SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

PROPOSED CONSTRUCTION OF 132 KV POWERLINES BETWEEN THE AUTHORISED LOERIESFONTEIN 3 PV SOLAR ENERGY FACILITY (12/12/20/2321/2/AM4) AND THE AUTHORISED DWARSRUG WIND ENERGY FACILITY (14/12/16/3/3/2/690/AM4), AND FROM THE DWARSRUG WIND ENERGY FACILITY TO THE AUTHORISED NAROSIES SUBSTATION (12/12/20/2049/3), LOCATED NEAR LOERIESFONTEIN IN THE HANTAM LOCAL MUNICIPALITY, NAMAKWA DISTRICT IN THE NORTHERN CAPE PROVINCE OF SOUTH AFRICA

BASIC SOCIAL IMPACT ASSESSMENT

DEFF Reference: To be allocated
Report Prepared by:

Dr Neville Bews & Associates
SOCIAL IMPACT ASSESSORS

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BASIC SOCIAL IMPACT ASSESSMENT

EXECUTIVE SUMMARY

INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (herein after referred to as “Mainstream”) appointed SiVEST to undertake a Basic Assessment (BA) Process for the proposed construction of 132 kV overhead powerlines between the proposed (and authorised) 100MW Loeriesfontein 3 Photovoltaic (PV) Solar Energy Facility (SEF) (12/12/20/2321/2/AM4) and proposed (and authorised) 140MW Dwarsrug Wind Energy Facility (WEF) (14/12/16/3/3/2/690/AM4); and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3) located near Loeriesfontein in the Northern Cape Province of South Africa.

Mainstream are proposing the construction of a 132 kV overhead powerlines between the proposed (and authorised) 100 MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and proposed (and authorised) 140 MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4); and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3). The powerline from the Loeriesfontein 3 PV SEF to the Dwarsrug WEF is proposed to link the SEF to the WEF in order to create a hybrid renewable energy facility, which will ensure that electricity is constantly supplied to the national grid by at least one or both technologies (namely solar PV and wind), at any given time. The powerline from the

Dwarsrug WEF is proposed to tie the, above mentioned, hybrid renewable energy facility to the approved Narosies substation to feed the National grid.

A site sensitivity verification has been undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool). The purpose of this report/statement is to verify the site sensitivity as identified by the screening tool and compile a statement confirming the identified impacts and any changes with the revised layout.

Route alternatives

Two alternatives powerline corridors linking the Loeriesfontein 3 PV SEF to the Dwarsrug WEF as well as a single powerline corridor proposed to link these two facilities to the National Grid from the Dwarsrug WEF are assessed. All three powerline route alignments will be assessed within a 300 m wide assessment corridor, 150 m on either side of powerline. The powerline alternatives which are being proposed and assessed are:

- **Corridor Alternative 1:** – Colour-coded green and runs parallel to the Granaatboskolk Road within the existing authorised powerline servitude to the west of the Loeriesfontein Wind Farm.
- **Corridor Alternative 2:** Colour-coded shaded pink and looping around the east of the Loeriesfontein Wind Farm.
- **Corridor 3 no alternative:** A third powerline corridor, which has no alternatives, runs between the Dwarsrug and Narosies substations and connects the Loeriesfontein 3 PV SEF and Dwarsrug WEF to the National Grid is also assessed.

The layout alternatives are being considered and assessed as part of the BA process and will be refined to avoid identified environmental sensitivities.

IMPACTS IDENTIFIED

The potential social impacts associated with the project are:

Construction Phase

- Health and social wellbeing impact
  - Annoyance, air quality and noise
  - Electromagnetic Fields (EMFs)
  - Increase in crime
  - Increased risk of HIV infections

- An influx of construction workers
- Hazard exposure.

- Quality of the living environment
  - Disruption of daily living patterns
  - Transformation of the sense of place.
- Economy
  - Job creation and skills development
  - Socio-economic stimulation.

Operational Phase

- Health and wellbeing
  - Electromagnetic fields
- Quality of the living environment
  - Transformation of the sense of place
- Economic
  - Socio-economic stimulation

Cumulative impacts

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

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

The no project option would mean that the social environment is not affected as the status quo remains. On a negative front, it would also mean that all the positive aspects associated with the project would not materialise. A summary of the impact assessment is provided below in tabular format.

Construction Phase			
Environmental parameter	**Issues**	**Rating prior to mitigation**	**Rating post-mitigation**
Health & social wellbeing	Air quality	-7	-7
	Noise	-5	-5
	Increase in crime	-18	-18
	Increased risk of HIV infections	-42	-42
	An influx of construction workers	-8	-8
	Hazard exposure.	-18	-18
Quality of the living environment	Disruption of daily living patterns	-8	-8
Economic	Job creation and skills development	+11	+11
	Socio-economic stimulation	+13	+13
Operational Phase			
Health & Wellbeing	Electromagnetic fields	-22	-20
Quality of the living environment	Transformation of the sense of place	-32	-32
	Socio-economic stimulation	+32	+32
Decommissioning Phase			
Considering a time period of 20 years prior to decommissioning and the dynamics of social variables, it would be rather meaningless to attach assessment criteria to decommissioning at this point due to the high level of uncertainty such assessment would be based upon.			
No Project Alternative			
No project		-51	No mitigation measures
Cumulative Impacts			
Health & social wellbeing	Risk of HIV	-57	-54
Quality of the living environment	Sense of place	-54	-54
	Services, supplies & infrastructure	-26	-24
Economic	Economic	+68	+68

COMPARATIVE ASSESSMENT OF LAYOUT ALTERNATIVES

Three grid alignment alternatives, as described above, are proposed to link the authorised Loeriesfontein 3 PV SEF to the authorised Dwarsrug WEF.

Considered purely on a social basis, no clear route alternatives emerge in respect of any of these alternatives. Taking into account the results of other specialist studies that may have secondary social consequences, such as the archaeological; heritage; palaeontological and visual, no least preferred route emerges.

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)**
POWERLINE CORRIDOR ROUTE ALTERNATIVES		
Power Line Corridor **Alternative 1** (Loeriesfontein 3 PV SEF to Dwarsrug WEF)	No Preference	Considering both the social and other specialist studies, no clear route alternatives emerge in respect of any of these routes.
Power Line Corridor **Alternative 2** (Loeriesfontein 3 PV SEF to Dwarsrug WEF)	No Preference	

SUMMARY AND CONCLUSION

The objective of the proposed development is to link the authorised 100 MW Loeriesfontein 3 PV SEF to the authorised 140 MW Dwarsrug WEF in order to create a hybrid energy facility. The hybrid energy facility will ensure that electricity is constantly supplied to the National Grid by at least one or both technologies (namely solar PV and wind) at any given time. Separate BA processes to add battery energy storage systems (BESS) to both renewable energy facilities (Loeriesfontein 3 BESS DEFF Reference number: 14/12/16/3/3/1/2263 and Dwarsrug BESS DEFF Reference number: 14/12/16/3/3/1/2262) are currently underway. The BESS will contribute to the hybrid renewable energy facility by storing and providing electricity for the National Grid.

Once commissioned, the powerline will be absorbed, operated and maintained by Eskom; thus, resulting in the powerline becoming an Eskom asset and eliminating any risk attached to privately owned transmission grid infrastructure. In this regard, Eskom indicates a

commitment " …*to developing the electricity supply industry by facilitating the integration of independent power producers (IPPs) into the National Grid and buying electricity from IPPs for national distribution*".

Regarding the negative impacts associated with the project, it is evident that most apply over the short-term and are confined to the construction phase of the project. Of these impacts, all are within acceptable ranges and there are no fatal flaws associated with the construction or operation of the project. Although over the operational phase, the project will be visible and is likely to alter the sense of place of the area, this should be limited to the extent that it is placed amongst existing electricity infrastructure.

In accordance with international and governmental requirements, the project will shift the country away from a high reliance on fossil fuels towards a far greener and cleaner energy generation mix. The proposed development also supports the objectives of the RMIPPPP, which serves as an "emergency" power generation programme for accelerated assistance to the National Grid amid electricity supply constraints. The DMRE issued an RFP for the emergency procurement of 2000 MW of electricity. Due to the emergency nature of the RMIPPPP, the objective is to procure energy from projects that are near ready and can connect to the grid quickly. The proposed development is deemed to meet these requirements and can reduce the risk of load shedding. Grid capacity is also available and no deep grid works are required, which are beneficial for the connection timelines of the RMIPPPP.

The Minister of Mineral Resources and Energy also recently welcomed the concurrence by the NERSA to the second Section 34 Ministerial Determination, which enables the Department to undertake procurement of additional electricity capacity in line with the IRP (2019). 6 800 MW of capacity is determined to be generated from renewable energy sources (PV and Wind), 513 MW from storage and 3 000 MW from gas. The proposed development will be able to contribute to this diverse electricity requirement and will thus actively contribute to the commitments made to increase generation capacity and ensure the security of energy supply to society rapidly and significantly.

IMPACT STATEMENT

Considering all social impacts associated with the project, it is evident that the positive elements outweigh the negative and that the project carries with it a significant social benefit. In addition, the project fits with international and governmental policy and legislation. Consequently, the construction of the proposed 132 kV Loeriesfontein to Dwarsrug Overhead Powerline and grid connection between the Dwarsrug and Narosies substations is supported at the social level with no further assessment being required.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA) AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) 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: 1.3**
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**Appendix 3**
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;	**Sections: 6 & 7**
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**N/A**
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Section: 1.4** **Appendix 1**
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;	**Sections:- 7 & 9**
g) an identification of any areas to be avoided, including buffers;	**None identified**
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;	**Section: Figures 1 & 2**
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**Section: 2.1**
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: 10**
k) any mitigation measures for inclusion in the EMPr;	**Section: 8**

l) any conditions for inclusion in the environmental authorisation;	**None**
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	No monitoring requirements included. See Section 8 last paragraph**.**
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	**Section: 10.1**
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	No feedback has been received from the public participation process
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.	**N/A**

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List of Abbreviations

AIDS	Acquired immunodeficiency syndrome
BA	Basic Assessment
BID	Background Information Document
DBAR	Draft Basic Assessment Report
DBSA	Development Bank of South Africa
DEFF	Department of Environment, Forestry and Fisheries
DEAT	Department of Environmental Affairs and Tourism
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
EMFs	Electromagnetic Fields
FBAR	Final Basic Assessment Report
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
OHL	Overhead Powerline
OHS	Occupational Health and Safety
O&M	Operation and Maintenance
PA	Per annum (Yearly)
PGDS	Provincial Growth and Development Strategy
PV	Photovoltaic
PPP	Public Participation Process
REIPPPP	Renewable Energy Independent Power Producer Procurement Program
RFP	Request For Proposal

RMIPPPP	Risk Mitigation Independent Power Producer Procurement Programme
SACPVP	South African Council for the Property Valuers Profession
SAHRA	South African Heritage Resources Agency
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 Organisation
WEF	Wind Energy Facility
WHO	World Health Organisation
WWF	World Wild Fund for Nature

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BASIC SOCIAL IMPACT ASSESSMENT

1 INTRODUCTION

Dr Neville Bews & Associates has been appointed by SiVEST (PTY) Ltd, on behalf of South Africa Mainstream Renewable Power Developments (Pty) Ltd, to assess the construction of a 132 kV grid connection between the approved substation at the authorised 100 MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and approved substation at the authorised 140 MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4) and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3). This project is located near Loeriesfontein in the Hantam Local Municipality, Namakwa District in the Northern Cape Province of South Africa.

The proposed overhead powerline (OHL) and substation project will irrespective of this be subject to a Basic Assessment (BA) process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 1 of the Environmental Impact Assessment (EIA) Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. The competent authority for this BA is the national Department of Environment, Forestry and Fisheries (DEFF). The Social Impact Assessment was to assess and verify the OHL and substations under the new Gazetted specialist protocols[1].

[1] Formally gazetted on 20 March 2020 (GN No. 320)

1.1 Scope and Objectives

Assess the impacts associated with the construction and operation of a 132 kV grid connection between the approved substation at the authorised 100 MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and approved substation at the authorised 140 MW Dwarsrug WEF (14/12/16/3/3/2/690/A) and between the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3).

