RED ROCKET SOUTH AFRICA (PTY) LTD

PROPOSED SOL INVICTUS 132KV OVERHEAD POWERLINE NEAR AGGENEYS, NORTHERN CAPE PROVINCE

DRAFT BASIC ASSESSMENT REPORT

2021-11

DRAFT

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RED ROCKET SOUTH AFRICA (PTY) LTD

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This Draft Basic Assessment Report (Report) for the proposed Sol Invictus 132kV Overhead Powerline has been prepared by WSP Group Africa Proprietary Limited (WSP) on behalf and at the request of Red Rocket South Africa (Pty) Ltd (Client), as part of the application process for Environmental Authorisation.

Unless otherwise agreed by us in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report, except where otherwise indicated in the Report.

DOCUMENT DESCRIPTION

CLIENT

Red Rocket South Africa (Pty) Ltd

PROJECT NAME

Proposed Sol Invictus 132kV Overhead Powerline near Aggeneys, Northern Cape, South Africa

REPORT TYPE

Draft Basic Assessment Report

WSP PROJECT NUMBER

41102909

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ACRONYMS

AEL	Atmospheric Emission Licence
AIS	Alien and Invasive Species
BA	Basic Assessment
BAR	Basic Assessment Report
BBBEE	Broad Based Black Economic Empowerment
BPEO	Best Practicable Environmental Option
BSP	Biodiversity Spatial Plan
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
CH	Critical Habitat
CIA	Cumulative Impact Assessment
CR	Critically Endangered
CRR	Comments and Responses Report
CSP	concentrated solar power
CV	Curriculum vitae
DAEARDL	Department of Agriculture, Environmental Affairs, Land Reform and Rural Development
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DoA	Department of Agriculture
DoT	Department of Transport
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDL	episodic drainage line
EGI	Electricity Grid Infrastructure
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
EPL	Ecosystem Protection Level
EPFI	Equator Principles Financial Institution
ERA	Electricity Regulation Act (Act 4 of 2006)
ESA	Ecological Support Area
ESA	Early Stone Age
ESMS	Environmental and Social Management System
ETS	Ecosystem Threat Status

EWT	Endangered Wildlife Trust
FI	Financial Institution
FPIC	Free, Prior, and Informed Consent
GA	General Authorisation
GBIF	Global Biodiversity Information Facility
GM	Grievance Mechanism
GG	Government Gazette
GHG	Greenhouse Gases
GIIP	Good International Industry Practice
GN	Government Notice
GNR	Government Notice Regulation
GPS	Global Positioning System
IBA	Important Bird Area
ICAO	International Civil Aviation Organisation
ICP	Informed Consultation and Participation
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPPPP	Independent Power Producer Procurement Programme
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
LC	Least Concern
LSA	Later Stone Age
MF	Monitoring Forum
MP	Moderately Protected
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MSA	Middle Stone Age
MSDS	Material Safety Data Sheets
NCPGDS	Northern Cape Provincial Growth and Development Strategy
NDM	Namakwa District Municipality
NDP	National Development Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMAQA	National Environment Management Air Quality Act (No. 39 of 2004)
NEMBA	National Environmental Management Biodiversity Act (Act 10 of 2004)
NEMPAA	National Environmental Management Protected Areas Act (Act 57 of 2003)
NEMWA	National Environmental Management Waste Act (Act 59 of 2008)
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resource Act (Act 25 of 1999)
NID	Notice of Intent to Develop
NIP	National Infrastructure Plan
NP	Not Protected
NT	Near Threatened
NWA	National Water Act (Act 36 of 1998)

OEC	Obstacle Evaluation Committee
OHPL	Overhead Powerline
OHSA	Occupational Health and Safety Act (Act 85 of 1993)
ONA	Other Natural Areas
PA	Protected Area
PES	Present Ecological State
PICC	Presidential Infrastructure Coordinating Commission
POSA	Plants of South Africa
PP	Poorly Protected
PPE	Personal Protective Equipment
PPP	Public Participation Process
PS	Performance Standard
PSDF	Provincial Spatial Development Framework
PVSEF	Photovoltaic Solar Energy Facility
REDZ	Renewable Energy Development Zones
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAAF	South African Air Force
SA CATS	South African Civil Aviation Technical Standards
SACAA	South African Civil Aviation Authority
SAHRA	South African Heritage Resources Agency
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Areas Database
SARPs	Standards and Recommended Practices
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SER	Stakeholder Engagement Report
SIA	Social Impact Assessment
SIP	Strategic Integrated Projects
SKEP	Succulent Karoo Ecosystem Programme
SO	Spatial objective
SPLUMA	Spatial Planning and Land Use Management Act (Act 16 of 2013)
STD	sexually transmitted disease
UN	United Nations
VEC	Valued Environmental and Social Components
VU	Vulnerable
WBG	World Bank Group
WMA	Water Management Area
WML	Waste Management Licence
WP	Well Protected
WSP	WSP Group Africa (Pty) Ltd
WUL	Water Use Licence

CONTENTS OF THIS REPORT

As per the Environmental Impact Assessment (EIA) Regulations 2014, as amended, Appendix 1 of Government Notice Regulation (GNR) 326 identifies the legislated requirements that must be contained within a Basic Assessment Report (BAR) for the Competent Authority (CA) to consider and come to a decision on the application. **Table A** below details where the required information is located within the draft BAR (this report).

Table A: Legal Requirements as detailed in Appendix 1 of GNR 326 of the 2014 EIA Regulations, as amended

APPENDIX 1 OF GNR 326	DESCRIPTION	RELEVANT REPORT SECTION
3(1) (a)	Details of the EAP who prepared the report and the expertise of the EAP, including a curriculum vitae	**Section 1.3** **Appendix A**
3(1) (b)	The location of the activity	**Section 4.1**
3(1) (c)	A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale	**Section 4.1 and 4.2**
3(1) (d)	A description of the scope of the proposed activity	**Section 4.2 and 4.3**
3(1) (e)	A description of the policy and legislative context within which the development is proposed	**Section 2**
3(1) (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	**Section 4.4**
3(1) (g)	A motivation for the preferred site, activity and technology alternative	**Section 5**
3(1) (h)	A full description of the process followed to reach the proposed alternative within the site	**Section 5**
3(1) (i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity	**Section 3.4**
3(1) (j)	An assessment of each identified potentially significant impact and risk	**Section 7**
3(1) (k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	**Section 3.3 and 3.4** **Section 6** **Section 7** **Section 8** **Section 9.1 and 9.2**
3(1) (l)	An environmental impact statement	**Section 9**
3(1) (m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the Environmental Management Programme (EMPr).	**Section 7** **Appendix G**

APPENDIX 1 OF GNR 326	DESCRIPTION	RELEVANT REPORT SECTION
3(1) (n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	**Section 9**
3(1) (o)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed	**Section 3.6**
3(1) (p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	**Section 9**
3(1) (q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be conducted, and the post construction monitoring requirements finalised	**N/A**
3(1) (r)	An undertaking under oath or affirmation by the EAP	**Appendix B**
3(1) (s)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	**N/A**
3(1) (t)	Any specific information that may be required by the competent authority	**N/A**
3(1) (u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act	**N/A**

GENERAL SITE INFORMATION

TECHNICAL DETAILS OF THE PROPOSED SOL INVICTUS 132KV OVERHEAD POWERLINE	
Location of Site	Near Aggeneys, Northern Cape Province
Farm Names	— Portion 2 of the Farm Aggeneys 56 (Aggeneis Substation) — Portion 1 of the Farm Aggeneys 56 — Portion 2 of the Farm Zuurwater 62 — Portion 6 of the Farm Zuurwater 62 — Portion 5 of the Farm Zuurwater 62 — Portion 14 of the Farm Taaibosmond 66 — Portion 6 of the Farm Taaibosmond 66 — Portion 5 of the Farm Taaibosmond 66 (Sol Invictus Solar PV Facility)
SG Codes	— C05300000000005600002 — C05300000000005600001 — C05300000000006200002 — C05300000000006200006 — C05300000000006200005 — C05300000000006600014 — C05300000000006600006 — C05300000000006600005
Total area of Site	25 842.05 ha
Size of Buildable Area i.e. project infrastructure footprint (only preferred layout, inclusive of all associated infrastructure)	Length of OHPL: 23 km Servitude width: 31 m (15.5 m either side of the OHPL) Buildable Area: 920 000 m^2 (i.e. servitude)

NON-TECHNICAL SUMMARY

This Non-Technical Summary provides a synopsis of the Draft Basic Assessment Report (BAR) prepared for the Sol Invictus 132kV Overhead Powerline Project for submission to the Department of Forestry, Fisheries, and the Environment (DFFE).

PROJECT BACKGROUND

Sol Invictus (Pty) Ltd (Sol Invictus), the Applicant, proposes to construct a 132 kV overhead powerline (OHPL), approximately 23 km in length, to connect the proposed Sol Invictus 1 to 6 Photovoltaic Solar Energy Facility (PVSEF cluster) onsite connector substation to the national grid via the existing Eskom Aggeneis substation. To facilitate the connection Sol Invictus proposes to expand the Eskom Aggeneis substation, involving the extension of the 400kV busbar and adding a 400/132kV 500MVA transformer and 132kV busbars. The Aggeneis substation and proposed OHPL are situated near Aggeneys in the Khâi-Ma and Nama Khoi Local Municipalities, within the Namakwa District Municipality of the Northern Cape Province, South Africa.

The proposed Sol Invictus PVSEF cluster (1 to 6), which is located approximately 30 km southwest of Aggeneys, was authorised under separate Environmental Authorisations (EA). The proposed Sol Invictus 132kV OHPL, which falls within the Northern Strategic Transmission Corridor, as per GN113 of 16 February 2018, constitutes associated infrastructure of the Sol Invictus PVSEF.

The powerline route traverses Critical Biodiversity Areas (CBA), according to the Namakwa Biodiversity Sector Plan (2008) and the Northern Cape CBA map (2016), and falls within the Kamiesberg Bushmanland Augrabies National Protected Area Expansion Strategy (NPAES) focus area. As such, the proposed OHPL requires an EA in terms of the National Environmental Management Act (Act 107 of 1998), as amended (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (2014, as amended) (the EIA Regulations). WSP Group Africa (Pty) Ltd (WSP) has been appointed by Red Rocket South Africa (Pty) Ltd, on behalf of Sol Invictus, as the independent Environmental Assessment Practitioner (EAP) to facilitate the Basic Assessment (BA) process in accordance with the EIA Regulations.

PROJECT DESCRIPTION

The proposed OHPL route runs from the proposed Sol Invictus PVSEF to the existing Eskom Aggeneis substation, located approximately 5 km south west of Aggeneys. **Figure 1** shows the alignment of the OHPL in relation to the proposed Sol Invictus PVSEF and existing Aggeneis substation as well as approximate routing of the OHPL.

The proposed Sol Invictus OHPL is proposed to be located over eight (8) properties owned by three (3) landowners, with the centre point of the OHPL located at 29°16'1.49"S 18°41'45.09"E.. Very few homesteads and settlements are present within the study area. These include Witputs (at the proposed Sol Invictus PVSEF), Suurwater, Kamasoas and the original Aggeneys farmstead.

The OHPL will be a 132kV steel single or double structure with kingbird conductor. The power line towers will either be steel lattice or monopole structures with a maximum height up to 36m above ground level.

The servitude width of the OHPL is 31m (15.5m on either side) and the length of the OHPL is approximately 23km, which will result in a servitude area of approximately 71 ha. The servitude is required to ensure safe construction, maintenance and operation of the powerline.

The N14 national road provides motorised access to the region, passing to the south of the Aggeneis Substation and provides access to the Sol Invictus Solar PVSEF cluster via the Witputs dirt road. The existing dirt roads and farm tracks will be used during the construction phase and to service the OHPL during the operational phase.

The expansion area in which the 400kV busbar extension, 400/132kV 500MVA transformer and 132kV busbars are to be established is approximately 4.5 ha (**Figure 2**). The exact details/layout within this footprint will be determined during the OHPL design phase.

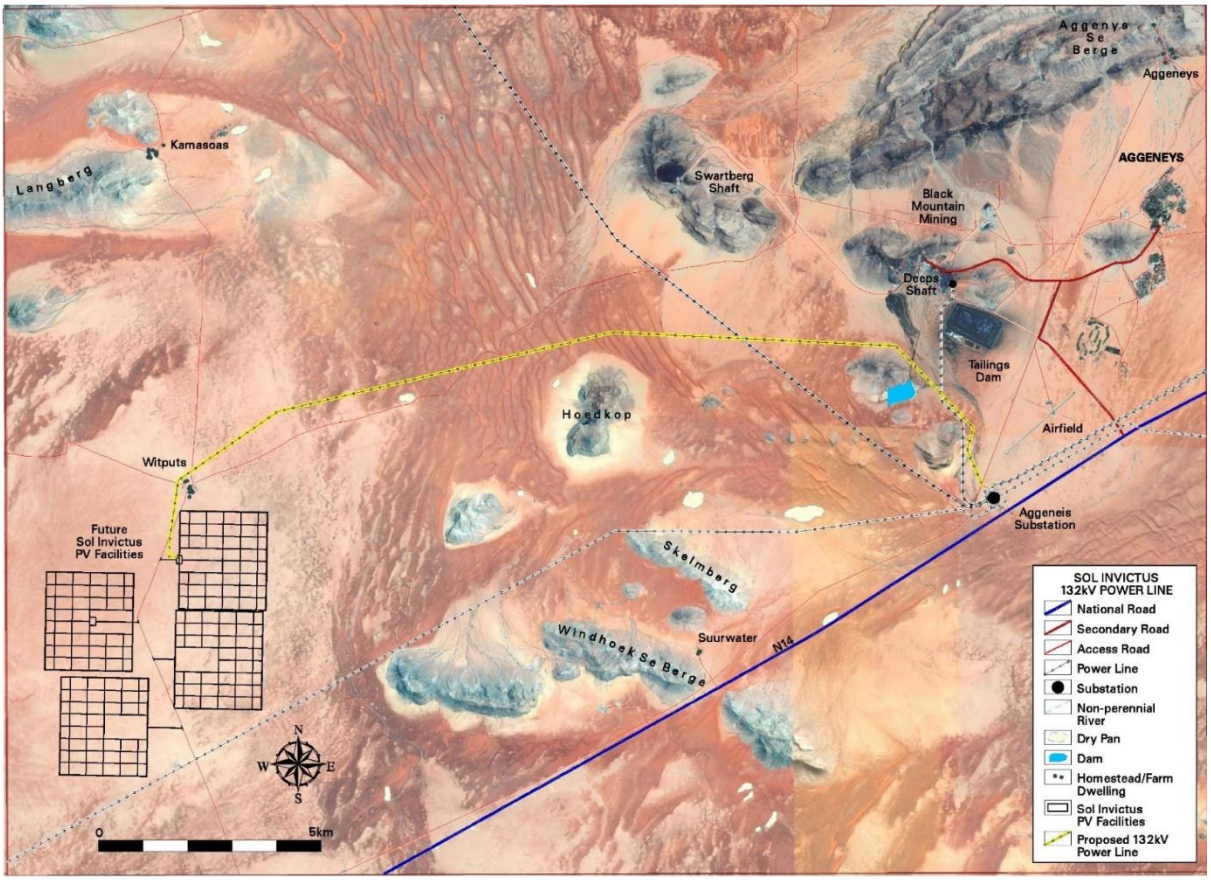

Figure 1: Location of the proposed Sol Invictus 132kV powerline and proposed Aggeneis substation expansion (source: LOGIS, 2021)

Figure 2: Area earmarked for the expansion of the Aggeneis substation

KEY LEGISLATIVE CONTEXT

Due to the fact that the proposed OHPL route traverses CBAs and falls within the Kamiesberg Bushmanland Augrabies NPAES focus area several listed activities in GNR 327 and GNR 324 are triggered. A BA process has therefore been followed as outlined in Regulation 19 of the EIA Regulations (2014, as amended). The DFFE is the Competent Authority in respect of this application for Environmental Authorisation. The listed activity numbers associated with the proposed project are as follows:

— GNR 327: Activity 11 (i), Activity 12 (ii) (a) and (c), and 19

— GNR 324: Activity 12 (g) (i) and (ii) and Activity 14 (ii) (a) and (c) - (g) (ii) (bb) and (ff)

NEED AND DESIRABILITY

The DEA&DP Guideline (2013) states that the essential aim of need and desirability is to determine the suitability (i.e. is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e. is it the right time to develop a given activity) of the development. Therefore, need and desirability addresses whether the development is being proposed at the right time and in the right place. Similarly, the 'Best Practicable Environmental Option' (BPEO) as defined in NEMA is "*the option that provides the most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*."

The development of renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of, and investment in, renewable energy and associated energy distribution infrastructure is supported by the National Development Plan, New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure. The development of the proposed power line is therefore supported by key policy and planning documents and is in line with South Africa's strategic energy planning context. Furthermore, the proposed Sol Invictus OHPL is located within the Northern Strategic Transmission Corridor per GN 113 of 2018. Strategic Transmission Corridors support areas where long-term electricity grid infrastructure will be developed.

The energy security benefits associated with the proposed Sol Invictus PVSEF are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. The proposed OHPL is therefore essential supporting infrastructure to the solar energy development, which, once developed, will generate power from renewable energy resources.

The land on which the OHPL will be constructed is located between the proposed Sol Invictus 1 to 6 PVSEF site and the existing Aggeneis substation. The land is predominantly privately owned agricultural land, which is zoned for agriculture. It is not necessary for each of the properties to be rezoned as the land will continue to be used for agriculture. The short section of the OHPL that traverses Vedanta Black Mountain Mine will not impact on the operation of the mine and Black Mountain Mining (Pty) Ltd are in support of the OHPL. No physical or economic displacement will be required along the proposed route. Furthermore, negative environmental impacts associated with the activity will be mitigated to acceptable levels in accordance with the EMPr (attached as Appendix G of the Draft BAR).

KEY ENVIRONMENTAL AND SOCIAL SENSITIVITIES

The following environmental sensitivities were identified on the site, as a result of the Project location and proposed activities, and will require specific applications or measures for mitigation to minimise impact.

— **Biodiversity:**
  - Critical Biodiversity Area (CBA)
  - Ecological Support Area (ESA)
  - One (1) Endangered avifauna species
  - Unique and low resilience habitats
  - A high richness of protected fauna species was present within the assessment area

— **Freshwater:**
  - NEMA zone of regulation

— **Bats:**
  - Local rocky ridges, cliff faces, steep slopes, and outcrops
  - Local buildings
  - NFEPA and other local rivers, wetlands, and other natural and artificial surface water resources

EIA FINDINGS AND RECOMMENDATIONS

A summary of the identified impacts and corresponding significance ratings for the proposed powerline is provided in **Table 1** below.

Table 1: Impact Summary

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
Air Quality	Generation of Dust and PM	Construction	**Moderate**	(-)	**Low**	(-)
Noise	Noise Emissions	Construction	**Low**	(-)	**Low**	(-)
Soils and Land	Wind Erosion	Construction	**High**	(-)	**Moderate**	(-)
	Change in Surface Profile	Construction	**Moderate**	(-)	**Moderate**	(-)
	Change in Land Use	Construction	**Moderate**	(-)	**Moderate**	(-)
	Change in Land Capability	Construction	**High**	(-)	**Moderate**	(-)
	Soil Contamination	Construction	**Moderate**	(-)	**Low**	(-)
Groundwater	Deterioration of Groundwater Quality	Construction	**Moderate**	(-)	**Low**	(-)
Freshwater	Freshwater Ecology and Surface Water	Construction	**Low**	(-)	**Low**	(-)
	Disturbance of Soils and Altered Runoff Patterns	Construction	**Low**	(-)	**Low**	(-)
	Access Road	Construction	**Low**	(-)	**Low**	(-)
	Disturbance of Soils and Altered Water Quality	Operation	**Low**	(-)	**Low**	(-)
Biodiversity	Destruction, Loss and Fragmentation of Habitats, Ecosystems & Vegetation Community	Construction	**Moderate**	(-)	**Low**	(-)
	Introduction of Alien Species	Construction	**Moderate**	(-)	**Low**	(-)
	Destruction of Threatened Plant Species	Construction	**Moderate**	(-)	**Low**	(-)
	Displacement and Fragmentation of Faunal Community due to Habitat Loss, Direct Mortalities & Disturbance	Construction	**Moderate**	(-)	**Low**	(-)
	Continued Disturbance of Vegetation Communities, especially Threatened Species and Encroachment by AIS	Operation	**Moderate**	(-)	**Low**	(-)
	Ongoing Displacement, Direct Mortalities & Disturbance of Faunal Community due to Habitat Loss and Diturbances	Operation	**Moderate**	(-)	**Low**	(-)
Visual	Visual Disturbance (close proximity)	Construction	**Low**	(-)	**Low**	(-)
	Visual Disturbance (Local)	Operation	**Low**	(-)	**Low**	(-)
	Visual Disturbance (Regional)	Operation	**Low**	(-)	**Low**	(-)
	Sense of Place	Operation	**Low**	(-)	**Low**	(-)

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
Waste	Improper Waste Management	Construction	**Moderate**	(-)	**Low**	(-)
Traffic	Increased Local Traffic	Construction	**Low**	(-)	**Low**	(-)
Heritage	Damage to Heritage Resources	Construction	**Low**	(-)	**Low**	(+)
	Historic Built Environment	Construction	**Low**	(-)	**Low**	(+)
	Palaeontology	Construction	**Low**	(-)	**Low**	(+)
Socio-economic	Creation of Employment, Business Development and Skills Development	Construction	**Low**	(+)	**Low**	(+)
	Presence of Construction Workers and Impact on Family Structures and Social Networks	Construction	**Low**	(-)	**Low**	(-)
	Noise, Dust and Safety	Construction	**Low**	(-)	**Low**	(-)
	Safety, Stock Theft and Damage to Property	Construction	**Low**	(-)	**Low**	(-)
	Development of Infrastructure to Improve Energy Security and Reduce Reliance on Coal	Operation	**Moderate**	(+)	**Moderate**	(+)
	Creation of Employment Opportunities	Operation	**Low**	(+)	**Low**	(+)
	Risks to Farming Activities by Maintenance Workers	Operation	**Moderate**	(-)	**Low**	(-)
Health and Safety	Employee Health & Safety	Construction	**Moderate**	(-)	**Low**	(-)
	Employee Health & Safety	Operation	**Moderate**	(-)	**Low**	(-)

ALTERNATIVES ASSESSMENT

Project alternatives in terms of activity, technology, location and layout were considered as part of the BA process. Only the preferred alternative has been assessed (i.e. the 132kV OHPL connecting the proposed Sol Invictus 1 – 6 PVSEF to the existing Aggeneis substation as well as the expansion of the Aggeneis substation). Alternative activities for the current Project are not considered reasonable or feasible as the purpose of this OHPL is to transmit electrical energy generated by the proposed Sol Invictus PVSEF to the existing Aggeneis substation for distribution via the national electrical grid network. Similarly, distribution of electricity via an overhead 132kV powerline utilising the assessed route is considered the most appropriate technology and layout and is in line with Eskom design requirements.

The no-go option would represent a lost opportunity for South Africa to improve energy security and supplement its current energy needs with renewable energy given that energy security benefits associated with the proposed Sol Invictus PVSEF are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. Considering South Africa's current energy security challenges and its position as one of the highest per capita producer of carbon emissions in the world, this would represent a significant socio-economic cost. Accordingly, the no-go option is not the preferred option.

RECOMMENDATIONS

The following recommendation are made in respect of the proposed 132kV OHPL:

- In the opinion of the Biodiversity Specialist, a survey in the correct season to confirm the presence/absence of the red data plants expected is to be undertaken. This may be undertaken as a walkdown of the line prior to placement of the poles.

- All proposed mitigation measures included in this BA Report and in the EMPr (**Appendix G** of the Draft BAR) must be implemented in order to reduce possible impacts to an acceptable level.

CONCLUSION AND AUTHORISATION OPINION

The overall objective of the BA is to provide sufficient information to enable informed decision-making by the authorities. This was undertaken through consideration of the proposed Project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures.

It is the opinion of WSP that the information contained in this document (read in conjunction the EMPr) is sufficient for DFFE to make an informed decision for the environmental authorisation being applied for in respect of this Project.

Mitigation measures have been developed, where applicable, for the above aspects and are presented within the EMPr. It is imperative that all impact mitigation recommendations contained in the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

Considering the findings of the respective studies, no fatal flaws were identified for the proposed Project. Should the avoidance and mitigation measures prescribed be implemented, the significance of the considered impacts for all negative aspects pertaining to the environmental aspects is expected to be low. It is thus the opinion of the EAP that the Project can proceed, and that all the prescribed mitigation measures and recommendations are considered by the issuing authority.

PUBLIC PARTICIPATION

The Draft BAR has been made available for public review and comment for 30 days, from **26 November 2021** to **17 January 2022**, at the following venues.

AREA	VENUE	ADDRESS	CONTACT NO.
Aggeneys	Aggeneys Post Office	Havelock Ave, Aggeneys, 8893	Tel: 054 983 2264
WSP website	https://www.wsp.com/en-ZA/services/public-documents).		

Parties wishing to formally register as interested and affected parties in order to receive more information and/ or raise their comment(s) on the proposed project, are requested to forward their full contact details to the EAP and disclose their direct business, financial, personal or other interest in the project. Any comments on the proposed project may be submitted to the EAP via the details provided below. Registered interested and affected parties will be sent all future project related correspondence and notified individually of additional opportunities to participate in the process.

All issues and comments are to be submitted to WSP (as per the contact details provided below) and will be incorporated in the Comments and Response Report (CRR) which will be attached as an appendix to the Final BAR.

Please submit all comments or queries to:

WSP Group Africa (Pty) Ltd
Attention: Jennifer Green
PO Box 2613, Cape Town, 8000
Tel: +27 21 481 8639
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E-mail: Jennifer.Green@wsp.com

The Draft BAR has also been submitted to the competent authorities. It is the opinion of WSP that the information contained in this document is sufficient for the DFFE to make an informed decision for the EA being applied for in respect of this Project.

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FIGURES

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND AND TERMS OF REFERENCE

Sol Invictus (Pty) Ltd (Sol Invictus), the Applicant, proposes to construct a 132 kV overhead powerline (OHPL), approximately 23 km in length, to connect the proposed Sol Invictus 1 to 6 Photovoltaic Solar Energy Facility (PVSEF cluster) onsite connector substation to the national grid via the existing Eskom Aggeneis substation. To facilitate the connection Sol Invictus proposes to expand the Eskom Aggeneis substation, involving the extension of the 400kV busbar and adding a 400/132kV 500MVA transformer and 132kV busbars. The Aggeneis substation and proposed OHPL are situated near Aggeneys in the Khâi-Ma and Nama Khoi Local Municipalities, within the Namakwa District Municipality of the Northern Cape Province, South Africa (**Figure 1-1)**.

The proposed Sol Invictus PVSEF cluster (1 to 6) was authorised under separate Environmental Authorisations (EA). Originally, only four (4) PVSEF projects of 150MW each (i.e. Sol Invictus 1 - 4) were planned and authorised under 4 separate EAs in September 2016 as part of the Sol Invictus PVSEF Project. In 2019, Sol Invictus 3 was split into two 75MW projects (i.e. Sol Invictus 3 and 5). Sol Invictus 4 was also split into two 75MW projects (i.e. Sol Invictus 4 and 6) in 2019. The EA reference numbers are as follows:

- 150MW Sol Invictus 1 PVSEF (EA Ref. No.: 14/12/16/3/3/2/873);
- 150MW Sol Invictus 2 PVSEF (EA Ref. No.: 14/12/16/3/3/2/869);
- 75MW Sol Invictus 3 PVSEF (EA Ref. No.: 14/12/16/3/3/2/872/1);
- 75MW Sol Invictus 4 PVSEF (EA Ref. No.: 14/12/16/3/3/2/871/1);
- 75MW Sol Invictus 5 PVSEF (EA Ref. No.: 14/12/16/3/3/2/872/1); and
- 75MW Sol Invictus 6 PVSEF (EA Ref. No.: 14/12/16/3/3/2/871/2).

The PVSEF site is located approximately 30 km southwest of Aggeneys (**Figure 1-1)**. The proposed Sol Invictus 132kV OHPL constitutes associated infrastructure of the Sol Invictus PVSEF.

On 16 February 2018, the Department of Environmental Affairs (DEA), now the Department of Forestry, Fisheries and the Environment (DFFE), gazetted the Renewable Energy Development Zones (REDZ) and Strategic Transmission Corridors and procedures for the assessment of large-scale wind and solar photovoltaic energy development activities (Government Notice (GN) 114) and grid infrastructure (GN 113). The proposed Sol Invictus OHPL falls within the Northern Strategic Transmission Corridor (see Section 4.4 below).

The powerline route traverses Critical Biodiversity Areas (CBA), according to the Namakwa Biodiversity Sector Plan (2008) and the Northern Cape CBA map (2016) (**Figure 1-2**), and falls within the Kamiesberg Bushmanland Augrabies National Protected Area Expansion Strategy (NPAES) focus area (**Figure 1-3**). As such, the proposed OHPL requires an EA in terms of the National Environmental Management Act (Act 107 of 1998), as amended (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (2014, as amended) (the EIA Regulations). WSP Group Africa (Pty) Ltd (WSP) has been appointed by Red Rocket South Africa (Pty) Ltd, on behalf of Sol Invictus, as the independent Environmental Assessment Practitioner (EAP) to facilitate the Basic Assessment (BA) process in accordance with the EIA Regulations.

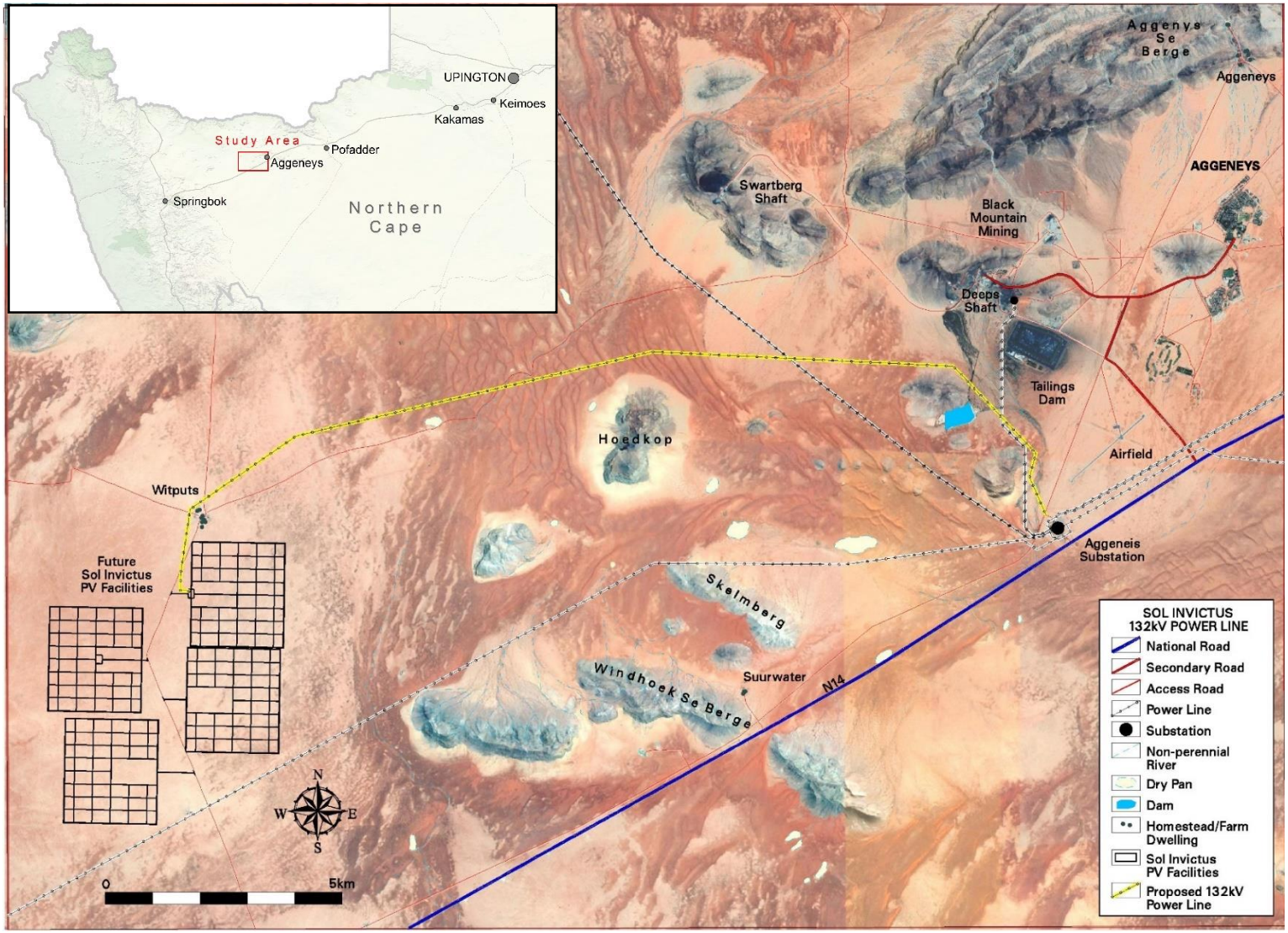


Figure 1-1: Location of the proposed Sol Invictus 132kV powerline and proposed Aggeneis substation expansion (source: LOGIS, 2021)

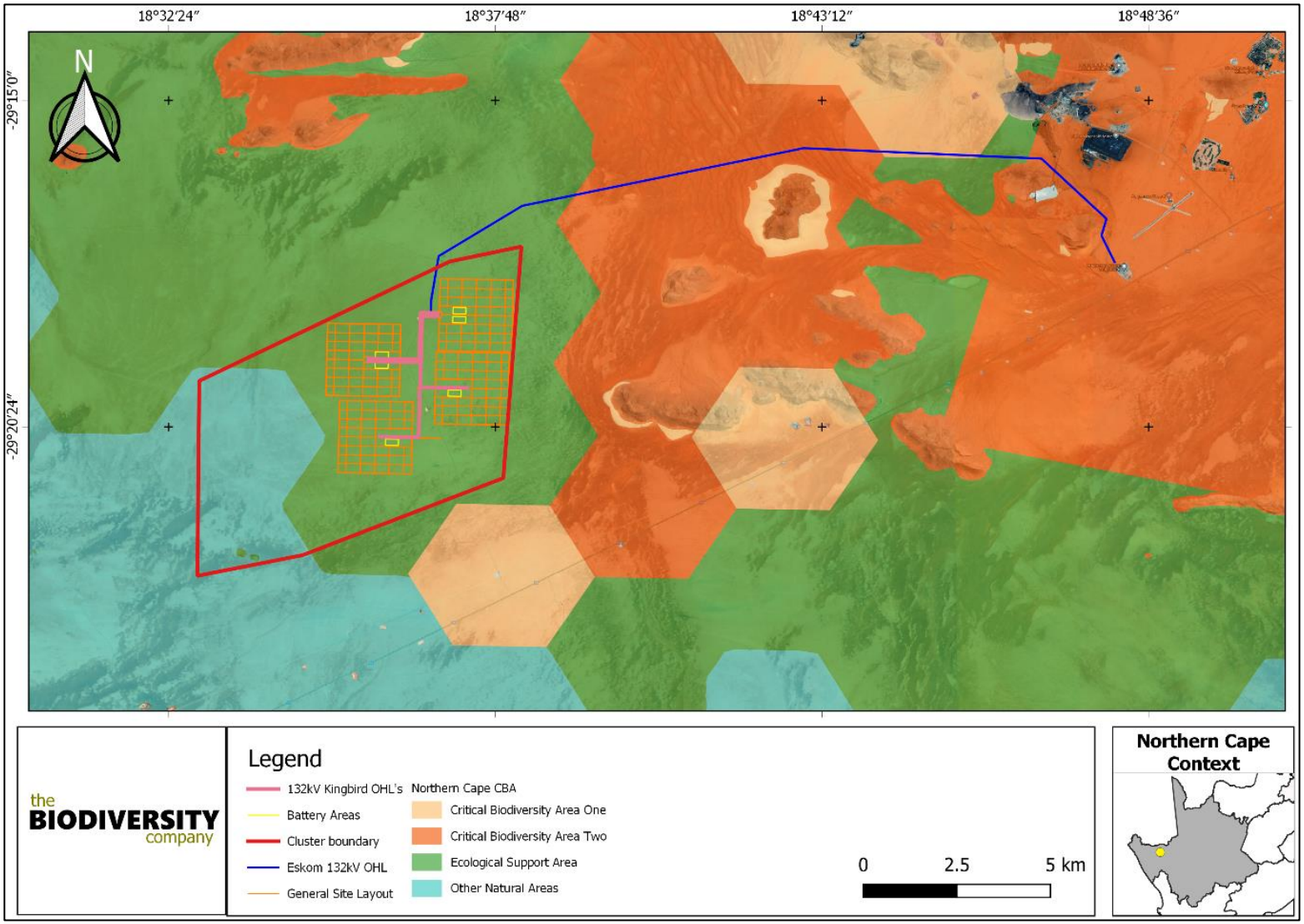


Figure 1-2: CBAs in relation to the proposed Sol Invictus Powerline and Aggeneis substation (source: The Biodiversity Company, 2021)

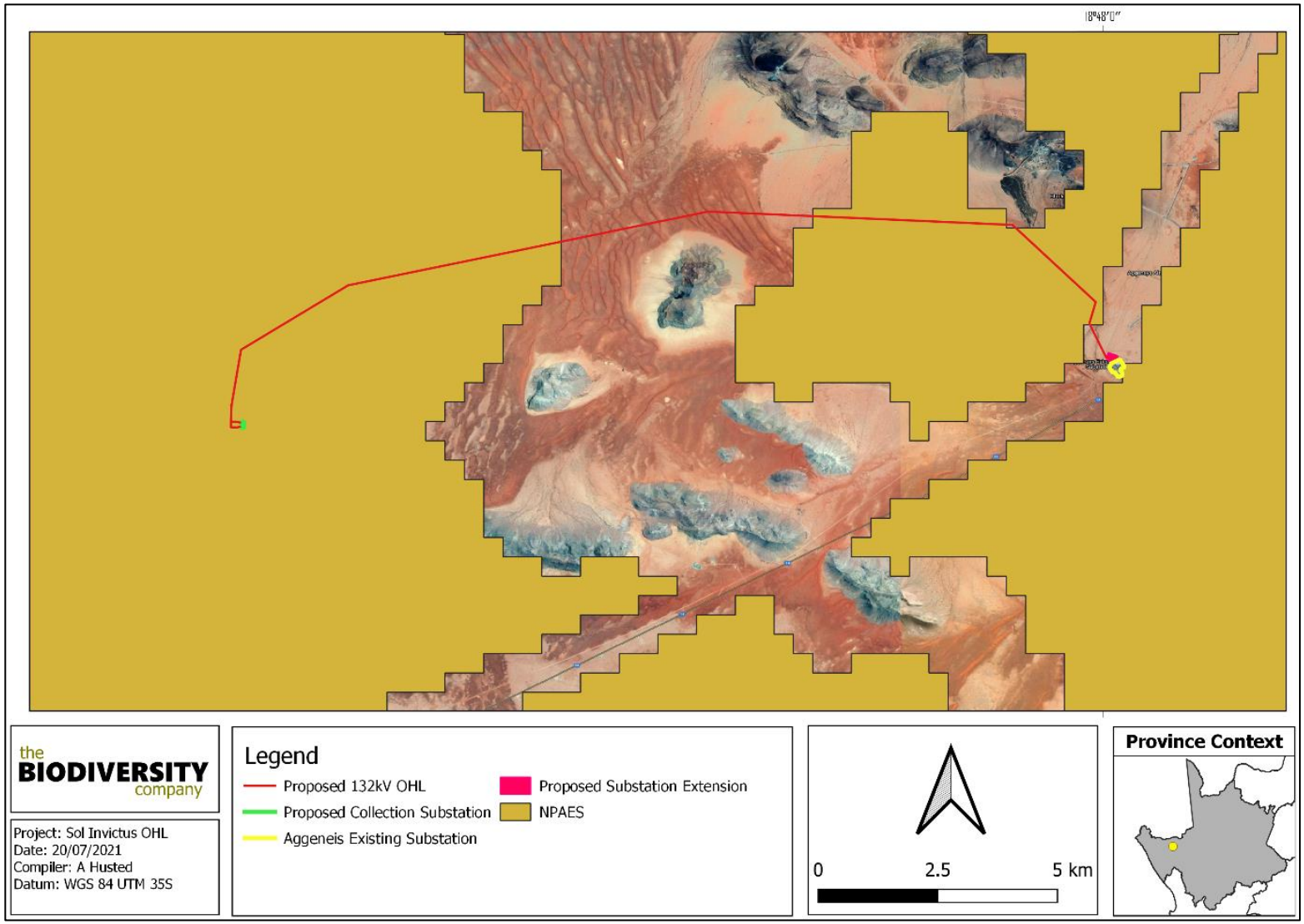


Figure 1-3: The project area in relation to the Kamiesberg Bushmanland Augrabies NPAES (source: The Biodiversity Company, 2021)

1.2 PURPOSE OF THE BA PROCESS

The BA process is an interdisciplinary procedure to ensure that environmental and social considerations are included in decisions regarding projects. Simply defined, the process aims to identify the possible environmental and social effects of a proposed activity and how those impacts can be mitigated. In the context of this report, the purpose of the BA process is to inform decision-makers and the public of potential negative and positive consequences of the proposed construction of the OHPL. This provides the competent authority (CA) sufficient information to make an informed decision with regards to granting or refusing the EA applied for.

1.3 DETAILS OF KEY ROLE PLAYERS

1.3.1 PROJECT PROPONENT

Sol Invictus is the project proponent (Applicant) with regards to this application for the construction and operation of the Sol Invictus 132kV OHPL. **Table 1-1** provides the relevant details of the project proponent.

Table 1-1: Details of Project Proponent

ASPECT	DESCRIPTION
Company Name:	Sol Invictus (Pty) Ltd
Contact Person:	Matteo Brambilla
Postal Address	Postnet Suite 150, Private Bag X3, Roggebaai, Cape Town, 8012
Telephone:	072 212 1531
Email:	m.logan@redrocket.energy

1.3.2 COMPETENT AND COMMENTING AUTHORITIES

Section 24C(2)(a) of NEMA stipulates that the Minister of Forestry, Fisheries and the Environment ("the Minister") must be identified as the competent authority (CA) if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030.

