource department and project manager. Contractors.	Over the construction and operational phase of the project.
Performance Indicator	The stability of STDs and HIV infections amongst the workforce.		
Monitoring	This is difficult to monitor on an individual level as a person's HIV status is confidential so can only be monitored voluntarily. Consultations with local clinics may provide some insight but this will depend on the availability of resources in the area and cooperation from the relevant health authorities.		

OBJECTIVE: To manage the impact of the influx of construction workers on family structures and social networks.			
Project component/s	The workforce employed over the construction phase.		
Potential Impact	The behaviour of the workers who are accommodated within the local community.		
Activity/risk source	The after-work hours interaction between the workers and local communities.		
Mitigation: Target/Objective	To minimise the disruptive effect that the workforce may pose for local communities.		
Mitigation: Action/control		**Responsibility**	**Timeframe**
As far as possible source low-skilled workers from local communities and surrounding areas. If feasible employ local contractors.		Project developer and contractors.	Over the construction phase of the project.
Performance Indicator	The frequency of complaints and incidents between the workforce and local communities.		
Monitoring	Maintain a full incident record and monitor and evaluate performance at weekly/monthly site meetings and report to the contract manager.		

<table>
<tr><td colspan="4">OBJECTIVE: Minimising the risk of increased crime associated with the project.</td></tr>
<tr><td>Project component/s</td><td colspan="3">Construction and laydown areas.</td></tr>
<tr><td>Potential Impact</td><td colspan="3">Construction activities may result in opportunities for criminal activities, such as theft, damage to property, stock theft and alcohol-related crime amongst others.</td></tr>
<tr><td>Activity/risk source</td><td colspan="3">Increased activity and human traffic in the area may lead to opportunistic crime.</td></tr>
<tr><td>Mitigation: Target/Objective</td><td colspan="3">To minimise the risk potential within local communities.</td></tr>
<tr><td colspan="2">Mitigation: Action/control</td><td>Responsibility</td><td>Timeframe</td></tr>
<tr><td colspan="2">Encourage contractors and local residents to report any suspicious activity associated with crime to the appropriate authorities.
Inform workers that trespassing onto adjoining private properties is not permitted.
Ensure that the local municipalities, police, security companies, and policing forums are alerted to the increased construction activities in the region and the risk it poses in respect of crime.
Prevent loitering within the vicinity of the construction camp as well as construction sites.
Manage the growth of informal settlements that may arise as a response to perceived job opportunities by promptly alerting the appropriate authorities.</td><td>Project developer and contractors.</td><td>Over the construction phase of the project.</td></tr>
<tr><td>Performance Indicator</td><td colspan="3">Frequency of incidents of project-related crime experienced.</td></tr>
<tr><td>Monitoring</td><td colspan="3">Keep a record of criminal incidents associated with the project and table it at weekly/monthly project meetings and report to the project manager.</td></tr>
</table>

OBJECTIVE: Maximise the employment of local people and the services of local business during construction.			
Project component/s	Construction of the WEF and Grid Infrastructure		
Potential Impact	Employment opportunity for local people and business opportunity for local businesses.		
Activity/risk source	External contractors are likely to use their existing labour source and their existing supplier/service network resulting in lost opportunities for local workers and businesses.		
Mitigation: Target/Objective	Project developers should enter into agreements with contractors to support the use of local labour and businesses wherever feasible.		
Mitigation: Action/control		**Responsibility**	**Timeframe**
Ensure that the majority of the low-skilled workforce are recruited locally, where possible. Undertake a skills audit to determine the level of skills and what development and training programmes are required. Commence with skill development programmes within the first month of construction. Identify employment opportunities for women and ensure that they receive appropriate training. Identify opportunities for local businesses and ensure that the services from local businesses are prioritised.		Human Resources, Project developer and contractors.	From the appointment of contractors and throughout the construction and operational phases.
Performance Indicator	Composition of the labour force and value of procurement from local businesses. Level of skills imparted to the local workforce.		
Monitoring	Human Resources and Finance function to monitor and report on through regular audits.		

12 CONCLUSION AND SUMMARY

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. 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).

12.1 Impact Statement

Considering all social impacts associated with the project, it is evident that, at the social level, the positive elements outweigh the negative and that the project carries with it a significant social benefit at a national level and is therefore supported. In addition, no compelling preference emerges in respect of the alternatives and it would be socially acceptable for the authorisation of either power line alternative.

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