1.2 Terms of Reference

The following terms of reference apply to the study:

- The Site Verification Report and Compliance Statement / Specialist Report must be in line with the DEA Screening Tool Specialist theme Protocols (As gazetted 20 March 2020) if they apply. If they do not, the report must be written in accordance with Appendix 6 of the EIA Regulations, 2014 (as amended);
- A table at the beginning of the report cross-referencing how the requirements for specialist according to Appendix 6 of the EIA Regulations, 2014 (as amended) has been adhered to;
- A thorough overview of all applicable legislation, policies and guidelines;
- Identification of sensitive and/or 'no-go' areas to be avoided;
- Recommend mitigation measures to minimise the impact of the proposed development;
- Provide implications of specialist findings for the proposed development (e.g. permits, licenses etc.);
- Specify if any further assessment will be required;
- Include an Impact Statement, concluding whether any fatal flaws have been identified and ultimately whether the proposed development can be authorised or not (i.e. whether EA should be granted/issued or not).

1.3 Specialist Credentials

Qualifications:

University of South Africa: BA (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

Projects:

The Social Impact Assessment (SIA) for the Gautrain Rapid Rail Link; The impact assessment for the Australian – South African sports development programme; SIA for Kumba Resources, Sishen South Project; Evaluation of a Centre for Violence Against Women for The United Nations Office on Drugs and Crime; SIAs for the following Exxaro Resources Ltd.'s mines, Leeuwpan Coal Mine Delmas, Glen Douglas Dolomite Mine Henley-on-Klip, Grootegeluk Open Cast Coal Mine Lephalale; SIA for the South African National Road Agency Limited (SANRAL) on Gauteng Freeway Improvement Project; SIA for SANRAL on the N2 Wild Coast Toll Highway; Research into research outputs of the University for the University of Johannesburg; SIA for Waterfall Wedge housing and business development in Midrand Gauteng; SIA for the Environmental Management Plan for Sedibeng District Municipality; Social and Labour Plan for the Belfast Project on behalf of Exxaro Resources Ltd; SIA for the Transnet New Multi-Product Pipeline (Commercial Farmers) on behalf of Golder Associates Africa (Pty) Ltd; SIA for the Proposed Vale Moatize Power Plant Project in Mozambique on behalf of Golder Associates Africa (Pty) Ltd; SIA for Kumba Resources Ltd.'s proposed Dingleton Resettlement Project at Sishen Iron Ore Mine on behalf of Water for Africa (Pty) Ltd; SIA for Gold Fields West Wits Project for EcoPartners; SIA for the Belfast Project for Exxaro Resources Ltd; SIA for Eskom Holdings Ltd.'s Proposed Ubertas 88/11 kV Substation on behalf of KV3 Engineers (Pty) Ltd; SIA for the Mokolo and Crocodile River (West) Water Augmentation Project for the Department of Water and Sanitation on behalf of Nemai Consulting and the Trans Caledonian Water Authority; Assisted Octagon Consulting with the SIA for Eskom's Nuclear 1 Power Plant on behalf of Arcus GIBB Engineering & Science. SIA for the 150 MW Photovoltaic Power Plant and Associated Infrastructure for Italgest Energy (Pty) Ltd, on behalf of Kalahari Survey Solutions cc. SIA for Eskom Holdings Limited, Transmission Division's Neptune-Poseidon 400kV Powerline on behalf of Nemai Consulting. Ncwabeni Off-Channel Storage Dam for the security of water supply in Umzumbe, Mpumalanga. Social Impact Assessment for Eskom Holdings Limited, Transmission Division, Forskor-Merensky 275kV ±130km Powerline and Associated Substation Works in Limpopo Province. Social impact assessment for the proposed infilling of the Model Yacht Pond at Blue Lagoon, Stiebel Place, Durban.ABC Prieska Solar Project; Proposed 75 MWp Photovoltaic Power Plant and its associated infrastructure on a portion of the remaining extent of ERF 1 Prieska, Northern Cape.Sekoko Wayland Iron Ore, Molemole Local Municipalities in Limpopo Province.Langpan Chrome Mine, Thabazimbi, Limpopo; Jozini Nodal Expansion Implementation Project, Mpumalanga, on behalf of Nemai Consulting; SIA for Glen Douglas

Dolomite Burning Project, Midvaal Gauteng, on behalf of Afrimat Limited; SIA for Lyttelton Dolomite mine Dolomite Burning Project, Marble Hall Limpopo on behalf of Afrimat Limited; Tubatse Strengthening Phase 1 – Senakangwedi B Integration for Eskom Transmission on behalf of Nsovo Environmental Consulting; Department of Water and Sanitation, South Africa (2014). Environmental Impact Assessment for the Mzimvubu Water Project: Social Impact Assessment DWS Report No: P WMA 12/T30/00/5314/7. Umkhomazi Water Project Phase 1 – Raw Water Component Smithfield Dam - 14/12/16/3/3/3/94; Water Conveyance Infrastructure - 14/12/16/3/3/3/94/1; Balancing Dam - 14/12/16/3/3/3/94/2. Umkhomazi Water Project Phase 1 – Potable Water Component: 14/12/16/3/3/3/95. Expansion of Railway Loops at Arthursview; Paul; Phokeng and Rooiheuwel Sidings in the Bojanala Platinum District Municipality in the North West Province for Transnet Soc Ltd; Basic Social Impact Assessment for the Cato Ridge Crematorium in Kwazulu-Natal Province; SIA for the Kennedy Road Housing Project, Ward 25 situated on 316 Kennedy Road, Clare Hills (Erf 301, Portion 5); Eskom's Mulalo Main Transmission Substation and Powerline Integration Project, Secunda;

Affiliation:

Registered on the database for scientific peer review of iSimangaliso GEF project outputs.

1.4 Assessment Method

Data was gathered using the following techniques:

- 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 site sensitivity verification through the national web-based environmental screening tool; attached as Appendix 2;
- 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.

The assessment technique used to evaluate the social impacts, as provided by SiVEST Environmental Division, is attached as **Appendix 1**.

2 ASSUMPTIONS AND LIMITATIONS

2.1 Assumptions

It is assumed that the technical information provided by the project proponent, South Africa Mainstream Renewable Power Developments (Pty) Ltd and the environmental consultants, SiVEST SA (Pty) Ltd, was 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 to a municipal level.

No site visit was undertaken as the region was sparsely populated and where necessary information could be obtained from the environmental consultants. Apart from this, the study was undertaken during the State of National Disaster declared in South Africa as a result of the COVID-19 pandemic. Accordingly, the need for social distancing and limiting unnecessary interpersonal contact and travel was respected throughout this study.

3 PROJECT DESCRIPTION

Mainstream is proposing the construction of a 132 kV grid connection between the approved substation at the authorised 100 MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and approved substation at the authorised 140MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4), located near Loeriesfontein in the Hantam Local Municipality, Namakwa District in the Northern Cape Province of South Africa. The location of the project is illustrated in **Figure 1**.

The grid connection is required to link the authorised 100 MW Loeriesfontein 3 PV SEF to the authorised 140 MW Dwarsrug WEF in order to create a hybrid energy facility. The hybrid

energy facility will ensure that electricity is constantly supplied to the National Grid by at least one (1) or both technologies (namely solar PV and wind) at any given time. Separate BA processes to add battery energy storage systems (BESS) to both renewable energy facilities (Loeriesfontein 3 BESS DEFF Reference number: 14/12/16/3/3/1/2263 and Dwarsrug BESS DEFF Reference number: 14/12/16/3/3/1/2262) are currently underway. The BESS will contribute to the hybrid renewable energy facility by storing and providing electricity for the National Grid.

3.1 Route alternatives

Two alternatives powerline corridors linking the Loeriesfontein 3 PV SEF to the Dwarsrug WEF as well as a single powerline corridor proposed to link these two facilities to the National Grid from the Dwarsrug WEF are assessed. All three powerline route alignments will be assessed within a 300 m wide assessment corridor, 150 m on either side of powerline. The powerline alternatives which are being proposed and assessed are:

- **Corridor Alternative 1:** – Colour-coded green and runs parallel to the Granaatboskolk Road within the existing authorised powerline servitude to the west of the Loeriesfontein Wind Farm.
- **Corridor Alternative 2:** Colour-coded shaded pink and looping around the east of the Loeriesfontein Wind Farm.
- **Corridor 3 no alternative:** A third powerline corridor, which has no alternatives, runs between the Dwarsrug and Narosies substations and connects the Loeriesfontein 3 PV SEF and Dwarsrug WEF to the National Grid is also assessed.

All three corridors are illustrated in **Figure 2**.

The layout alternatives are being considered and assessed as part of the BA process and will be refined to avoid identified environmental sensitivities.

3.2 'No-go' alternative

The 'no-go' alternative is the option of not constructing the powerline project, which would prevent the realization of the hybrid facility and thus prevent electricity generated from renewable sources being fed into the National Grid. This alternative would result in no additional environmental impact other than that assessed during the BA for the Renewable Energy (RE) facilities.

The ‘no-go’ option is feasible; however, this would prevent the hybrid facility from contributing to the environmental, social and economic benefits associated with the development of the renewables sector.