As the proposed Sol Invictus 132kV OHPL constitutes associated infrastructure of the Sol Invictus PVSEF, DFFE is the CA for the proposed Sol Invictus OHPL.

Table 1-2 provides the relevant details of the competent and commenting authorities on the Project.

Table 1-2: Competent and Commenting Authorities

ASPECT	COMPETENT / COMMENTING AUTHORITY	CONTACT PERSON
Competent Authority: Environmental Authorisation	Department of Forestry, Fisheries, and the Environment (DFFE)	Case Officer: Zamalanga Langa Regulatory, Compliance and Sector Monitoring Integrated Environmental Authorisations: National Infrastructure Projects
Commenting Authorities	Department of Environmental Affairs: Biodiversity Conservation Unit	Biodiversity Conservation Unit Portia Makitla

ASPECT	COMPETENT / COMMENTING AUTHORITY	CONTACT PERSON
	Department of Water and Sanitation (DWS)	Abe Abrahams Chief Director: Northern Cape
	Department of Mineral Resources and Energy (DMRE)	Regional Manager Jasper Nieuwoudt
	Department of Transport	Personal Assistant to the Director-General Ms Michelle Phenya
	National Energy Regulator of South Africa (NERSA)	Head of Communications Charles Hlebela
	South African Civil Aviation Authority (SACAA)	Lizell Stroh Obstacle Inspector
	Eskom	John Geeringh Senior Consultant Environmental Management Land and Rights
	Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development	Kabelo Mohibidu Head of Ministry
	Northern Cape Department of Roads and Public Works	Ramona Grewan Head of Department
	Northern Cape Heritage Resources Authority (NCHRA)	Ratha Andrew Timothy Manager
	Namakwa District Municipality	Municipal Manager Mr Christiaan Fortuin
	Khâi-Ma Local Municipality	Municipal Manager Obakeng Isaacs
	Nama Khoi Local Municipality	Municipal Manager Samantha Aumureen Titus

1.3.3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP was appointed in the role of Independent EAP to undertake the BA processes for the proposed construction of the powerline. The CV of the EAP is available in **Appendix A**. The EAP declaration of interest and undertaking is included in **Appendix B**. **Table 1-3** details the relevant contact details of the EAP.

Table 1-3: Details of the EAP

EAP	WSP GROUP AFRICA (PTY) LTD
Company Registration:	1999/008928/07
Contact Person:	Ashlea Strong
Physical Address:	Building C, Knightsbridge, 33 Sloane Street, Bryanston, Johannesburg

EAP	WSP GROUP AFRICA (PTY) LTD
Postal Address:	P.O. Box 98867, Sloane Park 2151, Johannesburg
Telephone:	011 361 1392
Fax:	011 361 1301
Email:	Ashlea.Strong@wsp.com

STATEMENT OF INDEPENDENCE

Neither WSP nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any business, financial, personal or other interest that could be reasonably regarded as being capable of affecting their independence. WSP has no beneficial interest in the outcome of the assessment.

1.4 SPECIALISTS

Specialist input was required in support of this application for EA. The details of the specialists are provided in **Table 1-4** below. The specialists declarations are attached in **Appendix C** and reports in **Appendix F**.

Table 1-4: Details of Specialists

ASSESSMENT	NAME OF SPECIALIST	COMPANY	SECTIONS IN REPORT	SPECIALIST REPORT ATTACHED AS
Aquatic Ecology	Nelanie Cloete	FEN Consulting (Pty) Ltd	Section 6.1, 7 and 9	Appendix F1
Avifauna	Andrew Husted	The Biodiversity Company	Section 6.1, 7 and 9	Appendix F2
Bats	Caroline Lötter	Inkululeko Wildlife Services on behalf of The Biodiversity Company	Section 6.1, 7 and 9	Appendix F3
Biodiversity	Andrew Husted	The Biodiversity Company	Section 6.1, 7 and 9	Appendix F2
Heritage	David Halkett	ACO Associates CC	Section 6.2, 7 and 9	Appendix F4
Socio-economic	Tony Barbour	Independent consultant	Section 6.2, 7 and 9	Appendix F5
Soils	Karen King	WSP	Section 6.1, 7 and 9	Appendix F6
Visual	Lourens Du Plessis	LOGIS	Section 6.2, 7 and 9	Appendix F7

1.5 BASIC ASSESSMENT REPORT STRUCTURE

The structure of the draft BAR (this report) is presented in **Table 1-5**.

Table 1-5: Structure of this report

SECTION	CONTENTS
1. Introduction	Provides a brief background and outlines the purpose of this document, as well as identifying the key role players, content of the report and the assumptions and limitations applicable to the assessment.

SECTION	CONTENTS
2. Governance Framework	Provides a brief summary and interpretation of the relevant legislation in terms of the proposed project.
3. Basic Assessment Process	Provides a description of the BA process being undertaken and the methodology employed.
4. Project Description	Describes the project location and surrounding area, project history, and a project description.
5. Project Alternatives	Provides a summary description of the proposed project alternatives.
6. Baseline Environment	Describes the biophysical and socio-economic characteristics of the affected environment against which potential project impacts are assessed.
7. Environmental Impact Assessment	Describes the specialist studies undertaken and assesses the potential impacts of the project as well as project alternatives. The significance of the impacts and proposed mitigation measures are presented.
8. Cumulative Impact Assessment	Describes the cumulative impacts identified by the EAP and Specialists and assesses the cumulative impacts. The significance of the impacts and proposed mitigation measures are presented.
9. Environmental Impact Statement	Provides the Environmental Impacts Statement including principal findings as well as recommendations and the authorisation opinion.
10. Way Forward	Outlines the stakeholder engagement details associated with the public review period.

2 GOVERNANCE FRAMEWORK

2.1 NATIONAL LEGAL AND REGULATORY FRAMEWORK

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of industrial and civil infrastructure developments. Different authorities at both national and regional levels carry out environmental protection functions. The applicable legislation and policies are shown in **Table 2-1** and **Table 2-2** below.

Table 2-1: Applicable Legislation

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
The Constitution of South Africa (No. 108 of 1996)	Section 24(b) of the Constitution provides that "*everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation [and] promote conservation.*" The Constitution cannot manage environmental resources as a stand-alone law, hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld in an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
National Environmental Management Act (No. 107 of 1998)	In terms of Section 24(2) of the National Environmental Management Act (No. 107 of 1998) (NEMA), the Minister may identify activities which may not commence without prior authorisation. On 7 April 2017, the Minister thus published GNR 327 (Listing Notice 1), 325 (Listing Notice 2) and 324 (Listing Notice 3) listing activities that may not commence prior to authorisation. The regulations outlining the procedures required for authorisation are published in GNR 326 EIA Regulations (2014, as amended). Listing Notice 1 and Listing Notice 3 identify activities that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require a Scoping and EIA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. **Listed Activities 11, 12 and 19 of GNR 327 and Listed Activities 12 and 14 of GNR 324** are considered applicable to the Sol Invictus OHPL and therefore a BA process must be followed to obtain an EA.
Listing Notice 1: GNR 327	***Activity 11(i):*** *The development of facilities or infrastructure for the transmission and distribution of electricity—* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;* *excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —* *(a) temporarily required to allow for maintenance of existing infrastructure;* *(b) 2 kilometres or shorter in length;* *(c) within an existing transmission line servitude; and* *(d) will be removed within 18 months of the commencement of development.* **Applicability:** The project involves the construction of a 132kV powerline to evacuate electricity from the Sol Invictus PVSEF cluster.

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	Activity 12 (ii), (a) and (c): *The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse* **Applicability:** The OHPL will be constructed within 32 m of a watercourse. The footprint of the powerline and associated servitude is greater than 100m².
	Activity 19: *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse* **Applicability:** The OHPL will be constructed within 32 m of a watercourse and depending on the footprint of the infrastructure, this activity may be triggered.
Listing Notice 3: GNR 324	***Activity 12 (i) (i) and (ii):*** *The clearance of an area of 300 square metres or more of indigenous vegetation. Except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***Northern Cape*** *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;* *ii. Within critical biodiversity areas identified in bioregional plans;* **Applicability:** The OHPL route traverses a CBA (according to the Namakwa Biodiversity Sector Plan and the Northern Cape CBA map) and falls within the Kamiesberg Bushmanland Augrabies NPAES focus area. The construction of the OHPL tower structures is likely to require the clearance of indigenous vegetation where the combined area to be cleared will exceed 300 m².
	Activity 14 (ii) (a) and (c) (i) (i) (bb) and (ff): *The development of—* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs—* *(a) within a watercourse; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;.* ***Northern Cape*** *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.* **Applicability:**

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	The powerline route traverses a CBA (according to the Namakwa Biodiversity Sector Plan and the Northern Cape CBA map) and falls within the Kamiesberg Bushmanland Augabies NPAES focus area. The powerline will be constructed within 32 m of a watercourse and depending on the footprint of the infrastructure, this activity may be triggered.
National Environmental Management Biodiversity Act (No. 10 of 2004)	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004, within the framework of NEMA, to provide for the management and conservation of national biodiversity. NEMBA's primary aims are for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, and the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources. In addition, NEMBA provides for the establishment and functions of the South African National Biodiversity Institute (SANBI). SANBI was established primarily to report on the status of the country's biodiversity and conservation status of all listed threatened or protected species and ecosystems. The Threatened or Protected Species (TOPS) Regulations were promulgated on 1 June 2007 in terms of Section 91(1)(g), (h) and (i) of NEMBA. TOPS aims to further regulate the permit system set out in NEMBA, provide for the prohibition and regulation of restricted activities, and provide for the protection of wild populations of listed and threatened or protected species. The minister published amendments to the TOPS on 29 April 2014, which was updated to include for the regulations and registration of a number of activities for the capture, farming and handling of threatened or protected species (e.g. captive breeding facilities, sanctuaries, game farms and nurseries).
National Environmental Management Protected Areas Act (No. 57 of 2003)	The purpose of the National Environmental Management Protected Areas Act (No. 57 of 2003) (NEMPAA) is to, inter alia, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas. Section 50(5) of NEMPAA states that "*no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority*." The Sol Invictus OHPL route does not fall within any proclaimed protected areas as per NEMPAA.
National Water Act (No. 36 of 1998)	The purpose of the National Water Act (No. 36 of 1998) (NWA) is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are national resources, which cannot be owned by any individual, and rights to which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources. The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21), which may impact on water resources through the categorisation of 'listed water uses.' Defined water use activities require the approval of DWS in the form of a General Authorisation (GA) or Water Use Licence (WUL) authorisation. Quantities of water required for the construction of the OHPL are unknown at this stage. However, based on the proposed installation methodology (i.e. standard OHPL installation methods), limited volumes of water will be required for installation of the OHPL. As such, the main demand for water will be for dust suppression (non-potable) and to service the site camp (potable), and for mixing concrete for foundations / capping should it be required. The contractor appointed for the construction of the OHPL will be required to arrange a suitable water supply. Should groundwater be abstracted as part of project activities, a WUL/GA would potentially be required.
National Heritage Resources Act (No. 25 of 1999)	The National Heritage Resource Act (Act No. 25 of 1999) (NHRA) serves to protect national and provincial heritage resources across South Africa. The NHRA provides for the protection of all archaeological and palaeontological sites, the conservation and care of cemeteries and graves by the South African Heritage Resource Agency (SAHRA), and lists activities which require any person who intends to undertake to notify the responsible

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	heritage resources agency and furnish details regarding the location, nature, and extent of the proposed development. In terms of the Section 38 of NHRA, any person who intends to undertake a linear development including, inter alia, a powerline, exceeding 300m in length or a development that exceeds 5000m^2 must notify the heritage resources authority and undertake the necessary assessment requested by that authority. As the proposed Sol Invictus OHPL is approximately 23km in length, the heritage authority is required to be consulted. SAHRA was notified of the proposed project on 05 July 2021 by way of registering a description of the project via the SAHRIS online system. An interim comment was received from the SAHRA case officer on 04 August 2021 requesting a Heritage Impact Assessment (HIA) to be undertaken. Construction activities should be conducted carefully, and all activities ceased if any archaeological, cultural and heritage resources are discovered. SAHRA should be notified and investigation conducted in accordance with the Chance Find Procedure to be established for the Project before any activities can commence.
National Environmental Management Waste Act (No. 59 of 2008)	The National Environmental Management Waste Act (No. 59 of 2008) (NEMWA) is subsidiary and supporting legislation to NEMA. NEMA is a framework legislation that provides the basis for the regulation of waste management. NEMA also contains policy elements and gives a mandate for further regulations to be promulgated. It is anticipated that activities on the site will not trigger the NEMWA list of waste management activities that require a Waste Management Licence (WML). However, waste handling, storage and disposal during the construction and operational phase of the project must be undertaken in accordance with the requirements of this Act and the Best Practicable Environmental Option (BPEO) which will be incorporated into the site-specific Environmental Management Programme (EMPr).
National Environment Management Air Quality Act (No. 39 of 2004)	The National Environment Management: Air Quality Act (No. 39 of 2004) (NEMAQA) came into effect on 11 September 2005. Persons undertaking such activities listed under GNR 893, as amended, are required to possess an Atmospheric Emissions License (AEL). The National Dust Control Regulations (GNR 827) were promulgated in terms of Section 32 of NEMAQA, which aim at prescribing general measures for the control of dust in both residential and non-residential areas. Although no AEL will be required for the construction and operation of the powerline, the dust control regulations will be applicable during construction.
Conservation of Agricultural Resources Act (No. 43 of 1983)	The Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) provides for the implementation of control measures for soil conservation works as well as alien and invasive plant species in and outside of urban areas. In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DFFE and the DWS, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners' cost and risk. The CARA Regulations with regards to alien and invasive species have been superseded by NEMBA Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014.
Mineral and Petroleum Resources Development Act (No. 28 of 2002)	The aim of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources. Section 53(1) of the MPRDA provides that any person who intends to use the surface of any land in any way that may be contrary to any object of the MPRDA, or which is likely to impede any such object, must apply to the Minister of Mineral Resources (the Minister) for approval. Section 53 of the MPRDA provides a mechanism for ensuring that, inter alia,

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	the mining of mineral resources is not detrimentally affected through the use of the surface of land and which may, for example, result in the sterilisation of a mineral resource. A Section 53 approval is necessary due to the fact that the powerline traverses a portion of the mining rights area of the Vedanta Black Mountain Mine. The Amendment Regulations (GNR 420 of 27 March 2020) introduced a template for section 53 applications (Form Z) and the specific information that applicants will need to provide as part of a section 53 application.
Civil Aviation Act (No. 13 of 2009)	Civil aviation in South Africa is governed by the Civil Aviation Act (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by SACAA as an agency of the Department of Transport (DoT). SACAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations. All proposed developments or activities in South Africa that potentially could affect civil aviation must thus be assessed by SACAA in terms of the Civil Aviation Regulations and South African Civil Aviation Technical Standards (SA CATS) to ensure aviation safety. Potential impacts from the power lines must be reviewed by these authorities. The Obstacle Evaluation Committee (OEC) which consists of members from both the SACAA and South African Air Force (SAAF) fulfils the role of streamlining and coordinating the assessment and approvals of proposed developments or activities that have the potential to affect civil aviation, military aviation, or military areas of interest. A portion of the powerline falls within 8km of the Aggeneys Airport. An Application for the Approval of Obstacles will therefore be submitted to SACAA. SACAA has also been included as an I&AP for the public participation process.
Occupational Health and Safety Act (No. 85 of 1993)	The National Occupational Health and Safety Act (No. 85 of 1993) (OHSA) and the relevant regulations under the Act are applicable to the proposed project. This includes the Construction Regulations promulgated in 2014 under Section 43 of the Act. Adherence to South Africa's OHSA and its relevant Regulations is essential.
National Energy Act (No. 34 of 2008)	The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantitates, and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors. The main objectives of the Act are to: — Ensure uninterrupted supply of energy to the Republic; — Promote diversity of supply of energy and its sources; — Facilitate effective management of energy demand and its conservation; — Promote energy research; — Promote appropriate standards and specifications for the equipment, systems and processes used for producing, supplying and consuming energy; — Ensure collection of data and information relating to energy supply, transportation and demand; — Provide for optimal supply, transformation, transportation, storage and demand of energy that are planned, organised and implemented in accordance with a balanced consideration of security of supply, economics, consumer protection and a sustainable development; — Provide for certain safety, health and environment matters that pertain to energy; — Facilitate energy access for improvement of the quality of life of the people of Republic; — Commercialise energy-related technologies; — Ensure effective planning for energy supply, transportation, and consumption; and — Contribute to sustainable development of South Africa's economy.

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	In terms of the act, the Minister of Energy is mandated to develop and, on an annual basis, review and publish the Integrated Energy Plan (IEP) in the Government Gazette. The IEP analyses current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this to project future energy requirements, based on different scenarios. The IEP and the Integrated Resource Plan are intended to be updated periodically to remain relevant. The framework is intended to create a balance between energy demand and resource availability so as to provide low-cost electricity for social and economic development, while taking into account health, safety and environmental parameters.
Electricity Regulation Act (No. 4 of 2006)	The Electricity Regulation Act (No. 4 of 2006) (ERA) aims to: — Achieve the efficient, effective, sustainable and orderly development and operation of electricity supply infrastructure in South Africa; — Ensure that the interests and needs of present and future electricity customers and end users are safeguarded and met, having regard to the governance, efficiency. effectiveness and long-term sustainability of the electricity supply industry within the broader context of economic energy regulation in the Republic: — Facilitate investment in the electricity supply industry; — Facilitate universal access to electricity; — Promote the use of diverse energy sources and energy efficiency; — Promote competitiveness and customer and end user choice; and — Facilitate a fair balance between the interests of customers and end users, licensees, investors in the electricity supply industry and the public. The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

Table 2-2: Applicable Policies

APPLICABLE POLICY	DESCRIPTION OF POLICY
National Development Plan	The National Development Plan (NDP) aims to eliminate poverty and reduce inequality by 2030. The main objectives to achieve this aim are categorised as follows: — Economy and Employment — Economic infrastructure — Environmental sustainability and resilience — Inclusive rural economy — South Africa in the region and the world — Transforming Human Settlements — Improving education, training and innovation — Health care for all — Social protection — Building Safer Communities — Building a capable and developmental state — Fighting corruption — Nation building and social cohesion Under "*Economic Infrastructure*", the NDP identifies "*improving infrastructure*" as an imperative for South Africa in the coming decade. It recognises that "*infrastructure is not just essential for faster economic growth and higher employment. It also promotes inclusive growth, providing citizens with the means to improve their own lives and boost their incomes. Infrastructure is essential to development*." In terms of electrical infrastructure, the NDP envisions that "*the proportion of people with access to the electricity grid should rise to at least 90 percent by 2030*." The NDP further refers to the need to produce sufficient energy

APPLICABLE POLICY	DESCRIPTION OF POLICY
	to support industry at competitive prices and ensure access for poor households, while reducing carbon emissions per unit of power by about one-third. In this regard, South Africa must invest in a strong network of economic infrastructure designed to support the country's medium- and long-term economic and social objectives. The plan envisages that, by 2030, South Africa will have an energy sector that promotes: — Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. — Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. More specifically, South Africa should have adequate supply security in electricity and in liquid fuels, such that economic activity, transport, and welfare are not disrupted. Chapter 3, Economy and Employment, identifies some of the structural challenges specific to South Africa, including an energy constraint that will act as a cap on growth and on options for industrialisation. The NDP notes that from an environmental perspective South Africa faces several related challenges. The reduction of greenhouse gas emissions and shift to a green low-carbon economy, is one of these challenges. In terms of implementation, the NDP identifies three phases. The first two are of specific relevance to the proposed project. The first phase (2012–2017) notes that ensuring the supply of energy and water is reliable and sufficient for a growing economy. The second phase (2018–2023) involves building on the first phase to lay the foundations for more intensive improvements in productivity. The provision of affordable and reliable energy is a key requirement for this to take place. The plan sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation. In this regard, coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources, will play a much larger role.
Integrated Resource Plan 2010 – 2030	The integrated resource plan (IRP) is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. On 6 May 2011, the then Department of Energy (DoE) released the Integrated Resource Plan 2010-2030 (IRP 2010) in respect of South Africa's forecast energy demand for the 20-year period from 2010 to 2030. The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. The IRP recognises that Solar photovoltaic (PV), wind and concentrated solar power (CSP) with storage present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present huge potential for the creation of new industries, job creation and localisation across the value chain.
New Growth Path	Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: energy, transport, communication, water and housing.
National Infrastructure Plan	The South African Government adopted a National Infrastructure Plan (NIP) in 2012. The NIP aims to transform the South African economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. It outlines the challenges and enablers which needs to be addressed in the building and developing of infrastructure. The Presidential Infrastructure Coordinating Commission (PICC) was established by the Cabinet to integrate and coordinate the long-term infrastructure build.

APPLICABLE POLICY	DESCRIPTION OF POLICY
Strategic Integrated Projects	As part of the NIP and in terms of Section 8(1)(a) read with Section 7(1) of the Infrastructure Development Act, as amended (Act 23 of 2014), large-scale infrastructure projects, known as Strategic Integrated Projects (SIPs), have been identified across all nine provinces. Eighteen (18) SIPs have been prioritised as part of the NIP. SIPs cover catalytic projects that can fast-track development and growth. Work is being aligned with key cross-cutting areas: human settlement planning and skills development. The SIPs comprise: — Five Geographically focussed SIPs (SIP 1 to 5); — Three Spatial SIPs (SIP 6, 7 and 11); — Three Energy SIPs (SIP 8 to 10); — Three Social Infrastructure SIPs (SIP 12 to 14); — Two Knowledge SIPs (SIP 15 and 16); — One Regional Integration SIP (SIP 17); and — One Water and Sanitation SIP (SIP 18). **SIP 10: Electricity Transmission and Distribution for All** aims to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" in South Africa. SIP 10 recognises that a reliable transmission network with adequate capacity to meet customer needs is a fundamental condition for the provision of a reliable electricity supply in South Africa. To remain reliable, the transmission system requires not only maintenance, but must also be developed and expanded to meet changing electricity demand and energy generation requirements. A reliable transmission network and an effective process for enabling network expansion, is therefore critical to the realisation of development plans and services, including job creation, the provision of quality education and health care, and the upliftment of previously disadvantaged communities. The Strategic Environmental Assessment (SEA) for Electricity Grid Infrastructure (EGI) in South Africa (CSIR, 2016) identified five Strategic Transmission Corridors that are of strategic importance for the rollout of the supporting large-scale electricity transmission and distribution infrastructure in terms of SIP 10. The EGI SEA identified the optimal location for strategic corridors where transmission infrastructure expansion is needed to enable the regionalised balancing of future demand and supply requirements, whilst minimising negative impacts to the environment. GN 113 of 16 February 2018 approved the Strategic Transmission Corridors, which support areas where long-term electricity grid infrastructure will be developed and where an integrated decision-making process for applications for EA in terms of NEMA will be followed. Applications for EA for large scale electricity transmission and distribution facilities, when such facilities trigger Activity 9 of Listing Notice 2 of the EIA Regulations (2014, as amended) and any other listed activities necessary for the realisation of such facilities, and where the greater part of the proposed facility is to occur in one or more such Strategic Transmission Corridors, must follow a BA procedure (and not a full S&EIA). The timeframe for decision-making is 57 days. Routes that have been pre-negotiated with landowners must be submitted as part of the application for an EA. The proposed Sol Invictus 132kV OHPL falls within the Northern Strategic Transmission Corridor of the promulgated Strategic Transmission Corridors per GN 113 and will therefore be subject to the shorter decision-making timeframes.
National Protected Area Expansion Strategy, 2010	The National Protected Area Expansion Strategy 2010 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010). The OHPL falls within the Kamiesberg Bushmanland Augrabies NPAES focus area (**Figure 1-3**). The Kamiesberg Bushmanland Augrabies focus area, in the Northern Cape, represents the largest remaining natural area for the expansion of the protected area network. It provides an opportunity to protect 22 Desert and Succulent Karoo vegetation types, mostly completely

APPLICABLE POLICY	DESCRIPTION OF POLICY
	unprotected, several river types that are still intact but not protected, and important ecological gradients and centres of endemism.

2.2 PROVINCIAL AND MUNICIPAL LEGAL AND REGULATORY FRAMEWORK

Table 2-3: Provincial and Municipal Legislation and Plans

APPLICABLE LEGISLATION / PLAN	DESCRIPTION OF LEGISLATION / PLAN
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	The purpose of the act is to provide for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act and to provide for the issuing of permits and other authorisations. Schedule 1 and 2 of the Act give extensive lists of specially protected and protected fauna and flora species. Refer to **Section 6.1.9** of this report for further details on flora species present on site.
Northern Cape CBA Map (2016)	The Northern Cape CBA Map identifies biodiversity priority areas, CBAs and Ecological Support Areas (ESAs), which, together with Protected Areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole. The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province. These include the: — Namakwa District Biodiversity Sector Plan; — Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e. Bokkeveld and Nieuwoudtville); and — Richtersveld Municipality Biodiversity Assessment. As the proposed Sol Invictus OHPL traverses a CBA, a biodiversity impact assessment has been undertaken as part of the BA Process.
Namakwa Biodiversity Sector Plan	The Northern Cape Department of Environment and Nature Conservation published the Namakwa Biodiversity Sector Plan in 2008. The purpose of the plan is to ensure that biodiversity information can be accessed and utilized by local municipalities within the Namakwa District Municipality (NDM) to inform land use planning and development as well as decision making processes within the NDM. Furthermore, it is intended to help guide land use planning, environmental assessments and authorisations and natural resource management in order to promote development that occurs in a sustainable manner. The plan includes a map of CBAs for the Namakwa District. The CBA map indicates the most efficient selection and classification of land portions requiring safeguarding to meet national biodiversity objectives. As the proposed Sol Invictus OHPL traverses a CBA, a biodiversity impact assessment has been undertaken as part of the BA Process.
Northern Cape Provincial Growth and Development Strategy (NCPGDS)	The NCPGDS identifies poverty reduction as the most significant challenge facing the government and its partners. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The NCPGDS notes that the only effective way to reduce poverty is through long-term sustainable economic growth and development. The sectors where economic growth and development can be promoted include: — Agriculture and Agro-processing; — Fishing and Mariculture; — Mining and mineral processing;

APPLICABLE LEGISLATION / PLAN	DESCRIPTION OF LEGISLATION / PLAN
	— Transport; — Manufacturing; and — Tourism. However, the NCPGDS also notes that economic development in these sectors also requires: — Creating opportunities for lifelong learning; — Improving the skills of the labour force to increase productivity; — Increasing accessibility to knowledge and information. The achievement of these primary development objectives depends on the achievement of a number of related objectives that, at a macro-level, describe necessary conditions for growth and development. These are: — Developing requisite levels of human and social capital; — Improving the efficiency and effectiveness of governance and other development institutions; and — Enhancing infrastructure for economic growth and social development. Of specific relevance to the OHPL, the NCPGDS make reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of energy sources such as ***solar energy***, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised. The NCPGDS also highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment. The proposed OHPL therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province. In this regard care will need to be taken to ensure that the proposed OHPL does not negatively impact on the region's natural environment. In this regard the NCPGDS notes that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile eco-systems and vulnerability to climatic variation. The document also indicates that due to the province's exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility and associated OHPL, do not affect the tourism potential of the province.
Northern Cape Provincial Spatial Development Framework (NCSDF)	The Northern Cape Provincial Spatial Development Framework (NCSDF) (2012) lists a number of sectoral strategies and plans are to be read and treated as key components of the PSDF. Of these there are a number that are relevant to the proposed OHPL. These include: — Sectoral Strategy 1: Provincial Growth and Development Strategy of the Provincial Government; — Sectoral Strategy 2: Comprehensive Growth and Development Programme of the Department of Agriculture, Land Reform and Rural Development; — Sectoral Strategy 5: Local Economic Development (LED) Strategy of the Department of Economic Development and Tourism; — Sectoral Strategy 11: Small Micro Medium Enterprises (SMME) Development Strategy of the Department of Economic Development and Tourism; — Sectoral Strategy 12: Tourism Strategy of the Department of Economic Development and Tourism; and

APPLICABLE LEGISLATION / PLAN	DESCRIPTION OF LEGISLATION / PLAN
	— Sectoral Strategy 19: Provincial renewable energy strategy (to be facilitated by the Department of Economic Development and Tourism). Under Section B 14.4, Energy Sector, the NCSDF (2012), notes the total area of high radiation in South Africa amounts to approximately 194 000 km^2 of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km^2 of mirror surface in a solar thermal power station were 30.2 MW and only 1% of the area of high radiation were available for solar power generation, then generation potential would equate to approximately 64 GW. A mere 1.25% of the area of high radiation could thus meet projected South African electricity demand in 2025 (80 GW) (NCPSDF, 2012). However, the SDF does indicate that this would require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres. Section C8.2.3, Energy Objectives, sets out the energy objectives for the Northern Cape Province. The section makes specific reference to renewable energy. The objectives are listed below: — Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts. — Develop and institute innovative new energy technologies to improve access to reliable, sustainable, and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution, and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector. — Develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10 000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013. Section C8.3.3, Energy Policy, sets out the policy guidelines for the development of the energy sector, with specific reference to the renewable energy sector. — The construction of infrastructure must be strictly regulated in terms of the spatial plans and guidelines put forward in the PSDF. They must be carefully placed to avoid visual impacts on landscapes of significant symbolic, aesthetic, cultural or historic value and should blend in with the surrounding environment to the extent possible. — EIAs undertaken for such construction must assess the impacts of such activities.
Namakwa District Municipality Integrated Development Plan (IDP)	The Namakwa District Municipality IDP (2019/2020) notes that the vision of the Namakwa DM is: 'Namakwa District, the centre of excellence'. The Mission statement for the MD includes: — Stimulating radical economic and social transformation. — Fostering partnerships with relevant role-players. — Supporting and capacitating local municipalities. — Maintaining transparent and accountable processes. — Providing local leadership. Key developmental issues facing the DM include: — The DM has a large cohort of people in the economically active age category (15-64). This highlights the need for local employment creation. — The youthful population group (15-34) has increased by 2.4%, further emphasizing the need for local employment creation. — Between 2004 and 2014, the urbanization rate in the DM has increased from 77.3% to 91.2% and that in the NKLM from 88.4% to 95.3%. These increases in urbanization have increased pressure on local authorities to provide municipal and social services. — The DM's economic outlook is depressed. This is linked to limited new mining activity and the ongoing drought.

APPLICABLE LEGISLATION / PLAN	DESCRIPTION OF LEGISLATION / PLAN
	Key developmental priorities identified for the DM include: — Economic diversification, specifically the development of local agricultural and mining manufacturing sectors. — New mining and renewable energy projects should be supported. The IDP notes support for the commitments made in terms of the Paris Accord on Climate Change. The IDP notes that the DM is located in an arid region, prone to droughts, and therefore very vulnerable to global warming.
Namakwa District Climate Change Response Plan	The Namakwa District Climate Change Response Plan (2017-2022) was developed through the Local Government Climate Change Support program. It includes a climate change vulnerability assessment and associated climate change responses which address these vulnerabilities. The vulnerability assessment identified 17 of the DM's socio-economic indicators which are both very exposed and highly sensitive to climate change but have very low capacity to adapt. These included the agricultural sector, tourism, water-dependent municipal services and the coastal and marine environment. Priority responses are identified for the key sectors, including agriculture, biodiversity and habitat conservation, human health, and human settlements. These include mainstreaming climate change preparedness into all future IDPs, and implementation of a Namakwa Renewable Energy Strategy which supports the development and use of non-fossil sources of energy.
Nama Khoi Local Municipality IDP (2019/2020)	The Nama Khoi IDP (2019/2020) Strategic Objectives are aligned with the 2010 National Outcomes and 2012 National Development Plan, and include: — Fostering the growth if an effective and efficient skilled workforce. — Maintaining a healthy and safe environment. — Expanding and strengthening relationships with LED stakeholders. — Sustainable delivery of basic services. — Effective land use management. — Mainstreaming sustainability and optimizing resource efficiency. The IDP notes that the closure of mines in the LM and DM has hit communities very hard, contributing to high poverty rates. At the same time, the LM has seen a mushrooming of small-scale farmers, as former labour sending communities try to find an alternative source of livelihoods.
Khâi-Ma Local Municipality IDP (2017 – 2022)	The Khai-Ma IDP (2017/2022) lists five Key Performance Areas (KPAs) developed to guide how the municipality must respond to the identified (and prioritised) community needs and challenges. The objectives are listed and linked to outcomes, predetermined objectives (PDO) and aligned with the higher-order 'performance directives. The SOs are: — KPA 1 Infrastructure Development and Basic Service Delivery. — KPA 2 Institutional Development and Transformation. — KPA 3 Economic Development. — KPA 4 Financial sustainable and viability. — KPA 5 Good governance and public participation. KPA 1 and 3 are relevant to the proposed development.

2.3 INTERNATIONAL STANDARDS AND GUIDELINES

2.3.1 IFC PERFOMANCE STANDARDS

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries. The

IFC is a member of the World Bank Group (WBG) and is headquartered in Washington, D.C., United States. It was established in 1956 as the private sector arm of the WBG to advance economic development by investing in strictly for-profit and commercial projects that purport to reduce poverty and promote development.

The IFC's stated aim is to create opportunities for people to escape poverty and achieve better living standards by mobilizing financial resources for private enterprise, promoting accessible and competitive markets, supporting businesses and other private sector entities, and creating jobs and delivering necessary services to those who are poverty-stricken or otherwise vulnerable. Since 2009, the IFC has focused on a set of development goals that its projects are expected to target. Its goals are to increase sustainable agriculture opportunities, improve health and education, increase access to financing for microfinance and business clients, advance infrastructure, help small businesses grow revenues, and invest in climate health.

The IFC is owned and governed by its member countries but has its own executive leadership and staff that conduct its normal business operations. It is a corporation whose shareholders are member governments that provide paid-in capital and which have the right to vote on its matters. Originally more financially integrated with the WBG, the IFC was established separately and eventually became authorized to operate as a financially autonomous entity and make independent investment decisions. It offers an array of debt and equity financing services and helps companies face their risk exposures, while refraining from participating in a management capacity. The corporation also offers advice to companies on making decisions, evaluating their impact on the environment and society, and being responsible. It advises governments on building infrastructure and partnerships to further support private sector development.

The IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. IFC's Access to Information Policy reflects IFC's commitment to transparency and good governance on its operations and outlines the Corporation's institutional disclosure obligations regarding its investment and advisory services. The Performance Standards (PSs) are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the PSs to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation to achieve its overall development objectives. The PSs may also be applied by other financial institutions (FIs).

The Project is considered a Category B project in terms of the IFC Policy on E&S Sustainability (2012), having the potential to cause limited adverse environmental or social risks and/or impacts that are few in number, generally site specific, largely reversible, and readily addressed through mitigation measures.

The objectives and applicability of the eight PSs are outlined in **Table 2-4**.

Table 2-4: Objectives and Applicability of the IFC Performance Standards

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts		
Overview	Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.	
Objectives	— To identify and evaluate environmental and social risks and impacts of the project. — To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.	

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
	— To promote improved environmental and social performance of clients through the effective use of management systems. — To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately. — To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.		
Aspects	1.1	Policy	The IFC Standards state under PS 1 (Guidance Note 23) that "*the breadth, depth and type of analysis included in an ESIA must be proportionate to the nature and scale of the proposed project's potential impacts as identified during the course of the assessment process*." This document is the draft deliverable from the BA process undertaken for the proposed Project. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMPr has been compiled and is included in **Appendix G**. Red Rocket, as the project Sponsor, has a corporate ESMS which aligns with the Equator Principles, the IFC Performance Standards and applicable WBG/IFC Environmental, Health and Safety (EHS) and Sector specific Guidelines and applicable Good International Industry Practice (GIIP). All Red Rocket's renewable energy projects, from inception, development, construction, operation, and any decommissioning are required to fully comply with the ESMS requirements and expectations. The ESMS will be applicable to Sol Invictus.
	1.2	Identification of Risks and Impacts	
	1.3	Management Programmes	
	1.4	Organisational Capacity and Competency	
	1.5	Emergency Preparedness and Response	
	1.6	Monitoring and Review	
	1.7	Stakeholder Engagement	
	1.8	External Communication and Grievance Mechanism	
	1.9	Ongoing Reporting to Affected Communities	
Performance Standard 2: Labour and Working Conditions			
Overview	Performance Standard 2 recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers.		
Objectives	— To promote the fair treatment, non-discrimination, and equal opportunity of workers. — To establish, maintain, and improve the worker-management relationship. — To promote compliance with national employment and labour laws. — To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. — To promote safe and healthy working conditions, and the health of workers. — To avoid the use of forced labour.		
Aspects	2.1	— Working Conditions and Management of Worker Relationship — Human Resources Policy and Management — Working Conditions and terms of Engagement — Workers organisation — Non- Discrimination and Equal Opportunity — Retrenchment — Grievance Mechanism	PS2 is not considered highly applicable as construction activities will not be significant for a project of this nature and scale. This BA Report and the EMPr, however, incorporate the requirements for compliance with local and international Labour and Working legislation and good practice on the part of the contractors. Formal human resource and labour policies will be compiled in the event that the project is developed in the future.

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
	2.2	— Protecting the Workforce — Child Labour — Forced Labour	
	2.3	Occupational health and Safety	
	2.4	Workers Engaged by Third Parties	
	2.5	Supply Chain	
Performance Standard 3: Resource Efficiency and Pollution Prevention			
Overview	Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world.		
Objectives	— To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. — To promote more sustainable use of resources, including energy and water. — To reduce project related GHG emissions.		
Aspects	3.1	— Policy Resource Efficiency — Greenhouse Gases — Water Consumption	PS3-related impacts, such as the management of construction waste, hazardous substances, and stormwater are assessed in **Section 7** of this report. There are no material resource efficiency issues associated with the Project. Refer to the EMPr for general resource efficiency measures. The establishment and operation of transmission lines is not GHG emissions intensive and a climate resilience study or a GHG emissions-related assessment is not deemed necessary for a project of this nature. As supporting infrastructure to the Sol Invictus PVSEF, the OHPL seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. The transmission line allows electricity generated from solar PV facilities to be delivered to the national grid, potentially reducing GHG emissions associated with traditional power generating facilities, such as coal. Globally, renewable energy generation promotes standards in environmental sustainability, contributes to the mitigation of climate change impacts, and improve energy security. Reduced carbon emissions through the use of renewable energy would have benefits in terms of global warming and climate change. In terms of site location, the proposed project is located in an area that has suitably high solar radiation intensities and is thus considered to be an efficient use of available resources. Dust air pollution in the construction phase has been adequately addressed in the EMPr. The Project will not result in the release of industrial effluents. Potential pollution associated with sanitary wastewater is low and mitigation measures have been included in the EMPr. Land contamination of the site from historical land use (i.e. low intensity agricultural / grazing) is not considered to be a cause for concern.
	3.2	— Pollution Prevention — Air Emissions — Stormwater — Waste Management — Hazardous Materials Management — Pesticide use and Management	

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
			The waste generation profile of the project is not complex. Waste mitigation and management measures have been included in EMPr. Hazardous materials are not a key issue; small quantities of construction materials (oil, grease, diesel fuel etc.) are the only wastes expected to be associated with the project. The EMPr identifies these anticipated hazardous materials and recommends relevant mitigation and management measures.
Performance Standard 4: Community Health, Safety, and Security			
Overview	Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.		
Objectives	— To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. — To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities		
Aspects	4.1	— Community Health and Safety — Infrastructure and Equipment Design and Safety — Hazardous Materials Management and Safety — Ecosystem Services — Community Exposure to Disease — Emergency Preparedness and Response	The requirements included in PS4 have been addressed in the BAR process and the development of the EMPr. The following generic plans have been included in the EMPr: — Emergency Response Plan; — Transport Management Plan; — HIV/AIDS Management Plan; and — Security Policy. All plans will be made site specific as part of the financial close process, in the event that the project is developed in the future. The location of the powerline outside of the security perimeter of the PVSEF results in potential risk of electrocution and potential electromagnetic fields exposure. These risks are qualitatively evaluated in the environmental and social assessment and the clients' standard safety and security measures. Additional measures are detailed in the EMPr.
	4.2	Security Personnel	
Performance Standard 5: Land Acquisition and Involuntary Resettlement			
Overview	Performance Standard 5 recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.		
Objectives	— To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. — To avoid forced eviction. — To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. — To improve, or restore, the livelihoods and standards of living of displaced persons. — To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.		
Aspects	5.1	— Displacement — Physical Displacement — Economic Displacement	PS5 is not applicable to the proposed Sol Invictus OHPL as no physical or economic displacement or livelihood restoration will be required.

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
		— Private Sector Responsibilities under Government Managed Resettlement	The proposed OHPL infrastructure is to be established is located on privately owned land that is utilised for agriculture (i.e. low intensity grazing) and mining by the landowners. The land will continue to be used for agriculture and mining without impediment by the OHPL. No physical structures are directly impacted by the Project, and the affected area (i.e. servitude) is to be leased from the land owner.
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources			
Overview	Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.		
Objectives	— To protect and conserve biodiversity. — To maintain the benefits from ecosystem services. — To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.		
Aspects	6.1	Protection and Conservation of Biodiversity	The powerline route traverses a CBA, ESA and NPAES focus area. A Biodiversity Impact Assessment as well as a Bat Impact Assessment and Freshwater Impact Assessment have been undertaken for the proposed Sol Invictus OHPL. Refer to **Appendix F.** The methodologies for the specialist assessments included a combination of literature review, in-field surveys and sensitivity mapping. This substantively complies with the PS6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa. The prevalence of invasive alien species on the site is low; however, the BAR process had noted the propensity for the spread of alien invasive species in the construction and operational phases and mitigation and management measures are included in the EMPr.
Performance Standard 7: Indigenous People			
Overview	Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded.		
Objectives	— To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. — To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. — To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. — To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. — To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. — To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.		

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
Aspects	7.1	General — Avoidance of Adverse Impacts — Participation and Consent	PS7 is not applicable to the proposed Sol Invictus OHPL. As per the international instruments under the United Nations (UN) Human Rights Conventions, no indigenous peoples are present within the study area.
	7.2	Circumstances Requiring Free, Prior, and Informed Consent — Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use — Critical Cultural Heritage — Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use	
	7.3	Mitigation and Development Benefits	
	7.4	Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues	
Performance Standard 8: Cultural Heritage			
Overview	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations.		
Objectives	— To protect cultural heritage from the adverse impacts of project activities and support its preservation. — To promote the equitable sharing of benefits from the use of cultural heritage.		
Aspects	8.1	Protection of Cultural Heritage in Project Design and Execution	In accordance with prevailing national legislation, SAHRA was notified of the proposed project on 05 July 2021 by way of registering a description of the project via the SAHRIS online system. An interim comment was received from the SAHRA case officer on 04 August 2021 requesting a Heritage Impact Assessment (HIA) (**Appendix F4**). A Chance Find Procedure is included in the EMPr (**Appendix G**).

2.3.2 EQUATOR PRINCIPLES

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing, and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making.

The EPs apply globally to all industry sectors and to five financial products 1) Project Finance Advisory Services, 2) Project Finance, 3) Project-Related Corporate Loans, 4) Bridge Loans and 5) Project-Related Refinance and Project-Related Acquisition Finance. The relevant thresholds and criteria for application is described in detail in the Scope section of the EP. Currently 125 Equator Principles Financial Institutions (EPFIs) in 37 countries have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets. EPFIs commit to implementing the EPs in their internal environmental and social policies, procedures and standards for financing projects and will not provide Project Finance or Project-Related Corporate Loans to projects where the client will not, or is unable to, comply with the EPs.

While the EPs are not intended to be applied retroactively, EPFIs apply them to the expansion or upgrade of an existing project where changes in scale or scope may create significant environmental and social risks and impacts, or significantly change the nature or degree of an existing impact. The EPs have greatly increased the attention and focus on social/community standards and responsibility, including robust standards for indigenous peoples, labour standards, and consultation with locally affected communities within the Project Finance market.

The EPs have also helped spur the development of other responsible environmental and social management practices in the financial sector and banking industry and have supported member banks in developing their own Environmental and Social Risk Management Systems.

The requirements and applicability of the EPs are outlined in **Table 2-5**.

It should be noted that Principles 8 and 10 relate to a borrower's code of conduct and are therefore not considered relevant to the BA process and have not been included in this discussion.

Table 2-5: Requirements and Applicability of the Equator Principles

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
Principle 1: Review and Categorisation		
Overview	When a project is proposed for financing, the EPFI will, as part of its internal social and environmental review and due diligence, categorise such project based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the IFC. Using categorisation, the EPFI's environmental and social due diligence is commensurate with the nature, scale, and stage of the Project, and with the level of environmental and social risks and impacts. The categories are: – Category A: Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented; – Category B: Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and – Category C: Projects with minimal or no adverse environmental and social risks and/or impacts.	Based upon the significance and scale of the Project's environmental and social impacts, the proposed project is regarded as a Category B project i.e. a project with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
Principle 2: Environmental and Social Assessment		
Overview	For all Category A and Category B Projects, the EPFI will require the client to conduct an appropriate Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and scale of impacts of the proposed Project (which may include the illustrative list of issues found in Exhibit II). The Assessment Documentation should propose measures to minimise, mitigate, and where residual impacts remain, to compensate/ offset/ remedy for risks and impacts to Workers, Affected Communities, and the environment, in a manner relevant and appropriate to the nature and scale of the proposed Project. The Assessment Documentation will be an adequate, accurate and objective evaluation and presentation of the environmental and social risks and impacts,	This document is the draft deliverable from the BA process undertaken for the proposed Project. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMPr has been compiled and is included in **Appendix G**.

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	whether prepared by the client, consultants or external experts. For Category A, and as appropriate, Category B Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA). One or more specialised studies may also need to be undertaken. For other Category B and potentially C Projects, a limited or focused environmental or social assessment may be appropriate, applying applicable risk management standards relevant to the risks or impacts identified during the categorisation process. The client is expected to include assessments of potential adverse Human Rights impacts and climate change risks as part of the ESIA or other Assessment, with these included in the Assessment Documentation.	
Principle 3: Applicable Environmental and Social Standards		
Overview	The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. The EPFI's due diligence will include, for all Category A and Category B Projects globally, review and confirmation by the EPFI of how the Project and transaction meet each of the Principles. For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC PS and WBG EHS Guidelines. For Projects located in Designated Countries, compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.	As South Africa has been identified as a non-designated country, the reference framework for environmental and social assessment is based on the IFC PS. In addition, this BAR process has been undertaken in accordance with NEMA (the host country's relevant legislation).
Principle 4: Environmental and Social Management System and Equator Principles Action Plan		
Overview	For all Category A and Category B Projects, the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree on an Equator Principles Action Plan (EPAP). The EPAP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.	Red Rocket has a corporate ESMS which aligns with the Equator Principles, the IFC Performance Standards and applicable World Bank/IFC Environmental, Health and Safety (EHS) and Sector specific Guidelines and applicable GIIP. All Red Rocket's renewable energy projects, from inception, development, construction, operation, and any decommissioning are required to fully comply with the requirements of the ESMS requirements and expectations. The ESMS will be applicable to Sol Invictus. A formal project specific ESMS will be compiled in the event that the project is developed in the future. Management and monitoring plans outlines in the EMPr will serve as the basis for an ESMS for the proposed Project.
Principle 5: Stakeholder Engagement		
Overview	EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities Workers and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities,	The BA process includes an extensive stakeholder engagement process which complies with the South African EIA Regulations. The process includes consultations with local communities, nearby businesses, and a range of government sector stakeholders (state owned enterprises, national, provincial and local departments).

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	the client will conduct an Informed Consultation and Participation process. To accomplish this, the appropriate assessment documentation, or non-technical summaries thereof, will be made available to the public by the borrower for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The borrower will take account of and document the process and results of the consultation, including any actions agreed resulting from the consultation. Disclosure of environmental or social risks and adverse impacts should occur early in the Assessment process, in any event before the Project construction commences, and on an ongoing basis. All Projects affecting Indigenous Peoples will be subject to a process of Informed Consultation and Participation, and will need to comply with the rights and protections for Indigenous Peoples contained in relevant national law, including those laws implementing host country obligations under international law.	The stakeholder engagement process solicits interest from potentially interested parties through the placement of site notices and newspaper advertisements as well as written and telephonic communication. The stakeholder engagement process is detailed in **Section 3.6.**
Principle 6: Grievance Mechanism		
Overview	For all Category A and, as appropriate, Category B Projects, the EPFI will require the client, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by Affected Communities and Workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The borrower will inform the Affected Communities and Workers about the grievance mechanism in the course of the stakeholder engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible, at no cost, and without retribution to the party that originates the issue or concern.	The EMPr includes a *Grievance Mechanism Process for Public Complaints and Issues*. This procedure effectively allows for external communications with members of the public to be undertaken in a transparent and structured manner. This procedure will be revised and updated as part of the EMPr amendment process in the event that the project is developed in the future.
Principle 7: Independent Review		
Overview	For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence, and assess Equator Principles compliance.	This principle will only become applicable in the event that that the project is developed in the future.
Principle 9: Independent Monitoring and Reporting		
Overview	To assess Project compliance with the Equator Principles after Financial Close and over the life of the loan, the EPFI will require independent monitoring and reporting for all Category A, and as appropriate, Category B projects. Monitoring and reporting should be provided by an Independent Environmental and Social Consultant; alternatively, the EPFI will require	This principle will only become applicable in the event that that the project is developed in the future.

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	that the client retain qualified and experienced external experts to verify its monitoring information, which will be shared with the EPFI in accordance with the frequency required.	

2.4 OTHER GUIDELINES AND BEST PRACTICE RECOMMENDATIONS

2.4.1 WORLD BANK GROUP ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES

EHS GENERAL GUIDELINES

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of GIIP. They contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs.

The EHS General Guidelines contain information on cross-cutting environmental, health and safety issues potentially applicable to all industry sectors, used together with the relevant industry sector guideline(s), to guide the development of management and monitoring strategies for various project-related impacts.

EHS GUIDELINES FOR ELECTRIC POWER TRANSMISSION AND DISTRIBUTION

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas.

The Guidelines includes industry-specific impacts and management, provides a summary of EHS issues associated with electric power transmission and distribution that occur during the construction and operation phases of a facility, along with recommendations for their management. Additionally, it includes performance indicators and monitoring related to the environment an occupational health and safety.

These Guidelines have been considered in the impact assessment and formulation of mitigation measures in this BAR.

2.4.2 GENERIC EMPR RELEVANT TO AN APPLICATION FOR SUBSTATION AND OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE

NEMA requires that an EMPr be submitted where an EIA has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation. The content of an EMPr must either contain the information set out in Appendix 4 of the EIA Regulations, 2014, as amended, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the CA.

GN 435 of 22 March 2019 identified a generic EMPr relevant to applications for substations and overhead electricity transmission and distribution infrastructure which require authorisation in terms of Section 42(2) of NEMA. Applications for substations and overhead electricity transmission and distribution infrastructure that trigger Activity 11 or Activity 47 of Listing Notice 1 or Activity 9 of Listing Notice 2 and any other listed or specified activities must use the generic EMPr.

The objective of the generic EMPr is "*to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature*."[1]

A pre-application consultation meeting was held with DFFE on 28 April 2021, where the proposed EMPr for the Project was discussed, amongst other agenda items. During the meeting, DFFE confirmed that both the generic EMPr for transmission lines as well as the generic EMPr for substations must be submitted for the Project. Refer to **Appendix I** for the approved meeting minutes.

The generic EMPrs are provided in the Sol Invictus OHPL EMPr included as **Appendix G**.

[1] DEA (2019) *Appendix 1: Generic Environmental Management Programme (EMPr) for the Development and Expansion for Overhead Electricity Transmission and Distribution Infrastructure*

3 BASIC ASSESSMENT PROCESS

3.1 OBJECTIVES OF THE BASIC ASSESSMENT PROCESS AS PER THE PROCEDURAL FRAMEWORK

As defined in Appendix 1 of the EIA Regulations, 2014 (as amended), the objective of the impact assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine—
    - The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    - The degree to which these impacts—
        - Can be reversed;
        - May cause irreplaceable loss of resources; and
        - Can be avoided, managed, or mitigated.
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to–
    - Identify and motivate a preferred site, activity and technology alternative;
    - Identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

3.2 DFFE WEB-BASED ENVIRONMENTAL SCREENING TOOL

DFFE has developed the National Web-based Environmental Screening Tool to flag areas of potential environmental sensitivity related to a site as well as a development footprint and produces the screening report required in terms of regulation 16 (1)(v) of the EIA Regulations (2014, as amended). The *Notice of the requirement to submit a report generated by the national web-based environmental screening tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended* (GN 960 of July 2019) states that the submission of a report generated from the national web-based environmental screening tool, as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as amended, is compulsory when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the EIA Regulations, 2014 as of 04 October 2019.

The Screening Report generated by the National Web-based Environmental Screening Tool contains a summary of any development incentives, restrictions, exclusions, or prohibitions that apply to the proposed development footprint as well as the most environmentally sensitive features on the footprint based on the footprint sensitivity screening results for the application classification that was selected.

A screening report for the proposed OHPL was generated on 06 July 2021 and is attached as **Appendix H**.

3.2.1 SENSITIVITIES IDENTIFIED

The Screening Report for the project identified various sensitivities for the site. The report also generated a list of specialist assessments that should form part of the BA based on the development type and the environmental sensitivity of the site. Assessment Protocols in the report provide minimum information to be included in a specialist report to facilitate decision-making.

Table 3-1 below provides a summary of the sensitivities identified for the development footprint.

Table 3-1: Sensitivities identified in the screening report

THEME	VERY HIGH SENSITIVITY	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVIY
Agricultural Theme				✓
Animal Species Theme		✓		
Aquatic Biodiversity Theme	✓			
Archaeological and Cultural Heritage Theme				✓
Civil Aviation Theme		✓		
Defence Theme				✓
Palaeontology Theme			✓	
Plant Species Theme			✓	
Terrestrial Biodiversity Theme	✓			

3.2.2 SPECIALIST ASSESSMENTS IDENTIFIED

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments were identified for inclusion in the assessment report:

- Agricultural Impact Assessment
- Landscape/Visual Impact Assessment
- Archaeological and Cultural Heritage Impact Assessment
- Palaeontology Impact Assessment
- Terrestrial Biodiversity Impact Assessment
- Aquatic Biodiversity Impact Assessment
- Avian Impact Assessment
- Civil Aviation
- Radio Frequency Interference (RFI) Assessment
- Geotechnical Assessment
- Plant Species Assessment
- Animal Species Assessment

3.2.3 MOTIVATION FOR SPECIALIST STUDIES

The report recognises that "*it is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the footprint situation*."

As summarised in **Table 1-4** above, the following specialist assessments have been undertaken for the project based on the environmental sensitivities identified by the Screening Report and are attached in **Appendix F**:

- Biodiversity Impact Assessment (inclusive of terrestrial biodiversity, plant species and animal species);
- Bat Impact Assessment;
- Freshwater Ecological Assessment (inclusive of aquatic biodiversity and hydrology);
- Visual Impact Assessment;
- Soils and Agricultural Potential Assessment;
- Socio-economic Impact Statement; and
- Archaeological and Cultural Heritage Desktop Assessment (inclusive of Palaeontology).

Three (3) of the identified specialist studies have not been undertaken as part of the BA process for the proposed Sol Invictus OHPL. Motivation for the exclusion of these specialist studies is provided below.

CIVIL AVIATION

A portion of the powerline falls within 8km of the Aggeneys Airport. A formal Civil Aviation Assessment will not be undertaken as part of the BA Process. Nevertheless, the relevant Authorities (such as the Civil Aviation Authority) will be included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought from these authorities as applicable.

An Application for the Approval of Obstacles will also be submitted to SACAA.

RFI ASSESSMENT

A Radio Frequency Interference (RFI) Study will not be undertaken. SKA-SA conducted a high-level risk assessment to determine the impact of the proposed Sol Invictus PVSEF cluster on the SKA in December 2016. The nearest SKA station is approximately 180km from the PVSEF site. SKA-SA confirmed that the proposed PVSEF cluster poses a very low risk of detrimental impact on the SKA given the distance. No mitigation measures or further studies were proposed.

SKA-SA will be engaged with as part of the Public Participation Process.

GEOTECHNICAL

A Geotechnical Assessment will not be undertaken as part of the BA Process as this will be undertaken during the design phase, once preferred bidder status is obtained.

3.3 APPLICATION FOR ENVIRONMENTAL AUTHORISATION

The application phase consisted of a pre-application consultation with DFFE and subsequently completing the appropriate application form as well as the submission and registration of the application for EA with the DFFE. The pre-application meeting was held with DFFE on 20 July 2021 (meeting minutes attached as **Appendix I**) and the application form submitted to the DFFE prior to distribution of the Draft BAR for Public Review. A reference number will be included in the Final BAR following acknowledgment of receipt from the DFFE.

3.4 BASELINE ENVIRONMENTAL ASSESSMENT

The description of the environmental attributes of the Project area was compiled through a combination of desktop reviews and site investigations. Desktop reviews made use of available information including existing reports, aerial imagery, and mapping. The specialist teams undertook site investigations between 14 June and 08 September 2021 to provide impact assessments for the proposed OHPL route.

3.5 IMPACT ASSESSMENT METHODOLOGY

3.5.1 ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct,[2] indirect,[3] secondary[4] as well as cumulative[5] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[6] presented in **Table 3-2**.

Table 3-2: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				

[2] Impacts that arise directly from activities that form an integral part of the Project.
[3] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[4] Secondary or induced impacts caused by a change in the Project environment.
[5] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[6] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

IMPACT SIGNIFICANCE RATING			
Total Score	0 – 30	31 to 60	61 – 100
Significance Rating (Negative (-)	**Low (-)**	**Moderate (-)**	**High (-)**
Significance Rating (Positive (+)	**Low (+)**	**Moderate (+)**	**High (+)**

3.5.2 IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The mitigation sequence/hierarchy is shown in **Figure 3-1** below.

The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

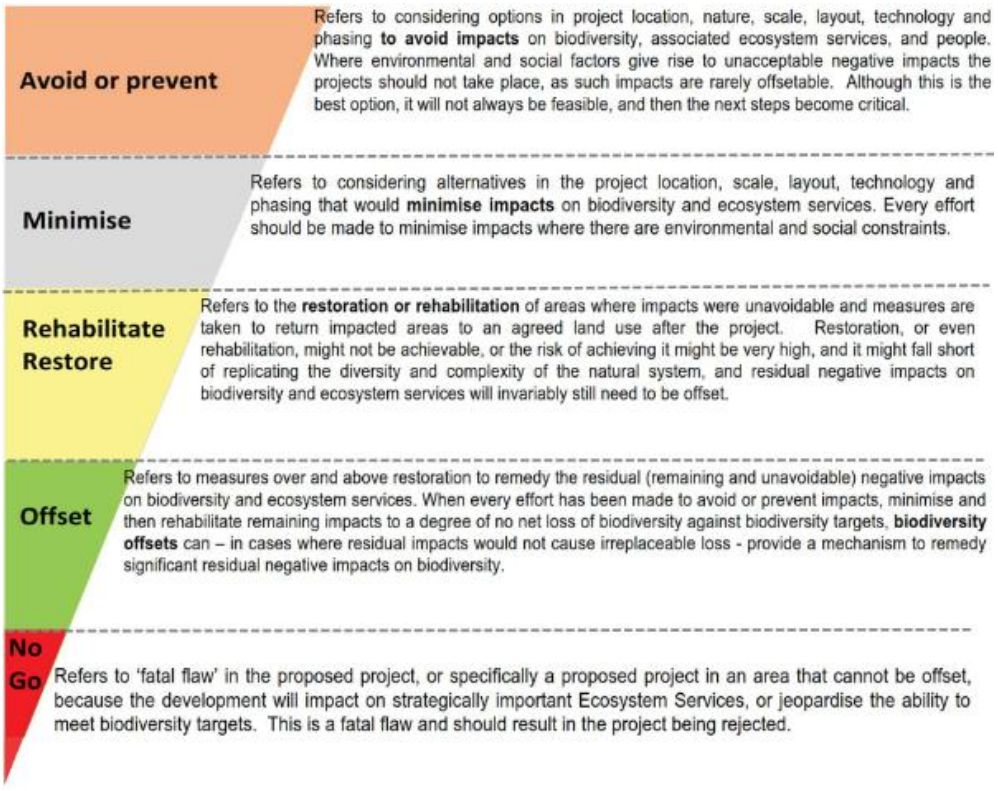


Figure 3-1: Mitigation Sequence/Hierarchy

3.6 STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder engagement (public participation) is a requirement of the BA process. It consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the BA decision-making process. Effective engagement requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project. The objectives of the stakeholder engagement process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the proposed project;
- Clearly outline the scope of the proposed project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues, and solutions.

A Stakeholder Engagement Report (SER) has been included in **Appendix D** and will be updated in the final BAR, detailing the project's compliance with Chapter 6 of the NEMA EIA Regulations 2014, as amended.

3.6.1 STAKEHOLDER CONSULTATION

As part of the pre-application consultation meeting held with DFFE on 28 April 2021, the proposed plan for public participation was discussed. A public participation plan was subsequently submitted to DFFE, along with the meeting minutes, for approval on 05 May 2021. The meeting minutes and public participation plan were approved by DFFE on 18 May 2021. Refer to the SER for details of the approved public participation plan and stakeholder consultation undertaken to date.

3.6.2 PUBLIC REVIEW

The Draft BAR will be placed on public review for a period[7] of 30 days from **26 November 2021** to **17 January 2021**, at the following public places:

- Aggeneys Post Office, Havelock Ave, Aggeneys, 8893; and
- WSP website (https://www.wsp.com/en-ZA/services/public-documents).

WSP will collate comments received during the public review period and compile a Comments and Responses Report (CRR) that will be attached to the Final BAR as an Appendix.

[7] Regulation 3(2) of the Environmental Impact Assessment ("EIA") Regulations, 2014, as amended, promulgated in terms of the NEMA state that, "*the period of 15 December to 5 January must be excluded in/from the reckoning of days*". Additionally, Regulation 3(3) of the EIA Regulations, 2014, as amended further states that, "*Unless justified by exceptional circumstances, as agreed to by the competent authority, the proponent and applicant must refrain from conducting any public participation process during the period of 15 December to 5 January*". As such the period between 15 December 2021 and 5 January 2022 are excluded from the reckoning of days of the public review period.

3.7 ASSUMPTIONS AND LIMITATIONS

General assumptions and limitations relating to the BA process are listed below:

- The information provided by Red Rocket and the specialists is assumed to be accurate;
- WSP's assessment of the significance of impacts of the proposed project on the affected environment has been based on the assumption that the activities will be confined to those described in Section 4. If any substantial changes to the project description are made, impacts may need to be reassessed;
- Where detailed design information is not available, the precautionary principle (i.e. a conservative approach that overstates negative impacts and understates benefits) has been adopted;
- The competent authority would not require additional specialist input, as per the proposals made in this report, in order to make a decision regarding the application; and
- All information is assumed to be accurate and relevant at the time of writing this report.

Key assumptions and limitations relevant to the specialist assessments include:

- Biodiversity
  - The assessment area was based on the area provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
  - The area was only surveyed during a single site visit and therefore, this assessment does not consider temporal trends. In order to address this limitation is would be recommended that a site walkover be undertaken during the wet season for the placement of structures. This walkover would aim to identify and sensitive aspects to either be relocated or avoided (if feasible);
  - Only a single season survey was conducted for the respective studies, this constitutes a dry (cold) season survey with its limitations;
    - Flora identification is limited due to the lack of aboveground plant parts used to determine species, especially in regard to bulbous plants, the vegetation was dry and most plants had already lost the green flush;
    - It must be noted that during the walkthrough survey, only a fraction of the expected geophytes/annuals were visible due to their variable emergence patterns.
    - This is especially true for cold blooded animals, such as reptiles and amphibians, which are less active during these times.
  - Whilst every effort is made to cover as much of the site as possible, representative sampling is completed and by its nature, it is possible that some plant and animal species that are present on site were not recorded during the field investigations; and
  - The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.
- Avifauna:
  - Seasonal variance reduced species normally found in the area by 14% because the survey was conducted in mid-winter. Several other species are also nomadic and dependant on food and water sources characteristically sparse in winter.
- Socio-economic
  - Technical suitability
    - It is assumed that the development site represents a technically suitable site for the establishment of the proposed grid infrastructure. The site is also located in the Springbok REDZ and Northern Transmission Corridor.
  - Strategic importance of the project
    - The strategic importance of promoting renewable energy and associated grid infrastructure is supported by the national and provincial energy policies. However, this does not mean that site related issues can be ignored or overlooked.

- Fit with planning and policy requirements
  - Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the Socio-Economic Assessment process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported. However, the study recognises the strategic importance of wind energy and the technical, spatial and land use constraints required for Renewable Energy Facilities (REFs). The site is also located in the Springbok REDZ and Northern Transmission Corridor.
- Demographic data
  - Some of the information contained in some key policy and land use planning documents, such as IDPs etc., is based on the 2011 Census. These limitations do not have a material bearing on the findings of the Socio-Economic Assessment. In addition, information from the 2016 Community Survey has been added where it is available.
- Interviews
  - No interviews were undertaken as part of the SIA. However, given the sparsely populated character of the area and the presence of a number of existing powerlines, the social issues are likely to be limited.

- Freshwater
  - All watercourses within 500 m of the proposed powerline were delineated in fulfilment of GN509 of the National Water Act, 1998 (Act No. 36 of 1998) using various desktop methods including use of topographic maps, historical photographs and digital satellite imagery;
  - On-site delineation of the watercourses is confined to the proposed powerline and investigation area as depicted in Figures 1 and 2 below, and does not include the neighbouring and adjacent properties, although land uses and possible catchment impacts occurring on surrounding properties were taken into consideration;
  - The basis of South African methodologies for the formal identification and delineation of wetlands is primarily that of soil morphological indicators such as mottling and gleying, and presence of hydrophytic vegetation. However, a number of wetland types and conditions have been identified in which these soil morphological indicators do not readily apply, including temporary wetlands in very arid areas, which are often either 'too shallow, too saline, or too temporarily inundated" to exhibit typical wetland indicators in their soil (Day et al, 2010). Nevertheless, a number of abiotic and biotic features indicate periodic wetness and were thus used in conjunction with visual analysis of soil and topography to identify possible watercourses within the investigation area;
  - The delineation of the identified watercourses associated with the proposed powerline, as provided in this report, is considered accurate taking into consideration the conditions at the time of assessment and undulating topography of the area;
  - Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the watercourse zones will need to be surveyed and pegged according to surveying principles;
  - Watercourse and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater resource boundaries may occur, however, if the Department of Water Affairs and Forestry (DWAF) (2008) method is followed, all assessors should get largely similar results; and
  - With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, it is expected that the proposed powerline activities have been accurately assessed and considered, based on the field observations and the consideration of existing studies and monitoring data in terms of riparian and wetland ecology.

- Bats
  - The present Bat Impact Assessment was only based on a desktop evaluation of pertinent information. No field survey was performed.
  - Information on bats in South Africa is limited relative to more popular taxa such as birds and large mammals. E.g. not all bat roosts in caves and mine tunnels in the country are known.
  - No alternative route for the proposed OHPL was provided for this assessment.
- Heritage
  - We assume that the information provided by WSP is accurate;
  - We assume that the information provided in consulted reports and publications is accurate;
  - There were however no perceived significant limitations in conducting this archaeological assessment.
- Visual
  - This assessment was undertaken during the planning stage of the project and is based on information available at that time.

It is the view of WSP that these assumptions and limitations do not compromise the overall findings of the report as WSP verified and reviewed the information provided by Red Rocket and the specialists.

4 PROJECT DESCRIPTION

This section provides a description of the location of the project area and the site location alternatives considered for the project. The descriptions encompass the activities to be undertaken during the construction and operational phases as well as the consideration for site accessibility, water demand, supply, storage, and site waste management. This section also considers the need and desirability of the project in accordance with Appendix 1 of GNR 326.

4.1 LOCATION OF THE PROPOSED PROJECT

The proposed Project is located in the Namakwa District Municipality of the Northern Cape Province. Approximately 4.7 km of the OHPL, along with the collector substation, fall within Ward 4 of the Nama Khoi Local Municipality, and the remainder of the OHPL and Aggeneis substation fall within Ward 1 of the Khâi-Ma Local Municipality (**Figure 4-1**). The Project area is located approximately 5km south-west of the town of Aggeneys (at the closest) (refer to **Figure 1-1** above).

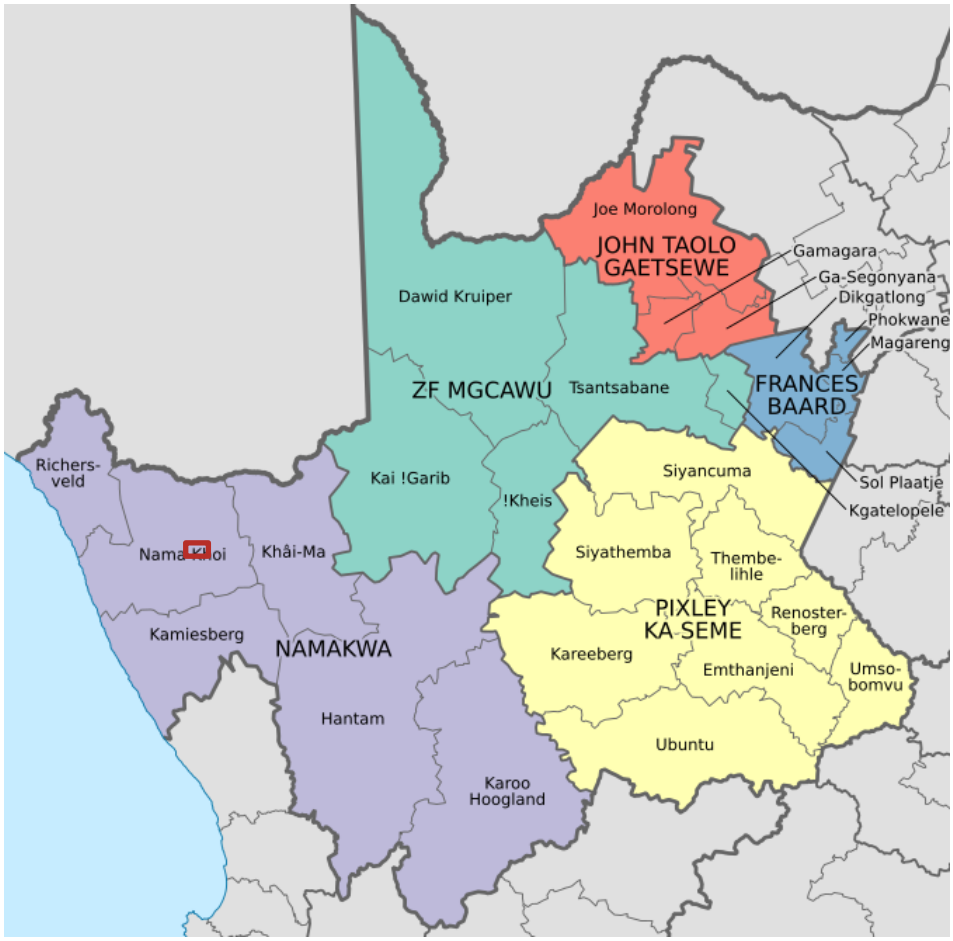


Figure 4-1: The study area (red polygon) in relation to the Northern Cape District and Local Municipalities

The proposed OHPL route runs from the proposed Sol Invictus PVSEF to the existing Eskom Aggeneis substation, located approximately 5 km south west of Aggeneys. **Figure 1-1** shows the alignment of the OHPL in relation to the proposed Sol Invictus PVSEF and existing Aggeneis substation as well as approximate routing of the OHPL.

The PVSEF site is located on one land parcel (Portion 5 of the Farm Ou Taaibosmond 56), which is situated approximately 4 km north of the N14 and approximately 20 km southwest of Aggeneys. The proposed Sol Invictus OHPL is proposed to be located over eight (8) properties owned by three (3) landowners (**Table 4-1**).

Table 4-1: Farm portions on which the proposed development is located

FARM NAME AND NUMBER	21 DIGIT SG CODE	MUNICIPALITY / PROVINCE	LAND USE	OWNER	FARM SIZE (HA)
Portion 5 of Farm 66	C05300000000006600005	Nama Khoi LM / Namakwa DM / Northern Cape	Grazing Proposed Sol Invictus PVSEF cluster	Blommeland Boerdery CC	5 769.40
Portion 6 of Farm 66	C05300000000006600006	Nama Khoi LM / Namakwa DM / Northern Cape	Grazing	Blommeland Boerdery CC	5 131.35
Portion 14 of Farm 66	C05300000000006600014	Nama Khoi LM / Namakwa DM / Northern Cape	Grazing	Blommeland Boerdery CC	1 669.35
Portion 5 of Farm 62	C05300000000006200005	Khâi-Ma LM Namakwa DM / Northern Cape	Grazing	Blommeland Boerdery CC	2 467.28
Portion 6 of Farm 62	C05300000000006200006	Khâi-Ma LM Namakwa DM / Northern Cape	Grazing	Blommeland Boerdery CC	1 931.62
Portion 2 of Farm 62	C05300000000006200002	Khâi-Ma LM Namakwa DM / Northern Cape	Grazing	Blommeland Boerdery CC	1 852.81
Portion 1 of Farm 56	C05300000000005600001	Khâi-Ma LM Namakwa DM / Northern Cape	Mining (Vedanta Black Mountain Mine)	Black Mountain Mining (Pty) Ltd	6 984.24
Portion 2 of Farm 56	C05300000000005600002	Khâi-Ma LM Namakwa DM / Northern Cape	Aggeneis Substation	Eskom Holdings Ltd	36.00
				Total hectares	**25 842.05**

The location and layout of the properties on which the OHPL is located is provided in **Figure 4-2.**

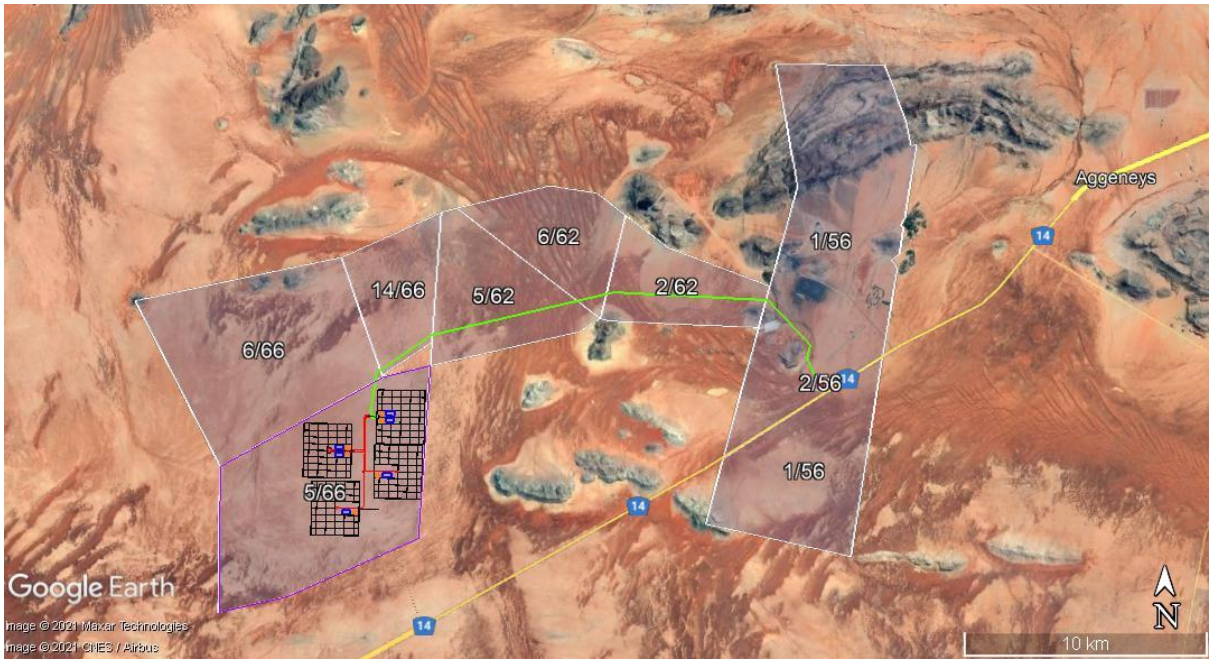


Figure 4-2: The proposed OHPL in relation to affected land portions

Very few homesteads and settlements are present within the study area. These include *Witputs* (at the proposed Sol Invictus Solar PV facilities), *Suurwater, Kamasoas* and the original *Aggeneys* farmstead. Refer to **Section 6.2.5** of this report for further information regarding the land use of the project area.

The centre point of the OHPL is located at 29°16'1.49"S 18°41'45.09"E. **Table 4-2** below provides the co-ordinates of bend points along the proposed route.

Table 4-2: Co-ordinates of structures along the OHPL route (WGS84)

POINT	CO-ORDINATES	
Aggeneis Substation Extension	29°17'40.35"S	18°48'2.31"E
Point 1	29°17'14.09"S	18°47'49.36"E
Point 2	29°16'57.46"S	18°47'54.31"E
Point 3	29°15'57.69"S	18°46'49.80"E
Point 4	29°15'47.31"S	18°42'54.01"E
Point 5	29°16'44.46"S	18°38'14.84"E
Point 6 (Witputs)	29°17'34.44"S	18°36'51.86"E
Point 7	29°18'17.70"S	18°36'44.48"E
Sol Invictus PVSEF Onsite Substation	29°18'30.21"S	18°36'44.07"E

4.2 PROJECT INFRASTRUCTURE

4.2.1 OVERHEAD POWERLINE

The OHPL will be a 132kV steel single or double structure with kingbird conductor. The power line towers will either be steel lattice or monopole structures with a maximum height up to 36m above ground level. **Figure 4-3** below provides an example of a conventional lattice tower compared with a monopole structure. Pole positions will only be available post preferred bidder award, once the powerline design has started.

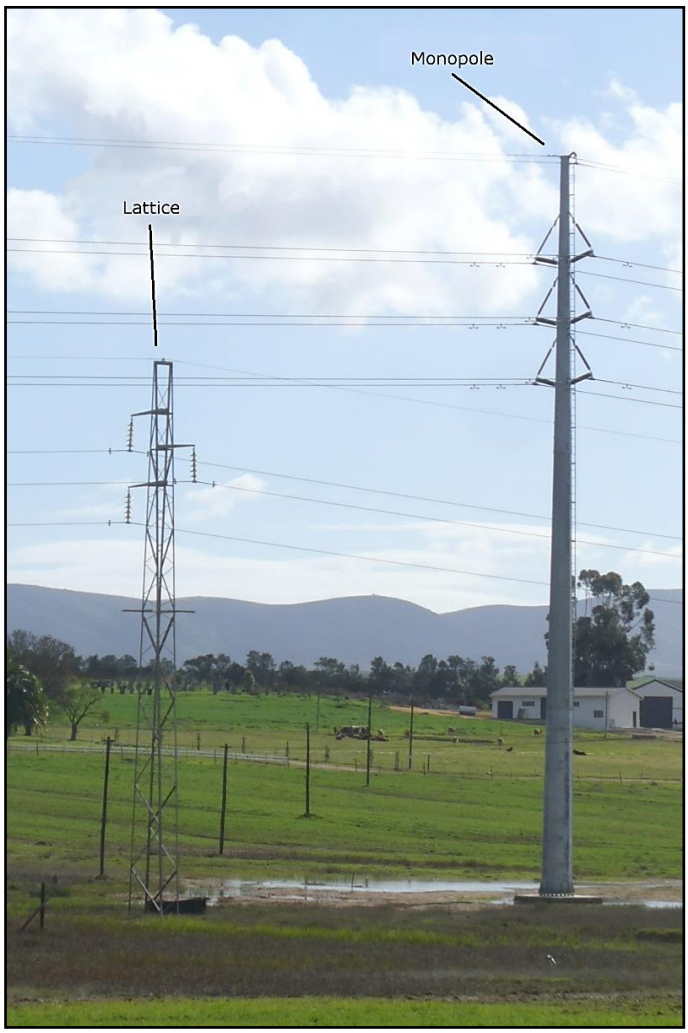


Figure 4-3: Conventional lattice powerline tower compared with a steel monopole structure

4.2.2 SERVITUDE

A 200m corridor around the OHPL (100m on either side of the centre line) has been assessed for the purposes of this BAR. The registered servitude will fall within this 200m corridor and will likely be 31m (15.5m on either side of the centre line).

The length of the OHPL is approximately 23km, which will result in a servitude area of approximately 71 ha.

The servitude is required to ensure safe construction, maintenance and operation of the powerline. Registration of the servitude grants Sol Invictus the right to erect, operate and maintain the powerline and to access the land to

carry out such activities, but it does not constitute full ownership of the land. Construction and operation activities and access to the powerline must be carried out with due respect to the affected landowners. The servitude required for the Project will be registered at the Deeds Office and will form part of the title deed of the relevant properties once the environmental authorisation has been obtained.

4.2.3 SITE ACCESS

The N14 national road provides motorised access to the region from Upington, the largest town closest to the site (approximately 266 km by road). This road passes to the south of the Aggeneis Substation (see **Figure 1-1**) and similarly provides access to the Sol Invictus Solar PVSEF cluster via the Witputs dirt road (from the N14).

The existing dirt roads and farm tracks will be used during the construction phase and to service the OHPL during the operational phase. **Figure 4-4** and **Figure 4-5** provide examples of the existing gravel farm roads/track on site. Short, temporary access tracks (jeep tracks) may be developed to access certain sections of the OHPL where no existing tracks are present.

Figure 4-4: Farm track providing access to Witputs from the N14

Figure 4-5: Existing dirt track near Black Mountain Mine

4.2.4 AGGENEIS SUBSTATION EXPANSION

The expansion area in which the 400kV busbar extension, 400/132kV 500MVA transformer and 132kV busbars are to be established is approximately 4.5 ha (**Figure 4-6**). The exact details/layout within this footprint will be determined during the OHPL design phase.

Figure 4-6: Area earmarked for the expansion of the Aggeneis substation

4.3 PROPOSED PROJECT DEVELOPMENT ACTIVITIES

The typical steps involved in the construction and operation of an OHPL is summarised below:

- Planning and Design Phase
  - Step 1: Surveying of the development area and negotiation with affected landowners; and
  - Step 2: Final design and micro-siting of the infrastructure based on geotechnical, topographical conditions and potential environmental sensitivities.
- Construction Phase
  - Step 3: Vegetation clearing;
  - Step 4: Assembly and erection of infrastructure on site;
  - Step 5: Stringing of conductors; and
  - Step 6: Rehabilitation of disturbed areas and protection of erosion sensitive areas.
- Operation Phase
  - Step 7: Continued inspection and maintenance during operation.

4.3.1 CONSTRUCTION PHASE

CONSTRUCTION SCHEDULE

Construction of the OHPL is anticipated to take 12 - 24 months.

SITE ESTABLISHMENT AND TRANSPORTATION OF MATERIALS AND EQUIPMENT TO SITE

The selected Contractor will establish a temporary site camp including, but not be limited to, temporary offices, laydown areas for equipment and materials, storage facilities, ablutions, waste storage and handling area, and parking area. The location and extent of the Contractors camp, to be established within the Project area, will be undertaken in line with specifications detailed within the EMPr. Materials are to be collected on a daily basis from the contractor laydown area for the construction activities along the servitude. This limits areas to be impacted for storage along the servitude as well as for security purposes when activities cease at the end of each day.

The required materials and equipment will be transported to the site via public roads and private farm roads/tracks along the proposed servitude (as indicated in Section 4.2.3). Mobile plant required for the installation of the OHPL will be determined by the contractor.