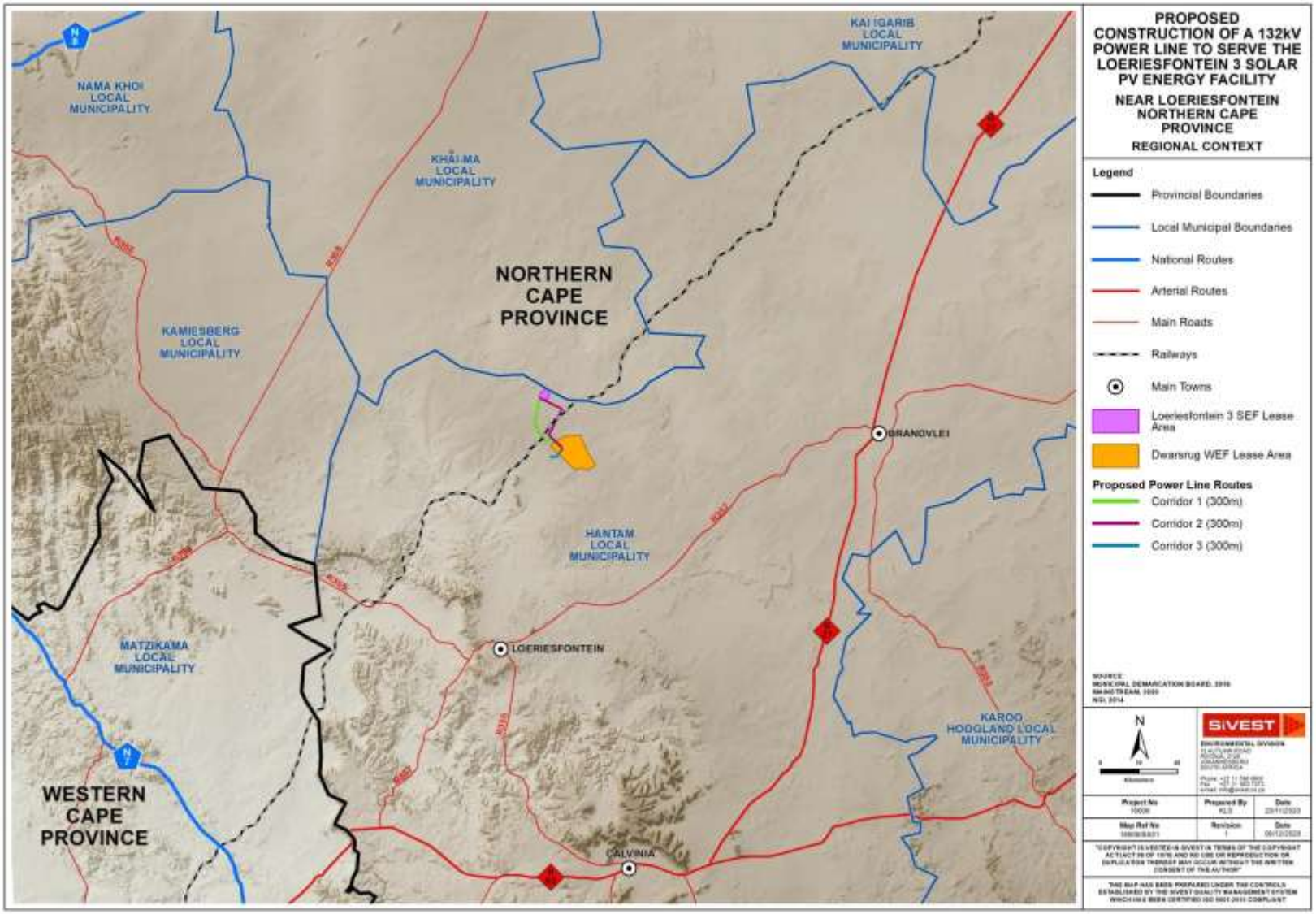


Figure 1: Regional context map

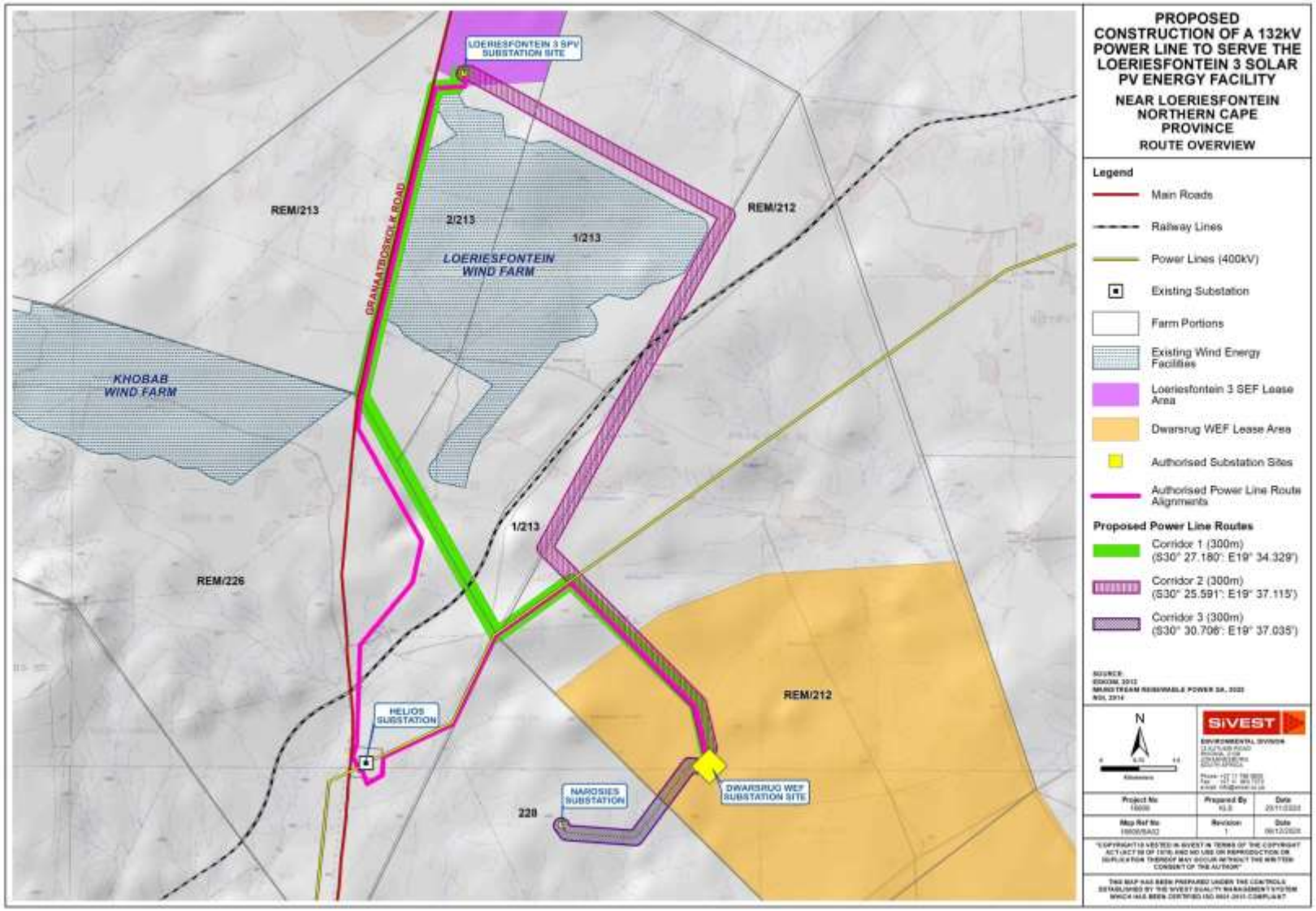


Figure 2: Route overview map

4 LEGAL REQUIREMENT AND GUIDELINES

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

4.1 International

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

4.2 National

- White Paper on the Energy Policy of the Republic of South Africa (1998)
- 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)

- Government Gazette No. 43734; 25 September 2020, Notice No. 1015; Determination Under Section 34(1) of the Electricity Regulation Act, 2006 (Act No. 4 of 2006)
- Department of Mineral Resources and Energy's Independent Power Producers Procurement Programme (2020)
- New Growth Path Framework (2010)
- The National Development Plan (2011)
- National Infrastructure Plan (2012).

4.3 Provincial

- Northern Cape Provincial Growth and Development Strategy (2004-2014)
- Northern Cape Province Twenty-Year Review (2014)
- Northern Cape Climate Change Response Strategy
- Northern Cape Spatial Development Framework
- Northern Cape Department of Environment & Nature Conservation Annual Report (2016/17)
- Northern Cape Department of Economic Development & Tourism Annual Report (2017)
- Northern Cape State of the Province Address (2018).

4.4 District and local

- Namakwa District Municipality Integrated Development Plan Revision 2020-2021
- Hantam Municipality Integrated Development Plan (IDP) 2020/2021 (Final).

4.5 Policy and legislation fit

Considering the nature and location of the project, there is a clear fit with international, national, provincial and local, at both district and municipal levels, policy and legislation. For instance, the World Wild Life 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 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 Northern Cape contributing 22 6332 GWh^2 to the National Grid of which 11 509 GWh is through Solar PV (51%) and 6 554 GWh is through wind (29%) (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 partly within the Renewable Energy Development Zone 2, which is located in the Komsberg region and falls across the borders of the Northern and Western Cape Provinces. The project, however, does not fall completely within this zone with a section falling outside the zone.

On 25 September 2020 (Government Notice No. 1015 in Government Gazette No. 43734) the Minister of Mineral Resources and Energy amended the regulations governing the

generation of electricity. This created additional capacity to contribute towards energy security with the requirement that Eskom Holdings SOC Limited purchase additional electricity from independent power producers. Of this 6 800 MW should be sourced from renewable energy sources, both wind and solar; 513 MW from storage and 3 000 MW from gas and diesel. The project fits with this requirement.

The Northern Cape Department of Economic Development and Tourism identifies six economic development opportunities, one of which is renewable energy, and states that;

> "*During the financial year* [2017/18] *the intension is to focus on additional opportunities such as, Renewable Energy, a focus area of the 9-Point Plan*" (Northern Cape Province. Department of Economic Development & Tourism, 2017, p. 10 & 15).

The importance of renewable energy facilities within the Northern Cape has been recognised in the province's Twenty-Year Review 2014, where it is indicated that;

> "*The New Growth Path that was adopted by national government in 2010 identified the green economy as a new economic sector that will be key to the creation of jobs. The focus of the green economy is on renewable energy and the Northern Cape was identified as the solar hub of the country with a number of solar plants being established across the province*" (Northern Cape Province, 2014, p. 153).

On a municipal level, support is also evident. In the Namakwa District Municipality Integrated Development Plan Revision 2020-2021 it is stated that;

> "*The role of local government in the electricity distribution industry, including consideration of renewable energy, reticulation, and municipal debt and tariff structures will be critical, as will its role in sustainable management of water and sanitation for all"* (Namakwa District Municipality, 2020, p. 51).

While in the Hantam IDP 2020/2021 it is stated that:

> "*The establishment of the SKA project and a few renewable energy projects in the region will positively impact on the economy of the municipal area. And that; "[t]he main economic sectors in Hantam are Agriculture, Tourism, Mining and Renewable Energy*" (Hantam Local Municipality, 2020, p. 31).

The municipality recognises the following contribution attributed to Mainstream:

South Africa Mainstream Renewable Power Developments (Pty) Ltd	Upgrading of play parks Replace VIP toilets with toilets connected to sanitation system Provision of outdoor gym Tarring of roads Construct a two-lane bridge for pedestrian & vehicles Assist with paving of street (Mainstream to provide pavers and material and Municipality to provide labour) Agreement for maintenance of water purification plant for irrigation of sports field for a number of years Prepaid water meters to households

(Hantam Local Municipality, 2020, p. 112).

Considering the policy and legislation referred to above, the project fits this framework; particularly in respect of the delivery of efficient and reliable renewable energy. In the following section, a description of the affected environment is provided.

5 DESCRIPTION OF THE RECEIVING ENVIRONMENT

The project falls within the Hantam Local Municipality which is located within the Namakwa District Municipality of the Northern Cape Province. The demographics pertaining to the provincial and municipal areas, as sourced from Statistics South Africa, are described below.

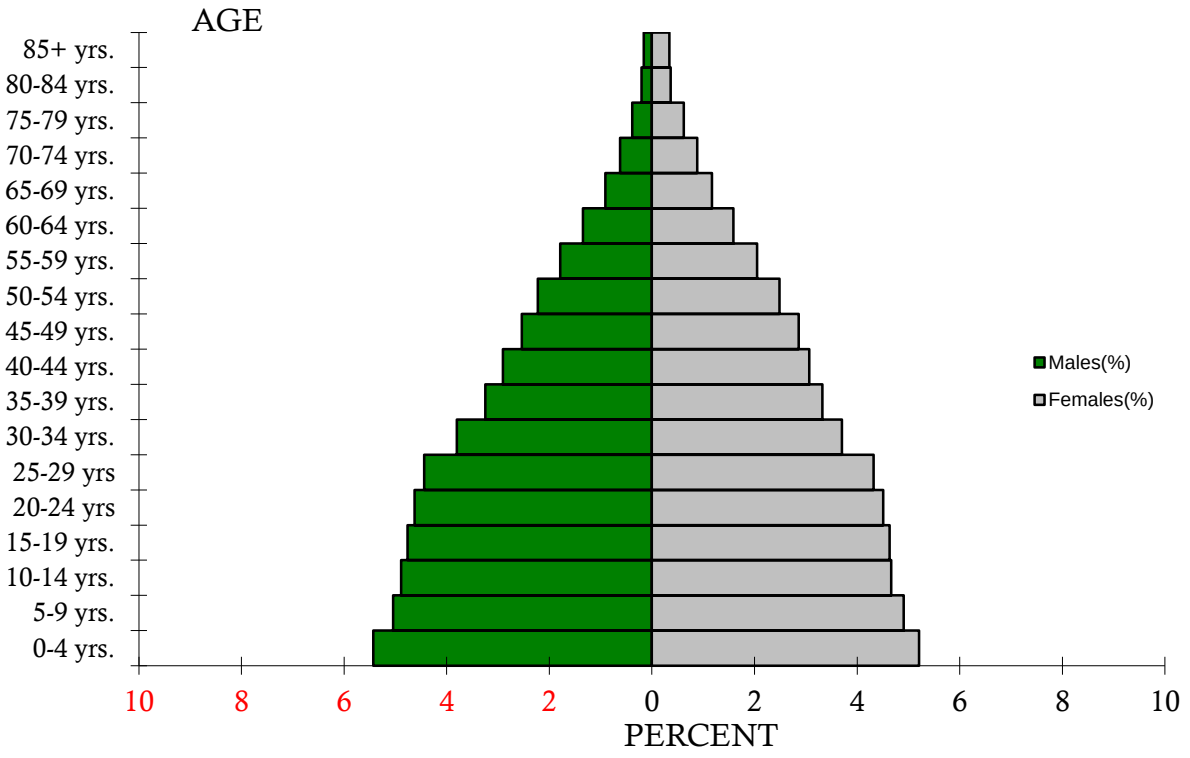
5.1 Provincial

The Northern Cape is the largest and most sparsely populated of all provinces in South Africa and shares borders with the following provinces:

- North West – northeast
- Free State – east
- Eastern Cape – southeast
- Western Cape – south and southwest.