LABOUR REQUIREMENTS

During site preparation and installation of Project related infrastructure, the selected Contractor working on behalf of Sol Invictus is anticipated to require 100-150 people to undertake the required works. Approximately 5% of workers would be highly skilled, 15% medium skilled, and 80% low skilled.

VEGETATION CLEARING

Due to the nature of the vegetation within the Project area, which is predominantly sparse, low shrubs, limited vegetation clearing will be required. Clearing of vegetation will be limited to pylon areas to facilitate installation of each pylon. Clearing will be done in phases along the OHPL route as required prior to installation activities.

INSTALLATION OF OHPL

Standard OHPL installation methods will be employed, which entails the of pits / drilling of holes, planting of pylons (backfill and stabilization through compaction, concrete foundations are to be applied where conditions require) and stringing of the conductors. It is not envisaged that any large excavations and stabilized backfill will be required. However, this will be verified on site once the geotechnical assessment has been undertaken at each monopole position (part of construction works).

As identified in Section 4.2.1, the Project will utilise either steel lattice or monopole structures with a maximum height up to 36m above ground level, which are reported to have a life expectancy of more than 25 years. The actual height of the pylons will vary based on the site topography to maintain the specified clearance of the overhead transmission lines.

Once the pylons have been installed, the lines will be strung. The Contractor in collaboration with Eskom will be responsible for functional testing and commissioning of the OHPL. This consists of connecting the line from the Sol Invictus PVSEF to the national grid, to transmit power.

DEMOBILISATION

Upon completion of the installation phase, any temporary infrastructure will be removed, and the affected areas rehabilitated.

4.3.2 OPERATIONAL PHASE

Eskom will be responsible for managing the operations of the OHPL in line with their internal management systems. Eskom is considered to have the requisite expertise to operate and maintain the transmission line and substation infrastructure. Eskom will adhere to all existing Safety Codes and Guidelines for the operation and maintenance of the substation and overhead electricity transmission and distribution infrastructure.

During the operational phase, there will be little to no Project-related movement along the servitude as the only activities are limited to maintaining the servitude (including maintenance of access roads and cutting back or pruning of vegetation to ensure that vegetation does not affect the OHPL), inspection of the powerline infrastructure and repairs when required. Inspections are likely to be on an annual basis. Limited impact is expected during operation since there will not be any intrusive work done outside of maintenance in the event that major damage occurs to site infrastructure.

Operation of the OHPL will involve the following activities, discussed below.

SERVITUDE MANAGEMENT AND ACCESS ROAD MAINTENANCE

Servitude and access road maintenance is aimed at eliminating hazards and facilitating continued access to the OHPL. The objective is to prevent all forms of potential interruption of power supply due to overly tall vegetation/climbing plants or establishment of illegal structures within the right servitude. It is also to facilitate ease of access for maintenance activities on the transmission line. During the operational phase of the project, the servitude will be maintained to ensure that the OHPL functions optimally and does not compromise the safety of persons within the vicinity of the line.

TRANSMISSION LINE MAINTENANCE AND OPERATIONS

Eskom will develop comprehensive planned and emergency programmes through its technical operations during the operation and maintenance phase for the OHPL. The maintenance activities will include:

- Eskom's Maintenance Team will carry out periodic physical examination of the OHPL and its safety, security and integrity.
- Defects that are identified will be reported for repair. Such defects may include defective conductors, flashed over insulators, defective dampers, vandalised components, amongst others.
- Maintenance / repairs will then be undertaken.

4.3.3 DECOMMISSIONING PHASE

Decommissioning will be considered when the OHPL is regarded obsolete and will be subject to a separate authorisation and impact assessment process. Based on the design life of at least 25 years, which may be extended, this is not expected to occur in the near future. It is recommended that a decommissioning assessment be undertaken at an appropriate time, prior to decommissioning activities taking place.

4.4 NEED AND DESIRABILITY OF THE PROJECT

The DEA&DP Guideline (2013) states that the essential aim of need and desirability is to determine the suitability (i.e. is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e. is it the right time to develop a given activity) of the development. Therefore, need and desirability addresses whether the development is being proposed at the right time and in the right place. Similarly, the 'Best Practicable Environmental Option' (BPEO) as defined in NEMA is "*the option that provides the most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*."

The development of renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of, and investment in, renewable energy and associated energy distribution infrastructure is supported by the National Development Plan, New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure. The development of the proposed power line is therefore supported by key policy and planning documents and is in line with South Africa's strategic energy planning context (Refer to **Section 2**).

Furthermore, the proposed Sol Invictus OHPL is located within the Northern Strategic Transmission Corridor per GN 113 of 2018. Strategic Transmission Corridors support areas where long-term electricity grid infrastructure will be developed (Refer to **Section 2** for more details). **Figure 4-7** below shows the location of the five corridors and the approximate location of the Sol Invictus OHPL within the Northern Corridor.

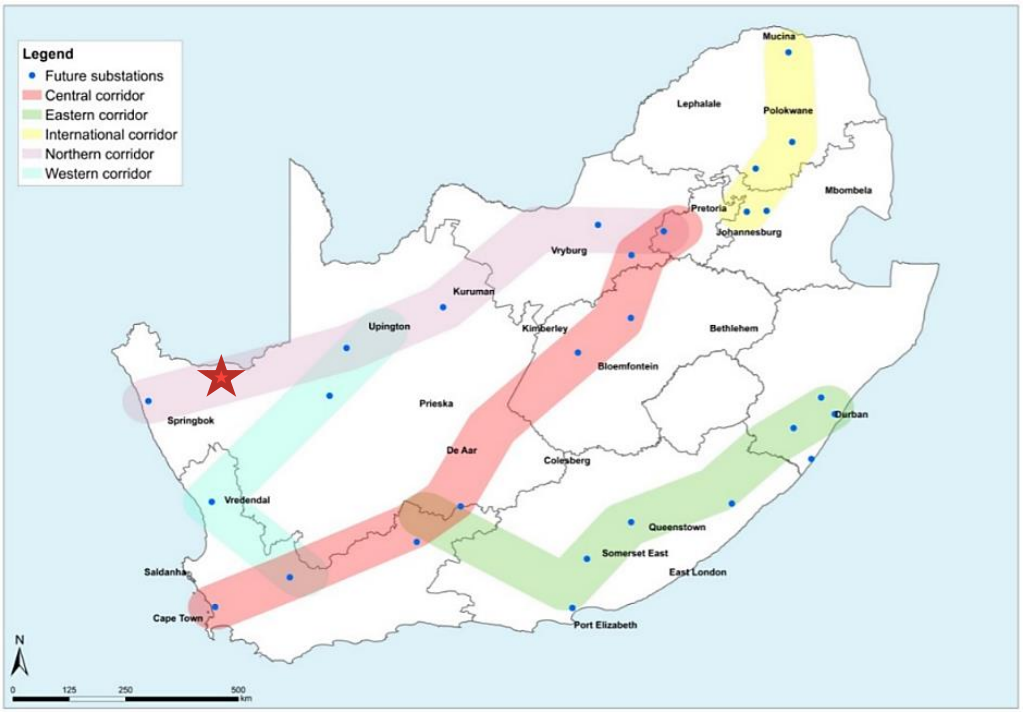


Figure 4-7: Strategic Transmission Corridors (GN 113 of 2018) (red star is approximate location of Sol Invictus OHPL)

The energy security benefits associated with the proposed Sol Invictus PVSEF are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. The proposed OHPL is therefore essential supporting infrastructure to the solar energy development, which, once developed, will generate power from renewable energy resources.

The land on which the OHPL will be constructed is located between the proposed Sol Invictus 1 to 6 PVSEF site and the existing Aggeneis substation. The land is predominantly privately owned agricultural land, which is zoned for agriculture. It is not necessary for each of the properties to be rezoned as the land will continue to be used for agriculture. The short section of the OHPL that traverses Vedanta Black Mountain Mine will not impact on the operation of the mine and Black Mountain Mining (Pty) Ltd are in support of the OHPL. No physical or economic displacement will be required along the proposed route.

Furthermore, negative environmental impacts associated with the activity will be mitigated to acceptable levels in accordance with the EMPr (**Appendix G**). Refer to **Section 0** below for the Environmental Impact Assessment and recommended mitigation measures.

5 PROJECT ALTERNATIVES

In terms of the EIA Regulations, feasible alternatives are required to be considered. All identified, feasible alternatives are required to be evaluated in terms of social, biophysical, economic, and technical factors. A key challenge of the BA process is the consideration of alternatives. Most guidelines use terms such as 'reasonable', 'practicable', 'feasible' or 'viable' to define the range of alternatives that should be considered.

Effectively there are two types of alternatives:

- Incrementally different (modifications) alternatives to the project; and
- Fundamentally (totally) different alternatives to the project.

"Alternatives", in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to –

a) the property on which or location where it is proposed to undertake the activity;
b) the type of activity to be undertaken;
c) the design or layout of the activity;
d) the technology to be used in the activity;
e) the operational aspects of the activity; and
f) the option of not implementing the activity (i.e. no-go).

The relevant alternatives to the proposed Project are discussed below.

5.1 ACTIVITY ALTERNATIVE

Only one activity has been assessed (i.e. electricity transmission). Alternative activities for the current Project are not reasonable or feasible as the purpose of this OHPL is to transmit electrical energy generated by the proposed Sol Invictus PVSEF to the existing Aggeneis substation for distribution via the national electrical grid network.

5.2 TECHNOLOGY ALTERNATIVES

There are two methods of power transmission, these being overhead lines and underground cables. Underground cables are considerably more difficult and expensive to install and maintain, relative to overhead lines. Considering the proposed terrain of the proposed OHPL, which traverses a CBA, underground cables would require extensive trenching and resultant vegetation clearing, which would result in greater environmental impacts. Underground distribution lines are therefore not considered feasible for the proposed Project.

Therefore, only one technology has been assessed, namely distribution of electricity via a 132kV OHPL, as this is considered the most appropriate technology and is in line with Eskom design requirements.

5.3 LOCATION ALTERNATIVES

The purpose of the OHPL is to connect the Sol Invictus PVSEF to the national grid. Therefore, the OHPL is required to be located between the proposed Sol Invictus PVSEF onsite substation and the closest existing Eskom substation, namely the Aggeneis substation. No alternative location for the proposed Project is deemed viable.

5.4 LAYOUT ALTERNATIVES

Only one powerline route / layout was considered for the transmission of generated power from the Sol Invictus PVSEF substation to the existing Aggeneis substation (see **Figure 1-1**). The proposed OHPL route selected as the preferred route and assessed within this BAR was selected considering the following primary factors:

- **Land ownership**: The preferred route involves only three landowners, namely Blommeland Boerdery CC, Black Mountain Mining (Pty) Ltd and Eskom Holdings Ltd (Aggeneis substation land parcel). All three landowners are in support of the OHPL.
- **Land use**: The majority of the proposed infrastructure occurs within low sensitivity areas from an environmental perspective. Additionally, no physical or economic displacement will be required along the proposed route.
- **Eskom approval**: The route has been approved by Eskom.

Only the preferred route alignment has therefore been assessed in detail in the BAR.

5.5 NO-GO ALTERNATIVE

The no-go option will mean the status quo remains. Both the potential positive and negative impacts from the proposed OHPL will not occur.

The no-go option would represent a lost opportunity for South Africa to improve energy security and supplement its current energy needs with renewable energy given that energy security benefits associated with the proposed Sol Invictus PVSEF are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. Considering South Africa's current energy security challenges and its position as one of the highest per capita producer of carbon emissions in the world, this would represent a significant socio-economic cost. Accordingly, the no-go option is not deemed viable.

6 BASELINE ENVIRONMENT

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed Project is located. It is important to gain an understanding of the Project area and its surroundings, as it will provide for a better understanding of the receiving environment in which the Project is being considered.

The description of the baseline environment is essential in that it represents the conditions of the environment before the construction of the proposed Project (i.e. the current, or status quo, environment) against which environmental impacts of the proposed Project can be assessed and future changes monitored.

The area has previously been studied to some extent and is recorded in various sources. Consequently, some components of the baseline have been generated based on literature review. However, where appropriate, baseline information has been supplemented or generated by specialists appointed to undertake baseline and impact assessments for the proposed Project.

The following characteristics of the receiving environment for the proposed Project area are described in **Table 6-1** below.

Table 6-1: Characteristics of the receiving environment

RECEIVING ENVIRONMENT	CHARACTERISTICS
Terrestrial Biophysical	Climate Climate Change Air Quality Noise Topography Geology and Soils Groundwater Surface Water (Hydrology) Ecologically Important Landscape Features Vegetation Fauna Habitat Assessment Bats Avifauna Protected Areas
Social and Economic	Socio-Economic Heritage Archaeology Palaeontology Land Use and Visual

6.1 BIOPHYSICAL ENVIRONMENT

6.1.1 CLIMATE

The climate in the west of the Namakwa District Municipality (NDM), or Succulent Karoo parts, is characterised by relatively reliable, although minimal (50–400mmpa) winter rainfall (>60% arriving between May and September). The east of the NDM lies in the Nama Karoo and despite receiving similar total annual rainfall this comes predominately in late summer (February-April) as violent thunderstorms and can be highly variable when

and where it falls. The presence of the cold Atlantic Ocean in the west not only moderates temperatures throughout Namaqualand (mean summer temperature 30°C), but also provides additional sources of moisture in the form of coastal fog and heavy dew experienced in winter months. The area is dominated by winds from the south.[8]

In Aggeneys itself, the average, variable annual rainfall is around 112 mm, the majority of which falls between January and April. The lowest recorded annual rainfall (11 mm) was measured in 1992, while the wettest year (220 mm) was recorded in 2006. Temperatures average between 15 °C and 38 °C in summer and between 0 °C and 18 °C in winter. The low rainfall leads to very low runoff volumes (<5%) owing to the sandy soils of the area.

6.1.2 CLIMATE CHANGE

The following is extracted from the Environmental Management Framework and Strategic Environmental Management Plan for the Namakwa District Municipality compiled by Nemai Consulting in 2011.

Variability in atmospheric circulation over the southern African region has significant influences on the climate of South Africa, producing patterns over several years or decades, particularly with regard to the timing, duration and intensity of rainfall and drought (Reason et al., 2006). The NDM is predicted to become generally warmer and drier, but with more severe storms. Rainfall is anticipated to become more variable (Bates, et al., 2008; Hewitson, 2007; Reason et al., 2006; DEAT, 2005).

Natural reserves of water, both surface water and groundwater, are likely to be detrimentally impacted by the less frequent, but more intense, precipitation (DEAT 2005). Overall, the amount of precipitation is anticipated to decrease, although the intensity of storm events is expected to be greater (DEAT, 2005).

The design of existing infrastructure is not able to exploit this adequately, and could potentially be damaged by flooding. Flooding will also become more common, with increased scouring as a consequence of faster-moving water through watercourse channels.

Groundwater recharge will be impaired with the more rapid movement of water across the landscape, as well as the infiltration capacity of the soil being exceeded by heavy precipitation, which limits the effectiveness of percolation (Bates et al., 2008).

Periodic flooding followed by drought would also affect the efficiency of dams, which would become prone to increased siltation, thus shallowing, and having reduced capacity (DEAT, 2005). The reliability (and thus predictability) of stream flow would decrease, and the effects of variable rainfall would affect the reserves of groundwater as people would overexploit these during dry periods (Mukheibir & Sparks, 2006).

Agriculture demands the greatest amount of the NDM`s water, and in a warming climate, the water loss to evapotranspiration through agricultural crops will increase (Mukheibir, 2007; DEAT, 2005). Much of the existing land surface used for agriculture and grazing is only marginally productive, with low arable (or long-term grazing) potential, further stretching the available water resources with their additional irrigation demands (DEAT, 2005).

The Project will not emit significant quantities of GHG and is not anticipated to be vulnerable to climate change due to the location and nature of the infrastructure.

6.1.3 AIR QUALITY

According to a study undertaken by Airshed Planning Professionals (Pty) Ltd in 2020 for the Gamsberg Smelter Project, which is within 15km of the proposed OHPL, ambient daily PM_{10} ground level concentrations in the study area ranged between 7.4 µg/m³ to 39 µg/m³. This is below the National Ambient Air Quality Standards (NAAQS) of 75 µg/m³. Measured ambient hourly NO_2 (maximum concentration of 0.4 µg/m³) and daily SO_2 (maximum concentration of 6.8 µg/m³) ground level concentrations in the vicinity of the project were well below the NAAQS of 200 µg/m³ (hourly NO_2) and 125 µg/m³ (daily SO_2). Dustfall rates were below non-residential requirements of the National Dust Control Regulations at all sampling sites.

[8] Northern Cape Department of Environment and Nature Conservation (2008) Namakwa District Biodiversity Sector Plan

Existing sources of emissions near the Project site include the following:

- Natural desert windblown dust from surrounding dunes;
- Windblown dust from unpaved roads;
- Mining activities from the Vedanta Black Mountain Mine, including materials handling activities, vehicle entrainment and windblown dust from storage piles and tailings storage facilities; and
- Vehicle emissions, such as carbon dioxide (CO_2), CO, hydrocarbon compounds (HC), sulphur diosxide (SO_2), oxides of nitrogen (NO_x) and particulate matter (PM).

The closest residential development and sensitive receptor to the proposed project is the town of Aggeneys, which is 5km to the north-east of the OHPL at the closest point, with an individual homestead located in Witputs, which is within 300m from the OHPL.

6.1.4 NOISE

According to a study undertaken by Airshed Planning Professionals (Pty) Ltd in 2020 for the Gamsberg Smelter Project, which is within 15km of the proposed OHPL, ambient daytime and night-time noise levels are quiet, influenced by occasional noisy incidents, such as vehicles passing by on the N14 or other access roads, mining activities and community activities. It should be noted that the impact of an intruding industrial/mining noise on the environment rarely extends over more than 5 km from the source.

Noise sensitive receptors generally include places of residence and areas where members of the public may be affected by noise generated by the Project. As identified above, the closest residential development and sensitive receptor to the proposed project is the town of Aggeneys, which is 5km to the north-east of the OHPL at the closest point, with an individual homestead located in Witputs, which is within 300m from the OHPL.

6.1.5 TOPOGRAPHY

The following is extracted from the Visual Impact Assessment compiled by Lourens Du Plessis and included as ***Appendix F7****.*

The study area occurs on land that ranges in elevation from approximately 720m (in the north-west near the Kamasoas homestead) to 1,140m at the top of the Aggenys Mountains (**Figure 6-1**). The region has a relatively even slope and the terrain morphology is described as *plains* with a great number of prominent *inselbergs* ('island mountains' - isolated hills or low mountains) occurring in the study area. Some of these include:

- Hoedkop;
- Skelmberg;
- Windhoek Se Berge;
- Swartberg; and
- Langberg.

Two of the smaller *inselbergs* (Kranskop and Platjiesvlei Se Kop) are located north-west of the Aggeneis Substation. The proposed powerline will traverse east of them before veering off in a westerly direction, crossing some sand dunes, and continuing south-west towards the Sol Invictus PVSEF cluster.

Figure 6-2 below shows the 1:50 000 topographical map of the Project area.

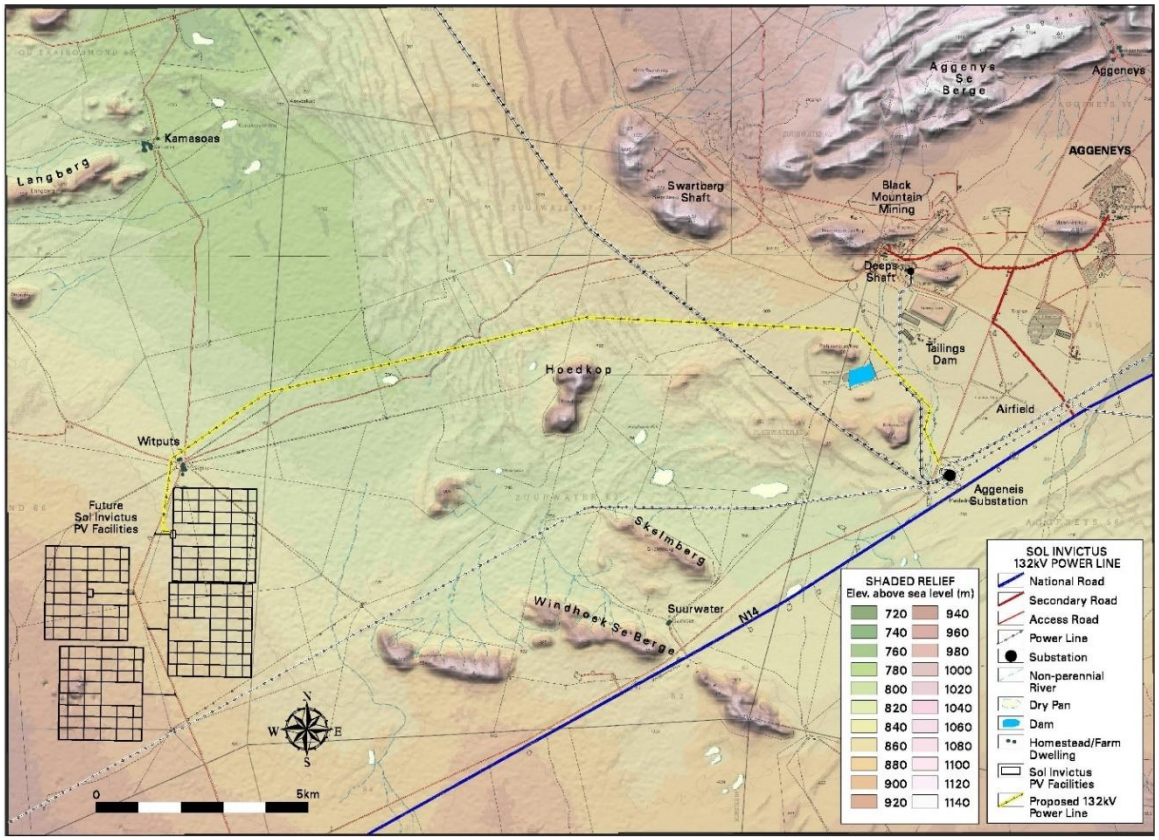


Figure 6-1: Shaded relief map of the study area (source: LOGIS, 2021).

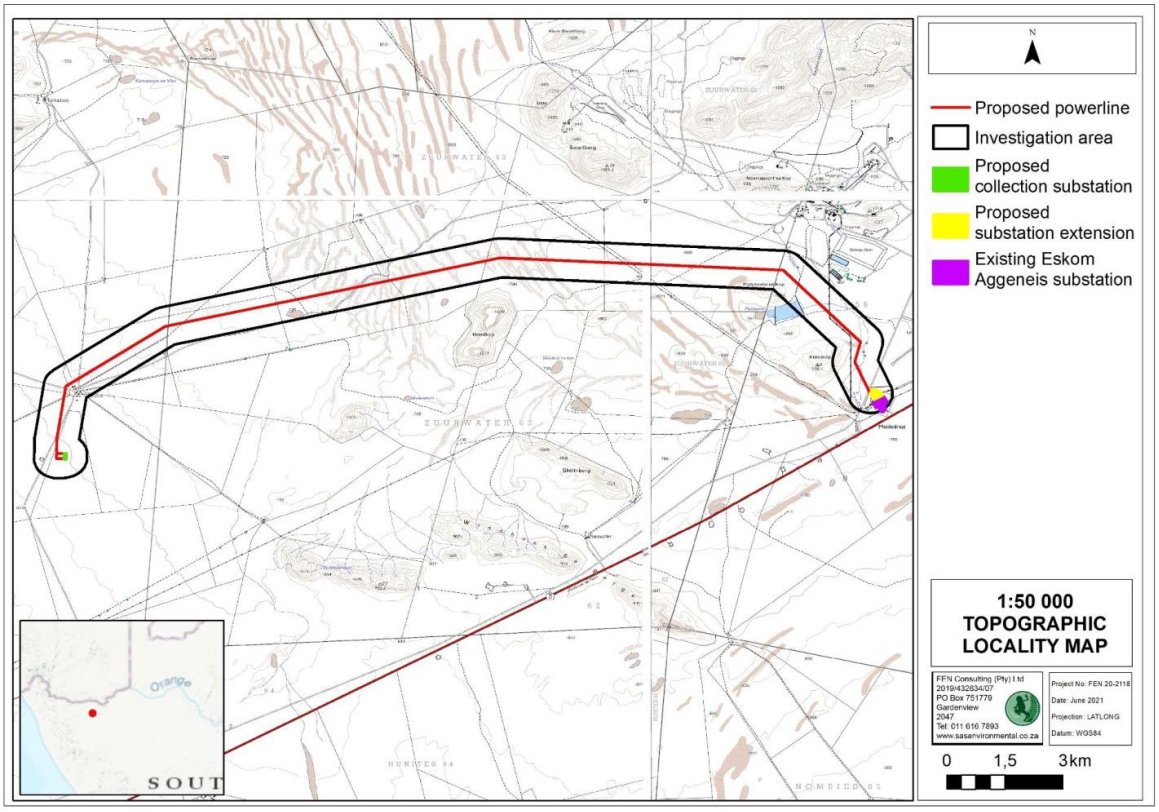


Figure 6-2: 1:50 000 topographical map of the proposed powerline and investigation area in relation to the surrounding environment (source: FEN Consulting, 2021).

6.1.6 GEOLOGY AND SOILS

*The following is extracted from the Soils and Agricultural Potential Assessment, compiled by WSP and included as **Appendix F6**.*

GEOLOGY

The central portion of this structurally complex region is underlain by a series of pelitic and psammitic metasediments, termed the Bushmanland Group. The hills and mountains in the area contain some of the most diverse and complex geology in Southern Africa, including some of the richest known concentrations of copper, lead and zinc. The structureless sands that dominate the region overlie hard rock.

LAND COVER

The majority of the soil on site is bare. The positioning of the structureless, red sands that cover the site is largely determined by wind. Where driving tracks have been created on the site, soil modification can be seen, but the majority of the site soils have not been anthropogenically modified.

SOIL FORM IDENTIFICATION AND CLASSIFICATION

The soils identified in the field were classified by form in accordance with the World Reference Base (WRB) for Soil Resources (WRB, 2006). This is the international standard taxonomic soil classification system endorsed by the International Union of Soil Sciences (IUSS).

The soils identified in the field were also classified by form in accordance with the South African soil taxonomic system (Soil Classification Working Group, 1991) as a great deal of information is available about the various South African soil forms. In this way, more information could be given about the characteristics of the types of soils identified in the field. All South African soil forms fall within 12 soil types; Duplex (marked accumulation of clay in the B horizon), Humic (intensely weathered, low base status, exceptional humus accumulation), Vertic (swelling, cracking, high activity clay), Melanic (dark, structured, high base status), Silicic (Silica precipitates as a dorbank horizon), Calcic (accumulation of limestone as a horizon), Organic (peaty soils where water inhibits organic breakdown), Podzolic (humic layer forms beneath an Ae or E), Plinthic (fluctuating water table causes iron re-precipitation as ferricrete), Oxidic (iron oxides weather and colour soils), Hydromorphic (reduced lower horizons) and Inceptic (young soils - accumulation of unconsolidated material, rocky B or disturbed) soils.

A site walkover was undertaken by the specialist from the 3rd to the 4th of August to identify the soil forms within the study area. Typically, one would auger to a depth of 1.2m or to refusal, for classification purposes, but the vast majority of the soils at the site were too sandy to remain in an auger bucket and the attempted auger holes fell in on themselves as the auger was removed from the soil. Other soils identified were too shallow to fill half a bucket.

Four soil forms were identified within the project area, as presented in **Figure 6-3**. These have been classified according to the South African and WRB taxonomic systems and described below.

1 Namib / Arenosols

Some of the red, sandy dune soils that dominate the site were very stony, especially those nearer the base of rocky outcrops, and some devoid of stones altogether (see **Table 6-2** (soil type 1) and **Figure 6-3**). The red colour can be attributed to oxides of iron that accumulate through weathering and colour the soils - uniformly if the conditions are well drained and aerated, as is the case at the Sol Invictus site. The red colour signifies conditions that are warm, dry, and not significantly affected by organic matter. These soils fall within the Namib soil form according to the South Africa taxonomic system and within the form Arenosols within the WRB system.

The Namib soil form describes deep sands. Sandy Arenosols are typical of desert areas, beach areas and inland dunes, and areas with highly weathered sandstone. These soils lack any significant soil profile development. They exhibit only a partially formed surface horizon (uppermost layer) that is low in humus, and they are bereft of subsurface clay accumulation. They are excessively permeable, have a very low nutrient content and are found in arid regions.

2 Mispah / Leptosols

The soils at the base of the rocky outcrops were very shallow; 1-2cm to refusal (see **Table 6-2** (soil type 2) and **Figure 6-3**). These soils fall within the soil form Mispah according to the South Africa taxonomic system, and within the form Leptosols within the WRB system.

The Mispah soil form is characterised by a shallow Orthic A-horizon over hard rock. Mispah soil comprises horizontally orientated, hard, fractured sediments which do not have distinct vertical channels containing soil material. Leptosols are described as shallow to very shallow soils underlain by a rock layer. These soils have a low water-holding capacity owing to their lack of depth and gravelly nature.

3 Hutton / Ferralsols

The soils identified within depressions in the landscape were 30-40cm deep, powdery soils with limited macrostructure (see **Table 6-2** (soil type 3) and **Figure 6-3**). While these depressions clearly contain water at times, as seen by the surface cracking of the soils, these soils are not wet enough for long enough periods of the year to exhibit any typical signs of soil wetness such as mottling or gleying. These soils thus fall into a terrestrial soil group and can be classified as Hutton soils, according to the South Africa taxonomic system, and fall within the form Ferralsols, within the WRB system.

The Hutton soil form is characterised by an Orthic A horizon over a red apedal B horizon over unspecified material. The Hutton soil form falls into the South African Oxidic soil group. These soils develop as oxides of iron accumulate through weathering and colour the soils - uniformly if the conditions are well drained and aerated, as is the case at the Sol Invictus site. The red colour of hematite signifies conditions that are warm, dry, and not significantly affected by organic matter. Ferralsols are yellow or – as in this case – red weathered soils whose colours result from an accumulation of metal oxides, particularly iron and aluminium (from which the name of the soil group is derived).

4 Witbank / Anthrosols

The final soil form identified at the site is what is called a Witbank in the South Africa taxonomic system and falls within the form Anthrosols within the WRB system (see **Table 6-2** (soil type 4) and **Figure 6-3**). These soils vary widely in appearance, can be found in any environment, and have in common that their properties are strongly affected by human interference.

The soil forms identified at each location are shown in **Table 6-2** and illustrated in **Figure 6-3**.

Table 6-2: Soil Forms within the project area

SOIL TYPE	IN-FIELD OBSERVATIONS	PHOTOGRAPHS	SOIL FORM
1	Too sandy to remain within an auger - holes fell in on themselves. Some very stony, some devoid of stones altogether.		Namib / Arenosol

SOIL TYPE	IN-FIELD OBSERVATIONS	PHOTOGRAPHS	SOIL FORM
			
2	Soils at the base of the rocky outcrops were very shallow – 1-2cm to refusal.	 	Mispah / Leptosols

SOIL TYPE	IN-FIELD OBSERVATIONS	PHOTOGRAPHS	SOIL FORM
3	These depressions contain water at times, but the soils are not wet enough for long enough periods to exhibit signs of wetness.	 	Hutton / Ferralsols
4	Areas of soils very strongly affected by human interference. On site, these were created owing to limited vehicular paths and housing.		Witbank / Anthrosols

SOIL TYPE	IN-FIELD OBSERVATIONS	PHOTOGRAPHS	SOIL FORM
			

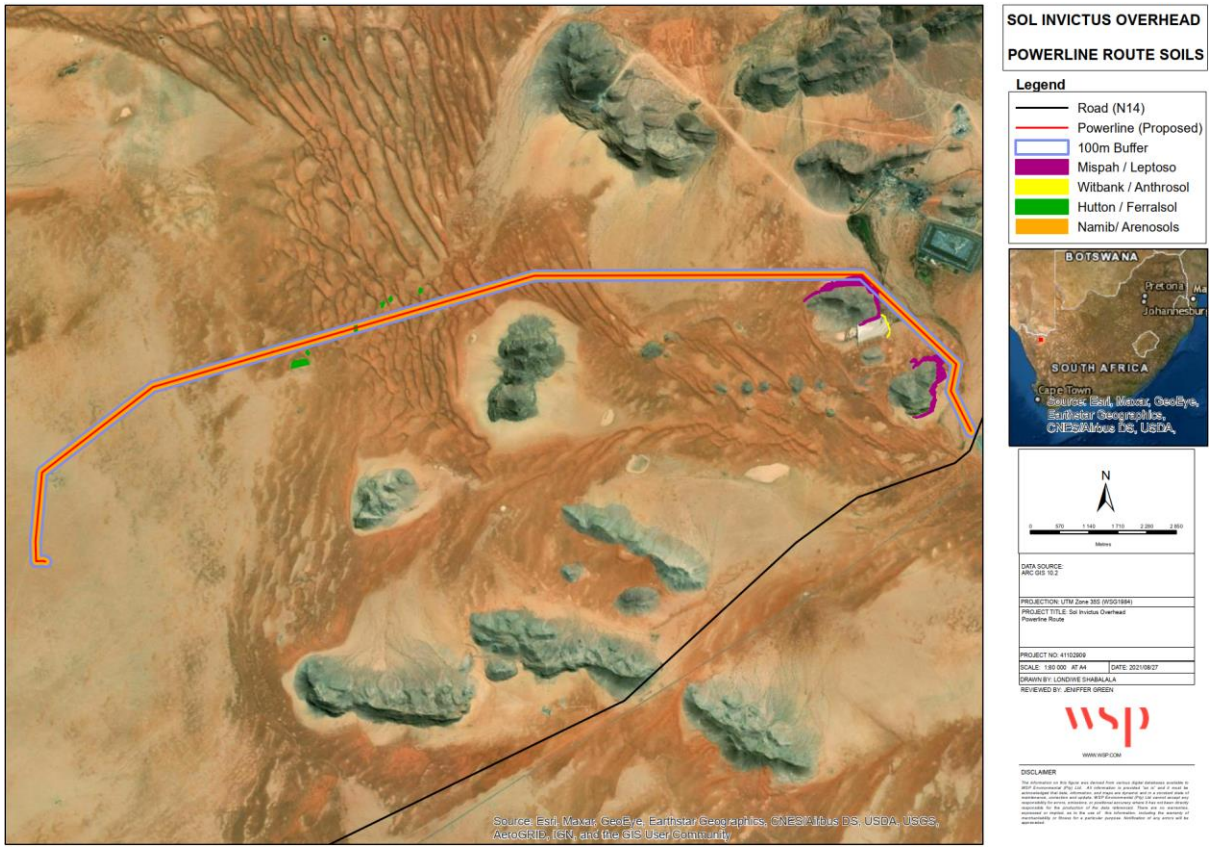


Figure 6-3: Soils identified in the study area

SOIL CAPABILITY ANALYSIS

Land capability is the inherent capacity of land to be productive under sustained use and specific management methods. The land capability of an area is the combination of the inherent soil properties and the climatic conditions as well as other landscape properties, such as slope and drainage patterns that may have resulted in the development of wetlands, as an example.

Using the South African soil classification guidelines (Scotney *et al.*, 1987), the land capability of the Namib soils / Arenosols was established as Land Capability Group 'Grazing' and Land Capability Class VII, as they have Very Severe Limitations, are Only Suitable for Natural Vegetation, and can be used for (in order of increased intensity of use) 'Wildlife, Forestry and Light Grazing'. These sandy dunes are easily moved from place to place by the wind, comprise no topsoil, comprise very low water holding potential and are very low in nutrients. Further to this, the site is in a very dry area.

The land capability of the Hutton soils / Ferralsols was established as Land Capability Group 'Arable Soils' and Land Capability Class IV, as they have 'Severe limitations' and 'High erosion hazards' and can be used for (in order of increased intensity of use) 'Wildlife, Forestry, Light Grazing, Moderate Grazing, Intensive Grazing and Light Cultivation'. In the context of this site, however, the Huttons have a very thin Orthic A horizon (topsoil), are only found in the limited depression areas identified on site. The area is extremely dry, and irrigation of these few, scattered depressions would not be viable.

The land capability of the Mispah soils / Leptosols was established as Land Capability Group 'Grazing' and Land Capability Class VII, as they have Very Severe Limitations, are Only Suitable for Natural Vegetation, and can be used for (in order of increased intensity of use) 'Wildlife, Forestry and Light Grazing'. In the context of this site, some of the Mispahs could sustain limited natural vegetation for light grazing and some would be too shallow.

The land capability of the Witbank soils / Anthrosols was established as Land Capability Class 'Grazing' and Land Capability Class VII, as they have Very Severe Limitations, are Only Suitable for Natural Vegetation, and can be used for (in order of increased intensity of use) 'Wildlife, Forestry and Light Grazing'.

In the context of the overall site, the land capability would be best described as a Class 'Grazing' with Very Severe Limitations and Only Suitable for Natural Vegetation, owing to the site predominantly consisting of the Namib soil form and the low rainfall in the area. Furthermore, this would need to be extensive, well managed grazing for the site to remain sustainable as a source of grazing land.

6.1.7 GROUNDWATER

Groundwater represents one of the most important water sources in the Namakwa District Municipality as it services most of the community water supply schemes. Hydrogeology in the district is such that the unconsolidated sub-structure hosts intergranular aquifers which have low yield due to the presence of fine and clayey materials. Aquifers are dependent upon rainfall for recharge. Recharge varies with, amongst others, the frequency of rainfall, rock type, soil and ground cover.[9]

Groundwater quality in the Lower Orange Water Management Area (WMA) varies from good to unacceptable, with a bias towards unacceptable, and is one of the main factors affecting the development of available groundwater resources. Total dissolved solids (TDS), nitrates and fluorides represent the majority of water quality problems that occur. Water quality issues that need to be addressed include diffuse pollution sources from agriculture, management of local sanitation problems at small towns, and the algae problem on the Orange River main stem (DWAF, 2004).[10]

6.1.8 SURFACE WATER

The following is extracted from the Freshwater Ecological Assessment, compiled by FEN Consulting and included as ***Appendix F1****.*

The proposed OHPL route is located within the Lower Orange WMA. **Table 6-3** provides a summary of the aquatic ecoregion and subregion of the Project area.

[9] Nemai Consulting (2011) *Environmental Management Framework and Strategic Environmental Management Plan for the Namakwa District Municipality*
[10] Nemai Consulting (2011) *Environmental Management Framework and Strategic Environmental Management Plan for the Namakwa District Municipality*

Table 6-3: Aquatic Ecoregion and Subregion of the Project Area

AQUATIC ECOREGION AND SUB-REGIONS IN WHICH THE PROPOSED POWERLINE IS LOCATED

Ecoregion	Nama Karoo
Catchment	Orange
Quaternary Catchment	D82C
WMA	Lower Orange
Sub WMA	Orange

RIVER AND WETLANDS – NFEPA (2011)

According to the National Freshwater Ecosystem Priority Areas (NFEPA) database (2011), no wetlands will be traversed by the proposed powerline. However, a natural depression wetland is indicated as occurring within the south western portion of the investigation area. The depression wetland is considered to be in a largely natural (Class A/B) ecological condition with only a few modifications. Three artificial unchanneled valley bottom wetlands are indicated within the eastern portion of the investigation area. During the field assessment, these features were identified to be associated with the existing mining activities. No rivers are associated with the proposed powerline and investigation area.

The proposed powerline is located within a sub-quaternary catchment considered important as a Freshwater Ecosystem Priority Area. River FEPAs are important for achieving biodiversity targets for river ecosystems and threatened fish species and should therefore remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources.

Figure 6-4 and **Figure 6-5** below show the River FEPAs and NFEPA wetlands in the study area, respectively.

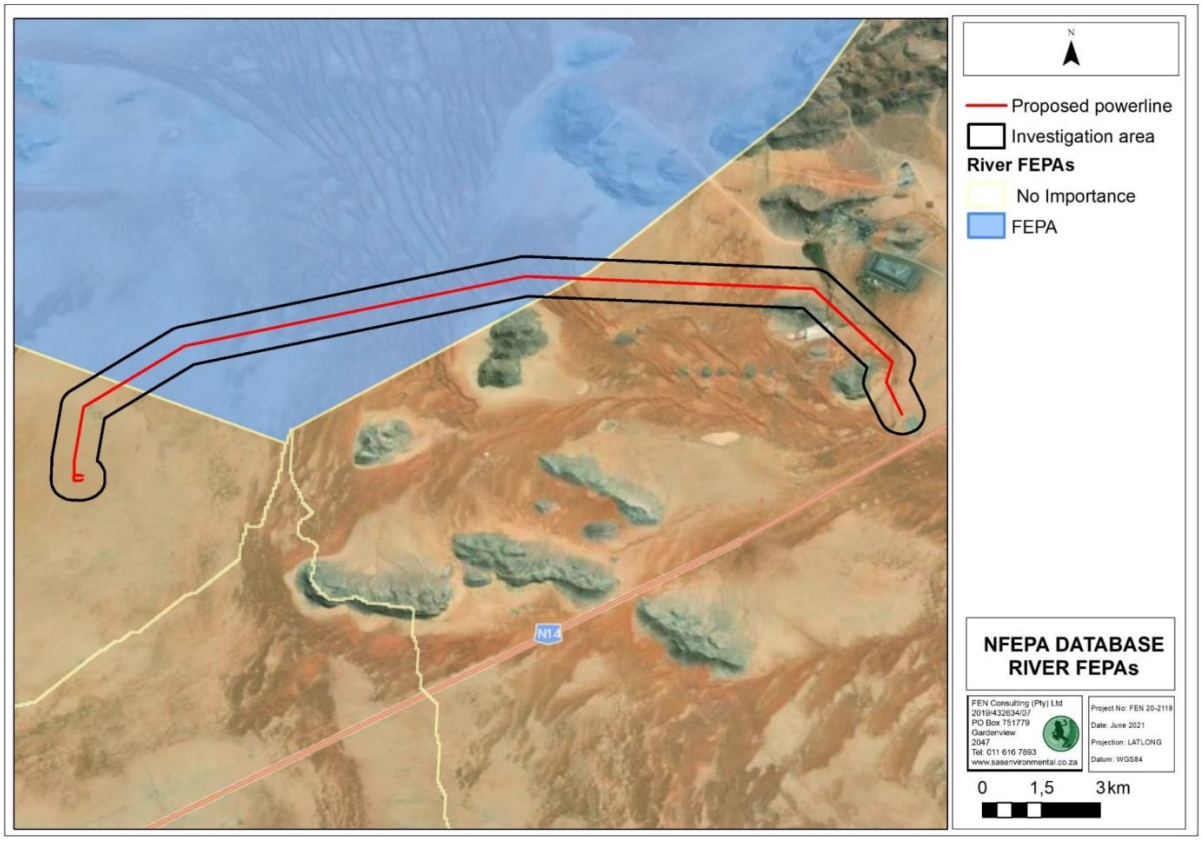


Figure 6-4: River FEPAs associated with the proposed powerline and investigation area as indicated by the NFEPA database (NFEPA, 2011) (source: FEN, 2021)

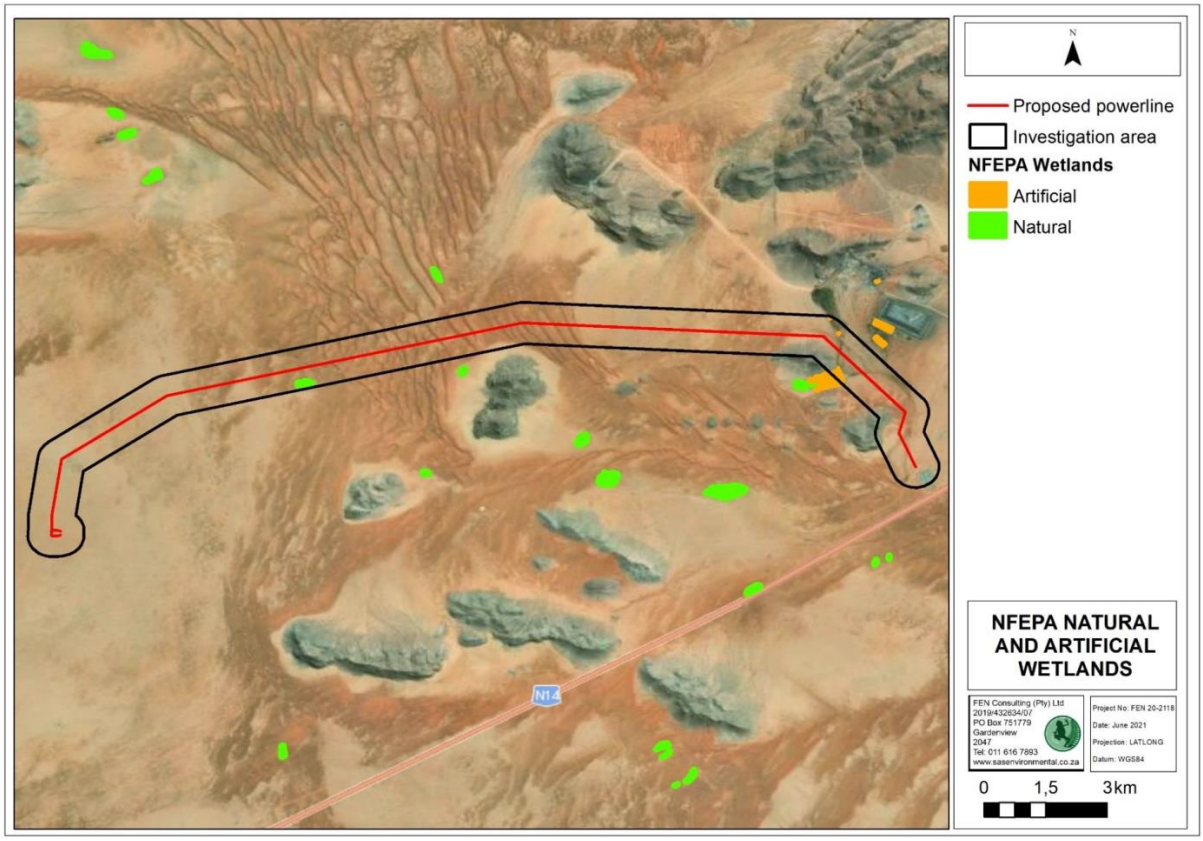


Figure 6-5: Natural and artificial systems associated with the proposed powerline and investigation area as depicted by the NFEPA (2011) database (source: FEN, 2021)

WETLAND VEGETATION TYPES – NFEPA (2011)

The proposed powerline is located within the Nama Karoo Bushmanland Wetland Vegetation Type, considered to be least threatened in terms of threat status according to Mbona et al. (2015).

RIVER AND WETLANDS – NBA (2018)

According to the NBA 2018: South African Inventory of Inland Aquatic Ecosystems (SAIIAE), a natural depression wetland is depicted as occurring within the south western portion of the investigation area. The depression wetland is indicated as being impacted by roads and is thus considered to be in a largely to critically modified (Class D/E/F) ecological condition. The depression wetland is considered to be critically endangered according to the ecosystem threat status (ETS) and no protected according to the ecosystem protection level (EPL). No rivers are indicated to be associated with the proposed powerline and investigation area.

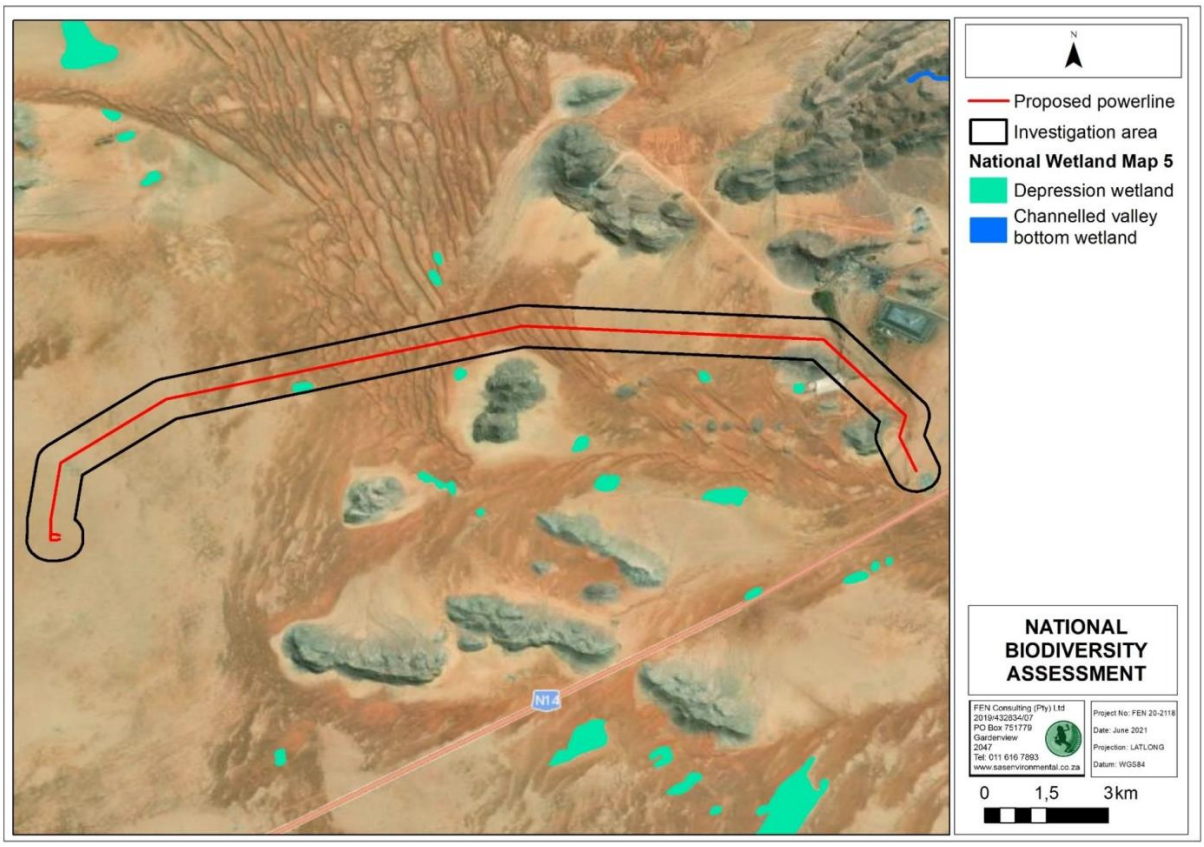


Figure 6-6: Wetland HGM units associated with the proposed powerline as depicted by the National Biodiversity Assessment (2018) (source: FEN, 2021)

SITE ASSESSMENT

During the site assessment undertaken by the freshwater specialist in June 2021 (Northern Cape winter period), the following true watercourses were identified to be crossed by the proposed OHPL:

- Cryptic wetlands
- Episodic Drainage Line

Classification of the cryptic wetlands and episodic drainage lines was undertaken at Levels 1-4 of the Classification System (Ollis et al, 2013). These systems were classified as Inland Systems falling within the Nama Karoo Aquatic Ecoregion and the Nama Karoo Bushmanland Wetland Vegetation (WetVeg) group, considered "least threatened" by SANBI (2012) and Mbona et al (2015). **Table 6-4** presents the further classification of these cryptic wetlands and episodic drainage lines at Levels 3 and 4 of the Classification System (Ollis et al, 2013).

Table 6-4: Characterization of the watercourses identified to be associated with the proposed powerline, according to the Classification System (Ollis et al., 2013)

		LEVEL 4: HYDROGEOMORPHIC UNIT
DRAINAGE SYSTEM	**LEVEL 3: LANDSCAPE UNIT**	**HGM Type**
Cryptic Wetland	Plain: an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land.	Depression: a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.
Episodic Drainage Line	Valley floor: The base of a valley, situated between two distinct valley side-slopes.	River: a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.

CRYPTIC WETLANDS

During the assessment, the following indicators were used to identify and delineate the boundaries of the cryptic wetlands:

- Topography/elevation was a key determinant in the identification of these features. Six cryptic wetlands were identified within the investigation area, all of which were situated within distinct, low-lying depressions in the landscape. All were clearly defined endorheic systems where surface water, when sufficient is present, will accumulate;
- Sediment deposits on plants: the presence of sediment deposits on rocks or plants indicates minimum levels of inundation; thus a feature displaying such deposits is assumed to be seasonally inundated. The absence of such sediment deposits is inconclusive, and other indicators may be required to determine whether a feature is seasonally inundated. Whilst this is a subtle determinant of possible wetland conditions in some of the assessed features, it was nevertheless apparent in sufficient features to be utilised as an indicator;
- Soil wetness / morphological characteristics: whilst soil wetness is considered by Day et al (2010) to be an unreliable indicator of wetlands in arid areas, consideration was nevertheless given to the soil classification and morphological characteristics, such as mottling, when present;
- Vegetation: Due to the semi-arid climate of the study area, the absence of obligate floral species was expected, and none were identified. According to Day et al (2010), the absence of both dryland and wetland plants from a site may equally be an indicator of a cryptic wetland. However, five floral indicators were generally present within the cryptic wetlands, and a combination of at least two of these within any given feature was considered sufficient, in conjunction with other indicators, to classify a feature as a cryptic wetland. These floral indicators were *Eragrostis bicolor*, *Eragrostis echinochloidea*, *Aristida congesta subsp. congesta*, *Cullen tomentosum* and *Ziziphus mucronate*. Typically, the woody or shrub component associated with cryptic wetlands is largely limited to the outer boundaries thereof.

Although the cryptic wetlands identified in the study area do not possess one of the key indicators typically associated with wetlands in South Africa, specifically, hydrophytic vegetation, they are nevertheless deemed to be potentially ecologically important and may play a significant role in the ecology of the area. Wetlands in arid areas are under-researched, particularly cryptic wetlands such as those identified in the study area, and little is known about the biodiversity associated with such systems (Henschel, unknown date, retrieved from http://fbip.co.za/wp-content/uploads/2018/08/Henschel-Abstract-2017-Small-Project.pdf, 18th March 2020). For example, cryptic wetlands such as those identified may host populations of invertebrates (mostly Branchiopods but also Phyllopods) which are considered keystone species of ephemeral pans globally, playing a pivotal role in the food web as prey (Henschel; unknown date of publication).

Thus, it is the opinion of the specialist that the cryptic wetlands identified to be associated with the proposed powerline should be afforded the same protection as a wetland which meets the legislated definition thereof, and that suitable mitigation measures be implemented to minimise impacts to these features.

The photos shown in **Figure 6-7** and **Figure 6-8** illustrate typical conditions of one of the larger cryptic wetlands identified within the mid-western and southern portion of the investigation area.

Figure 6-7: Examples of the larger cryptic wetland identified within the investigation area

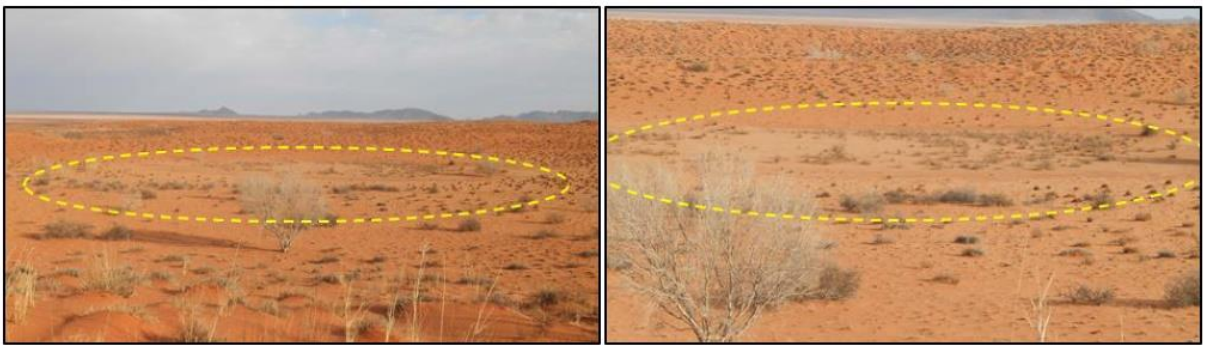


Figure 6-8: Representative photographs of the cryptic wetland identified to be traversed by the proposed powerline (yellow dashed lines indicate the boundary of the wetland).

The region is characteristically semi-arid, and although rainfall had been received between December 2020 - February 2021, at the time of conducting the assessment in June 2021, surface water was not present in the cryptic wetland. Nevertheless, based on the remote locality and significant distance from the existing mining activities and absence of impacts such as industry or cultivation, water quality, when present, will be the result of precipitation and therefore unpolluted.

Due to the highly ephemeral nature of the cryptic wetlands, as well as the endorheic geomorphological setting, ecological service provision is generally of low levels, with the exception of biodiversity maintenance, which is deemed 'high'. Although no species of conservation concern (SCC) were noted at the time of the assessment, the limitations posed by the duration of the assessment present a "snapshot" of conditions, and further detailed studies would need to be undertaken over a greater period of time to ascertain the occurrence of floral and/or faunal SCC.

Nevertheless, the wetland habitat on site forms part of a network of open spaces which may provide support for local fauna and flora within a semi-arid to arid climate.

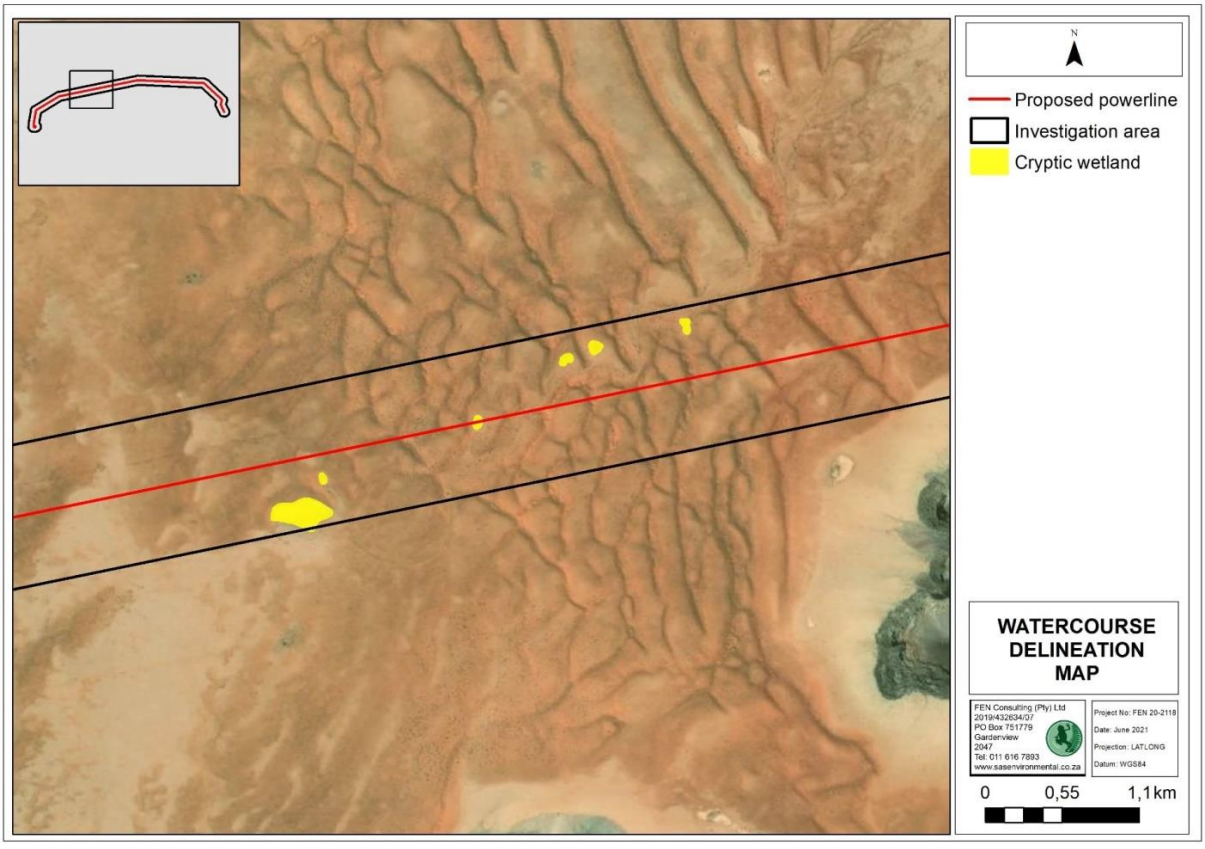


Figure 6-9: Map depicting the delineated extent of the cryptic wetlands associated with the proposed powerline and investigation area

EPISODIC DRAINAGE LINE

One distinct episodic drainage line illustrated in **Figure 6-10** below and the delineation thereof indicated in **Figure 6-11** below was identified to be traversed by the eastern portion of the proposed powerline. The episodic drainage line flows in a general southerly direction and likely receives recharge from the upgradient mountain areas. The episodic drainage line was charachterised without riparian vegetation, grasses such as *Stipagrostis brevifolia* and *Stipagrostis cilliata* dominated the episodic drainage line. However, the vegetation associated with the riparian zone of the episodic drainage line was distinctly different from the surrounding upland areas in terms of species abundance and community structure, both of which are sufficient for providing a clear indication of the watercourse boundaries given the climatic conditions of the area. The upgradient and adjacent mining area and roads have potentially augmented the surface water input into this system, such that the system receives increased volumes of water, leading to development of prominent wetness indicators including the distinct wetness signatures visible in the most recent digital satellite imagery.

Figure 6-10: Representative photographs of the episodic drainage line

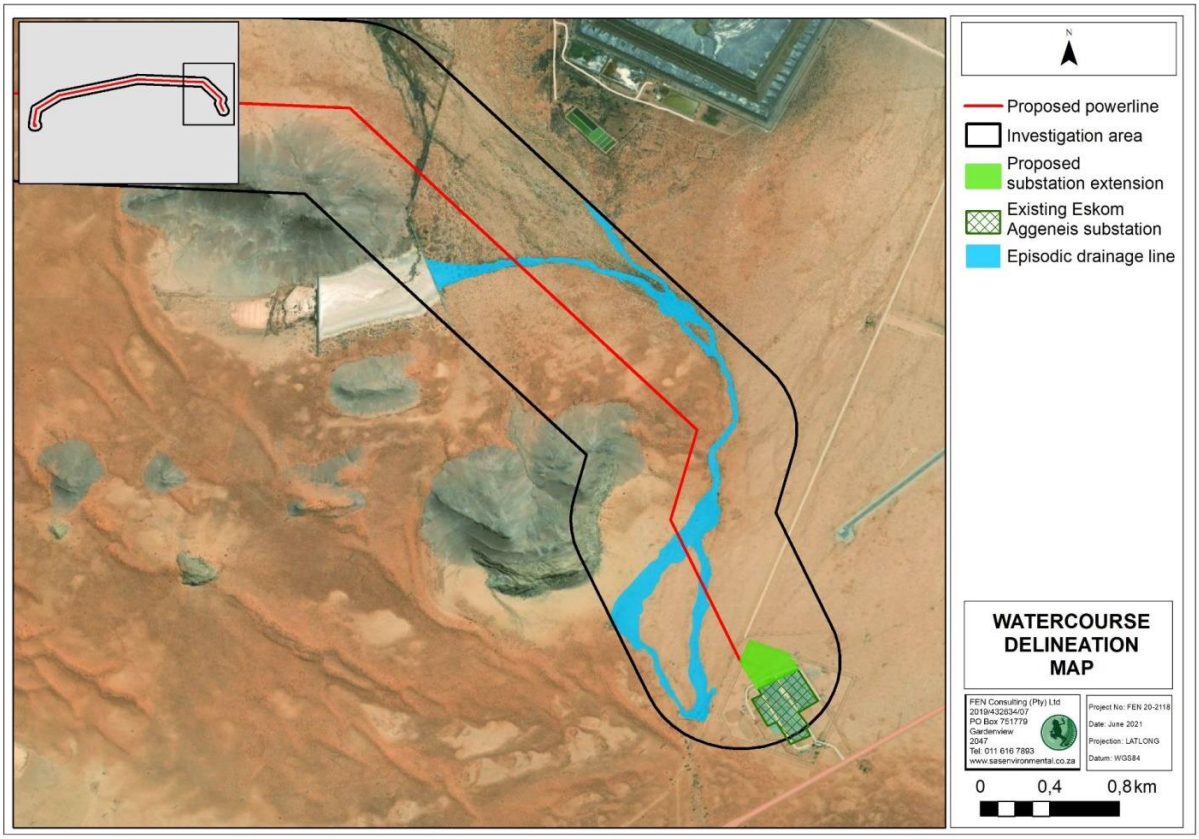


Figure 6-11: Map depicting the delineated extent of the episodic drainage line associated with the proposed powerline and investigation area.

Episodic drainage lines are highly intermittent systems that flow or flood only in response to extreme rainfall events. However, the surrounding mining activities have potentially augmented the surface water input into this system through increased seepage reaching this system from the upgradient mining activities, essentially threatening the ephemeral nature of this episodic drainage line.

Due to seepage from the upgradient mining development and catchment land use changes thereof, the surface water quality of the episodic drainage line is expected to be impaired. No significant erosion was noted within the episodic drainage line. Alterations to the geomorphology and sediment balance of the episodic drainage line may result from sediment runoff from the upgradient mining area, transported to the system through the increased runoff and seepage from the mine.

Despite the highly ephemeral nature of the episodic drainage line, ecological service provision is of intermediate levels, albeit at the lower end of the scale. Biodiversity maintenance is considered moderately high, whilst the capacity for providing other services such as sediment trapping and assimilation of nutrients is considered moderate although the opportunity to do so is reduced due to lack of surface water for the majority of the year. Direct service provision (such as water for human use) is low to very low as a result of the ephemerality of the system as well as its locality within privately owned, access-controlled land.

6.1.9 ECOLOGICALLY IMPORTANT LANDSCAPE FEATURES

*The following is extracted from the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as **Appendix F2**.*

ECOSYSTEM THREAT STATUS

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps with a LC ecosystem (**Figure 6-12**).

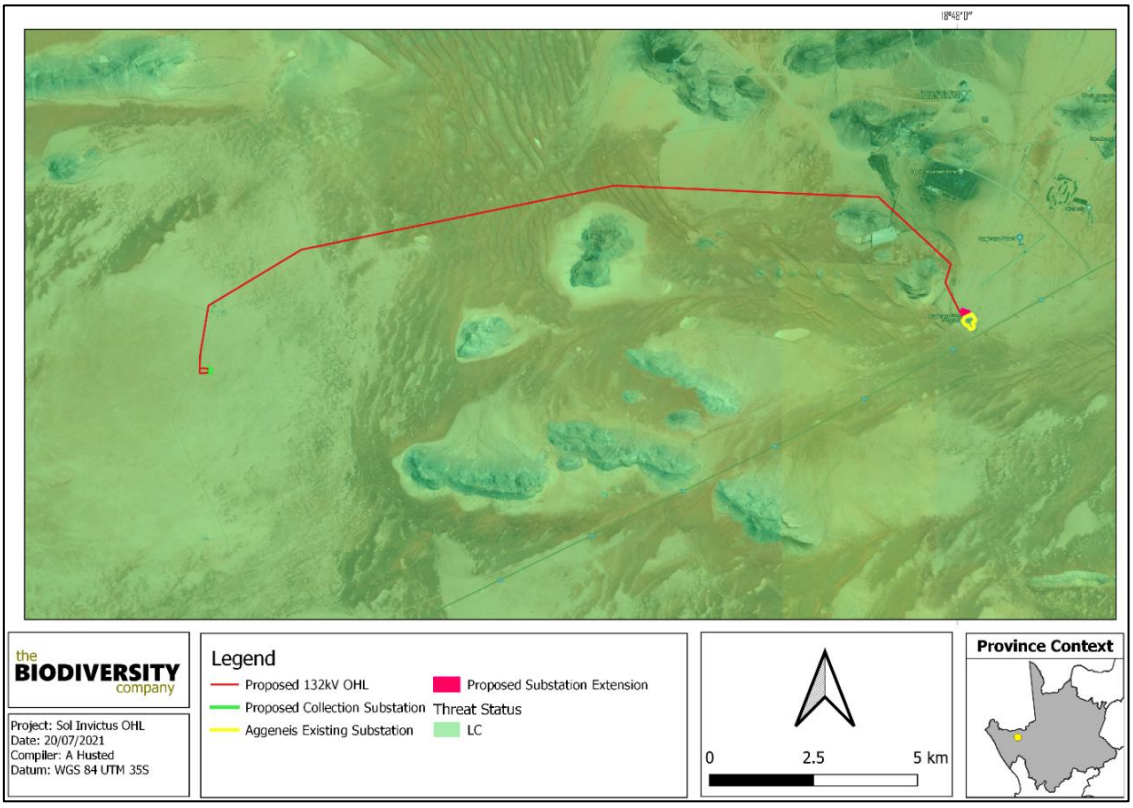


Figure 6-12: Map illustrating the ecosystem threat status associated with the proposed Project area (source: The Biodiversity Company).

ECOSYSTEM PROTECTION LEVEL

Ecosystem protection level (EPL) is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems. The proposed powerline project overlaps with a NP ecosystem (**Figure 6-13**).

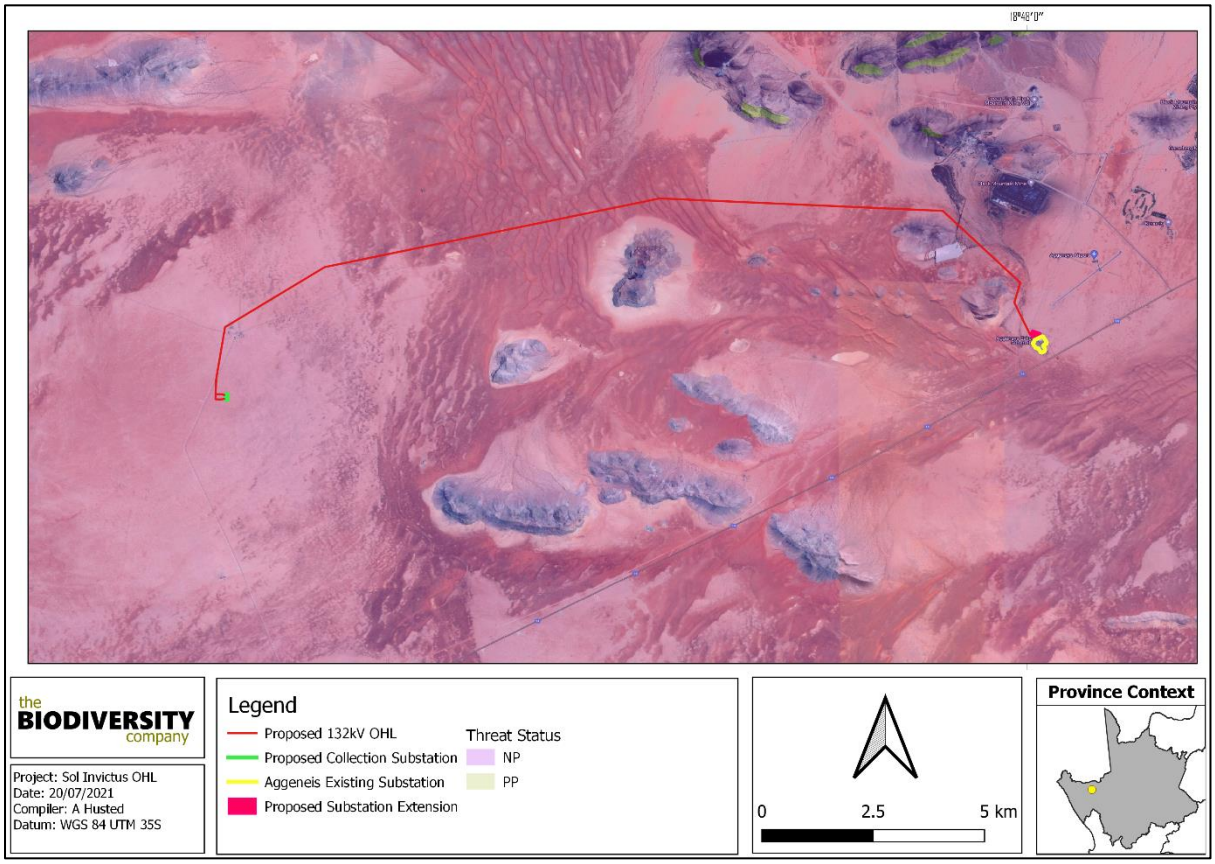


Figure 6-13: Map illustrating the ecosystem protection level associated with the proposed project area (source: The Biodiversity Company).

CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

Figure 6-14 shows the project area superimposed on the Terrestrial CBA map. The powerline project area overlaps with a CBA2 and an ESA area, and a limited portion of CBA1.

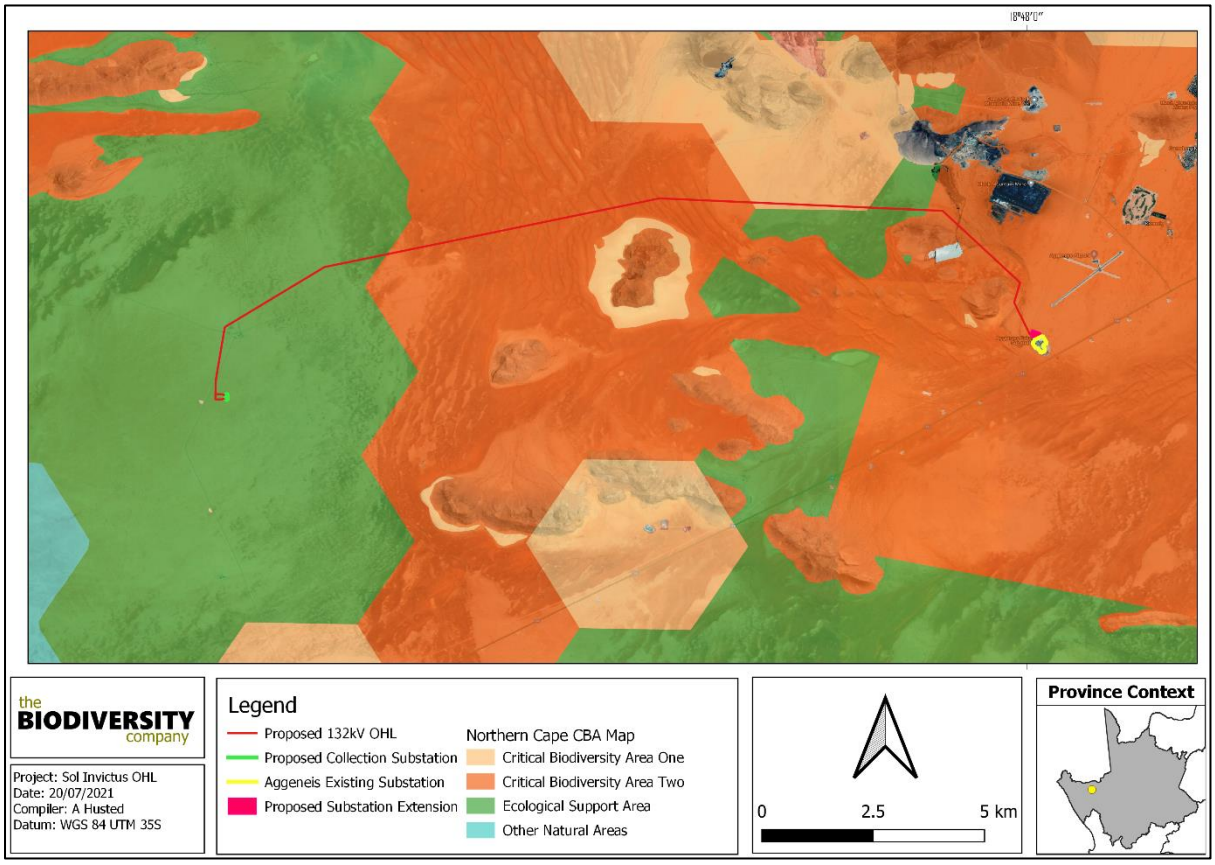


Figure 6-14: Map illustrating the locations of CBAs in the project area (source: The Biodiversity Company).

SUCCULENT KAROO ECOSYSTEM PROGRAMME (SKEP)

The Succulent Karoo Ecosystem Programme (SKEP) is a long-term bioregional conservation programme, with the aim to conserve ecosystems and to develop conservation as a land-use rather than instead of land-use (SANBI, 2021). The focal areas are:

- Increasing local, national and international awareness of the unique biodiversity of the Succulent Karoo;
- Expanding protected areas and improving conservation management, particularly through the expansion of public-private-communal-corporate partnerships;
- Support the creation of a matrix of harmonious land uses; and
- Improve institutional co-ordination to generate momentum and focus on priorities, maximise opportunities for partnerships, and ensure sustainability.

The areas of SKEP endemism for mammals, amphibians, reptiles and birds were assessed in relation to the project area, it was found that the project area overlaps with a unique bird habitat (**Figure 6-15**).

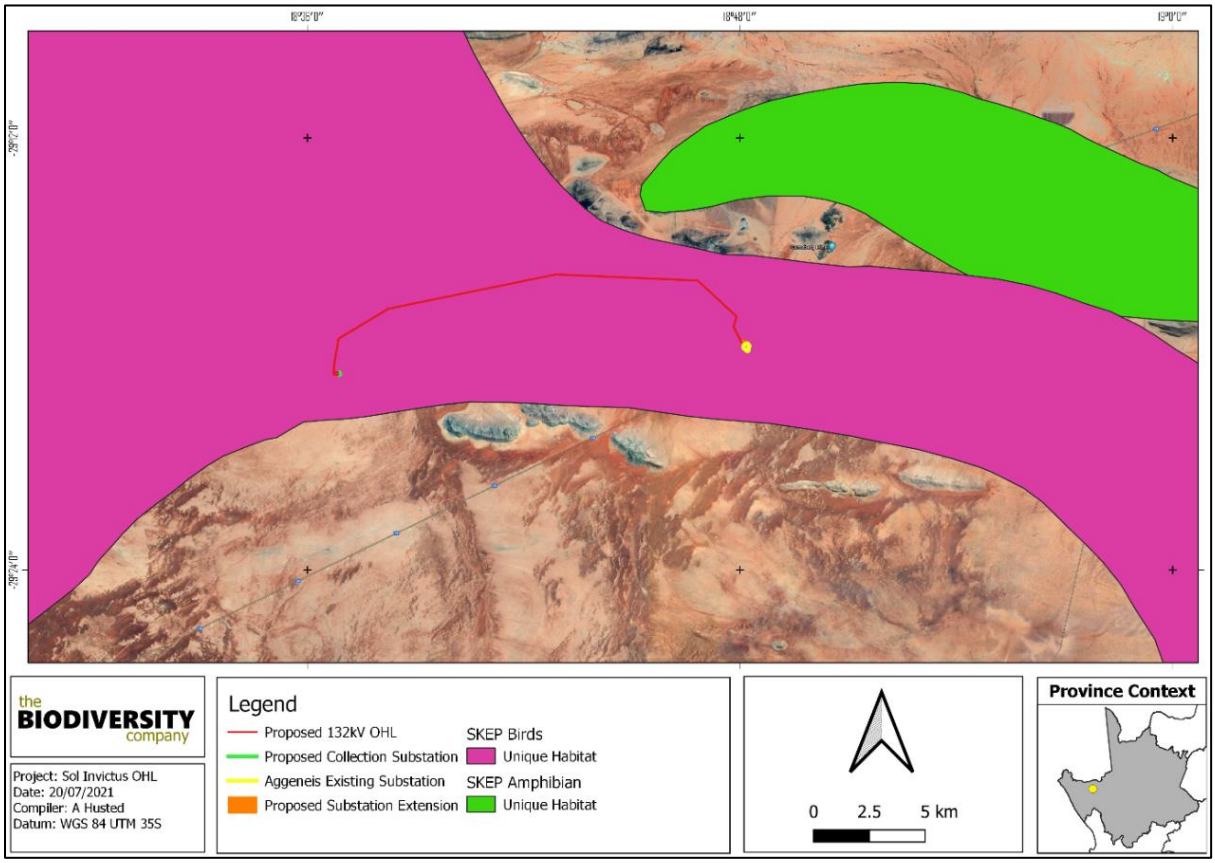


Figure 6-15: The project area in relation to the Succulent Karoo Ecosystem Programme

6.1.10 VEGETATION

*The following is extracted from the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as **Appendix F2**.*

The project area is situated within the Nama Karoo Biome and borders on the Succulent Karoo Biome. The Nama Karroo biome is found in the central plateau of the western half of South Africa. The geology underlying the biome is varied, as the distribution of this biome is determined primarily by rainfall. The rain falls in summer and varies between 100 and 520mm per year. This also determines the predominant soil type - over 80% of the area is covered by a lime-rich, weakly developed soil over rock. Although less than 5% of rain reaches the rivers, the high erodibility of soils poses a major problem where overgrazing occurs (SANBI, 2019).

The dominant vegetation is a grassy, dwarf shrubland. Grasses tend to be more common in depressions and on sandy soils, and less abundant on clayey soils. Grazing rapidly increases the relative abundance of shrubs. Most of the grasses are of the C4 type and, like the shrubs, are deciduous in response to rainfall events (SANBI, 2019).

On a fine-scale vegetation type, the project area overlaps with three vegetation types: the Bushmanland Arid Grassland, Bushmanland Sandy Grassland and Aggeneys Gravel Vygieveld (**Figure 6-16**). Refer to the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as **Appendix F2** for more details regarding the fine-scale vegetation types.

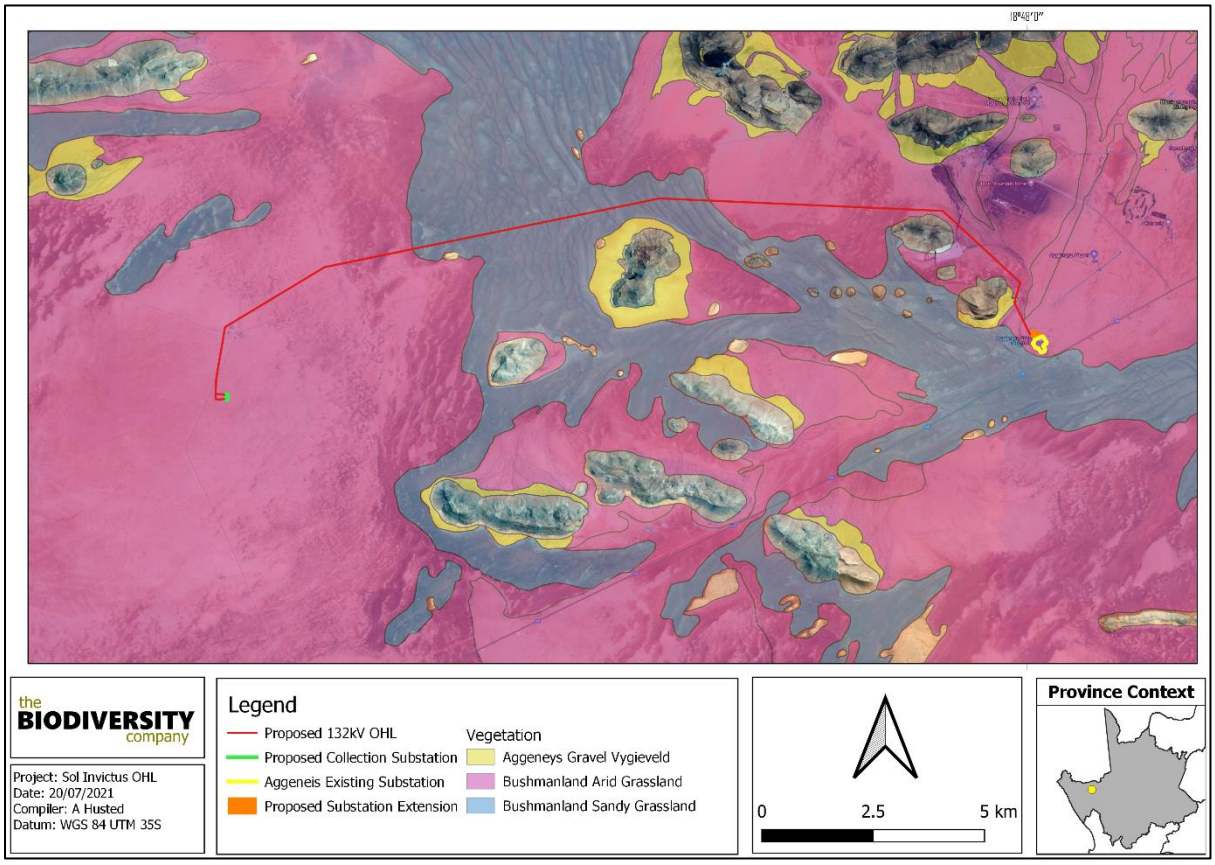


Figure 6-16: Map illustrating the vegetation type associated with the project area

EXPECTED FLORA SPECIES

The POSA database indicates that 472 species of indigenous plants are expected to occur within the project area. Appendix A provides the list of species and their respective conservation status and endemism. Five (5) SCC based on their conservation status could be expected to occur within the project area and are provided in **Table 6-5** below.