The province covers a geographical area of 372 889 km² and, with a population of 1 145 861 people in 2011, had a population density of 3.1 people per km² (Statistics South Africa,

2011). By mid-2020 the population of the Northern Cape was estimated at 1 292 789 (Statistics South Africa, 2020a). 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, 36% (36% in 2016) of the population of the Northern Cape were below 18 years while 59% (58% in 2016) were between 18 and 64 years of age and 6% (7% in 2016) were above 64 years in 2011. The population pyramid of the Northern Cape Provinces is illustrated in **Figure 3**.



Source: (Statistics South Africa, 2011)

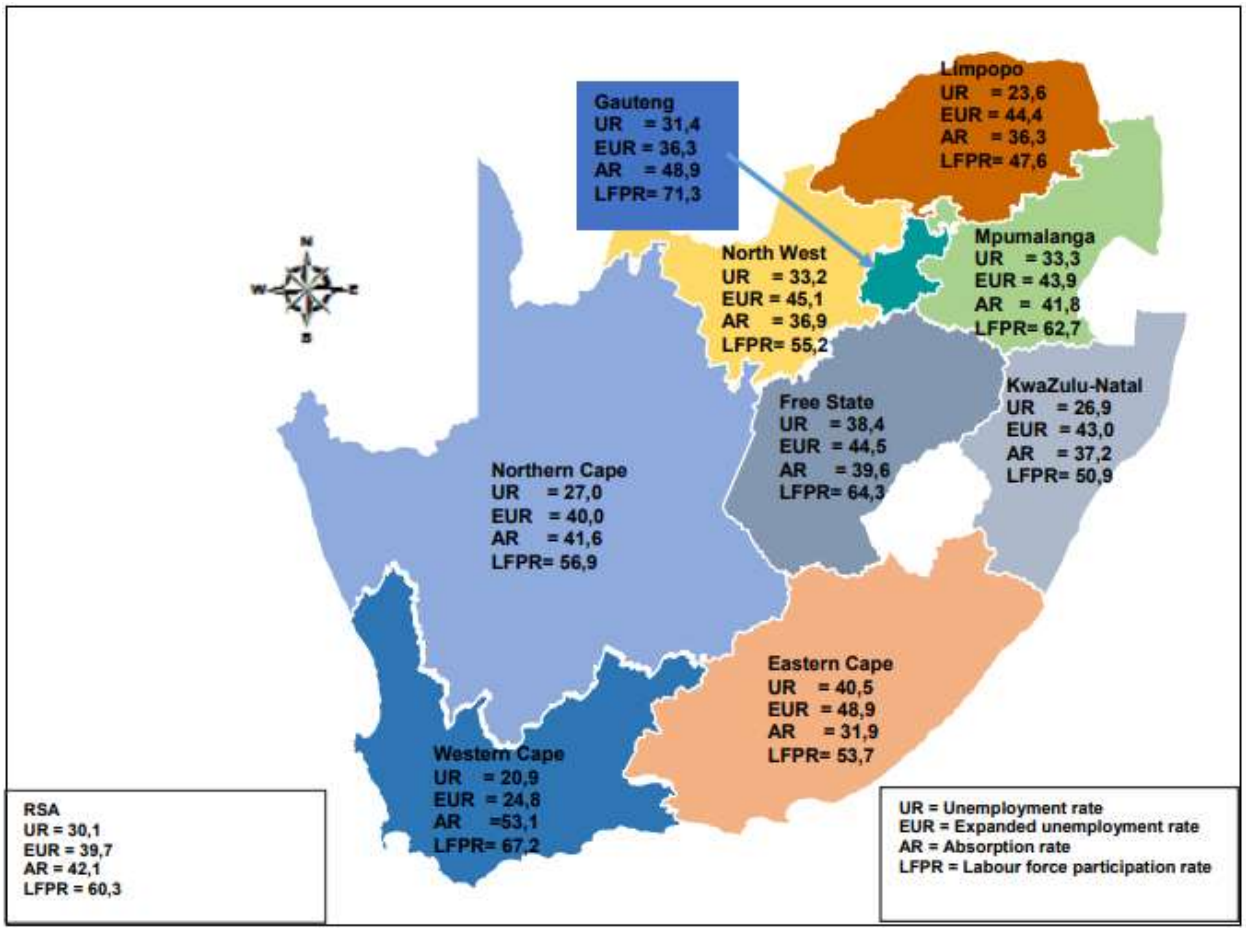
Figure 3: Population pyramid Northern Cape Province

In respect of population grouping, the dominant population group in the Northern Cape are black African people at 50.4% (48.1% in 2016) followed by coloured people at 40.3% (43.7% in 2016), white people at 7% (8% in 2016) with Indian or Asian people accounting for 1% (1% in 2016) of the population. The majority of this population, 52.9% (55.7% in 2016), speak Afrikaans followed by Setswana at 32.6% (32.7% in 2016) and isiXhosa at 5.3% (5.1% in 2016).

In 2011 the official unemployment rate in the Northern Cape was 27.4% with the official unemployment rate amongst the youth, aged between 15 and 34 years, coming in at 34.5%. In the 4th Quarter of 2020, the official unemployment rate in the province was 27%. 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, 2020b, p. 18).

In the 4th Quarter of 2020 the expanded unemployment rate of the Northern Cape stood at 40.0%; the labour absorption rate at 41.6% and the labour force participation rate at 56.9%. A summary of the labour market indicators illustrated on a comparative basis across South Africa is provided in **Figure 4**.



Source: (Statistics South Africa, 2020b, p. 10)

Figure 4: Labour market indicators 4th Quarter 2020

In respect of households, the 2011 Census indicated that there were 313 402 (353 713 in 2016) households in the Northern Cape. Of these households 38.5% were female-headed, 12.6% lived in informal dwellings, and 53% either owned or were paying off their dwelling.

Regarding household services in 2011, 60.1% of households in the Northern Cape had flush toilets connected to the sewerage system, 64.0% had their refuse removed weekly, 45.8% had piped water delivered inside the dwelling and 85.4% used electricity as a means of energy for lighting.

Concerning HIV prevalence among pregnant women attending public antenatal facilities in South Africa, the Western Cape had the lowest prevalence rate across South Africa at 15.9% in 2017 followed by the Northern Cape with a prevalence rate of 17.9%. KwaZulu-Natal, with a prevalence rate of 41.1% had the highest rate with the national HIV prevalence rate at around 30% in 2017. HIV prevalence rate among pregnant women attending public

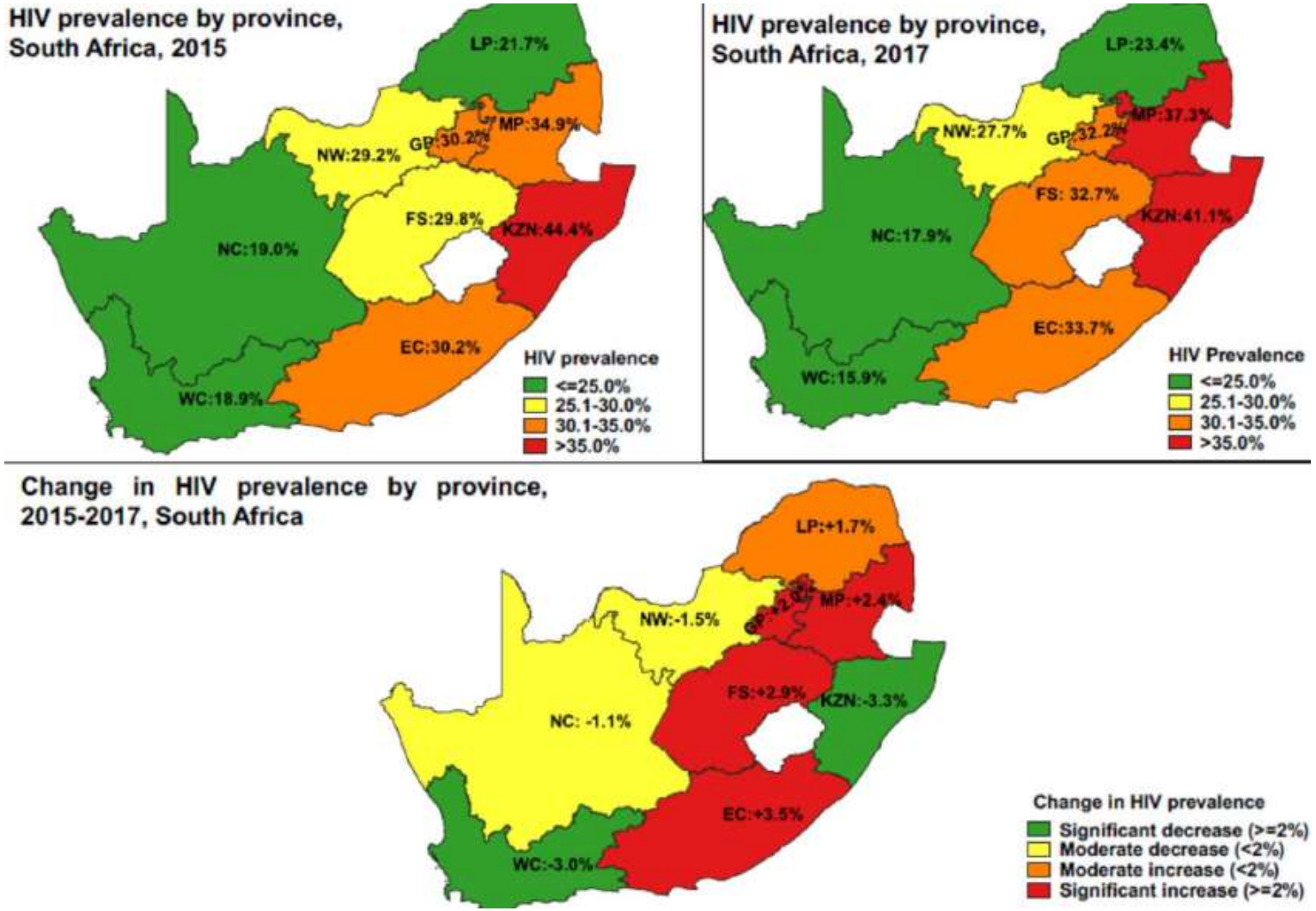
antenatal facilities in South Africa between 2015 and 2017 as it stood across all South African provinces is illustrated in **Figure 5**.

The 2017 National Antenatal Sentinel HIV Survey extended to the district level, which indicated that at the time the survey was undertaken the Frances Baard district had the highest HIV prevalence rate in the province at 22.3% and the Namakwa district the lowest at 8.5%. The incidence of HIV prevalence as it occurred between 2012 and 2017 across the Northern Cape is illustrated in **Table 1** (Woldesenbet, et al., 2019, p. 82).

Table 1: HIV prevalence by district in the Northern Cape Province; 2012 – 2017

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
F. Baard	23.0	18.5 – 28.2	18.2	14.7 – 22.3	19.5	14.5 – 25.6	24.3	20.6 – 28.3	22.3	18.0 – 27.2
J. T. Gaetsewe	14.8	10.4 – 20.5	23.2	17.0 – 30.8	18.5	12.5 – 26.4	21.9	15.1 – 30.7	18.7	15.3 – 22.8
Namakwa	1.5	0.2 – 10.2	2.3	0.5 – 9.1	3.6	1.2 – 10.5	2.9	0.7 – 11.8	8.5	4.2 – 16.5
Pixley ka Seme	18.4	12.7 – 25.9	15.1	9.4 – 23.4	13.6	9.1 – 19.7	15.8	10.0 – 23.9	16.7	12.6 – 21.8
Z. F. Mgcawu	14.3	9.8 – 20.4	20.1	14.3 – 27.5	14.8	9.8 – 21.8	14.5	9.2 – 22.2	16.1	12.1 – 21.1
Northern Cape	**17.8**	**15.3 – 20.7**	**17.5**	**15.0 – 20.4**	**16.1**	**13.5 – 19.2**	**19**	**16.3 – 22.0**	**17.9**	**16.0 – 20.1**

Source: (Woldesenbet, et al., 2019, p. 82)



Source (Woldesenbet, et al., 2019, p. 25):

Figure 5: HIV: SA 2015 – 2017 pregnant women attending public antenatal facilities

In the following section, a demographic description of the municipalities and small area affected by the project is given.

5.2 Municipal

Namakwa District Municipality (DC7): The district covers an area of 103 409.91 km^2 and incorporates the following four local municipalities:

- Hantam Local Municipality
- Kamiesberg Local Municipality
- Karoo Hoogland Local Municipality
- Khai-Ma Local Municipality
- Nama Khoi Local Municipality
- Richtersveld Local Municipality

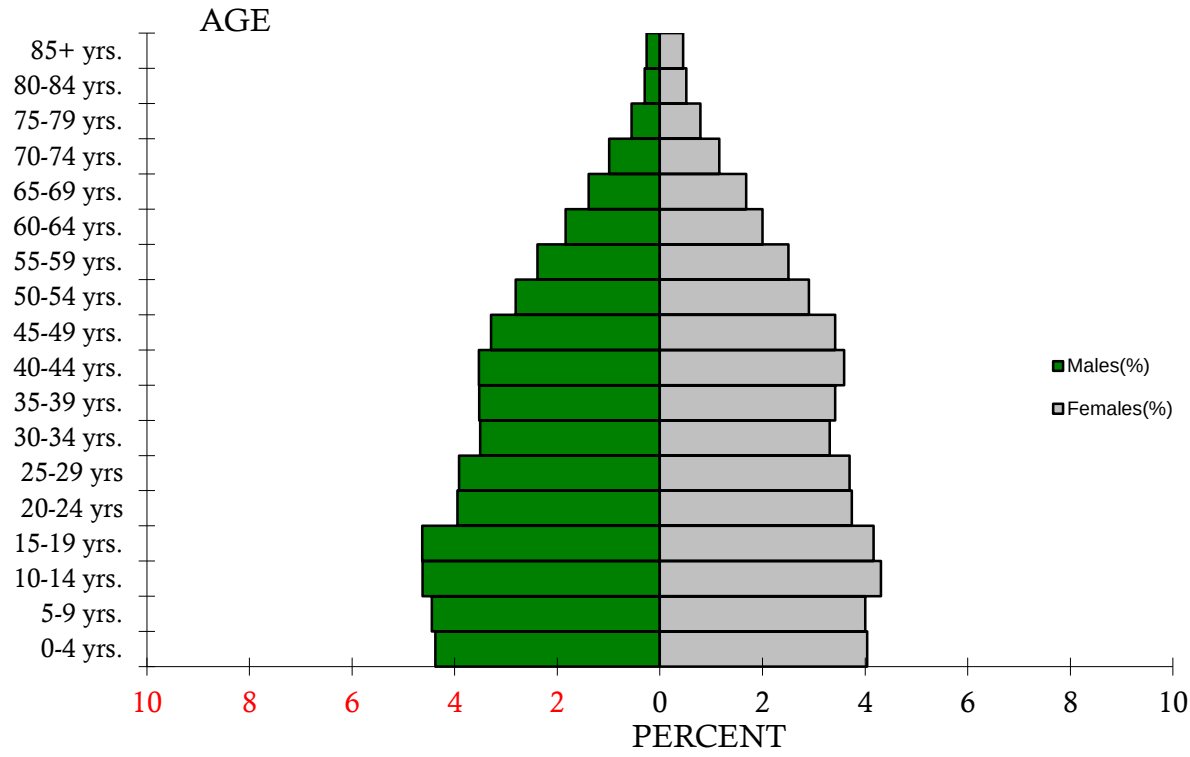
The following towns are also located within the Namakwa District Municipality:

Aggeneys	Alexander Bay	Brandvlei	Bulletrap,
Calvinia	Carolusberg	Concordia	Eksteensfontein
Frasersburg	Garies	Hondeklip Bay	Kamieskroon
Kleinzee	Koingnaas	Kuboes	Leliefontein/Kamiesberg
Loeriesfontein	Middelpos	Nababeep	Nieuwoudtville
O'Kiep	Onderste Doorns	Pella	Port Nolloth
Richtersveld	Sanddrift	Springbok	Steinkopf
Steinkopf	Sutherland	Williston	

The main economic sectors of the district include:

- Agriculture
- Tourism.

With a population of 115 842 people, the Namakwa DM has a population density of 0.91/km^2. According to Census 2011, the district has a sex ratio of 101.2 with 25.8% of the population being under 15 years; 66.1% being between 15 and 65 years and 8.1% being over 65 years of age. The population pyramid of the Namakwa District Municipality is illustrated in **Figure 6**.



Source: (Statistics South Africa, 2011)

Figure 6: Population pyramid Namakwa District

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

	Community Survey 2016	Census 2011
Population	**115 488**	**115 842**
Age Structure		
Population under 15	22.5%	25.8%
Population 15 to 64	68.0%	66.1%
Population over 65	9.5%	8.1%
Dependency Ratio		
Per 100 (15-64)	47.1	51.2
Sex Ratio		
Males per 100 females	101.5	101.2
Population Growth		
Per annum	-0.07%	n/a
Labour Market		

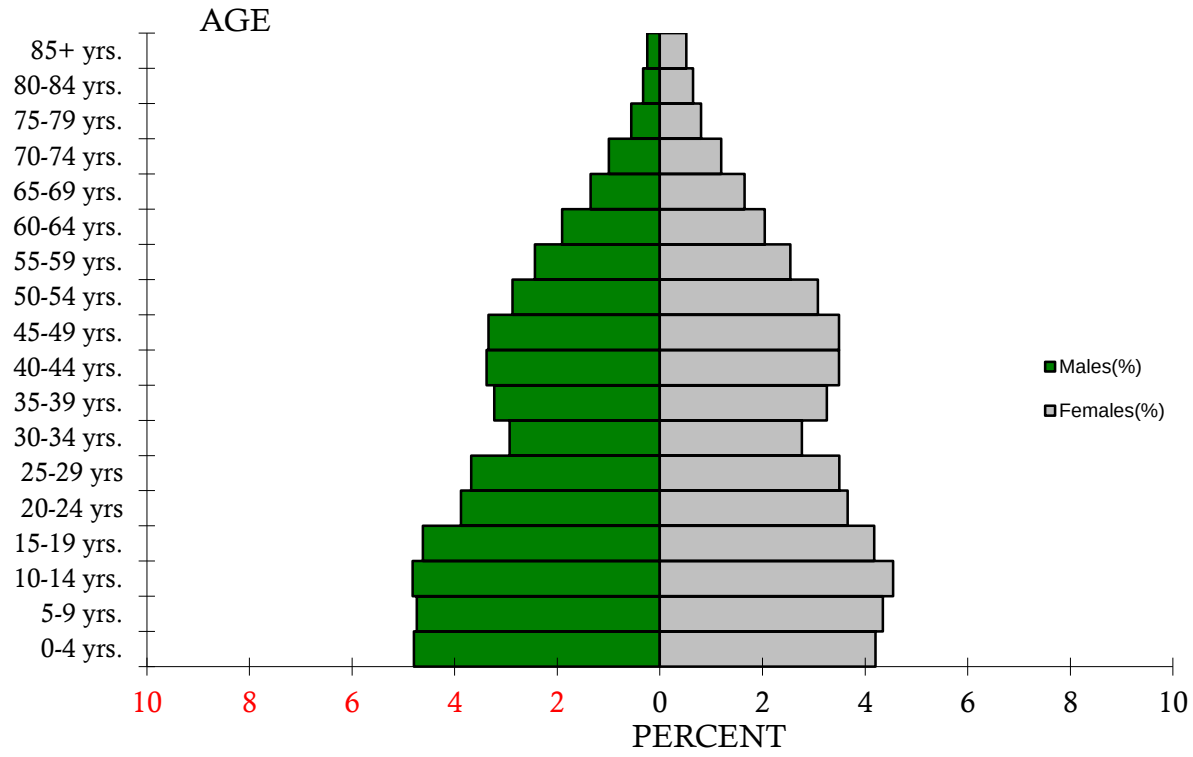
	Community Survey 2016	Census 2011
Unemployment rate (official)	n/a	20.1%
Youth unemployment rate (official) 15-34	n/a	25.4%
Education (aged 20 +)		
No schooling	4.4%	6.6%
Matric	24.2%	18.8%
Higher education	8.0%	7.4%
Household Dynamics		
Households	37 669	33 856
Average household size	3.1	3.2
Female-headed households	37.6%	36.6%
Formal dwellings	95.2%	93.8%
Housing owned	72.6%	60.1%
Household Services		
Flush toilet connected to sewerage	67.9%	57.9%
Weekly refuse removal	81.7%	80.1%
Piped water inside the dwelling	70.5%	63.3%
Electricity for lighting	88.4%	86.5

Hantam Local Municipality: Hantam covers a geographical area of 39 085 km^2 and incorporates the town of:

- Brandvlei
- Calvinia
- Loeriesfontein
- Middelpos
- Nieuwoudtville and
- Onderste Doorns.

Agriculture is the main economic driver in the municipality.

With a population of 21 684 people, the Hantam LM has a population density of 0.55/km^2. According to Census 2011, the municipal area has a sex ratio of 100.4 with 27.4% of the population being under 15 years; 64.3% being between 15 and 65 years and 8.3% being over 65 years of age. The population pyramid of the Hantam Local Municipality is illustrated in **Figure 7**.



Source: (Statistics South Africa, 2011)

Figure 7: Population pyramid Hantam Local Municipality

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

	Community Survey 2016	**Census 2011**
Population	21 540	21 684
Age Structure		
Population under 15	24.2%	27.4%
Population 15 to 64	66.9%	64.3%
Population over 65	8.9%	8.3%
Dependency Ratio		
Per 100 (15-64)	49.6	55.5
Sex Ratio		
Males per 100 females	101.9	100.4
Population Growth		
Per annum	-0.15%	n/a
Labour Market		

	Community Survey 2016	Census 2011
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
Education (aged 20 +)		
No schooling	9.9%	13.9%
Matric	24.7%	18.2%
Higher education	8.0%	7.7%
Household Dynamics		
Households	6 894	6 392
Average household size	3.1	3.2
Female-headed households	34.1%	33.4%
Formal dwellings	94.8%	96.9%
Housing owned	67.6%	53.8%
Household Services		
Flush toilet connected to sewerage	78.3%	53.4%
Weekly refuse removal	76.2%	72.0%
Piped water inside the dwelling	65.7%	59.8%
Electricity for lighting	80.9%	76.3%

5.3 Project footprint

At a more project-specific footprint level, the project is located within the Hantam Non-Urban (NU) area, Main Place 366002 (Census, 2011). The area is sparsely populated, having a population density of 0.12 people per square kilometre. The demographic data in respect of this area is as follows:

Total population	4,175
Young (0-14)	21,3%
Working Age (15-64)	70,9%
Elderly (65+)	7,9%
Dependency ratio	41,1
Sex ratio	124,8
Population density	0.12 persons/km^2

No schooling aged 20+	19,1%
Higher education aged 20+	9,4%
Matric aged 20+	13,2%
Number of households	1,721
Average household size	2,3
Female-headed households	10,9%
Formal dwellings	96,5%
Housing owned/paying off	26,1%
Flush toilet connected to sewerage	27,8%
Weekly refuse removal	6,2%
Piped water inside the dwelling	44,5%
Electricity for lighting	32,2%

6 IDENTIFICATION OF IMPACTS

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

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

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

6.1 Health and Social Wellbeing

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

- Annoyance, air quality and noise
- Electromagnetic Fields (EMFs)
- Increase in crime

- Increased risk of HIV infections
- An influx of construction workers
- Hazard exposure.

These impacts are addressed separately below.