Table 6-5: Threatened flora species that may occur within the project area.

FAMILY	TAXON	AUTHOR	IUCN	ECOLOGY
Asphodelaceae	*Bulbine ophiophylla*	G.Will.	EN	Indigenous
Aizoaceae	*Conophytum limpidum*	S.A.Hammer	NT	Indigenous; Endemic
Fabaceae	*Crotalaria pearsonii*	Baker f.	VU	Indigenous; Endemic
Asteraceae	*Helichrysum marmarolepis*	S.Moore	NT	Indigenous; Endemic
Aizoaceae	*Lithops olivacea*	L.Bolus	VU	Indigenous; Endemic

FIELD ASSESSMENT

The following sections provide the results from the field survey for the proposed development that was undertaken during the 2nd to the 4th of August 2021.

INDIGENOUS FLORA

The vegetation assessment was conducted throughout the extent of the survey area. A total of 36 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment. The list of

plant species recorded to is by no means comprehensive, and repeated surveys during different phenological periods not covered, may likely yield up to 40% additional flora species for the project area. However, floristic analysis conducted to date is however regarded as a sound representation of the local flora for the project area.

INVASIVE ALIEN PLANTS

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

NEMBA is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24 February 2021. The legislation calls for the removal and / or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued;
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued;
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones; and
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing;
- Take steps to manage the listed invasive species in compliance with:
- Section 75 of the NEMBA;
- The relevant invasive species management programme developed in terms of regulation 4; and
- Any directive issued in terms of section 73(3) of the NEMBA.

One (1) IAP species (*Salsola kali*) was recorded within the project area. The species is listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. Category 1b species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

FLORAL SPECIES OF CONSERVATION CONCERN

During the infield assessment a total of two (2) protected and SCC were recorded, these species are protected under the Northern Cape Nature Conservation Act No. 9 of 2009. These species occurred numerously and naturally spaced throughout the area.

One (1) species (*Acanthopsis hoffmannseggiana*) is listed as Data Deficient - Taxonomically Problematic (DDT) under the National Red List, one being potentially threatened. The specimens were found numerously and naturally spaced throughout the Arid Grassland habitats. No loss of specimens should be permitted as the species is likely to become more threatened in the near future. All remaining subpopulations have to be conserved if this species is to survive in the long term.

6.1.11 FAUNA

The following is extracted from the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as ***Appendix F2****.*

AMPHIBIANS AND REPTILES

Based on the IUCN Red List Spatial Data and AmphibianMap, nine (9) amphibian species are expected to occur within the area. One (1) is regarded as threatened.

Table 6-6: Threatened amphibian species that are expected to occur within the project area

		CONSERVATION STATUS		
SPECIES	**COMMON NAME**	**Regional (SANBI, 2016)**	**IUCN (2021)**	**LIKELIHOOD OF OCCURRENCE**
Strongylopus springbokensis	Namaqua Stream Frog	VU	LC	High

Strongylopus springbokensis (Namaqua stream frog) is listed as VU on a regional scale. It lives in springs and streams in rocky hills and mountains in the Succulent Karoo and Fynbos biomes. It breeds in springs and streams, small permanent and temporary ponds, as well as small artificial dams. The likelihood of occurrence is rated as high based on available wetlands and rocky areas.

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 59 reptile species are expected to occur within the area. Two (2) are regarded as threatened (**Table 6-7**). Based on the absence of suitable habitat one specie was given a low likelihood of occurrence.

Table 6-7: Threatened reptile species that are expected to occur within the project area

		CONSERVATION STATUS		
SPECIES	**COMMON NAME**	**Regional (SANBI, 2016)**	**IUCN (2021)**	**LIKELIHOOD OF OCCURRENCE**
Chersobius signatus	Speckled Dwarf Tortoise	EN	EN	Low
Psammobates tentorius verroxii	Tent Tortoise	NT	NT	High

Psammobates tentorius veroxii (Tent Tortoise) is categorised as NT both locally and internationally. This species can be found in low densities in the Karoo and semi-desert areas of South Africa and Namibia. It is threatened because of the pet trade and destruction of its habitat. The likelihood of occurrence in the project area is rated as high due to the presence of mesembryanthemums plant, which is suitable food sources for this species.

MAMMALS

The IUCN Red List Spatial Data lists 58 mammal species that could be expected to occur within the area. This list excludes large mammal species that are limited to protected areas. Five (5) of these expected species are regarded as threatened (**Table 6-8**), two of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area. This report must be read in conjunction to the bat survey assessment that assessed these mammals in detail.

Table 6-8: Threatened mammal species that are expected to occur within the project area

		CONSERVATION STATUS		
SPECIES	**COMMON NAME**	**Regional (SANBI, 2016)**	**IUCN (2021)**	**LIKELIHOOD OF OCCURRENCE**
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	High

SPECIES	COMMON NAME	CONSERVATION STATUS		
		Regional (SANBI, 2016)	IUCN (2021)	LIKELIHOOD OF OCCURRENCE
Graphiurus ocularis	Spectacular Dormouse	NT	LC	Moderate
Panthera pardus	Leopard	VU	VU	Moderate
Parotomys littledalei	Littledale's Whistling Rat	NT	LC	Low

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the project area can be considered to be optimal for the species and the likelihood of occurrence is rated as high.

Graphiurus ocularis (Spectacular Dormouse) is categorised as NT on a regional scale. This species is endemic to South Africa, where it occurs widely in Northern Cape, Eastern Cape, and Western Cape provinces, with a single record from the North West province. The species is associated with the sandstone formations of the Cape, which have many vertical and horizontal cracks and crevices in which to shelter and nest. Some areas of suitable habitat can be found in the project area; therefore the likelihood of occurrence is rated as moderate.

Panthera pardus (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Prey species can be found in the project area, and as the area is mostly uninhabited by humans this species has a moderate likelihood of occurrence.

FIELD ASSESSMENT

The following sections provide the results from the field survey for the proposed development that was undertaken during the 2nd to the 4th of August 2021.

One (1) species of reptile was recorded in the project area during survey period. However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture. No amphibian species were recorded during the survey period, this was largely due to the season in which the field survey was carried out as well as the fact that no pitfall trapping was done. Due to the seasonality of the survey, surveys relied on opportunistic sightings as opposed to intensive and appropriate sampling methods. The only other method utilised was refuge examinations using visual scanning of terrains to record smaller herpetofauna species that often conceal themselves under rocks, in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, this method was also not intensively applied in the field. None of the herpetofauna species recorded are regarded as threatened, albeit all are protected under provincial legislation.

Twelve (12) mammal species were observed during the survey of the project area based on either direct observation or the presence of visual tracks and signs. One of the species recorded are regarded as a SCC, namely Brown Hyaena, eleven (11) mammal species are additionally protected provincially.

6.1.12 HABITAT ASSESSMENT

The following is extracted from the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as ***Appendix F2****.*

The main habitat types identified across the survey corridor area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in **Figure 6-17**. Emphasis was placed on limiting timed meander searches along the proposed route within the natural habitats and therefore habitats with a higher potential of hosting SCC.

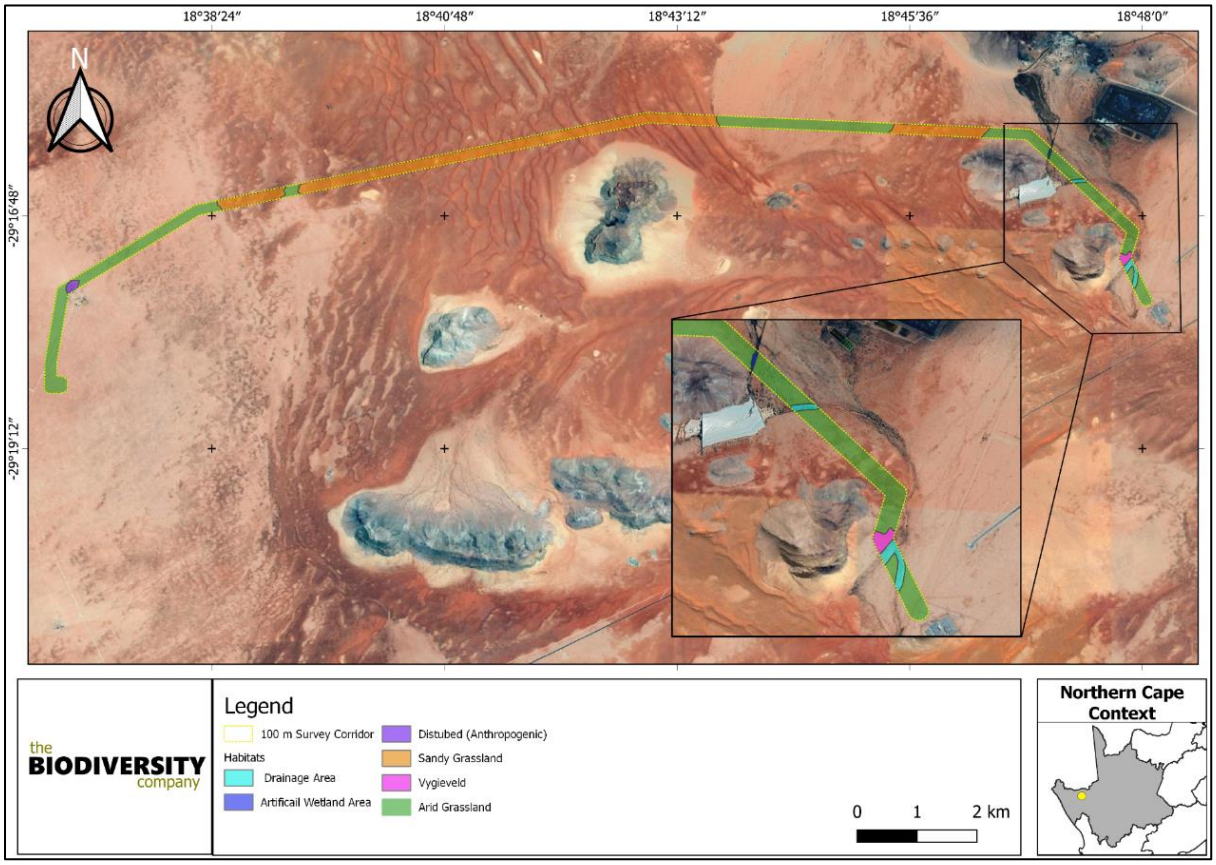


Figure 6-17: Habitats present in the Project area

ARID GRASSLAND

The arid grassland habitat is an open plain habitat that was occupied by bare ground in most areas, sparsely covered by some grass species in other areas. The areas that have been not overgrazed by livestock can be seen in **Figure 6-18**, whereas a comparison can be seen in **Figure 6-19**. These habitats are expected to change dramatically in terms of the amount and diversity of flora depended on the availability of moisture after rainfall events. The diversity during the studies was very low, mainly attributed to the seasonality of the survey, as well as the prolonged drought. *Hoodia gordonii* was found occurring sparsely within this habitat, with a larger concentration to the western portion of the powerline route.

Figure 6-18: An example of arid grassland from the project area.

Figure 6-19: Arid grassland overgrazed.

SANDY GRASSLAND

The sandy grassland has not been as disturbed extensively by historic grazing or impacts (**Figure 6-20** and **Figure 6-21**), mainly due the terrain being difficult to traverse and utilise due to the dunes. Generally, this unique habitat unit has high ecological function attributed to floral communities expected to be found in this habitat. The current ecological condition of this habitat regarding the main driving forces, are intact, which is evident in the lack of broad scale impacts as well as the importance of the species recorded in the faunal assessment.

This habitat unit can thus be regarded as important, not only within the local landscape, but also regionally; it acts as a greenland, used for habitat, foraging area and movement corridors for fauna (including SCC). The habitat sensitivity of the sandy grassland is regarded as medium-high, due to floral and faunal species recorded as well as the role of this intact habitat to biodiversity within a very unique local landscape, not to mention the various ecological datasets.

Figure 6-20: Examples of sandy grassland habitat from the project area.

Figure 6-21: Examples of sandy grassland habitat from the project area.

GRAVEL VYGIEVELD

A unique habitat that was observed near the foothills/peneplains of one of the inselbergs (**Figure 6-22**). This habitat usually appears as distinctly white surface quartz layers, that seems bare. These habitats usually support sparse, low-growing vegetation such as small to dwarf leaf-succulents, in this case, *Anacampseros papyracea* (Gansmis) was only recorded in this habitat unit.

Figure 6-22: Example of Vygieveld habitat from the project area

DRAINAGE LINES

The drainage lines within the project area can be regarded as non-perennial and possess surface flow only briefly during and following a period of rainfall, which is a feature of semi-arid/arid regions. These seasonal streams create an ecological link between the stream and its surrounding terrestrial landscape and has the same function albeit on a smaller scale than a river (**Figure 6-23**). This habitat is important as a movement corridor as it creates

an imperative link between the system and its surrounding terrestrial landscape for several faunal species, especially birds and mammals, and plays a vital role as a water resource not only for the biodiversity but also the local community. This habitat unit can be regarded as highly important, not only within the local landscape, but also regionally.

Figure 6-23: A typical example drainage habitat from the project area.

ARTIFICIAL WETLAND AREA

A habitat found overgrowing with *Phragmites australis* which shows the area being inundated with water for most periods of the year (**Figure 6-24**). It is assumed that the water source is anthropogenic from the nearby mine.

Figure 6-24: Example of artificial wetland habitat from the project area.

DISTURBED

Areas that have been altered anthropogenically, and in this case include a homestead and the associated impacts (**Figure 6-25**). Some sections of this habitat are considered as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state. Other areas are considered not entirely transformed but in a constant disturbed state.

Figure 6-25: Example of disturbed habitat from the project area.

6.1.13 BATS

*The following is extracted from the Bat Impact Assessment, compiled by IWS on behalf of The Biodiversity Company and included as **Appendix F3**.*

Currently in South Africa, detailed bat impact assessments are not required for proposed power line projects. It is only if requested for a specific reason that such assessments are conducted. IWS therefore undertook a desktop assessment of important bat habitats and features along and near the OHPL route, and potential impacts of the development on bats with recommended measures to mitigate these.

POTENTIALLY OCCURRING BAT SPECIES

A list of bat species which are likely to reside in or frequent the OHPL study area was determined based on the following:

i. Bat species records and predicted distribution maps published in Monadjem et al. (2020) and Jacobs et al. (2013);

ii. Regional bat species records provided online by the African Chiroptera Report (2020), FIAO (2021) and iNaturalist (2021); and

iii. IWS's accumulated bat data and professional knowledge, expertise and judgement. The current national and global Red List status of the listed bat species is as reported by Child et al. (2016) and the IUCN (2021-1), respectively.

Thirteen bat species are likely to occur in the OHPL study area (refer to the Bat Impact Assessment in **Appendix F3** for the full list). The Cape Serotine Bat (*Neoromicia capensis*), which often roosts in the roofs of buildings, is likely to be common in the area. The widespread Egyptian Free-tailed Bat (*Tadarida aegyptiaca*) no doubt also occurs. There are many horseshoe (*Rhinolophus*) bat records in the region which represent Geoffroy's Horseshoe Bat (*R. clivosus*) and the Damara Horseshoe Bat (*R. damarensis*; Jacobs et al. 2013). There is a low probability that the Cape Horseshoe Bat (*R. capensis*) and Dent's Horseshoe Bat (*R. denti*) occur.

The Egyptian Slit-faced Bat (*Nycteris thebaica*) is likely to occur where e.g. abandoned buildings provide suitable night feeding roosts for this species. There is a good chance that the crevice-roosting Flat-headed Free-tail Bat (*Sauromys petrophilus*) occurs in association with local rocky ridges and outcrops. The widely but sparsely distributed Long-tailed Serotine (*Eptesicus hottentotus*) may also occur in the area given its recorded occurrence in the region (African Chiroptera Report 2020) and its reported association with rocky outcrops (Monadjem et al. 2020). The widespread, migratory Natal Long-fingered Bat (*Miniopterus natalensis*) may also be present.

Eleven of the listed species represent provincial Protected Species under the Northern Cape Nature Conservation Act (2009). The following are regarded by IWS as priority conservation bat species:

- Namib Long-eared Bat (*Laephotis namibensis*): Red Listed as Vulnerable in South Africa (Child et al. 2016) where there is only one published record of this species (Monadjem et al. 2020).
- Angolan Hairy Bat (*Cistugo seabrae*): Red Listed as Near Threatened in South Africa (Child et al. 2016), and endemic in southern Africa (Monadjem et al. 2020).
- Dent's Horseshoe Bat (*R. denti*): Red Listed as Near Threatened in South Africa (Child et al. 2016), and endemic in southern Africa (Monadjem et al. 2020).
- Lesueur's Hairy Bat (*Cistugo lesueuri*): Endemic essentially to the Cape Fold and Drakensberg mountains (Monadjem et al. 2020; IUCN 2021-1).
- Cape Horseshoe Bat (*R. capensis*): Endemic to the south-western edge of South Africa and possibly Namibia (Monadjem et al. 2020).
- Natal Long-fingered Bat (*M. natalensis*): known to roost in large numbers (sometimes hundreds or thousands of individuals) and to migrate hundreds of kilometres (Miller-Butterworth et al. 2003; MacEwan et al. 2016).
- Damara Horseshoe Bat (*R. damarensis*): Should be regarded as a provincial Protected Species given its former recognition as Darling's Horseshoe Bat (Jacobs et al. 2013), which is listed as a Protected Species under the Northern Cape Nature Conservation Act (2009).

IMPORTANT BAT HABITATS

Known significant roosts in the region (African Chiroptera Report 2020; IWS unpubl. data) appear to be limited to mines around the town of Springbok, situated approximately 70 km south-west of the OHPL. The nearest known cave roosts (IWS unpubl. data) are situated along the west South African and Namibian coastlines, more than 150 km away from the OHPL route.

6.1.14 AVIFAUNA

The following is extracted from the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as ***Appendix F2****.*

IMPORTANT BIRD AREAS

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels.

As indicated in **Figure 6-26**, the project area overlaps with portions of the Haramoep and Black Mountain Mine IBA. This IBA is one of the few sites where the globally threatened Red Lark Calendulauda burra and near-threatened Sclater's Lark *Spizocorys sclateri* can be found. A total of 198 species has been recorded in this IBA. Some important species include: Ludwig's Bustard *Neotis ludwigii*, Kori Bustard *Ardeotis kori*, Martial Eagle *Polemaetus bellicosus*, Secretarybird *Sagittarius serpentarius*, Verreauxs' Eagle *Aquila verreauxii*, Booted Eagle *Hieraaetus pennatus*, Cape Eagle-Owl *Bubo capensis*, Spotted Eagle-Owl *B. africanus*, and Hooded Vulture *Necrosyrtes monachus*. Restricted-range and biome-restricted birds species found here are: Stark's Lark, Karoo

Spizocorys starki, Long-billed Lark *Certhilauda subcoronata*, Black-eared Sparrow-lark *Eremopterix australis*, Tractrac Chat *Cercomela tractrac*, Sickle-winged Chat *C. sinuata*, Karoo Chat *C. schlegelii*, Layard's Tit-Babbler *Sylvia layardi*, Karoo Eremomela *Eremomela gregalis*, Cinnamon-breasted Warbler *Euryptila subcinnamomea*, Namaqua Warbler *Phragmacia substriata*, Sociable Weaver *Philetairus socius*, Pale-winged Starling *Onychognathus nabouroup* and Black-headed Canary *Serinus alario*.

This IBA is also home to approximately 35 threatened, rare and endemic plant species (IBA, 2018).

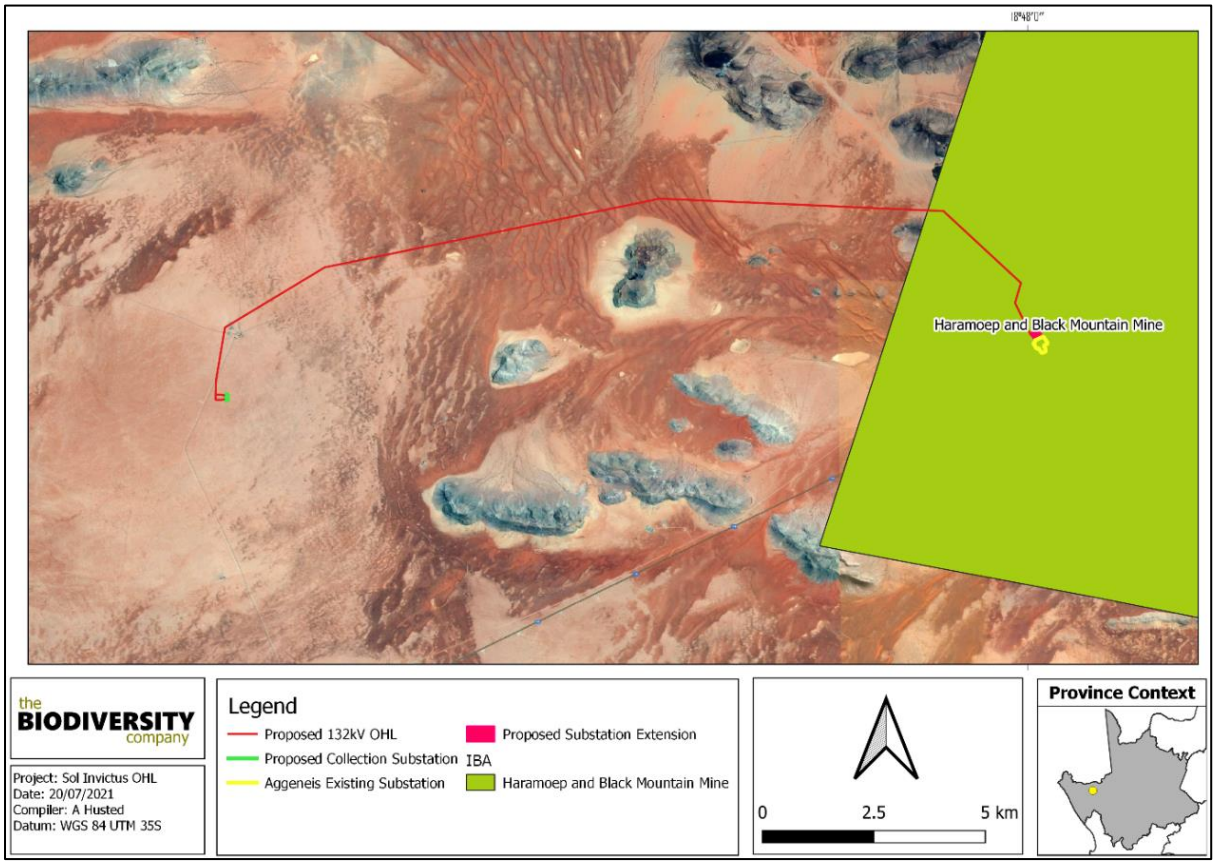


Figure 6-26: The project area in relation to the Haramoep and Black Mountain Mine IBA (source: TBC, 2021)

DESKTOP ASSESSMENT

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 122 bird species are expected to occur in the vicinity of the project area. It is expected that this list is not fully comprehensive based on the limited sampling that has been done in the area. The full list of potential bird species is provided in the Biodiversity Impact Assessment report compiled by The Biodiversity Company and included as **Appendix F2**. Of these species, eight are species of conservation concern, of which one has a low likelihood of occurrence based on the lack of suitable habitat (**Table 6-9**).

Table 6-9: List of bird species of regional or global conservation importance that are expected to occur in the project area (SABAP2, 2021, ESKOM, 2015; IUCN, 2021)

		CONSERVATION STATUS		
SPECIES	**COMMON NAME**	**Regional (SANBI, 2016)**	**IUCN (2021)**	**LIKELIHOOD OF OCCURRENCE**
Aquila verreauxii	Eagle, Verreaux's	VU	LC	High
Calendulauda burra	Lark, Red	VU	VU	High

SPECIES	COMMON NAME	CONSERVATION STATUS		LIKELIHOOD OF OCCURRENCE
		Regional (SANBI, 2016)	IUCN (2021)	
Cursorius rufus	Courser, Burchell's	VU	LC	High
Eupodotis vigorsii	Korhaan, Karoo	NT	LC	High
Falco biarmicus	Falcon, Lanner	VU	LC	High
Neotis ludwigii	Bustard, Ludwig's	EN	EN	Confirmed
Oxyura maccoa	Duck, Maccoa	NT	NT	Low
Polemaetus bellicosus	Eagle, Martial	EN	VU	Confirmed

Aquila verreauxii (Verreaux's Eagle) is listed as VU on a regional scale and LC on a global scale. This species is locally persecuted in southern Africa where it coincides with livestock farms, but because the species does not take carrion, is little threatened by poisoned carcasses. Where hyraxes are hunted for food and skins, eagle populations have declined (IUCN, 2017). Based on the expected habitat, the close proximity to mountains, and the availability of prey items, the likelihood of occurrence of this species at the project site is rated as high.

Calendulauda burra (Red Lark) is listed as VU both locally and internationally (IUCN, 2016). Their habitat consists of tropical dry shrubland to dry lowland grassland. This species is threatened by habitat destruction and loss. The likelihood of this species occurring in the project area is high due to the suitable habitat found in the project area.

Cursorius rufus (Burchell's Courser) is categorised as VU on a regional scale. It inhabits open short-sward grasslands, dry savannas, fallow fields, overgrazed or burnt grasslands and pastures, bare or sparsely vegetated sandy or gravelly deserts, stony areas dotted with small shrubs and saltpans (IUCN, 2017). The species is threatened in the south of its range by habitat degradation as a result of poor grazing practices and agricultural intensification. The likelihood of occurrence in the project area is rated as high.

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins. The likelihood of records of this species in the project area is rated as high due to the nearby mountains/ridges, where they could nest, and the presence of many bird species on which Lanner Falcons may predate.

Neotis ludwigii (Ludwig's Bustard) is listed as EN both locally and internationally. This species is found in the desert, grassland and shrubland specifically in rocky areas such as mountains and cliffs. The main reason for the decline in the numbers are ascribed to the collisions with power lines. The presence was confirmed via a track during the 2021 survey.

Polemaetus bellicosus (Martial Eagle) is listed as EN on a regional scale and VU on a global scale. This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thornbush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). The presence was confirmed via direct observation during the 2021 survey.

FIELD ASSESSMENT

Twenty-four (24) species (19.67 % of expected species) were recorded in the project area during the survey based on either direct observation, vocalisations, or the presence of visual tracks & signs. All of the species are protected under the Northern Cape Nature Conservation Act No. 9 of 2009, with the following two species rated as threatened.

Neotis ludwigii (Ludwig's Bustard) has a large range centred on the dry biomes of the Karoo and Namib in southern Africa, being found in the extreme south-west of Angola, western Namibia and South Africa. This species inhabits open lowland and upland plains with grass and light thornbush, sandy open shrub-veld and semi-desert in the arid and semi-arid Namib and Karoo biomes. Ludwig's Bustard is nomadic and a partial migrant,

moving to the western winter-rainfall part of its range in winter. The primary threat to the species is collisions with overhead power lines, irrespective of size, with potentially thousands of individuals involved in such collisions each year (Jenkins *et al*. 2011). Collision rates on high voltage transmission lines in the Karoo may exceed one Ludwig's Bustard per kilometre per year. Bustards have limited frontal vision so may not see power lines, even if they are marked (Martin and Shaw 2010). Ludwig's Bustard tracks were observed during the August 2021 survey within the 100 m survey corridor.

Polemaetus bellicosus (Eagle, Martial) has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thornbush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). In South Africa, 138 active Martial Eagle nests have been found along 1,750 km of power lines, potentially showing the pylons provide artificial nesting sites, although this species remains extremely vulnerable to power line related fatalities (G. Tate *in litt*. 2020). The Sol Invictus project area form part of the territory of various birds, including a breeding pair. A 1,5 km buffer is found in the southwest of Sol Invictus 1. The individual observed during the August 2021 survey was observed perched on a pylon next to the tar road.

The reported results by DJ Van Niekerk (2016) are considered to be crucially important in regard to longer term studies across seasons and should be considered alongside these results, and the mitigation measures strictly adhered to.

6.1.15 PROTECTED AREAS

The following is extracted from the Biodiversity Impact Assessment compiled by The Biodiversity Company and included as ***Appendix F2****.*

The DFFE maintains a spatial database on Protected Areas and Conservation Areas. The Protected Areas and Conservation Areas (PACA) Database scheme that is used for classifying protected areas (South Africa Protected Areas Database-SAPAD) and conservation areas (South Africa Conservation Areas Database-SACAD) into types and sub-types in South Africa has been considered for this component of the project.

The definition of protected areas used in these documents follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003) (NEM:PA). Chapter 2 of the NEM:PA sets out the "System of Protected Areas", which consists of the following kinds of protected areas:

- Special nature reserves;
- National parks;
- Nature reserves;
- Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003);
- World heritage sites declared in terms of the World Heritage Convention Act;
- Marine protected areas declared in terms of the Marine Living Resources Act;
- Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and
- Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).
- The types of conservation areas that are currently included in the database are the following:
- Biosphere reserves;
- Ramsar sites;
- Stewardship agreements (other than nature reserves and protected environments);
- Botanical gardens;
- Transfrontier conservation areas;
- Transfrontier parks;
- Military conservation areas; and
- Conservancies.

Figure 6-27 shows that the Karaas Nature Reserve, which is the closest protected area, is situated approximately 16.8 km southwest of the project area, which means the project area is outside the protected areas 5 km buffer.

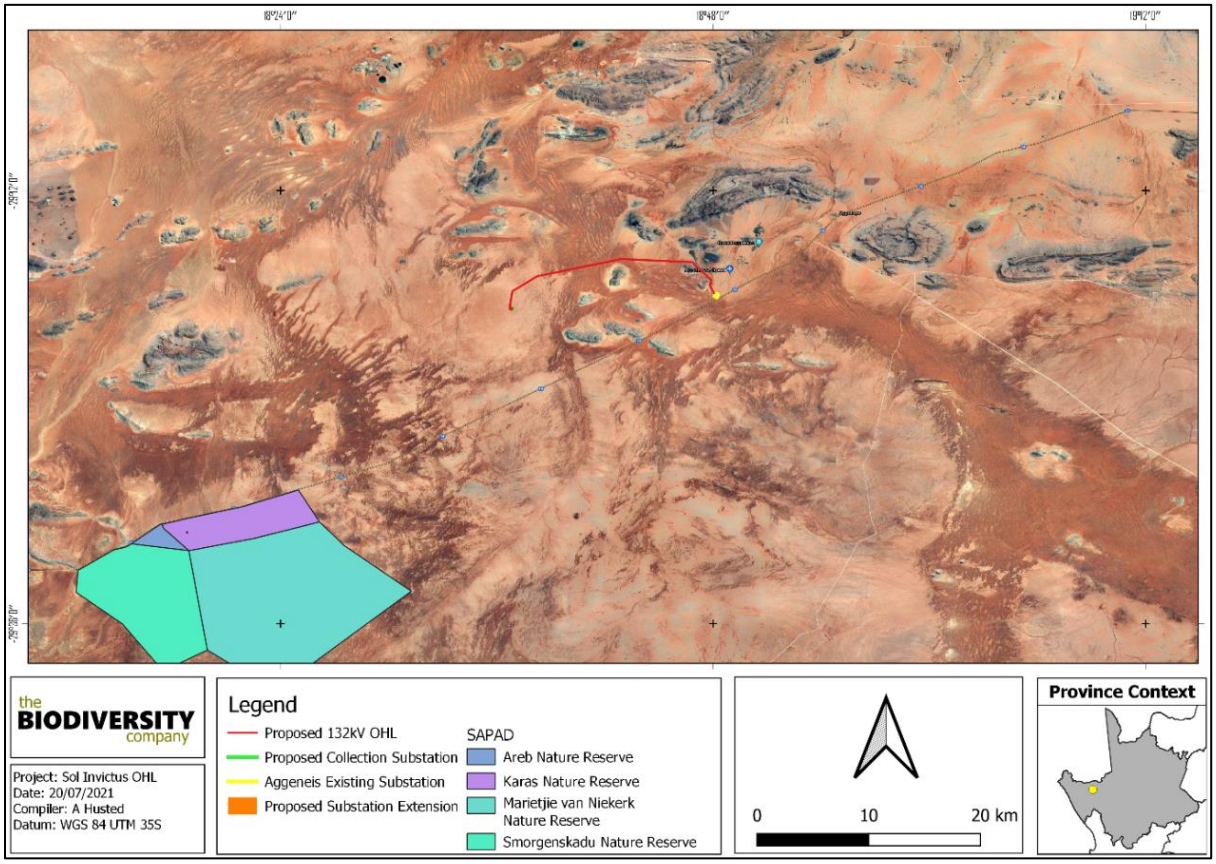


Figure 6-27: The project area in relation to the nearby protected areas

6.2 SOCIAL AND ECONOMIC

6.2.1 SOCIO-ECONOMIC

The following is extracted from the Social Impact Assessment compiled by Tony Barbour and included as ***Appendix F5****.*

ADMINISTRATIVE CONTEXT

The proposed project infrastructure is located approximately 5km south-west of Aggeneys (at the closest), a small mining town located some 266km by road from Upington, in the Northern Cape Province. The town was established in 1976 in order to provide housing for the mining operations west of the town. The Black Mountain Mining (BMM) mine was originally established by Anglo American and comprises of the Deeps and Swartberg Shafts. The mine primarily produces copper, lead and zinc, with silver as a by-product, which is transported to the Port of Saldanha via railroad.

The NKM and KMM are two of six local municipalities that make up the Namakwa District Municipality (NDM) (**Figure 6-28**). The towns of Springbok and Pofadder are the administrative seats of the NKM and KMM, respectively. The Sol Invictus PV Solar Cluster is located in Ward 1 of the NKM, while portions of the powerline are located within the NKM and KMM. The closest settlement to the SEFs is the mining town of Aggenys, ~20 km to the north east of the site. Aggeneys is located in the KMM. The town of Pofadder, which serves as the administrative seat of the KMM, is located 71 km to the north east of the site. Springbok, the administrative seat

of the NKM, is located 87 km to the south west of the site. Pofadder is the largest of the settlement in the area, with a population of 3 663, followed by Aggeneys, 2 262.

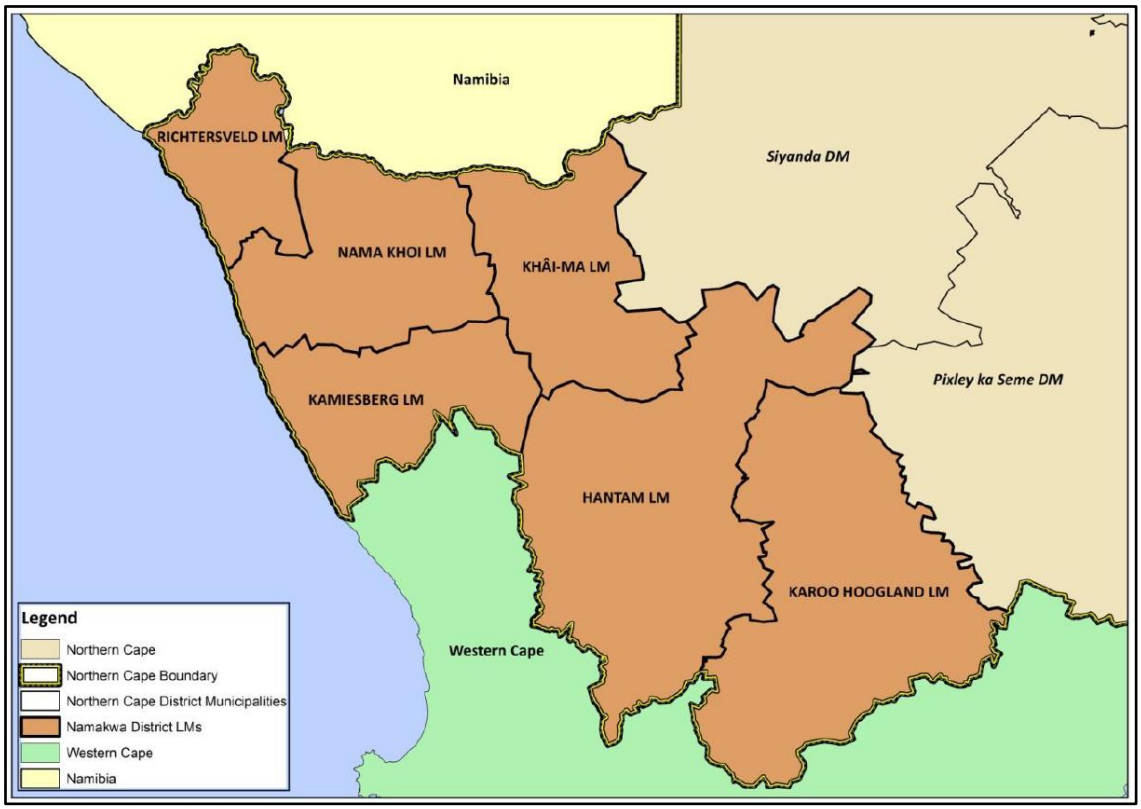


Figure 6-28: Local municipalities within Namakwa District Municipality

NAMA KHOI MUNICIPALITY

POPULATION

The population in the NKM in 2016 was 46 513 persons. The number of households was 14 547, with an average household size of 3.2. The population of Ward 1 in 2011 was 5 082 persons. The total number of households was 1 494, with an average household size of 3.4.

Most of the population in the NKM is Coloured (93%), followed by Whites (5.6%) and Black Africans (1.4%). The dominant language within the Municipality is Afrikaans (97.4%) (Household Community Survey, 2016). In terms of Ward 1, the majority of the population was also Coloured (97.4%), followed by Black Africans (1%) and Whites (0.7%). The dominant language was Afrikaans (98.5%) (Census 2011).

Based on the 2016 Household Community Survey 28.1% of the population of the NKM were under the age of 18, 61.5% were 18 to 64, and the remaining 10.5% were 65 and older. Based on these figures the dependency ratio for the NKM in 2016 was 63. The 2011 figures for Ward 1 were 31.81% under the age of 18, 58.5% between 18 to 64 and the remaining 9.6% 65 and older. Based on these figures the dependency ratio for Ward 1 was 71. As indicated by the data, a high percentage of the population in Ward 1 were under the age of 18.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates reduced revenue for local authorities to meet the growing demand for services. A high dependency ratio also reflects the limited employment opportunities in the area and represent a significant risk to the local and district municipality.

The traditional approach to measuring the dependency ratio is to use figures of 0-14 years of age and 15-65, and 65 and over. Using the above figures will result in a higher dependency ratio. However, it is likely to be more accurate given that the majority of the population under the age of 18 are or should be at school and are likely to be residing with their parents as opposed to working. Based on this approach the provincial and national dependency ratios in 2011 were 55.7 and 52.7, respectively. The dependency ratio for Ward 1 was therefore significantly higher than the provincial and national levels.

HOUSEHOLDS, HOUSE TYPES AND OWNERSHIP

The number of households in the NKM was 14 547 in 2016. There was a total of 1 494 (2011) households in Ward 1. Of these 95.1% were formal houses and 1.7% were apartments. The majority of dwellings in Ward 1 are therefore formal structures. In terms of ownership, 67% of houses are owned and fully paid off, 7.7% are owned, but not paid off, 7.9% were rented and 6.8% were occupied rent free. The high number of formal houses, together with the high percentage of houses that are owned and fully paid off reflects a relatively stable community.

Approximately 43% of the households in Ward 1 were headed by women. The figure is higher than the district level (36.5%) and provincial level (38.5%). Women headed households tend to be more vulnerable and reflect a lack of employment opportunities in the area, which result in the men leaving to seek employment in larger towns, such as Springbok, Upington, Cape Town and Saldanha Bay.

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 9.5% of the population of the NKM have no formal income, 2.5% earn under R 4 800, 5.1% earn between R 5 000 and R 10 000 per annum, 17.7% between R 10 000 and 20 000 per annum, and 20.6% between R 20 000 and R 40 000 per annum (Census 2011)[11]. The figures for Ward 1 were 5.4%, 1.6%, 5.7%, 13.7% and 25.6% respectively.

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ R 40 000 per annum). Based on this measure, in the region of 55.4% of the households in the NKM and 52% in Ward 1 live close to or below the poverty line. The low-income levels reflect the limited formal employment opportunities in the area. This is also reflected in the high unemployment rates. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the NKM. This in turn impacts on the ability of the NKM to maintain and provide services. The current (2021) percentage of households living on or below the poverty line is likely to be higher due to the impact of the COVID-19 pandemic.

INDIGENT HOUSEHOLDS

The total number of indigent households registered in the Namakwa District in 2016 was 11 537. Of this total, the NKM had the highest number of indigent households, namely 5 045 (44%) households. The IDP notes that not all of the indigent households benefit from free basic services. However, the majority of households within the NKM have access to services (i.e. water, electricity, sanitation, and refuse removal).

EMPLOYMENT

The official unemployment rate in the NKM in 2016 was 11.6%, with 43% falling within the not economically active group and 6.2% being classified as discouraged work seekers. The figures for Ward 1 (2011) were 10.4%, with 49% falling within the not economically active group and 5.9% being classified as discouraged work seekers. The unemployment rate was lower than the district (11.1%) and provincial (14.5%) rate. However, the current (2021) unemployment rates are likely to be higher due to the impact of the COVID-19 pandemic.

[11] There is no data on household income from the 2016 Household Community Survey for the NKM Ward 1.