6.1.1 Annoyance, air quality and noise

Annoyance, dust and noise will be more evident during the construction phase of the project, as construction activities will result in the generation of dust and noise from construction vehicles and equipment. Because of the scale and duration of the project, it is unlikely that this impact will be significant.

It is most unlikely that there will be any significant impact associated with annoyance, dust and noise over the operational phase of the project as this will be associated with maintenance and repair activities, which will be sporadic and limited.

6.1.2 Electromagnetic fields

There has been increasing public concern regarding the health effects that the exposure to electromagnetic fields can cause. Symptoms reported by the public range from the less severe, such as headaches; fatigue; nausea; loss of libido and anxiety, to the more severe depression; suicide; Alzheimer's and childhood cancers amongst others. Despite these perceptions, the World Health Organisation (WHO) concludes that:

> "*To date, scientific evidence does not support a link between these symptoms and exposure to electromagnetic fields. At least some of these health problems may be caused by noise or other factors in the environment, or by anxiety related to the presence of new technologies*" (Electromagnetic fields (EMF), 2020).

Notwithstanding this, with regard to the impact that EMFs are likely to have in respect of this project, the more relevant issue is the perceptions that people hold regarding the general health effects of EMFs. In this regard, it is quite clear that many people perceive EMFs to be hazardous to health (Fernandez, Ng, & Kaur, 2019; Zeleke, et al., 2019; Gallastegi, et al., 2019). Consequently, given the choice, people will tend to avoid exposure to EMFs rather than take the risk and are quite likely to avoid facilities that have powerlines, transformers and cellular phone towers within proximity. Apart from the potential health hazards associated with EMFs, perceptions regarding EMFs are likely to have a negative impact on the sense of place of the area. In this regard, the impact of EMFs associated with the project can only be considered at a

superficial level. Any in-depth understanding in this regard falls within the disciplines of medicine and physics. For further details regarding health risks associated with EMFs, including a comprehensive list of references, see the following source.[2]

6.1.3 Increase in crime

Between 1st January and 04th December 2020, 103 crimes were reported to the Loeriesfontein Police Precedent[3] indicating a low level of criminal activity in the area. Considering the potential for criminal activities associated with the project, it is often opportunistic crime such as, stock theft; the abuse of alcohol and relationship-related crime that is associated with construction activities.

Although the construction phase of the project is likely to carry a higher risk of associated criminal activities than the operational phase, due to the nature of the project and limited workforce, the magnitude of these risks is likely to be limited during construction and negligible over the operational phase.

6.1.4 Increased risk of HIV infections

Considering the project's location being within the Namaqua district, which in 2017 had the lowest HIV prevalence rates in the Northern Cape at 8.5%, it is likely that an in-migration of workers associated with the construction phase of the project is likely to increase the risk of the spread of HIV in the area. This is due to the fact that sexually transmitted diseases tend to be spread by construction and transport workers (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); and must be considered against the background of the high prevalence of HIV across the rest of South Africa.

Although this risk is likely to be at its highest level during the construction phase of the project, as the construction workforce increases and materials and equipment are delivered to the site; because of the limited nature of the project and small workforce, it is most likely to be limited. Over the operational phase of the project, the risk of this impact is likely to be extremely low.

6.1.5 An influx of construction workers

It is estimated that over the construction period, which will stretch over ~8 to 24 month, the peak construction workforce will reach approximately 50 workers; of these, the majority are likely to be

[2] National Cancer Institute at the National Institutes of Health https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet#what-do-expert-organizations-conclude-about-the-cancer-risk-from-emfs

[3]According to Crime Stats SA as at 04 December 2020 https://www.crimestatssa.com/index.php

recruited locally. Consequently, the size of the workforce and relatively short duration of the construction phase are likely to result in this impact remaining low during construction with little to no effect associated with the operational phase.

6.1.6 Hazard exposure

The use of heavy equipment and vehicles and an increase in vehicle traffic within the vicinity of the construction site 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. However, due to the low population numbers within the vicinity of the proposed development and the limited nature and duration of construction, this risk is likely to be low; with the appropriate mitigation measure reducing this impact to very low. There is, however, an increased risk of fires brought about through construction workers lighting fires for cooking and warmth during cold periods. Successful implementation of the recommended mitigation measures will result in this risk remaining at acceptable levels.

6.2 Quality of the Living Environment

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

- Disruption of daily living patterns
- Transformation of the sense of place.

6.2.1 Disruption of daily living patterns

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

6.2.2 Transformation of the sense of place

The overhead powerlines are visible and will result in a transformation of the landscape from that of a rural setting to what some may consider having more of an industrial aura. This issue remains controversial, as a sense of place is personal and subjective and is therefore difficult to assess. In this regard, the visual specialist points out that:

> "*Adverse impacts often arise where a new development is seen as an intrusion which alters the visual character of the area and affects the 'sense of place'. The degree of visual impact experienced will however vary from one receptor to*

another, as it is largely based on the viewer's perception" (SiVest SA (Pty) Ltd, 2020, p. 45).

From a social perspective, visual characteristics are one aspect of a sense of place, which is influenced by an array of sensory stimuli including sight, sound, smell and touch amongst others that generate emotions of attachment (Kastenholza, Marques, & Carneiro, 2020).

6.3 Economic

The economic impacts related to the project include.

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

6.3.1 Job creation and skills development

Over the construction phase, the project will lead to the creation of both direct and indirect jobs. The impact of this, in respect of both job creation and skills development, will be limited as only 33 temporary jobs will be created during construction.

6.3.2 Socio-economic stimulation

Apart from job creation and procurement spend; the project will also have broader positive socio-economic impacts. In this sense, the greatest benefit attached to the project is that it will provide the infrastructure required to link the authorised 100 MW Loeriesfontein 3 PV SEF to the authorised 140 MW Dwarsrug WEF in order to create a hybrid energy facility. The hybrid energy facility will ensure that electricity is constantly supplied to the National Grid by at least one or both technologies at any given time. Separate BA processes to add battery energy storage systems to both renewable energy facilities (Loeriesfontein 3 BESS DEFF Reference number: 14/12/16/3/3/1/2263 and Dwarsrug BESS DEFF Reference number: 14/12/16/3/3/1/2262) are currently underway. The BESS will contribute to the hybrid renewable energy facility by storing and providing electricity for the National Grid. This will have significant economic benefit associated with the security of electricity supply across the country over the operational phase of the project.

6.4 Cultural Impacts

At a social level, it is likely that any cultural impacts would be associated with sensitive archaeological and/or heritage sites that may be found. In this regard, palaeontological and heritage impact assessments were undertaken, and it was found that:

Heritage:

"*The current study has confirmed that the impact of the OHL will be low. This finding and with the implementation of a chance finds procedure as part of the EMPr will mitigate possible impacts on unidentified heritage resources*" (PGS Heritage Pty Ltd, 2020, p. 22).

Palaeontological:

"The significance of the impact occurring will be medium before mitigation and Low after mitigation.

The overall impact of the proposed construction of a 132 kV powerline between the approved substation at the authorised 100MW Loeriesfontein 3 Photovoltaic Solar Energy Facility and the approved substation at the authorised 140MW Dwarsrug Wind Energy Facility, located near Loeriesfontein on the paleontological resources, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorized" (Banzai Environmental (Pty) Ltd, 2020, p. 22).

7 OVERALL IMPACT RATING

The impacts are assessed below as they apply to the following project phases:

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

Where appropriate optimisation and mitigation measures are also suggested.

7.1 Planning / Pre-construction

The need for Eskom to purchase a specified amount of electricity from independent power producers has recently been gazetted (Government Gazette No. 43734 Notice No. 1015 Department of Mineral Resources and Energy, 2020). In addition, a review of applicable policy and legislation shows support on an international; national; regional and local government level for the provision of renewable energy into the National Grid. Towards this end, the project is a necessary component required in connecting the approved substation at the authorised 100 MW Loeriesfontein 3 PV SEF (12/12/20/2321/2/AM4) and approved substation at the authorised 140 MW Dwarsrug WEF (14/12/16/3/3/2/690/AM4) and the Dwarsrug WEF and the proposed (and authorised) Narosies Substation (12/12/20/2049/3). This will create a hybrid energy facility to ensure a more constant supply of electricity into the National Grid and as such will fit the relevant national planning criteria.

A sensitivity verification, undertaken on 28 October 2020, did not identify any socially linked restrictions, exclusions or prohibitions that apply to the proposed development site or any socially sensitive features on the site. It is therefore unlikely that any negative social impacts will be associated with the planning/pre-construction phase of the project.

7.2 Construction Phase

Most of the impacts discussed above apply over the short-term to the construction phase of the project and include:

- Health and social wellbeing impact;
  - Annoyance, air quality and noise
  - Increase in crime
  - Increased risk of HIV infections
  - An influx of construction workers
  - Hazard exposure.
- Quality of the living environment;
  - Disruption of daily living patterns.
- Economic
  - Job creation and skills development
  - Socio-economic stimulation.

These impacts are assessed and presented, together with mitigation and optimisation measures, in **Table 2** below.

7.3 Operational Phase

The social impacts that apply to the operational phase of the project are:

- Health and wellbeing;
  - Electromagnetic fields.
- Quality of the living environment;
  - Transformation of the sense of place. and
- Economic;
  - Socio-economic stimulation.

These impacts are assessed and presented, together with mitigation and optimisation measures, in **Table 1Table 2**.

Table 2: Construction impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction																				
Health & social wellbeing	Air quality	1	3	1	1	1	1	7	-	Low	Ensure that dust suppression measures, such as damping down of unsealed roads where necessary are applied.	1	3	1	1	1	1	7	-	Low
	Noise	1	1	1	1	1	1	5	-	Low	Ensure that no construction activity occurs near residences between 18:30 and 06:30 during the week and between 08:30 and 16:30 over weekends.	1	1	1	1	1	1	5	-	Low
	Increase in crime	1	2	3	2	1	2	18	-	Low	Ensure that construction workers are identifiable. All workers should carry identification cards and wear identifiable clothing. Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum. Prevent loitering within the vicinity of the construction camp and construction sites.	1	2	3	2	1	2	18	-	Low
	Increased risk of HIV infections	3	2	3	3	3	3	42	-	Medium	Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms. Expose workers to a health and HIV/AIDS awareness educational program.	3	2	3	3	3	3	42	-	Medium
	Influx of construction workers	1	4	1	1	1	1	8	-	Low	Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors. Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.	1	4	1	1	1	1	8	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction																				
	Hazard exposure	2	2	2	2	1	2	18	-	Low	Ensure all construction equipment and vehicles are properly maintained at all times. Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population, such as children and the elderly. Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to. Make staff aware of the dangers of fire during regular toolbox talks.	2	2	2	2	1	2	18	-	Low
Quality of the living environment	Disruption of daily living patterns	2	2	1	2	1	1	8	-	Low	Ensure that, at all times, people have access to their properties and social facilities.	2	2	1	2	1	1	8	-	Low
Economic	Job creation and skills development	2	4	2	2	1	1	11	+	Low	Wherever feasible, local residents should be recruited to fill semi and unskilled jobs. Women should be given equal employment opportunities and encouraged to apply for positions. A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills which they can use to secure jobs elsewhere post-construction.	2	4	2	2	1	1	11	+	Low
	Socio-economic stimulation	3	4	2	3	1	1	13	+	Low	A procurement policy promoting the use of local business should, where possible, be put in place to be applied throughout the construction phase.	3	4	2	3	1	1	13	+	Low

Table 3: Operational and 'no go' impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR)	S
Operational Phase																				
Health & wellbeing	Electromagnetic fields	1	3	1	3	3	2	22	-	Low	Ensure that were ever possible the powerline is routed away from areas of high human and animal habitat. Establish a grievance mechanism and deal with grievances transparently.	1	2	1	3	3	2	20	-	Low
Quality of the living environment	Transformation of the sense of place	3	4	3	3	3	2	32	-	Medium	Apply the mitigation measures suggested in the Visual Impact Assessment Report. A Grievance Mechanism should be initiated and all grievances should be dealt with transparently. The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.	3	4	3	3	3	2	32	-	Medium
Economic	Socio-economic stimulation	4	4	2	3	3	2	32	+	Medium	The powerline will revert to Eskom and become an Eskom asset over the operational phase. Consequently, optimisation measures as they apply in respect to similar Eskom assets would also apply in this in this case.	4	4	2	3	3	2	32	+	Medium
'No-go' Impact																				
'No-go'	Project will not proceed	4	4	3	3	3	3	51	-	High	The only mitigation measure would be to proceed with the project and that would result in the elimination of this impact.									

7.4 Decommissioning

Considering the time to decommissioning, the uncertainty of what would exactly occur over this period and the significance of the impact in isolation; it would be rather meaningless to attach assessment criteria to decommissioning at this point. Apart from this, once the project is commissioned it will be ceded to Eskom becoming an Eskom asset over the operational phase.

7.5 'No-go' Impact

The 'no-go' option would mean that the social environment would not be affected, as the status quo would remain intact. The impact of this is that the opportunity to connect the proposed Oya Energy Facility as well as the potential of connecting other nearby developments to the National Grid will be lost. This will have a negative social impact, as it will compromise national efforts in ensuring the security of energy supply. In addition, national efforts to reduce CO_2 emissions through increasing renewable energy capacity would also be compromised without the means of connecting these renewable energy facilities in the area to the National Grid. The 'no-go' alternative is assessed in **Table 3**.

7.6 Cumulative Impacts

The projects and associated powerlines and substations that are within a 35 km radius of the project site are listed below in **Table 4** and illustrated in **Figure 8**.

Table 4: Renewable energy developments within a 35 km radius of the site

Applicant	Project	Technology	Capacity	Status of Application / Development
South African Mainstream Renewable Power (Pty) Ltd	!Xha Boom WEF	Wind	235 MW	Approved
	Hartebeestleegte	Wind		
South African Mainstream Renewable Power (Pty) Ltd	Ithemba	Wind	235 MW	Approved
South African Mainstream Renewable Power (Pty) Ltd	Graskoppies	Wind	235 MW	Approved
	Kokerboom 1			
	Kokerboom 2	Wind		
	Kokerboom 3	Wind		
SA Orlight (Pty) Ltd	Orlight	Solar	70 MW	Approved
	Khobab	Wind	138 MW	Approved
	Loeriesfontein 2	Wind		
South African Mainstream Renewable Power (Pty) Ltd	Loeriesfontein 3	Solar	100 MW	Approved
South African Mainstream Renewable Power (Pty) Ltd	Dwarsrug	Wind	140 MW	Approved

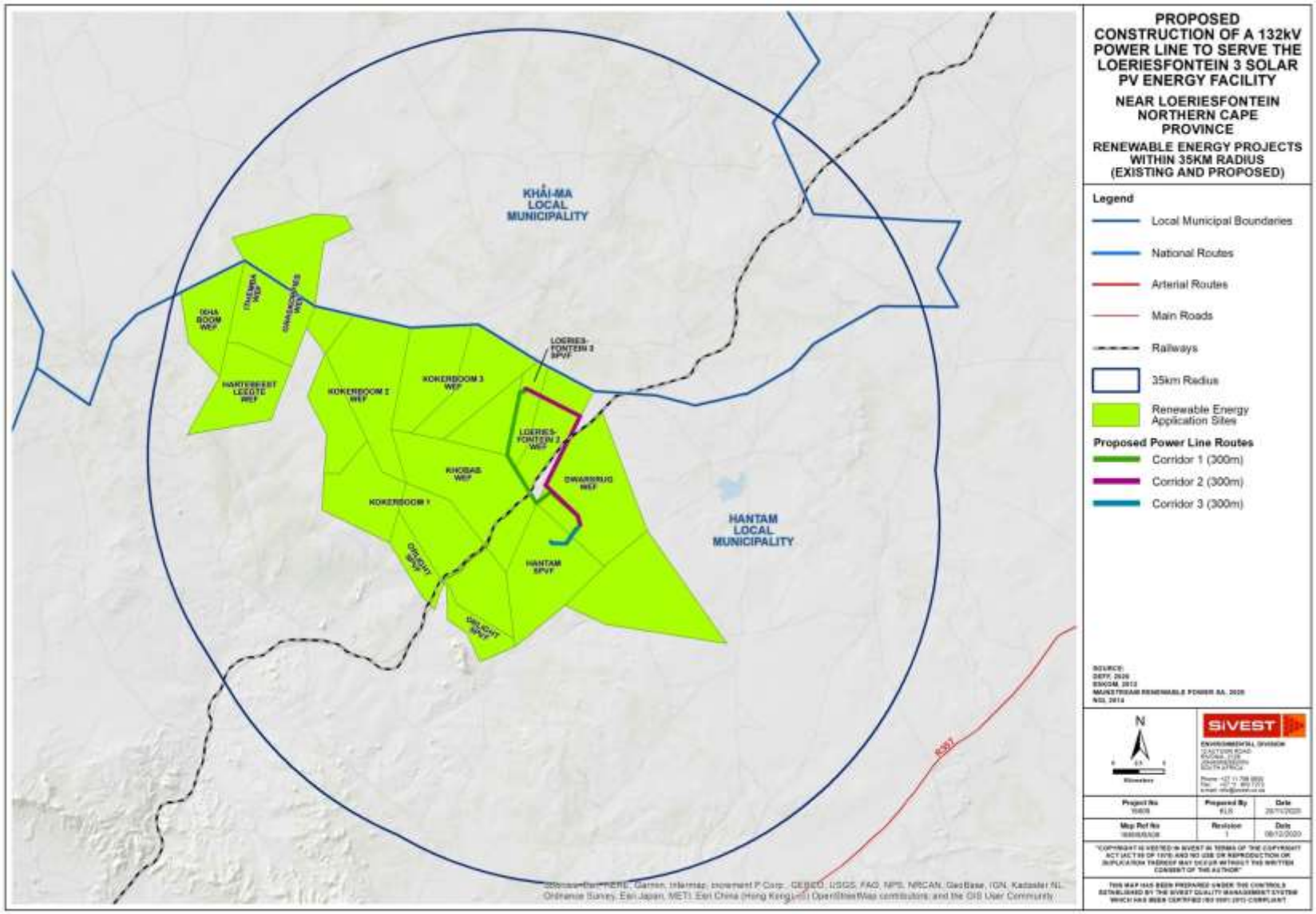


Figure 8: Renewable energy developments within a 35 km radius of the site

The following social issues were raised in the specialist reports pertaining to some renewable energy initiatives (including associated grid connections) 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 and 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 and 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
  - Overall social impact.

The details of the reports from which these impacts have been sourced are provided in **Table 5**.

Table 5: List of some SIA reports for projects within a 35 km radius

Date	Title of report	Consultant responsible for the report
May 2012	MRP Wind Farms: Loeriesfontein Site – Socio-Economic Impact Assessment	MasterQ Research (pty) Ltd
May 2015	Dwarsrug Socio-Economic Impact Assessment	Urban-Econ Development Economists
November 2016	Itemba Socio-Economic Impact Assessment	Urban-Econ Development Economists
April 2017	Social Impact Assessment for Kokerboom 1 Wind Energy Facility	Tony Barbour Environmental Consulting and Research
April 2017	Social Impact Assessment for Kokerboom 2 Wind Energy Facility	Tony Barbour Environmental Consulting and Research
April 2017	Social Impact Assessment for Kokerboom 3 Wind Energy Facility	Tony Barbour Environmental Consulting and Research
September 2019	Mainstream Renewable Power (Pty) Ltd, South Africa: Amendments to Graskoppies, Hartebeest Leegte, Ithemba and !Xha Boom wind farms	Urban-Econ Development Economists

In response to the various developments within the Karoo, there has been a counter-reaction amongst some communities opposed to this relatively sudden change to what was previously an isolated, tranquil and pristine environment. In this vein, the Heritage Association of South Africa published an undated appeal to the Department of Environment Forestry and Fisheries to consider the need for a cumulative impact assessment with regard to the cumulative effect of mining and energy developments within the area[4]. Another article cited in the Karoo News Group appeal is a criticism of the cumulative effects of the renewable energy sector, highlighting environmental questions regarding wind farms[5]. Apart from the general reaction towards the cumulative effects of renewable energy projects the following more specific social issues need to be considered, these relate to the effects on:

- Risk of HIV
- Sense of place
- Service supplies and infrastructure and
- The economy.

7.6.1 Risk of HIV infections[6]

With respective HIV prevalence rates among pregnant women attending public antenatal facilities in South Africa of 15.9 and 17.9 percent, both the Western and Northern Cape provinces have the

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

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

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

lowest HIV prevalence rates across the country. At a district level, the Namaqua district had the lowest HIV prevalence rate in the Northern Cape, which in 2017 was 8.5%. These figures are significantly low compared to other areas of the country, which range from a rate of 23.4% in Limpopo and 41.1% in KwaZulu-Natal with the uMgungundlovu District Municipality having an HIV prevalence rate of 46.6% in 2017 (Woldesenbet, et al., 2019, p. 69). The provinces sharing common borders with the Northern Cape Provinces all have relatively high HIV prevalence rates as indicated below;

- North West = 27.7%
- Free State = 32.7%;
- Eastern Cape = 33.7%.

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

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

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

7.6.2 Sense of place

There is also a concern amongst various interest groups that the proliferation of renewable energy facilities (including associated grid connection), particularly when considered in association with

other industrial activities such as mining, will have a significant and negative cumulative social impact on the area[7]. In this regard, issues such as the noise from blades; aesthetic associated with highly visible wind farms, solar parks and mines; the loss of bird and bat life and its effect on tourism; as well as the disruption of social networks have all been cited amongst these concerns. For more project-specific cumulative impacts see the Visual Impact Assessment Report.

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

7.6.3 Services, supplies and infrastructure

With the proliferation of renewable energy facilities in the area, it is quite likely that the local authorities, currently hard-pressed to deliver services, will find it difficult to keep up with this development. The influx of construction workers is likely to place pressure on accommodation and the need for both services and supplies in the vicinity. On this basis, market demands could inflate costs that may have a negative effect on local communities, particularly the poor, who may be forced to pay higher prices for essential supplies resulting in an escalation of the cost of living in the area. Social services such as medical and educational facilities could also be placed under pressure because of increased demand. Although this may reach its peak during the construction phase, the fact that the construction of the various projects will be spread across different timelines should mitigate it somewhat, with some projects commencing while others reach completion. Where numerous projects are entering the construction phase simultaneously, the

[7] Amongst others see for instance:
1. Heritage South Africa's Karoo News Group http://heritagesa.org/wp/2222-2/
2. Alternative sources of energy for South Africa in various shades of green (Smit, 2011)
3. Social media sites such as the Facebook Karoo Energy Debate https://www.facebook.com/TheKarooEnergyDebate/
4. Why the Karoo. (Research Chair in the Sociology of Land, Environment and Sustainable Development. Department of Sociology and Social Anthropology, Stellenbosch University, 2016).

project companies should engage to align efforts. Employing local people across the various projects and project phases may also assist in reducing the stress placed on services, supplies and infrastructure in the area.

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

7.6.4 Economic

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

From a positive perspective, the proliferation of renewable energy facilities within the region is likely to result in significant and positive cumulative impacts in the area in terms of both direct and indirect job creation, skills development, training opportunities, and the creation of business opportunities for local businesses. In this regard it is indicated in the IPPPP Quarterly Report, as at 31 March 2018, that in respect of South Africa as a whole and through the Independent Power Producers Procurement Programme, " ..*the REIPPPP is targeting broader economic and socio-economic developmental benefits*" and that "[t]*o date, a total of 48 334 job years have been created for South African citizens, of which 39 312 were in construction and 9 021 in operations*" (Independent Power Producer Office, 2020a, p. 37 & 41). In addition to this "[t]*he combined (construction and operations) procurement value is projected as R149.9 billion, of which R75.8 billion has been spent to date. For construction, of the R65.7 billion already spent to date, R51.4 billion is from the 64 projects which have already been completed. These 64 projects had planned to spend R50.4 billion. The actual procurement construction costs have therefore exceeded the planned costs by 2% for completed projects*" The district and local municipalities within the area have identified renewable energy as a strategic economic opportunity in a region that previously had few such opportunities. This is indicated in the various IDPs and LEDs pertaining to the affected municipalities.