EDUCATION

The data from the 2016 Community Survey indicates that 1.4% of the population over 20 years of age had no education, 8.5% had a primary school level education and 26% had passed matric, 2.9% had achieved an undergraduate degree and 1.6% a postgraduate qualification. The matriculation figures are marginally better than the provincial figure (25.2%), but lower than the national (28.4%) average. Low education levels, specifically higher education, therefore, remains a challenge in the NKM.

The figures for Ward 1 indicate that 1.9% of the population had no education. This figure is lower than the district and provincial level. The figures for the percentage of the population over the age of 20 with matric (23.6%) was higher than the district figure (21.5%), but marginally lower than the provincial level (25.2%). Only 1.5% had achieved an undergraduate degree and 0.4% a postgraduate qualification (**Table 6-10**). The low percentage the population with an undergraduate and or postgraduate qualifications in Ward 1 is likely to have implications in terms of meeting local employment targets during the construction phase, and to a lesser extent the operational phase of the Sol Invictus projects.

Table 6-10: Population by highest educational level

COLUMN	NAMA KHOI WARD 1		NAMAKWA		NORTHERN CAPE	
None	1.9%	61	6.3%	4,794	11.1%	76,861
Other	0.2%	8	0.2%	184	0.3%	1,746
Some primary	18.5%	610	17.1%	12,928	16.8%	116,114
Primary	10.8%	357	9.7%	7,332	6.2%	43,111
Some secondary	42.8%	1,411	37.9%	28,744	34.2%	236,956
Grade 12 (Matric)	23.6%	777	21.5%	16,290	25.2%	174,210
Undergrad	1.5%	49	2.4%	1,825	2.7%	18,802
Post-grad	0.4%	13	1%	729	1.2%	8,254
N/A	0.3%	9	3.9%	2,946	2.4%	16,755

Source: Wazimap: 2011 Census

ACCESS TO WATER

Based on the 2011 Census, 96.2% of households in Ward 1 were provided with water by a service provider, namely the NKM. 1.4% rely on a vendor and 0.9% rely on boreholes (**Table 6-11**). The high number of households that are provided with water by a service provider reflects a high level of service delivery.

Table 6-11: Population by water access

COLUMN	NAMA KHOI WARD 1		NAMAKWA		NORTHERN CAPE	
Service provider	96.2%	4,890	85.2%	98,720	85.4%	978,825
Vendor	1.4%	73	0.2%	208	0.5%	6,038
Borehole	0.9%	45	8.2%	9,536	5.9%	67,242
Other	0.9%	44	1.2%	1,425	2%	22,673

Source: Wazimap: 2011 Census

SANITATION

Based on 2011 Census, 67.4% of the households in Ward 1 had flush toilets, 16% relied on pit latrines with ventilation, 7.1% on chemical toilets, and 6.2% on pit latrines without ventilation. It would appear that no households had no access to sanitation facilities. The figures in terms of access to flush toilets are similar to the district and provincial figures for flush toilets (**Table 6-12**).

Table 6-12: Population by sanitation access

COLUMN	NAMA KHOI WARD 1		NAMAKWA		NORTHERN CAPE	
Flush toilet	67.4%	1,006	70.7%	24,456	66%	207,095
Pit latrine with ventilation (VIP)	16%	239	15.2%	5,247	8.9%	27,988
Chemical toilet	7.1%	106	0.9%	313	0.6%	1,987
Pit latrine without ventilation	6.2%	93	4.5%	1,559	10.4%	32,772
Other	3.3%	49	8.8%	3,043	14%	43,953

Source: Wazimap: 2011 Census

REFUSE COLLECTION

97.3% of the households in Ward 1 had their waste collected by a service provider on a regular basis, while 2% relied on their own dump and 0.6% had not access to refuse disposal facilities (**Table 6-13**). The high number of households that are serviced on a regular basis reflects a high level of service delivery.

Table 6-13: Population by refuse access

COLUMN	NAMA KHOI WARD 1		NAMAKWA		NORTHERN CAPE	
Service provider (regularly)	97.3%	4,942	85.4%	98,900	67.4%	771,733
Own dump	2%	100	9%	10,418	21.7%	248,965
None	0.6%	29	1.7%	1,943	4.9%	56,171
Unspecified	0.1%	6	0.2%	229	0.3%	3,819
Other	0.1%	5	3.8%	4,352	5.7%	65,173

Source: Wazimap: 2011 Census

KHAI MA MUNICIPALITY

As indicated above, the focus of the Needs Assessment is on the settlements of Pella, Witbank, Onseepkans and Pofadder, located in the KMM. The towns of Aggeneys, Witbank and Pofadder are located in Ward 4. An overview of the KMM and Ward 4 is provided below.

POPULATION

The population in the KMM in 2016 was 12 344 persons. The number of households was 4 079, with an average household size of 3. The population of Ward 4 in 2011 was 3 638 persons. The total number of households was 1 106, with an average household size of 3.3.

Most of the population is in the KMM is Coloured (89.2%), followed by Whites (7.1%) and Black Africans (2.8%). The dominant language within the Municipality is Afrikaans (94.9%) (Household Community Survey, 2016). In terms of Ward 4, the majority of the population was also Coloured (65.8%), followed by Whites (17.2%) and Black Africans (15.8%). The dominant language was Afrikaans (79.3%) followed by IsiXhosa (8.1%) (Census 2011).

Based on the 2011 Census data 29.5% of the population of Ward 4 were under the age of 18, 66.3% were 18 to 64 and the remaining 4.2% were 65 and older. Based on these figures the dependency ratio for Ward 4 in 2011 was 50.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates reduced revenue for local authorities to meet the growing demand for services. A high dependency ratio also reflects the limited employment opportunities in the area and represent a significant risk to the local and district municipality.

The traditional approach to measuring the dependency ratio is to use figures of 0-14 years of age and 15-65, and 65 and over. Using the above figures will result in a higher dependency ratio. However, it is likely to be more accurate given that the majority of the population under the age of 18 are or should be at school and are likely to be residing with their parents as opposed to working. Based on this approach the provincial and national dependency ratios in 2011 were 55.7 and 52.7, respectively. The dependency ratio for Ward 4 was therefore lower than the provincial and national levels.

HOUSEHOLDS, HOUSE TYPES AND OWNERSHIP

The number of households in the KMM was 4 079 in 2016. There was a total of 1 106 (2011) households in Ward 4. Of these 87.9% were formal houses, 1.8% were apartments and 3.9% were shacks. The majority of dwellings in Ward 4 are therefore formal structures. In terms of ownership, 20.8% of houses are owned and fully paid off, 2.5% are owned, but not paid off, 57.1% were rented and 15.1% were occupied rent free. The high number of rented structures is likely to be linked to the mining activities at Aggenys where the properties are owned by the mining company and rented out to employees.

Approximately 20.4% of the households in Ward 4 were headed by women. The figure is significantly lower that the district level (36.5%) provincial level (38.5%). However, despite the lower percentage of women headed households, women headed households tend to be more vulnerable.

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 4.9 % of the population of the KMM have no formal income, 1.7 % earn under R 4 800, 6.7 % earn between R 5 000 and R 10 000 per annum, 40.9% between R 10 000 and 20 000 per annum and 13.9% between R 20 000 and R 40 000 per annum (Census 2011)[12]. The figures for Ward 4 were 5.2%, 2.8%, 3.1%, 11.6% and 14.1% respectively.

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ R 40 000 per annum). Based on this measure, in the region of 68.1% of the households in the KMM and 36.8% in Ward 4 live close to or below the poverty line. The income levels in Ward 4 are therefore higher than those in the KMM. The low-income levels in the KMM reflect the limited formal employment opportunities in the area and the dependence on seasonal employment in the agricultural sector. This is also reflected in the high unemployment rates. The low-income levels in the KMM are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the KMM. This in turn impacts on the ability of the KMM to maintain and provide services. The current (2021) percentage of households living on or below the poverty line is likely to be higher due to the impact of the COVID-19 pandemic.

INDIGENT HOUSEHOLDS

The total number of indigent households registered in the Namakwa District in 2016 was 11 537. Of this total, the KMM had the second highest number of indigent households, namely 1 752 (15%) households.

EMPLOYMENT

The official unemployment rate in Ward 4 in 2011 was 6.4%, with 33.9% falling within the not economically active group and 3% being classified as discouraged work seekers. The unemployment rate for Ward 4 was lower than the district (11.1%) and provincial (14.5%) rate. However, the current (2021) unemployment rates are likely to be higher due to the impact of the COVID-19 pandemic.

EDUCATION

The data from the 2016 Community Survey indicates that 2.8% of the population over 20 years of age in the KMM had no education, 6.7% had a primary school level education and 23.3% had passed matric. 3.1% had achieved

[12] There is no data on household income from the 2016 Household Community Survey for the KMM and Ward 4.

an undergraduate degree and 0.6% a postgraduate qualification. The matriculation figures are lower than the provincial figure (25.2%) and national (28.4%) average. Low education levels, specifically higher education, therefore, remains a challenge in the KMM.

The figures for Ward 5 indicate that 2.3% of the population had no education. This figure is lower than the district and provincial level. The figures for the percentage of the population over the age of 20 with matric (29.7%) was higher than the district figure (21.5%) and provincial level (25.2%). 3.7% had achieved an undergraduate degree and 2.2% a postgraduate qualification (**Table 6-14**). These figures are also higher than the district figure (2.4% and 1%) and provincial level (2.7 and 1.2%). Despite this the relatively low percentage of the population with an undergraduate and or postgraduate qualifications in Ward 4 is likely to have implications in terms of meeting local employment targets during the construction phase, and to a lesser extent the operational phase of the Sol Invictus projects.

Table 6-14: Population by highest educational level

COLUMN	KHÂI-MA WARD 4		NAMAKWA		NORTHERN CAPE	
None	2.3%	57	6.3%	4,794	11.1%	76,861
Other	0.4%	10	0.2%	184	0.3%	1,746
Some primary	8.7%	215	17.1%	12,928	16.8%	116,114
Primary	4.2%	104	9.7%	7,332	6.2%	43,111
Some secondary	39.2%	965	37.9%	28,744	34.2%	236,956
Grade 12 (Matric)	29.7%	731	21.5%	16,290	25.2%	174,210
Undergrad	3.7%	91	2.4%	1,825	2.7%	18,802
Post-grad	2.2%	54	1%	729	1.2%	8,254
N/A	9.6%	236	3.9%	2,946	2.4%	16,755

Source: Wazimap: 2011 Census

ACCESS TO WATER

Based on the 2011 Census, 85% of households in Ward 4 were provided with water by a service provider, namely the KMM. 10.2% relied on boreholes and 2.5% on the Gariep (Orange) River (**Table 6-15**). The high percentage that relies on boreholes reflects the rural nature of the area. Due to the rural, dispersed nature of the area, it is both difficult and costly to provide municipal services, hence the reliance on boreholes.

Table 6-15: Population by water access

COLUMN	KHÂI-MA WARD 4		NAMAKWA		NORTHERN CAPE	
Service provider	85%	3,094	85.2%	98,720	85.4%	978,825
Borehole	10.2%	371	8.2%	9,536	5.9%	67,242
River	2.5%	89	1.6%	1,873	1.8%	21,008
Tanker	0.9%	32	0.8%	877	2.1%	24,299
Other	1.5%	53	4.2%	4,836	4.8%	54,488

Source: Wazimap: 2011 Census

SANITATION

85.9% of the households in Ward 4 had flush toilets, 5.5% relied on pit latrines with ventilation, and 3.3% had no access to sanitation facilities. The figures in terms of access to flush toilets are higher than the district and provincial figures for flush toilets (**Table 6-16**).

Table 6-16: Population by sanitation access

COLUMN	KHÂI-MA WARD 4		NAMAKWA		NORTHERN CAPE	
Flush toilet	85.9%	953	71.3%	24,456	66.4%	207,095
Pit latrine with ventilation (VIP)	5.5%	61	15.3%	5,247	9%	27,988
None	3.3%	37	5.7%	1,940	8.2%	25,586
Pit latrine without ventilation	2.3%	25	4.5%	1,559	10.5%	32,772
Other	3.1%	34	3.2%	1,103	5.9%	18,367

Source: Wazimap: 2011 Census

REFUSE COLLECTION

81% of the households in Ward 4 had their waste collected by a service provider (KMM) on a regular basis, while 7.4% relied on their own dump and 4.2% were serviced by the local service provider, but not on a regular basis (**Table 6-17**). The relatively high percentage of households that rely on their own and or communal refuse dumps reflects the rural nature of Ward 4.

Table 6-17: Population by refuse access

COLUMN	KHÂI-MA WARD 4		NAMAKWA		NORTHERN CAPE	
Service provider (regularly)	81%	2,948	85.4%	98,900	67.4%	771,733
Own dump	7.4%	269	9%	10,418	21.7%	248,965
Service provider (not regularly)	4.2%	153	2%	2,311	2.3%	26,678
Other	4.2%	151	0.9%	1,048	1.7%	19,953

Source: Wazimap: 2011 Census

ECONOMIC OVERVIEW

In terms of GGDP, the most important sector is the mining sector with a 56%, followed by the community services (12%). Khâi-Ma LM is rich in minerals deposits. South Africa's main source of lead production is from Aggeneys. The main zinc deposits in the Northern Cape Province can be found at Gamsberg near Aggeneys.

Mining is dominated by Vedanta Zinc International (VZI), which acquired Black Mountain and Gamsberg Mine from Anglo American in 2011. Since then, VZI has invested considerable resources into developing the Gamsberg Mine. The combined entity, Black Mountain and Gamsberg, is known as the Black Mountain Mining Complex (BMC). A total of 2,863 people (including business partners) are currently employed within the BMC. This is made up of 1 692 at Black Mountain and 1 711 at the Gamsberg Mine. Other mining operations include the Bosluispan Mine managed by Kori Diamond Mining (Pty) Ltd (Diamonds and Salt) and Aroams Quarry.

The IDP notes that an application for the establishment of the Namakwa Special Economic Zone (SEZ) in vicinity of the Aggeneys and Gamsberg Zinc mine has been made. The SEZ will include a smelter and associated industries. The IDP indicates that the SEZ would create about 6000 permanent and temporary jobs. The Northern Cape Department of Economic Development and Tourism in conjunction with the national Department of Trade and Industry is preparing the final documents for the declaration of a Namakwa SEZ.

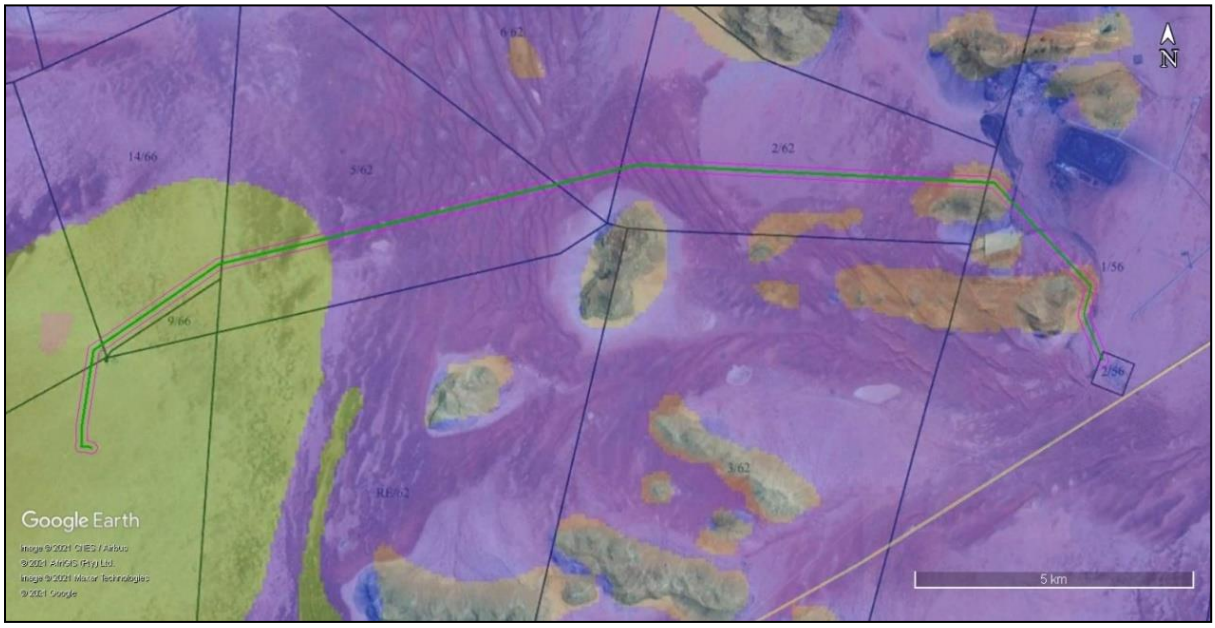
Agriculture includes both commercial and emerging, small scale farming, with a focus on livestock (sheep, goats and cattle). Irrigation farming also takes place along the Gariep River. The main crops are grapes (table, raisin and wine). The Department of Agriculture and Rural Development also supports the Pella community farming operations that are linked to raisin and table grapes. Vedanta Zinc International BMC also supports small farmers by equipping boreholes and other needs. Abengoa Solar also supports local small-scale farmers at Onseepkans.

There are also a number of renewable energy facilities in the KMM, including Abengoa's Khaxu Solar One, a 100MW concentrated solar power (CSP) plant located north of Pofadder.

6.2.2 PALAEONTOLOGY

The following is extracted from the Heritage Impact Assessment compiled by ACO Associates and included as ***Appendix F4****.*

The SAHRIS Palaeo sensitivity map indicates that the majority of the eastern part of the powerline crosses areas of 'low' palaeontological sensitivity, while only a relatively small section at the western end crosses areas of 'moderate' sensitivity, denoted as blue and green respectively, in **Figure 6-29**.



Green denotes moderate sensitivity, while blue denotes low sensitivity

Figure 6-29: Extract from the SAHRIS Palaeo sensitivity map indicating the palaeontological sensitivity of the area.

Almond (2015) in his desktop study of the Sol Invictus PVSEF notes that most of the study area is underlain by unfossiliferous metamorphic basement rocks (gneisses etc), or is mantled by superficial sediments of far more recent age than the underlying rocks which are of low palaeontological sensitivity. Most fossils within the superficial deposits are likely to be of widespread occurrence (i.e. not unique), with the exception of occasional rare vertebrate remains. Igneous and metamorphic hard rocks, mainly gneisses, schists, quartzites and amphibolites, crop out at the surface only in the southwestern part of the study area. The overall impact significance of the proposed Sol Invictus Solar PV development on fossil heritage was therefore considered to be 'very low'.

No fossils are known to have been found within the study area. Although isolated examples of fossil sites are found in the broader region, for example at Bundu Pan near Copperton (Kibberd 2006), the fossil record of the Kalahari Group as a whole is sparse and limited in its diversity. While the basement rocks are unfossiliferous, the kinds of fossils that may be expected to occur in the sand deposits are of very low significance and would be sparsely distributed. Overall, the palaeontological sensitivity of the study area is thus considered to be low.

The desktop palaeontological impact assessment concluded that the proposed powerline route lies on non-fossiliferous volcanic rocks of the Namaqua-Natal Province and aeolian Quaternary sands in the eastern part. The shorter western part the route is along moderately sensitive Tertiary Calcretes that would only preserve fossils in such features as palaeo-pans and palaeo-springs. None of these features is evident in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the environmental officer when excavations commence. As far as the palaeontology is concerned, it is recommended that the project be authorised.

6.2.3 ARCHAEOLOGY

The following is extracted from the Heritage Impact Assessment compiled by ACO Associates and included as ***Appendix F4****.*

The fieldwork component of the Archaeological Impact Assessment was conducted by Mr D Halkett and Mr J Gribble of ACO Associates cc on the 6–8 September 2021. Visibility of the ground surface in the project site was considered to be good to excellent and there were no limitations in terms of access to the powerline route. Observations made during the survey of the powerline corridor are largely in agreement with observations of other studies made in the area, but there were far fewer Later Stone Age resources on the powerline route.

EARLIER AND MIDDLE STONE AGE

Morris (2011b) noted that Beaumont et al. (1995:240-1) described a widespread low density stone artefact scatter of Pleistocene age across areas of Bushmanland where raw materials, mainly quartzite cobbles, were derived from Dwyka till, however that "*substantial Middle Stone Age sites are uncommon in Bushmanland*" (1995:241) and those that have been documented thus far have generally yielded only small samples (Morris & Beaumont 1991; Beaumont et al 1995). The Earlier Stone Age included Victoria West cores on dolerite, long blades, and a very low incidence of handaxes and cleavers.

No substantial sites have been found previously in the survey area. Only very sparse localized scatters of stone tools have been seen in places, with limited traces in the hills (e.g. an MSA site at the top of Gamsberg) or at the bases of hills. Earlier Stone Age, including a Victoria West core on quartzite, has been noted within the Gamsberg basin (Morris 2010).

Figure 6-30 indicates locations of other heritage assessments that have been undertaken around the proposed powerline and which are discussed in the HIA report.

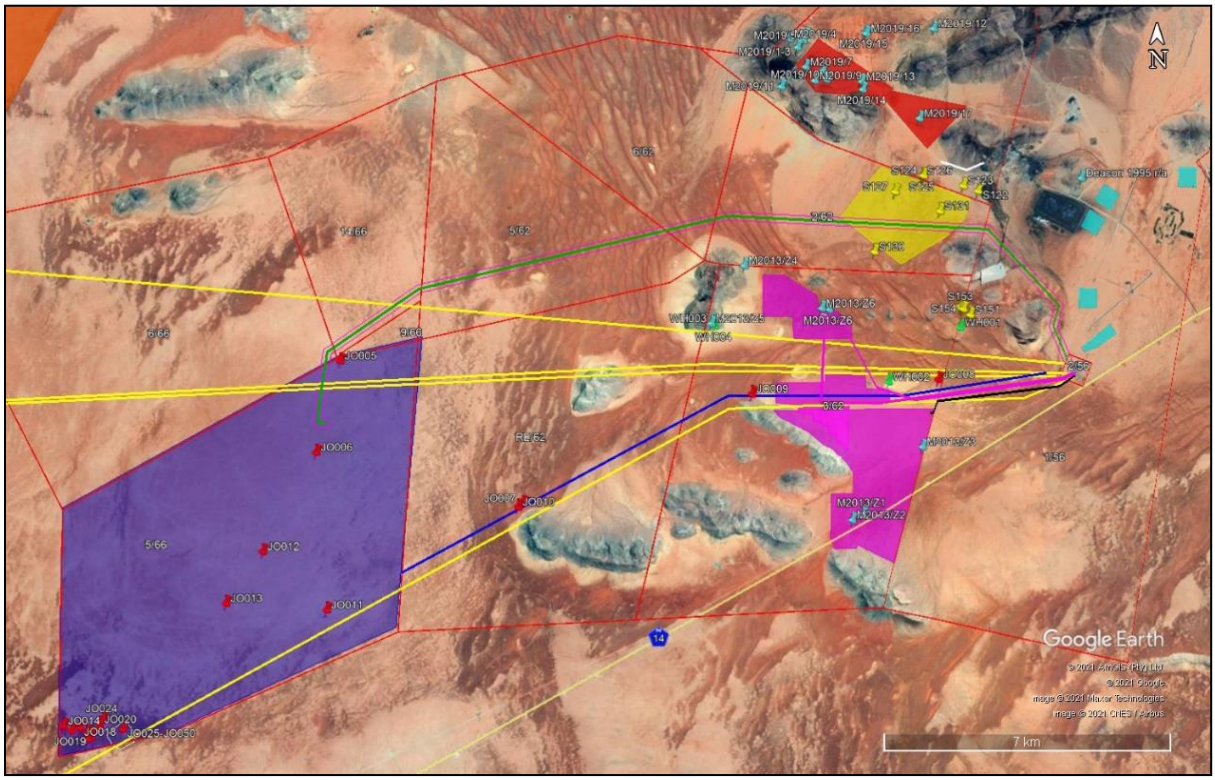


Figure 6-30: The locations of other heritage assessments around the proposed powerline discussed in the report.

LATER STONE AGE

Morris (2011b) notes that generally speaking, Late Holocene Later Stone Age (LSA) sites are the predominant archaeological trace noted in past surveys in the Aggeneys-Pofadder region (Morris 1999a-b, 2000a-c, 2001, 2010). Beaumont et al. (1995) have shown, with reference to the LSA, that "*virtually all the Bushmanland sites so far located appear to be ephemeral occupations by small groups in the hinterland on both sides of the [Orange] river*" (1995:263). The appearance of herders in the Orange River Basin, Beaumont et al. argue, led to competition over resources and ultimately to marginalisation of hunter-gatherers, some of whom then occupied Bushmanland, probably mainly in the last millennium, and focused their hunting and gathering activities around the limited number of water sources in the region. Surveys have located signs of human occupation mainly in the shelter of granite inselbergs, on red dunes which provided clean sand for sleeping, or around the seasonal pans (Beaumont el al. 1995:264). Possibly following good rains, herders moved into the Orange River hinterland, as attested archaeologically at sites with ample pottery near Aggeneys and, east of Pofadder.

A number of surveys have been carried out in the Aggeneys area and have reported a variety of finds directly relevant to the proposed powerline. Morris surveyed a CSP at Aggeneys (east of the powerline) and also undertook the initial survey of the Zuurwater PVSEF site (south of the powerline) (2011a, 2011b), while Smith (2012) surveyed the site of the proposed Boesmanland PVSEF (never built) through which a section of the Sol Invictus powerline will pass. According to De Kock (2012, Annexure 4) the alternative powerline routes for the PV were also assessed. One of these (Alt 1) is similar to the orientation of the Sol Invictus powerline. No archaeological sites are shown on the route, however; Smith and Morris each reported finding only a small number of isolated quartz artefacts in the surveys, possibly due to the prevalent sand cover in those areas. Smith's comments about his survey are relevant given that the line crosses the surveyed farm. He concluded that "*the flat, open terrain has a low archaeological signature, and that there are no inhibitors, from an archaeological perspective, preventing the solar facility from proceeding with construction*".

In 2016, Orton assessed the sites of 4 proposed PV arrays as part of the Sol Invictus PVSEF (2016a-d), during which he intensively surveyed not only the PV sites, but the whole of the farm (Ptn 5/66). With respect to the searched area, Orton (2016a) indicated that: "*…there were generally very few heritage resources…*"

The Sol Invictus PVSEF lies at the western end of the proposed powerline route, where the last 1.5km of the line and associated infrastructure, such as onsite substations, lie in areas already assessed by Orton. His survey failed to produce many significant archaeological sites except in the very far south west of the farm. The area where the PVSEF with its associated infrastructure is located, was however found not to contain any resources requiring mitigation. Orton also assessed a powerline alternative between the southern part of the farm and the Aggeneis substation, rejected in favour of the new proposed alignment. He found four archaeological sites on the ~17km powerline alignment. According to his site listing, two of these are listed as being of very low significance. The remaining sites are equivocal as Orton cannot say with certainty if they are graves or not, and significance is therefore questionable. In any event, what is more useful to note is that three of the four sites on the powerline are found on the edges of rock outcrops.

Orton concluded the following about the site and surroundings: "*The vast majority of the study area was found to be a flat, featureless plain that is completely unconducive to finding traces of Stone Age archaeological settlement. Even isolated artefacts attributable to background scatter were very rarely encountered. This would be unusual in parts of Bushmanland, but is unsurprising here, given that the surface is either sandy or else, when rocks are found, they are totally unsuited to the production of stone artefacts and isolated artefacts found were all in quartz. No part of the broader study area seemed more likely to produce isolated artefacts than any other*."

He included the following rider: "*If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution*."

More generally, it can be noted that archaeological sites in the area tend to be more commonly encountered around the fringes of granite hills, rocks and koppies, on sand dunes or in or around pans (Beaumont *et al.* 1995). Other surveys in the region support this contention (Halkett 2010; Morris 2011a, 2013; Orton & Webley 2012).

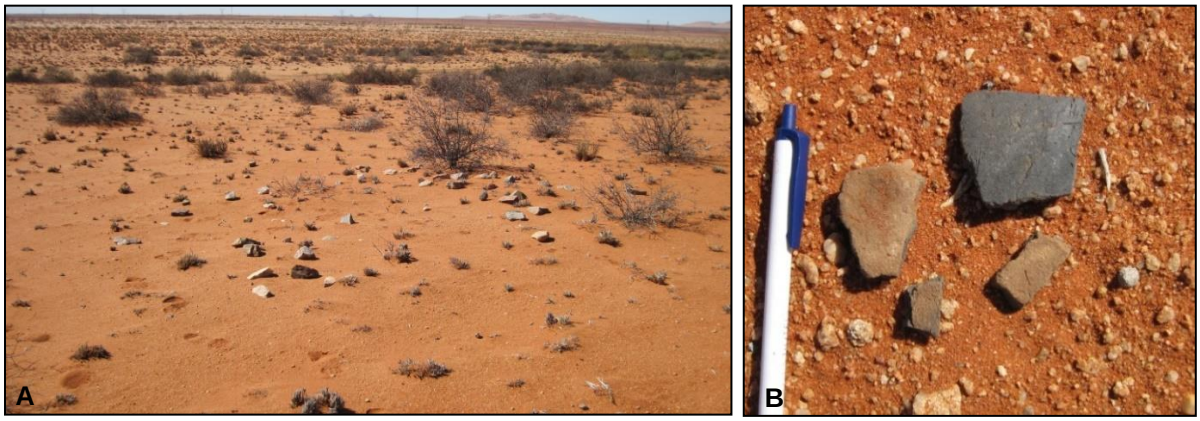
PRE-COLONIAL SITES

No typical Earlier Stone Age artefacts were identified. Rather, the bulk of observations consisted of Middle Stone Age cores, flakes and chunks made predominantly on quartz (chunks of which are strewn in abundance across the

peneplain – **Figure 6-31**). Most of the artefacts are clearly wind abraded attesting to long surface exposure. Few concentrations were found and the majority of these were isolated finds. In rare occasions small scatters were found to contain silcrete-like material. The material is widespread throughout the region. None of these occurrences are rated[13] (not conservation worthy (NCW)) and do not require mitigation.

Figure 6-31: Typical MSA artefacts identified in the powerline corridor

Later Stone Age material was also very limited in the corridor with only one unequivocal observation in the vicinity of the Aggeneys sub-station. This observation (D008/009) consists of a circular arrangement of stone (~1.5m diam – probably marking the base of an informal shelter/skerm, **Figure 6-32(A)**) associated with a piece of patinated clear glass, and slightly further away, a number of indigenous potsherds (probably fragments of a single pot, **Figure 6-32(B)**) and 3 small quartz flakes. These have been graded as IIIC[14] but the content does not warrant mitigation.



(A) A circular arrangement of stone probably marks the base of a small informal hut/skerm at D008. (B) Some of a number of indigenous pot sherds found at D009.

Figure 6-32: Later Stone Age material in the vicinity of the Aggeneys sub-station

6.2.4 HERITAGE / BUILT ENVIRONMENT

*The following is extracted from the Heritage Impact Assessment compiled by ACO Associates and included as **Appendix F4**.*

GRAVES

The findings from the Heritage Impact Assessment undertaken for the Sol Invictus PVSEF, as per Orton (2016), identified two possible graves in the larger project area. It was noted that such isolated graves, when present,

[13] Heritage Western Cape (2012) uses a system in which resources of local significance are sub-divided into Grade IIIA, IIIB and IIIC i.e. high, medium and medium low local significance, while sites of low or very low significance (and generally not requiring mitigation or other interventions) are referred to as "not conservation worthy" (NCW) or "Ungradeable".

[14] Of medium to low intrinsic, associational, or contextual heritage value, local level of significance.

might relate to precolonial occupation of the area or could be from the early farmers ('trekboers') who colonised the area during the 19th century.

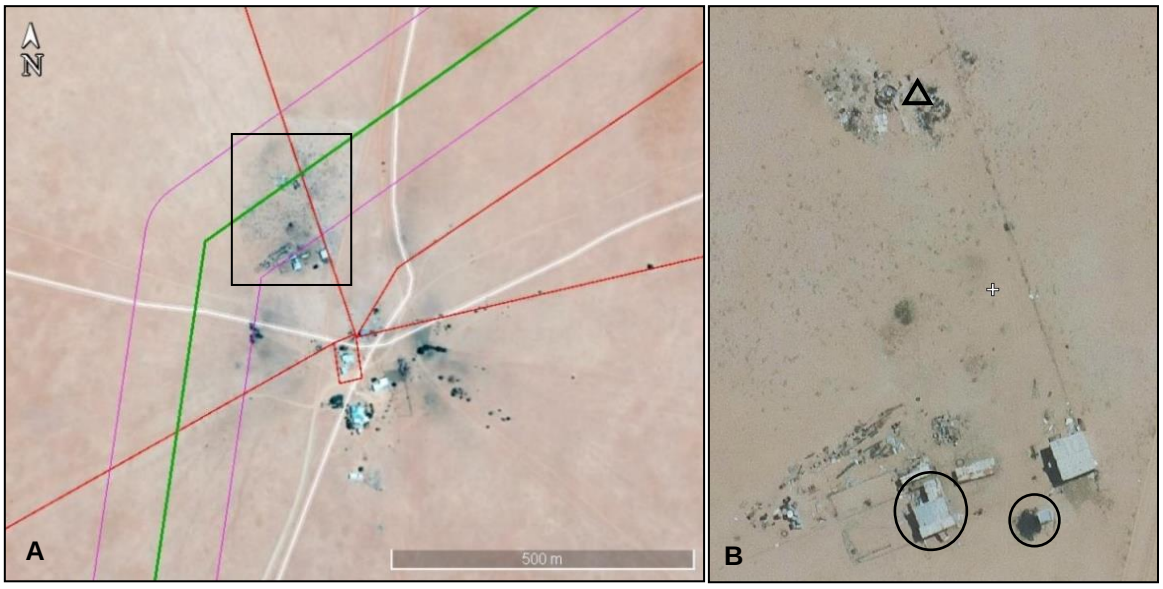
There is always the small possibility of encountering unmarked graves in sandy substrates. However, because of the low density of occupation sites in the area, the chances of locating graves is deemed to be very small indeed. If present, they are likely to be around farm werfs, or at dense archaeological occurrences.

(A) Possible grave at an unspecified waypoint outside the original transmission corridor (Orton 2016a). (B) Possible grave at waypoint 013 (Orton 2016a).

Figure 6-33: Two possible graves in the larger project area

BUILT ENVIRONMENT

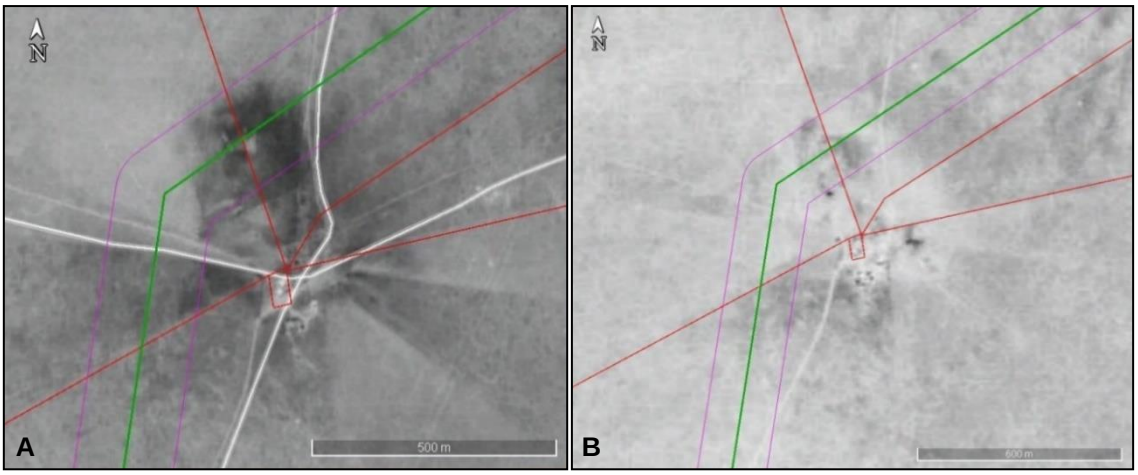
The built environment of the powerline corridor is limited to the Witputs farm werf, at -29.294573° 18.616970° (**Figure 6-34**). The powerline corridor crosses to the north and west of the werf, and only an "old" disused stone kraal, is crossed by the line (**Figure 6-35**). Historical aerial photographs (**Figure 6-36**) of the werf (though resolution is poor) suggest that the shed and barn (**Figure 6-37**) post-date 1961, with the larger shed in place by 1976. Both structures lie just outside the powerline corridor and are unlikely to be impacted by the powerline. Other structures in the vicinity of he shed and barn are informal wooden pole and corrugated iron structures (**Figure 6-38**).



(A) Google Earth 2021 showing the Witputs werf (farm boundaries - red, powerline green, corridor – purple). The area in the black rectangle is enlarged in (B). The triangle symbol marks the old kraal, while circles indicate the barn and shed. (B) NGI 2918BC_3 1:10 000 (2021).

Figure 6-34: Arial layout of Witputs farm werf

Figure 6-35: An older disused kraal made from clacrete blocks also serving as a farm dump.



(A) 1961 aerial photo (464_011_08541) section overlaid on Google Earth (farm boundaries - red, powerline green, corridor – purple). (B) 1976 aerial photo (763_008_08479) section overlaid on Google Earth (farm boundaries - red, powerline green, corridor – purple).

Figure 6-36: Historical aerial photographs

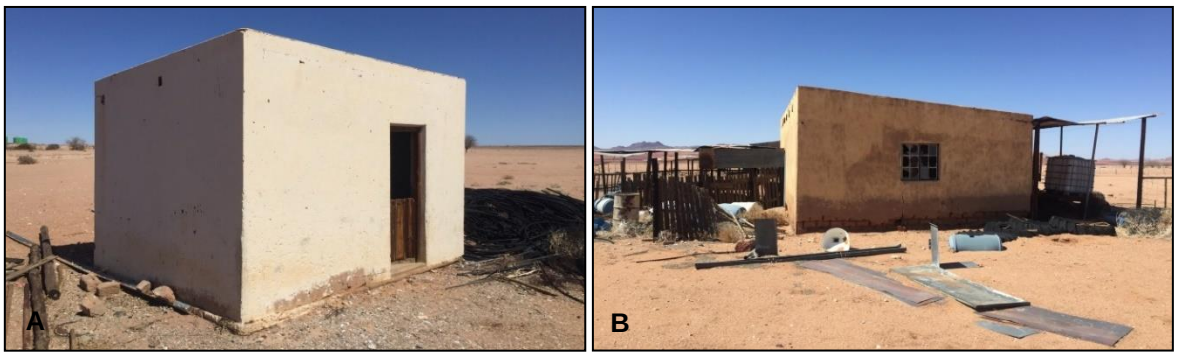


Figure 6-37: Photos of a small storeroom (A) and medium sized barn (B).

Figure 6-38: Broader view of structures along the edge of the powerline corridor showing pole and corrugated iron structures

CULTURAL LANDSCAPE

This vast area is characterised by wide open flat plains with extruding rocky hills, koppies, and larger massifs with a significant mining and alternative energy layer superimposed. There is a low population density with farms being large, and farm werfs widely spaced. Denser population is found at mining sites and towns (e.g. Aggeneys). Small stock farming is the predominant agricultural activity, while mining provides employment to many and contributes to the local economy. A number of powerlines cross the landscape converging and originating at the Aggeneys sub-station. To date, few of the PVSEF's discussed in the text have yet to be built.

The N14 is the only major road in the area and runs to the south of the powerline site, and can probably be classified as a scenic route because of the aesthetic qualities of the landscape through which it runs. The proposed powerline development is mostly very distant from the road and shielded by significant topography. The bulk of the route is remote and there will be few receptors. Some views of the powerline will be possible in the vicinity of the Aggeneis substation, but here it is in the context of existing powerlines and other mining related infrastructure.

6.2.5 LAND USE AND VISUAL

The following is extracted from the Visual Impact Assessment compiled by Lourens Du Plessis and included as ***Appendix F7****.*

LAND USE AND SETTLEMENT PATTERNS

The majority of the study area is sparsely populated (less than 1 person per km^2), with the highest concentration of people living in the town of Aggeneys (population 2040). These residents of Aggeneys are associated with the BMM mine that employs over 900 people on a permanent basis, and an additional 842 as sub-contractors.

The study area consists of a landscape that can be described as remote due to its considerable distance from any major metropolitan centres or populated areas. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of water. Settlements, where they occur, are usually rural homesteads and farmsteads. Very few homesteads and settlements are present within the study area. These include *Witputs* (at the proposed Sol Invictus Solar PV facilities), *Suurwater*, *Kamasoas* and the original *Aggeneys* farmstead.

It is uncertain whether all of these farmsteads are inhabited or not. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present. These farmsteads do, however; retain the potential to be affected visually should they ever become inhabited again in the future. For this reason, the assessment is undertaken under the assumption that they are all inhabited.

The N14 national road provides motorised access to the region from Upington, the largest town closest to the site (approximately 266km by road). This road traverses south of the Aggeneis Substation and similarly provides access to the Sol Invictus Solar PV facilities via the Witputs dirt road (from the N14).

There are neither designated protected areas within the region nor any identified tourist attractions or destinations within the study area.[15]

In spite of the rural and natural character of the study area, there are a large number of overhead power lines in the study area, all congregating at the Aggeneis Substation. The areas rural sense of place has therefore been significantly altered. These include:

- Black Mountain/Black Mountain Mine 1 66kV
- Black Mountain/Black Mountain Mine 2 66kV
- Aggeneis/Gamsberg 1 66kV
- Aggeneis/Black Mountain 1 66kV
- Aggeneis/Black Mountain 2 66kV
- Aggeneis/Nama 1 220kV
- Aggeneis/Harib 1 220kV
- Aggeneis/Harib 2 220kV
- Aggeneis/Paulputs 1 220kV
- Aries/Aggeneis 1 400kV

[15] Sources: DEAT (ENPAT Northern Cape), NBI (Vegetation Map of South Africa, Lesotho and Swaziland), NLC2018 (ARC/CSIR), REEA_OR_2021_Q1 and SAPAD2021 (DEA).

— Aggeneis/Bypass 1 400kV

The proposed Sol Invictus power line will cross four of these power lines north and north-west of the Aggeneis substation. Refer to **Figure 6-39** for the broad land use patterns in the study area.