7.6.5 Assessment of cumulative impacts

The cumulative impacts discussed above are assessed in **Table 6**. It must, however, be noted that this assessment is at a superficial level as any in-depth investigation of the cumulative effects of the various developments being planned for the region are beyond the scope of this study as they would require a broad-based investigation on a far larger scale. The assessment of the cumulative impacts takes into consideration the impacts associated with all renewable energy facilities and associated grid connection infrastructure in the area and on this basis; no fatal flaws associated with the cumulative impacts are evident at a social level. It is also important to note that it is not within the capacity of individual developers to address these impacts as they fall within the scope of control of the appropriate authorities.

All impacts as assessed across all project phases above are summarised and a pre and post-mitigation comparison is presented below in **Table 7**.

Table 6: Rating of cumulative impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ O	S
Health	Risk of HIV	4	4	4	3	4	3	57	-	High	Mitigation can only be implemented at a regional level and will need to be driven on a provincial and municipal basis. In this sense, the following mitigation measures would need to be considered. Ensure that all companies coming into the area have, and are implementing an effective HIV/AIDS policy. Introduce HIV/ADS awareness programs to schools and youth institutions. Carefully monitor and report on the HIV status of citizens in the region. Be proactive in dealing with an increase in the HIV prevalence rate in the area.	4	4	3	3	4	3	54	-	High
Quality of the living environment	Sense of place	3	4	4	3	4	3	54	-	High	Mitigation can only be implemented at a regional level and will need to be driven on a provincial and municipal basis. In this sense, the following mitigation measures would need to be considered. Consider undertaking a cumulative impact assessment to evaluate the changes taking place across the area on a broader scale. Form a regional workgroup tasked with addressing the effect of changes to the sense of place of the region. Establish grievance mechanisms to deal with complaints associated with changes to the area. Enlighten the public about the need and benefits of renewable energy.	3	4	4	3	4	3	54	-	High

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ O	S
Quality of the living environment	Service supplies and infrastructure	2	4	2	3	2	2	26	-	Medium	Mitigation can only be implemented at a regional level and will need to be driven on a provincial and municipal basis. In this sense, the following mitigation measures would need to be considered. Engage with the municipal authorities to ensure that they are aware of the expansion planned for the area and the possible consequences of this expansion Ensure that local labour is recruited in respect of these developments in the area.	2	4	2	2	2	2	24	-	Medium
Economic	Positive economic impacts	4	4	3	3	3	4	68	+	Very High	Mitigation can only be implemented at a regional level and will need to be driven on a provincial and municipal basis. In this sense, the following mitigation measures would need to be considered. Implement a training and skills development programme amongst the local community. Ensure that the procurement policy supports local enterprises. Establish a social responsibility programme. Work closely with the appropriate municipal structures regarding establishing a social responsibility programme. Ensure that any trusts or funds are strictly managed in respect of outcomes and funds allocated.	4	4	3	3	3	4	68	+	Very High

Table 7: Impact summary

Construction Phase			
Environmental parameter	**Issues**	**Rating prior to mitigation**	**Rating post-mitigation**
Health & social wellbeing	Air quality	-7	-7
	Noise	-5	-5
	Increase in crime	-18	-18
	Increased risk of HIV infections	-42	-42
	An influx of construction workers	-8	-8
	Hazard exposure.	-18	-18
Quality of the living environment	Disruption of daily living patterns	-8	-8
Economic	Job creation and skills development	+11	+11
	Socio-economic stimulation	+13	+13
Operational Phase			
Health & Wellbeing	Electromagnetic fields	-22	-20
Quality of the living environment	Transformation of the sense of place	-32	-32
	Socio-economic stimulation	+32	+32
Decommissioning Phase			
Considering a time period of 20 years prior to decommissioning and the dynamics of social variables, it would be rather meaningless to attach assessment criteria to decommissioning at this point due to the high level of uncertainty such assessment would be based upon.			
No Project Alternative			
No project		-51	No mitigation measures
Cumulative Impacts			
Health & social wellbeing	Risk of HIV	-57	-54
Quality of the living environment	Sense of place	-54	-54
	Services, supplies & infrastructure	-26	-24
Economic	Economic	+68	+68

8 MEASURES TO BE INCLUDED IN EMPr

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

Pre-Construction / Design Phase:

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

Construction Phase:

- **Air quality**
  - Ensure that dust suppression measures, such as damping down of unsealed roads where necessary, are applied.
- **Noise**
  - Ensure that no construction activity occurs near residences between 18:30 and 06:30 during the week and between 08:30 and 16:30 over weekends.
- **Increase in crime**
  - Ensure that construction workers are identifiable. All workers should carry identification cards and wear identifiable clothing.
  - Encourage local people to report any suspicious activity associated with the construction sites through the establishment of a community liaison forum.
  - Prevent loitering within the vicinity of the construction camp and construction sites.
- **Increased risk of HIV infections**
  - Ensure that an onsite HIV Infections Policy is in place and that construction workers have easy access to condoms.
  - Expose workers to a health and HIV/AIDS awareness educational program.
- **An influx of construction workers**
  - Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors.
  - Draw up a recruitment policy in consultation with the Community Leaders and Ward Councillors of the area and ensure compliance with this policy.
- **Hazard exposure**
  - Ensure all construction equipment and vehicles are properly maintained at all times.
  - Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place

specific emphasis on the vulnerable sector of the population, such as children and the elderly.

- Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to.
- Make staff aware of the dangers of fire during regular toolbox talks.

- **Disruption of daily living patterns**
  - Ensure that, at all times, people have access to their properties as well as to social facilities.
- **Job creation and skills development**
  - Wherever feasible, local residents should be recruited to fill semi and unskilled jobs.
  - Women should be given equal employment opportunities and encouraged to apply for positions.
  - A skills transfer plan should be established at an early stage and workers should be given the opportunity to develop skills, which they can use to secure jobs elsewhere post-construction.
- **Positive economic impacts**
  - A procurement policy promoting the use of local business should, where possible, be installed and applied throughout the construction phase.

Operational Phase:

- **Electromagnetic fields**
  - Ensure that were ever possible the powerline is routed away from human and animal habitat.
  - A Grievance Mechanism should be established and all grievances should be dealt with transparently.
- **Transformation of the sense of place**
  - Apply the mitigation measures suggested in the Visual Impact Assessment Report.
  - A Grievance Mechanism should be initiated and all grievances should be dealt with transparently.
  - The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.
- **Socio-economic stimulation**

- The powerline will revert to Eskom and become an Eskom asset over the operational phase. Consequently, optimisation measures as they apply in respect to similar Eskom assets would also apply in this in this case.

Decommissioning Phase:

The time lag between constructing and decommissioning the project is extensive and, as the social environment is highly dynamic, it is meaningless to attach measurements. In addition, once the project is commissioned it becomes an Eskom asset, which could extend the life of the powerline.

Cumulative Impacts:

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

Construction Phase Monitoring:

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

Operation Phase Monitoring:

The project will become an Eskom asset after commissioning and would fall under the control of Eskom. Consequently, it must be subjected to the same monitoring protocol applied to all similar Eskom assists.

9 ASSESSMENT OF POWERLINE CORRIDORS

Two grid alignment alternatives are proposed to link the authorised Loeriesfontein 3 PV SEF to the authorised Dwarsrug WEF:

- **Alternative 1:** Colour-coded green and runs parallel to the Granaatboskolk Road within the existing authorised powerline servitude to the west of the Loeriesfontein Wind Farm.
- **Alternative 2:** Colour-coded shaded pink and looping around the east of the Loeriesfontein Wind Farm.

These alternatives are illustrated in **Figure 2**.

In addition to these alternatives, a 300 m wide powerline corridor, also illustrated in **Figure 2** and colour coded shaded mauve, is required to connect the Dwarsrug WEF and the Loeriesfntein 3 PV SEF to the National Grid. This corridor runs between the Dwarsrug and Narosies substations and is the only available alternative.

Considered purely on a social basis, no clear route alternatives emerge in respect of these alternatives. Taking into account the results of other specialist studies that may have secondary social consequences, such as the archaeological; heritage; palaeontological and visual, no least preferred route emerges. Consequently, no social preference has emerged in respect of these 2 route alternatives as indicated in **Table 8**.

Table 8: 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)
POWERLINE CORRIDOR ROUTE ALTERNATIVES		
Power Line Corridor **Alternative 1** (Loeriesfontein 3 PV SEF to Dwarsrug WEF)	No Preference	Considering both the social and other specialist studies, no clear route alternatives emerge in respect of these routes.
Power Line Corridor **Alternative 2** (Loeriesfontein 3 PV SEF to Dwarsrug WEF)	No Preference	

Regarding powerline corridor three, connect the Dwarsrug WEF and the Loeriesfntein 3 PV SEF to the National Grid, there are no obvious fatal flaws. Consequently, this corridor is acceptable from a social perspective.

10 SUMMARY AND CONCLUSION

The objective of the proposed development is to link the authorised 100 MW Loeriesfontein 3 PV SEF to the authorised 140 MW Dwarsrug WEF in order to create a hybrid energy facility and to connect these facilities to the National Grid at the proposed (and authorised) Narosies Substation (12/12/20/2049/3). The hybrid energy facility will ensure that electricity is constantly supplied to the National Grid by at least one or both technologies (namely solar PV and wind) at any given time. Separate BA processes to add battery energy storage systems (BESS) to both renewable energy facilities (Loeriesfontein 3 BESS DEFF Reference number: 14/12/16/3/3/1/2263 and Dwarsrug BESS DEFF Reference number: 14/12/16/3/3/1/2262) are currently underway. The BESS will contribute to the hybrid renewable energy facility by storing and providing electricity for the National Grid via the Narosies Substation.

Once commissioned, the powerline will be absorbed, operated and maintained by Eskom; thus, resulting in the powerline becoming an Eskom asset and eliminating any risk attached to privately owned transmission grid infrastructure. In this regard, Eskom indicates a commitment " …*to developing the electricity supply industry by facilitating the integration of independent power producers (IPPs) into the National Grid and buying electricity from IPPs for national distribution*".

Regarding the negative impacts associated with the project, it is evident that most apply over the short-term and are confined to the construction phase of the project. Of these impacts, all are within acceptable ranges and there are no fatal flaws associated with the construction or operation of the project. Although over the operational phase, the project will be visible and is likely to alter the sense of place of the area, this should be limited to the extent that it is placed amongst existing electricity infrastructure.

In accordance with international and governmental requirements, the project will shift the country away from a high reliance on fossil fuels towards a far greener and cleaner energy generation mix. The proposed development also supports the objectives of the RMIPPPP, which serves as an "emergency" power generation programme for accelerated assistance to the National Grid amid electricity supply constraints. The DMRE issued an RFP for the emergency procurement of 2000 MW of electricity. Due to the emergency nature of the RMIPPPP, the objective is to procure energy from projects that are near ready and can connect to the grid quickly. The proposed development is deemed to meet these requirements and can reduce the risk of load shedding. Grid capacity is also available and no deep grid works are required, which are beneficial for the connection timelines of the RMIPPPP.

The Minister of Mineral Resources and Energy also recently welcomed the concurrence by the NERSA to the second Section 34 Ministerial Determination, which enables the Department to undertake procurement of additional electricity capacity in line with the IRP (2019). 6 800 MW of capacity is determined to be generated from renewable energy sources (PV and Wind), 513 MW from storage and 3 000 MW from gas. The proposed development will be able to contribute to this diverse electricity requirement and will thus actively contribute to the commitments made to increase generation capacity and ensure the security of energy supply to society rapidly and significantly.

10.1 Impact statement

Considering all social impacts associated with the project, it is evident that the positive elements outweigh the negative and that the project carries with it a significant social benefit. In addition, the project fits with international and governmental policy and legislation. Consequently, the construction of the proposed 132 kV Loeriesfontein to Dwarsrug Overhead Powerline and grid connection between the Dwarsrug and Narosies substations is supported at the social level with no further assessment being required.

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