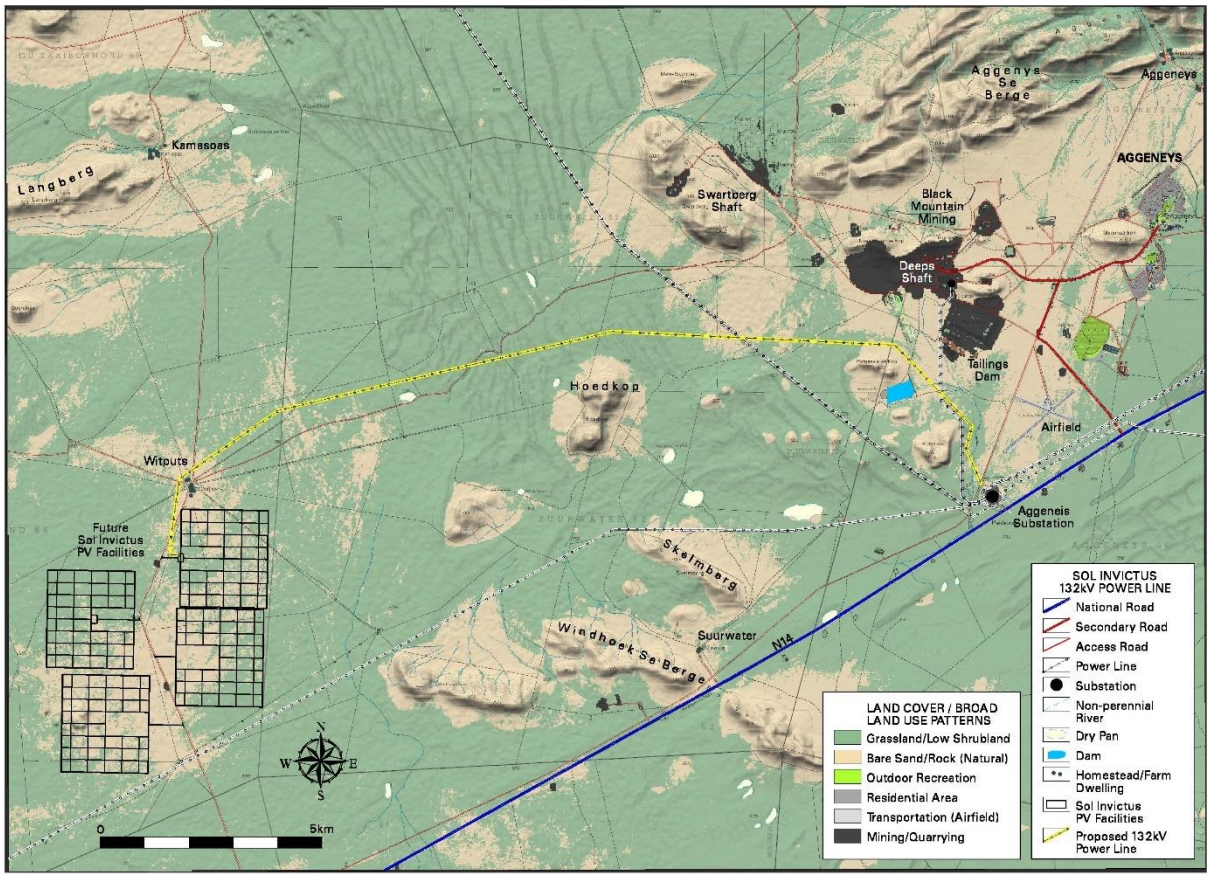


Figure 6-39: Land cover and broad land use patterns.

Further to this, the proposed project infrastructure is located within the Springbok Renewable Energy Development Zone (REDZ) and Northern Strategic Transmission Corridor. REDZ are described as:

> *"Areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country."*

Applications that have been approved, or are being reviewed (additional to the Sol Invictus Solar PV Facilities) in the study area include:

- Proposed Veld PV South Solar Energy Facility (SEF)
- Proposed Sato Energy Holdings Photovoltaic Project
- Proposed Boesmanland Solar Farm
- Proposed 70MW Orlight SA Photovoltaic Solar Power Plant

Some of these applications include more than one phase. The photographs provided below (**Figure 6-40** to **Figure 6-46**) aid in describing the general environment within the study area and surrounding the proposed project infrastructure.

Figure 6-40: Power lines crossing the access road to Aggeneys near the N14.

Figure 6-41: Mining operations at the BMM mine with Aggenys Mountain in the background.

Figure 6-42: The Aggeneis Substation as seen from the N14

Figure 6-43: Wide open expanse of the study area

Figure 6-44: Access road from the N14 to the Sol Invictus Solar PVSEF cluster

Figure 6-45: Inselbergs in the study area

Figure 6-46: The Witputs homestead

POTENTIAL VISUAL EXPOSURE

The potential visual exposure (visibility) of the grid connection infrastructure is shown on **Figure 6-47**. The visibility analysis was undertaken from the Aggeneis Substation, along the power line alignment (up to the Sol Invictus Solar PV collector substation site) at an offset of 36m above average ground level (i.e. the approximate height of the grid connection infrastructure), for a distance of 3km from the infrastructure. The viewshed analysis was restricted to a 3km radius due to the fact that visibility beyond this distance is expected to be negligible/highly unlikely for the relatively constrained vertical dimensions of this type of power line (i.e. a 132kV power line) and substation extension (see **Figure 6-48**).

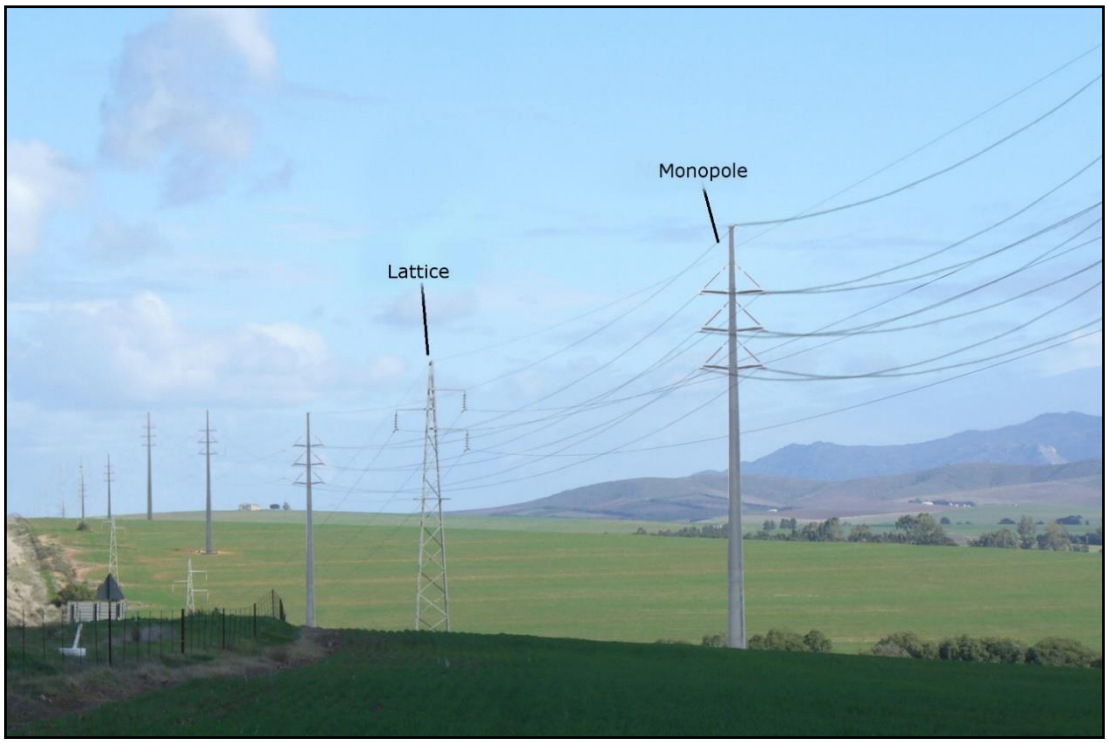


Figure 6-47: Examples of 132kV overhead power lines.

It is expected that the grid connection infrastructure may theoretically be visible within the 3km visual corridor and potentially highly visible within a 500 – 1,500m radius of the structures due to the generally flat terrain it traverses. Beyond 1,500m the visibility becomes more scattered due to the undulating nature of the topography as well as the presence of inselbergs. The grid connection structures are unlikely to be visible beyond a 3km radius of the structures.

The majority of the exposed areas fall within vacant open space, generally devoid of observers or potential sensitive visual receptors. The only homestead within a 500m radius of the proposed power line is the Witputs residence, located partially on the property identified for the Sol Invictus Solar PV facilities. The power line will traverse north and west of this residence at a distance of 120m at the closest. It has been confirmed that the residents of this homestead are supportive of the future Solar PV facilities and ancillary infrastructure.

Visual exposure within a 500m – 1,500m radius includes a section of the N14 national road. The busbar (or extension to the Aggeneis Substation) will be at a distance of approximately 570m from the N14 at the closest. Although the busbar and power line may theoretically be visible from this road, the visibility will not be in isolation due to the existing substation structures and the large number of power lines at this location. It is unlikely that observers travelling along this road would be able to distinguish the proposed Sol Invictus power line and busbar from the existing grid connection infrastructure.

Visual exposure beyond a 1.5km radius of the power line structures includes a section of the BMM mine at the Deeps Shaft. Given the activities and structures at the mine (e.g. buildings, mining equipment, mine dumps, etc.), the observers (employees) are unlikely to notice the power line, or would be indifferent to the power line structures.

In general terms, it is envisaged that the grid connection infrastructure, where visible from shorter distances (e.g. less than 1.5km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be very low, due to the generally remote location of the proposed infrastructure, the low number of potential observers and the existing activities and infrastructure north of the Aggeneis Substation.

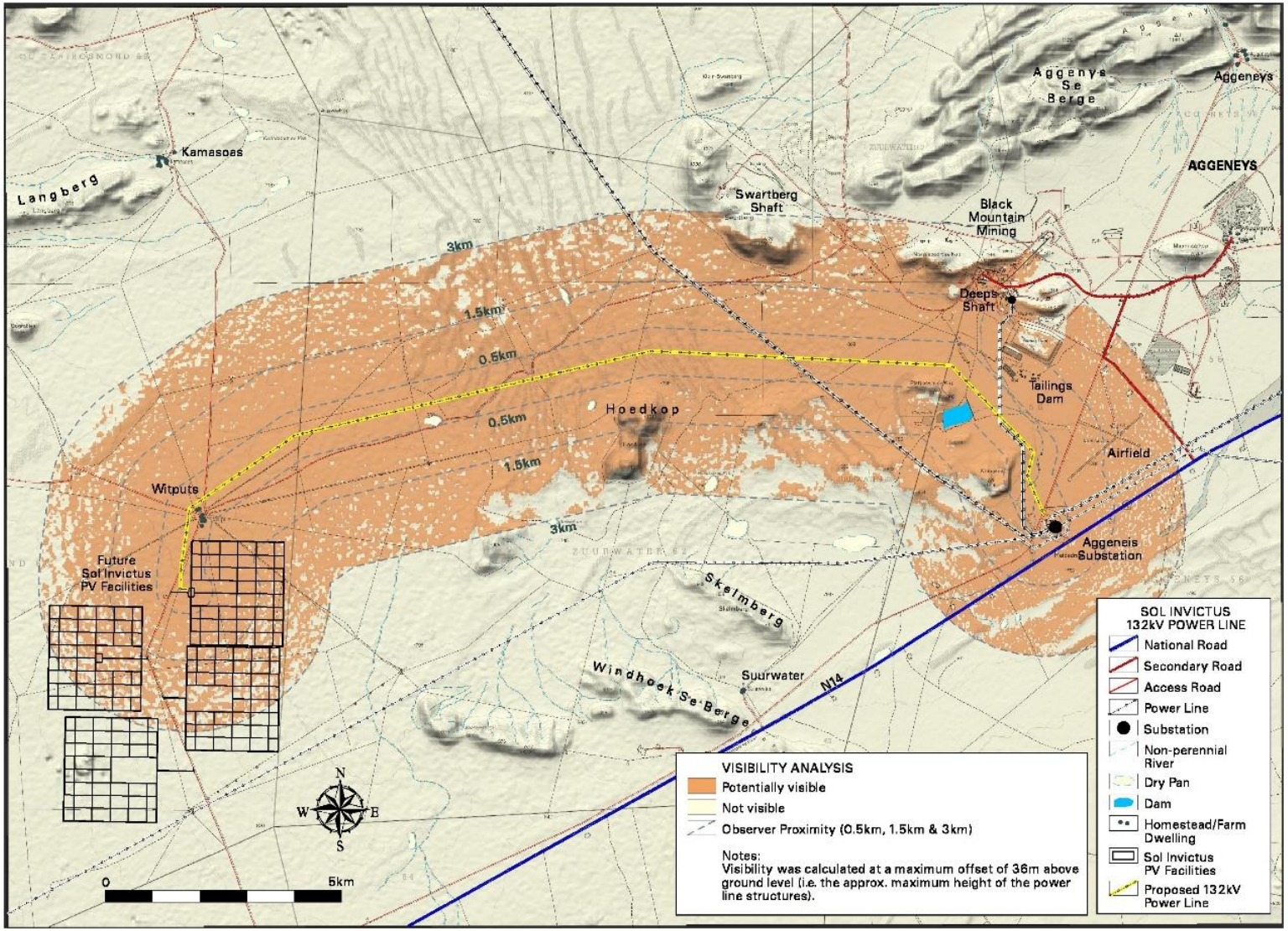


Figure 6-48: Viewshed analysis of the proposed Sol Invictus Solar PV grid connection infrastructure.

VISUAL DISTANCE / OBSERVER PROXIMITY TO THE GRID CONNECTION INFRASTRUCTURE

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger grid connection infrastructure (e.g. 400kV) and downwards for smaller structures (e.g. 132kV) due to variations in height. This methodology was developed in the absence of any known and/or accepted standards for South African power line infrastructure.

The proximity radii (calculated from the grid connection infrastructure) are indicated on **Figure 6-49**, and include the following:

- 0 - 0.5km - Short distance view where the structures would dominate the frame of vision and constitute a very high visual prominence.
- 0.5 - 1.5km - Medium distance views where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 1.5 - 3km - Medium to longer distance view where the structures would become part of the visual environment but would still be visible and recognisable. This zone constitutes a medium visual prominence.
- Greater than 3km - Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power lines.

The visual distance theory and the observer's proximity to the 132kV power line and substation extension are closely related, and especially relevant, when considered from areas with a higher viewer incidence and a potentially negative visual perception of the proposed infrastructure.

VIEWER INCIDENCE / VIEWER PERCEPTION

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed grid connection infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer: regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Viewer incidence is calculated to be the highest along the N14 national road and less so for the secondary road providing access to Aggeneys and the BMM mine. Travellers using these roads may be negatively impacted upon by visual exposure to the grid connection infrastructure.

Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer’s perception, unless the observer is associated with (or supportive of) the grid connection infrastructure, would generally be negative.

Due to the very remote location of the proposed power line and substation, and the ill populated nature of the receiving environment, there are only four potential sensitive visual receptor sites located within the study area. These are the residents of, or visitors, to Suurwater, Kamasoas, Aggeneys (original homestead) and Witputs. Only the Witputs residence is located in closer proximity (i.e. within 3km) to the grid connection infrastructure. This homestead is partially located on the property earmarked for the Sol Invictus Solar PV facilities, and it has been confirmed that the landowner is supportive of the proposed infrastructure. Refer to **Figure 6-49**.

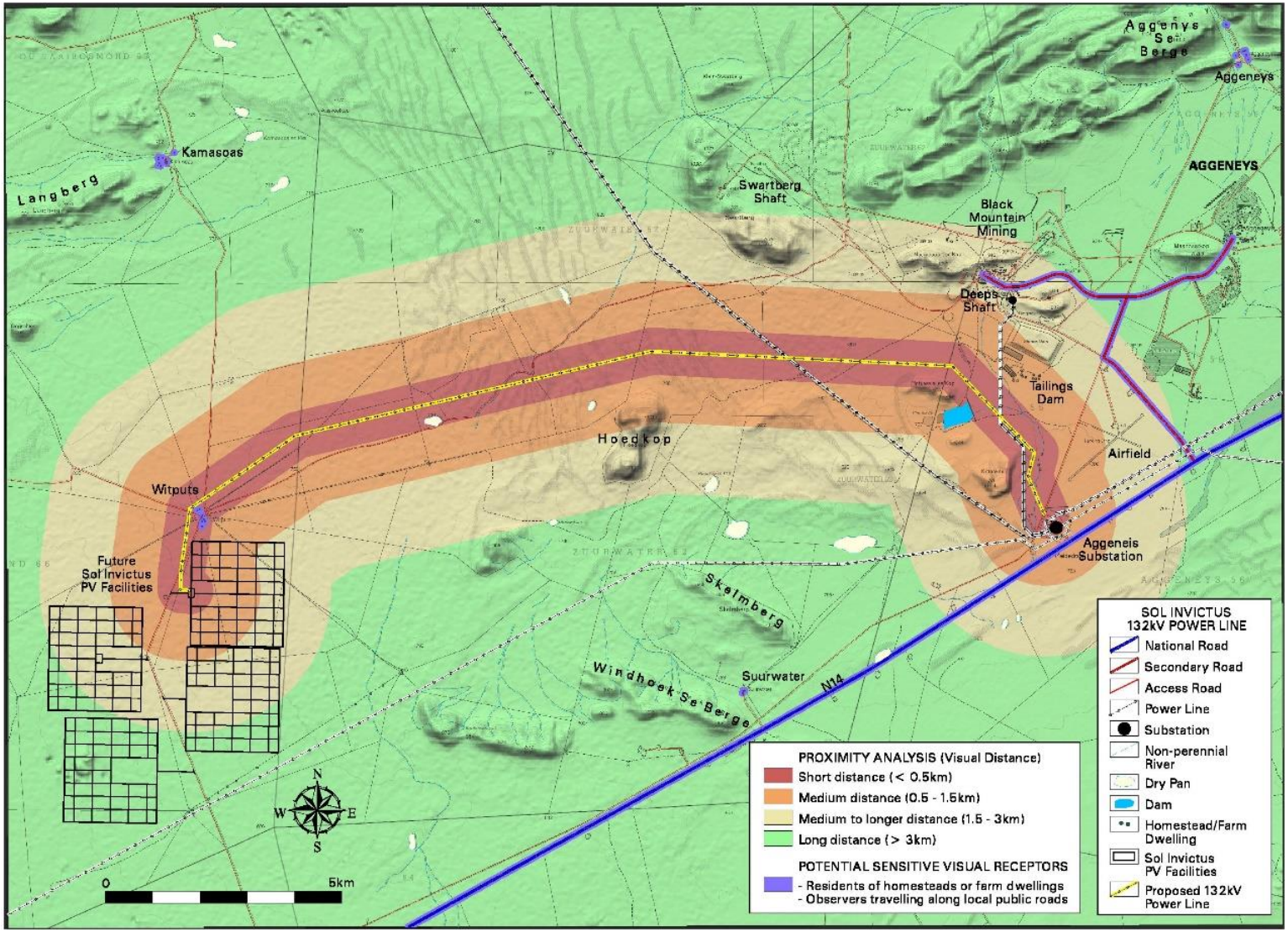


Figure 6-49: Proximity analysis and potential sensitive visual receptors.

VISUAL ABSORPTION CAPACITY

The vegetation types within the study area are predominantly *Bushmanland Sandy* and *Arid Grassland*, with *Bushmanland Inselberg Shrubland* along the mountainous *inselbergs*. The land cover types are grassland and low shrubland, but these are actually bare sand and rock surfaces for large periods of the year.

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is low by virtue of the limited height (or absence) of the vegetation, the relatively homogenous landform and the overall low occurrence of buildings, structures, and infrastructure outside of Aggeneys and the BMM mining area. In addition, the scale and form of the proposed structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form, and light/shade characteristics. Within this area the VAC of vegetation will not be taken into account, thus assuming a worst case scenario in the impact assessment.

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption capacity (i.e. shielding the observers from the infrastructure). As this is not a consistent occurrence, however, VAC will not be taken into account for any of the homesteads or settlements, thus assuming a worst case scenario in the impact assessment.

Figure 6-50: Bare sand (seasonally grassland and low shrubland) within the study area – low VAC.

VISUAL IMPACT INDEX

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed grid connection infrastructure culminate in a visual impact index. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

The criteria (previously discussed in this report) which inform the visual impact index are:

- Visibility or visual exposure of the structures
- Observer proximity or visual distance from the structures
- The presence of sensitive visual receptors

- The perceived negative perception or objections to the structures (if applicable)
- The visual absorption capacity of the vegetation cover or built structures (if applicable)

An area with short distance visual exposure to the proposed grid connection infrastructure, a high viewer incidence and a potentially negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact and determining the potential magnitude of the visual impact.

The index indicates that potentially sensitive visual receptors within a 500m radius of the project infrastructure may experience a high visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to moderate within a 0.5 – 1.5km radius (where/if sensitive receptors are present) and low within a 1.5 – 3km radius (where/if sensitive receptors are present). Receptors beyond 3km are expected to have a very low or insignificant potential visual impact.

MAGNITUDE OF THE POTENTIAL VISUAL IMPACT

The visual impact index and potentially affected sensitive visual receptors are indicated on **Figure 6-51**. In general, there is only one receptor site within close proximity (0.5km) to the proposed project infrastructure, namely the Witputs homestead.

The magnitude of the potential visual impact may potentially be high at this receptor site when assuming a worst-case scenario (i.e. if the residents are not supportive of the proposed infrastructure).

A 2.5km section of the N14 national road is located within a 1.5km radius of the proposed power line and substation extension. The magnitude of the potential visual impact may potentially be moderate on this section of road if one does not consider the existing structures present at this location (i.e. worst-case scenario).

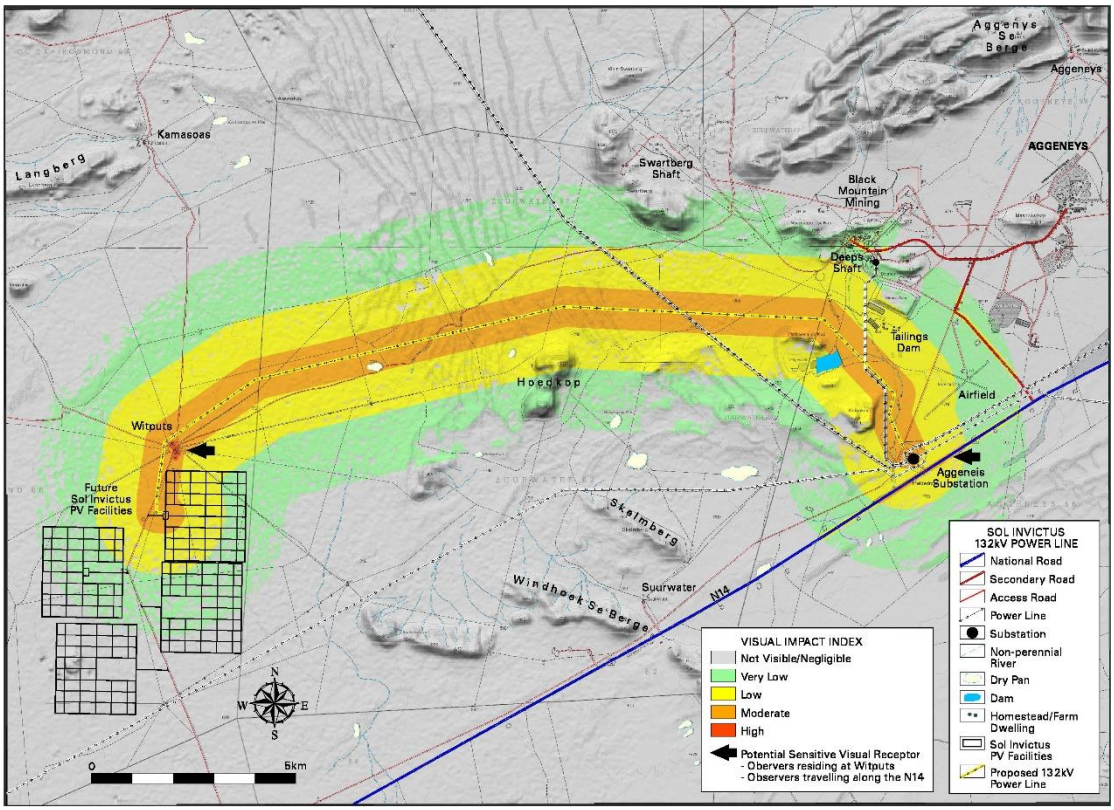


Figure 6-51: Visual impact index and potentially affected sensitive visual receptors

7 ENVIRONMENTAL IMPACT ASSESSMENT

This Chapter identifies the perceived environmental and social effects associated with the proposed Project. The assessment methodology is outlined in **Section 3.5**. The issues identified stem from those aspects presented in **Chapter 6** of this document as well as the Project description provided in **Chapter 4**. The impact assessment is based on the preferred alternative at all Project phases. This section only assesses the preferred option along with the no-go alternative. The impact mitigation hierarchy criteria, as per **Section 3.5.2**, for each mitigation measure are indicated in brackets after each measure indicated.

Furthermore, a decommissioning assessment will be considered as part of the decommissioning process that will be subject to a separate authorisation and impact assessment process. Any decommissioning impacts will be assessed at this stage. The impact assessment in this section encompasses the geographical, physical, biological, social, economic, heritage and cultural aspects in accordance with Appendix 1 of GNR 326.

7.1 AIR QUALITY

7.1.1 CONSTRUCTION PHASE

DUST AND PARTICULATE MATTER

The National Dust Control Regulations (GNR 827) prescribe general measures for the control of dust in both residential and non-residential areas and will be applicable during construction of the OHPL. **Table 7-1** provides the acceptable dust fall rates as prescribed by GNR 827.

Table 7-1: Acceptable dust fall rates (GNR 827)

RESTRICTION AREAS	DUST FALL RATE (D) (mg/m^2/day – 30 DAYS AVERAGE)	PERMITTED FREQUENCY OF EXCEEDING DUST FALL RATE
Residential area	D < 600	Two within a year, not sequential months
Non-residential area	600 < D < 1200	Two within a year, not sequential months

During the construction phase, fugitive dust and vehicular emissions (carbon monoxide (CO), hydrocarbons, particulate matter (PM) and nitrogen oxides (NO_x) will be released as a result of vegetation clearing activities, transportation of equipment and materials to site, and the use and installation thereof, all of which involves the movement of large plant and trucks along unpaved roads and exposing of soils. Notably, majority of the construction works would be undertaken in remote areas with limited receptors. In addition, the construction of the OHPL would be transitory with work in any one place being of short duration relating to the installation of pylons. As such, the emissions will have short-term impacts on the immediate surrounding areas that can be easily mitigated and thus further assessment of such emissions will not be required. All construction phase air quality impacts will be minimised with the implementation of dust control measures contained within the EMPr (**Appendix G**).

The impact of the construction phase on the generation of dust and particulate matter (PM) is shown in **Table 7-2** below.

Table 7-2: Construction Impact on Generation of Dust and PM

Potential Impact GENERATION OF DUST AND PM	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	1	4	**32**	**Moderate**	(-)	High
With Mitigation	1	1	3	1	3	**18**	**Low**	(-)	High
Mitigation and Management Measures	— Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and soil/material stockpiles especially. This includes wetting/covering of exposed soft soil surfaces and not conducting activities during high wind periods which will increase the likelihood of dust being generated; — All stockpiles (if any) must be restricted to designated areas and may not exceed a height of two (2) metres; — Ensure that all vehicles, machines and equipment are adequately maintained to minimise emissions; — It is recommended that the clearing of vegetation from the site should be selective, be kept to the minimum feasible area, and be undertaken just before construction so as to minimise erosion and dust potential; — All materials transported to, or from, site must be transported in such a manner that they do not fly or fall off the vehicle. This may necessitate covering or wetting friable materials. — Enforcing of speed limits. Reducing the dust generated by the listed activities above, putting up signs to enforce speed limit in access roads. — No burning of waste, such as plastic bags, cement bags and litter is permitted; and — All issues/complaints received must be recorded in the complaints register.								

7.1.2 OPERATIONAL PHASE

There are no anticipated air quality impacts during the operational phase as maintenance activities will occur as and when required and will be extremely short term. The assessment of air quality impacts during the operational phase is, therefore, not required.

Notably, once constructed, operational traffic would likely consist of not more than annual inspections in light vehicles, with minimal periodic maintenance being required. It is considered that the use of GIP, will ensure that no significant air quality impacts would occur due to the construction of the Project.

With regards to the proposed substation extension, the infrastructure may include Gas Insulated Switchgear (GIS), which use sulphur hexafluoride (SF6) gas as an electrical insulator. This is a GHG rather than a local air quality pollutant. However, manufacturers now produce GIS switchgear that is guaranteed to have no or minimal leakage and there would be no resulting local air quality or greenhouse gas impacts.

7.2 NOISE EMISSIONS

7.2.1 CONSTRUCTION PHASE

Elevated noise levels are likely to be generated by the construction activities (machinery and vehicles) and the workforce. It is important to note that noise impacts (nuisance factor) may vary in the different areas as a result of the surrounding land uses and will be temporary in nature. Due to the temporary and limited nature of the

Project activities, coupled with the fact that there are a limited number of noise receptors around the Project area, the impact is regarded as low. The construction impact on noise is indicated in **Table 7-3** below.

Table 7-3: Construction Impact on Noise

Potential Impact: NOISE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	1	4	**28**	**Low**	(-)	High
With Mitigation	2	1	1	1	3	**15**	**Low**	(-)	High
Mitigation and Management Measures	— The equipment must be in maintained in good working order, within service dates, and inspected before use; — Align working times with the substation related operational times; and — Install noise reducing fittings on machinery (if required).								

7.2.2 OPERATIONAL PHASE

There are no anticipated noise impacts during the operational phase as maintenance activities will occur as and when required and will be extremely short-term.

7.3 SOIL

The following potential soil-related impacts were identified as applicable in terms of the proposed project.

- Erosion
- Change in surface profile
- Change in land use
- Change in land capability
- Soil Contamination

The assessment of impact significance considers pre-mitigation as well as implementation of post-mitigation scenarios. Due to the nature of the project, the actual footprint of each pole/pylon infrastructure has a small localised, impact. Additionally, existing access / jeep tracks are to be utilized as much as possible throughout the project area, thereby reducing the extent of new access tracks required. Additionally, the fact that the project area occurs within a Renewable Energy Development Zone (REDZ) reduces the significance of impacts.

The potential impacts associated with the construction and operation of the site are assessed and discussed in the following sections, along with identification of recommended mitigation measures. The soil protection strategies identified are taken from the International Finance Corporation (World Bank) Environmental, Health and Safety Guidelines for Mining, 2007 (IFC, 2007). These guidelines are applicable to projects outside of the mining sphere and can be used to guide proposed construction activities at the site. Furthermore, the project is to be undertaken in line with the generic EMPr relevant to applications for the development or expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure.

7.3.1 CONSTRUCTION PHASE

This phase refers to the period when construction of the proposed infrastructure is built/installed. This phase usually has the largest direct impact on soils and land capability.

This phase includes site preparation prior to construction activities, involving vehicular movement (transportation of construction materials) and the removal of vegetation within the development footprint and associated disturbances to soil, and access to the site. Site preparation is followed by installation of the support structures

and spanning of the powerline cable. This phase entails the excavation of pits / drilling of holes for the support structures, leading to stockpiling and exposure of loose soils, as well as movement of construction equipment and personnel within the project area.

The following potential impacts were considered on soils and land capability within the project area.

WIND EROSION

Movement of vehicles, mobile plant and equipment, as well as earthworks required for establishment of support structures could result in increased loose material being exposed.

Wind erosion is already an ongoing, inevitable process associated with dune sands. The probability of the process occurring, with or without mitigation, is thus definite, the change is considered irreversible once eroded, and the duration is considered indefinite (i.e. will continue beyond the life of the project). Within the context of the impact assessment rating methodology, these aspects push the calculated significance rating up dramatically to indicate an impact of 'high' negative significance, as indicated in **Table 7-4**, yet the significance in comparison to the current situation is not considered high. It is the specialist's opinion that this significance value should be 'low' with mitigation. Mitigation should focus on limiting earthworks and vehicle movement to demarcated paths and areas, as well as limiting the duration of the construction activities where possible.

Table 7-4: Construction impact of wind erosion

Potential Impact: WIND EROSION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	5	5	5	**75**	**High**	(-)	High
With Mitigation	1	1	5	5	5	**48**	**Moderate**	(-)	High
Mitigation and Management Measures	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit the duration of construction activities where possible, especially those involving earthwork / excavations. — Access roads associated with the development should have gradients or surface treatment to limit erosion, and road drainage systems should be accounted for. — Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible. — During periods of strong winds, stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.).								

CHANGE IN SURFACE PROFILE

Earthworks required for establishment of support structures, as well as establishment of access tracks, could result in the change of surface profile within the project area.

A change in the surface profile is inevitable with earthworks, permanent in duration, definite and cannot be mitigated against. Even though the extent of the impact is very small, within the context of the impact assessment rating methodology the calculated significance is a 'moderate' negative as indicated in **Table 7-5**. Despite this, it is the specialist's opinion that the significance of this change in surface profile in the context of this project is 'low'.

It is however noted that excavations (if required) will be limited to the pole positions (i.e. establishment area for support structures).

Table 7-5: Construction impact of change in surface profile

Potential Impact: CHANGE IN SURFACE PROFILE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	5	5	5	**60**	**Moderate**	(-)	High
With Mitigation	1	1	5	5	5	**60**	**Moderate**	(-)	High
Mitigation and Management Measures	— N/A								

CHANGE IN LAND USE

Clearance of vegetation on site and establishment of infrastructure will result in some change of land use within the project area.

The land is currently used for low intensity grazing. The proposed project will result in a change in land use to host powerline pylons, so there is a change in land use, albeit this change will be limited to the pylon bases, as the area between the powerline pylons can still be used for grazing. The degree of alteration is very high (i.e. complete change in land use) at the base of each pylon, however, in this context, change in the project area is deemed low. However, the change will definitely take place and will be irreversible for the duration of the project life (i.e. the impact will take place in the construction phase but will remain as long as the project infrastructure is in place).

Even though the extent is small and impact magnitude is low, within the context of the impact assessment rating methodology the calculated significance is a 'moderate' negative, as indicated in **Table 7-6**. With implementation of mitigation measures, that include limited disturbance and removal of vegetation, the impact remains 'moderate'. It is however the specialist's opinion that the significance of this change in land use is low, as the current land use is very limited.

Table 7-6: Construction impact of change in land use

Potential Impact: CHANGE IN LAND USE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	5	4	5	**60**	**Moderate**	(-)	High
With Mitigation	1	1	5	4	5	**55**	**Moderate**	(-)	High
Mitigation and Management Measures	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit removal of vegetation to demarcated areas only. — Rehabilitate disturbed areas as soon as practicable following disturbance thereof.								

CHANGE IN LAND CAPABILITY

The movement of mobile plant / equipment could result in compaction / disturbance of soils and associated change in land capability. Furthermore, the areas where the pylons will be placed will no longer be capable of supporting growth of vegetation for grazing activities. The degree of alteration is very high (i.e. complete loss of land capability) at the base of each pylon, however in the context change in the project area the alteration is deemed low. However, the change will definitely take place and will be irreversible for the duration of the project life (i.e. the impact will take place in the construction phase but will remain as long as the project infrastructure is in place).

Even though the extent is small and impact magnitude is low, within the context of the impact assessment rating methodology the calculated significance is a 'high' negative, as indicated in **Table 7-7**. With implementation of mitigation measures, that include limited disturbance and removal of vegetation, the impact is reduced to 'moderate'. It is however the specialist's opinion that the significance of this change in land capability is 'low', as the current land capability is very limited.

Table 7-7: Construction impact of change in land capability

Potential Impact: CHANGE IN LAND CAPABILITY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	5	4	5	**70**	**High**	(-)	High
With Mitigation	1	1	3	4	5	**60**	**Moderate**	(-)	High
Mitigation and Management Measures	— Limit earthworks and vehicle movement to demarcated paths and areas. — Limit removal of vegetation to demarcated areas only.								

SOIL CONTAMINATION

Movement of vehicles and plant / equipment on site could result in leaks, spills of hazardous materials, such as fuels, oils, chemicals, and so forth. Contaminated soil is expensive to rehabilitate and contamination entering the soils of the project area infiltrate into the ground as well as migrate from site during rainfall events. With the implementation of mitigation measures, the probability and duration of the impact can be reduced, thereby reducing the potential impact from a 'moderate' negative to 'low', as indicted in **Table 7-8**.

Table 7-8: Construction impact of soil contamination

Potential Impact: SOIL CONTAMINATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	1	3	5	4	**56**	**Moderate**	(-)	High
With Mitigation	3	1	3	2	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— On-site vehicles should be well-maintained, — Drip trays should be placed under stationary vehicles / plant; — On-site pollutants/hazardous materials should be contained in a bunded area and on an impermeable surface; — Ensure proper control of dangerous substances entering the site; — Adequate disposal facilities should be provided, and — A non-polluting environment should be enforced.								

7.3.2 OPERATIONAL PHASE

This phase refers to the operation and maintenance period of the OHPL (i.e. following commissioning through project life). As indicated above, the identified impacts to soil take place during the construction phase but the impact is felt throughout the operation phase. The impact for the operation phase is therefore equivalent to the impacts identified above.

7.4 GROUNDWATER

7.4.1 CONSTRUCTION PHASE

DETERIORATION IN GROUNDWATER QUALITY

There is a potential to affect the groundwater quality in the area. This is influenced by spills and leaks and the storage of chemicals and fuels. Any contaminants that are not cleaned from the ground will seep into underground water resources. The impact of construction on change in water quality is shown in **Table 7-9** below.

Table 7-9: Construction Impact on Deterioration in Groundwater Quality

Potential Impact: DETERIORATION IN GROUNDWATER QUALITY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	**30**	**Moderate**	(-)	High
With Mitigation	2	2	3	2	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— Construction areas should be demarcated, and wetland areas marked as "restricted" in order to prevent the unnecessary impact to and loss of these systems; — Laydown yards, camps and storage areas must be beyond the wetland areas where applicable; — During construction, contractors used for the Project must have spill kits available to ensure that any fuel or oil spills are cleaned-up and disposed of correctly; — A suitable stormwater management plan must be generated for the project to control the movement of water on site; — The stormwater management plan should incorporate "soft" engineering measures as much as possible, limiting the use of artificial materials; — As much material as possible must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site; — All chemicals and toxicants must be stored in bunded areas; — All machinery and equipment should be inspected regularly for faults and possible leaks; these should be serviced off-site; — All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting, and cleaning of spills and leaks and general good "housekeeping"; — Adequate sanitary facilities and ablutions along the servitude must be provided for all personnel throughout the Project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); and — Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.								

7.4.2 OPERATIONAL PHASE

There are no anticipated groundwater quality impacts expected during the operational phase as maintenance activities will occur as and when required and will be extremely short-term.

7.5 FRESHWATER

The activities associated with the construction and operational phases of the proposed powerline, based on the alignment provided by the proponent, including site preparation and excavation of foundation pits for the installation of support structures, pose a Low risk to the cryptic wetland. Should the recommended mitigation measures be implemented, with specific mention of keeping the construction footprint as small as possible and ensuring that the support structures associated with the proposed powerline are located outside the identified cryptic wetland and associated buffer zone, no direct negative impacts to the wetland are expected.

The below considerations were taken into account for the impact assessment:

- Support structures or pole positions associated with the proposed powerline were not available at the time of compiling this report, thus recommendations are made regarding the pole positions in consideration of the identified watercourses;
- The proposed extension of the existing Eskom Aggeneis substation is located outside the 100 m GN509 ZoR of the episodic drainage line and was thus not considered in the risk assessment;
- At the time of this assessment, the layout of the proposed access roads (potential new) was not available. As such, it is assumed that the existing informal farm roads will be used as access roads. However, it is noted that the existing farm road can only access the powerline route to a certain point; thereafter, no existing roads are available. The proponent has confirmed that there will be an informal access road ("jeep-track") for maintenance activities that will most likely run underneath or adjacent to the powerline route, and will likely be used to access the site during construction. As such, the proposed "jeep-track" is assessed in both the construction and operational phases of the proposed powerline;
- The impact assessment was applied assuming that a high level of mitigation is implemented, thus the results of the impact assessment provided in this report present the perceived impact significance post-mitigation;
- The activities relating to the proposed powerline are all highly site specific, not of a significant extent relative to the area of the cryptic wetlands assessed, and therefore have a limited spatial extent;
- While the operation of the proposed powerline will be a permanent activity, the installation thereof is envisioned to take no more than a few months. However, the frequency of the construction impacts may be daily during this time;
- Most impacts are considered to be easily detectable;
- The considered mitigation measures are easily practicable; and
- It is recommended that the proponent make provision for rehabilitation of any edge effects which might affect the cryptic wetlands and episodic drainage line. This is especially applicable to re-sloping of the area to natural topography following installation of the support structures associated with the proposed powerline and ensure that no new preferential flow paths or erosion gullies form. This must be monitored through the operational phase.

There are five key ecological risks on the wetland that were assessed, namely:

- Loss of watercourse habitat and ecological structure resulting in impacts to biota;
- Changes to the socio-cultural and service provision;
- Impacts on the hydrology and sediment balance of the watercourses;
- Impacts on water quality; and
- Proliferation of alien and invasive plant species.

7.5.1 CONSTRUCTION PHASE

IMPACT OF SITE PREPARATION ACTIVITIES

During the initial stage of the construction phase, site preparation activities involving vehicular movement (transportation of equipment / construction materials) and the removal of vegetation within the development footprint and associated disturbances to soil, and access to the site, potentially including grading of existing informal farm roads will result in the following potential impacts to freshwater ecology and surface water:

- Transportation of construction materials can result in disturbances to soil, and increased risk of sedimentation/erosion;
- Soil and surface water (if present) contamination from potentially spilled oils and hydrocarbons originating from construction vehicles.
- Soil compaction leading to increased runoff and erosion within the vicinity of the watercourses;
- Exposure of soils, leading to increased runoff, and erosion, and thus increased sedimentation of the watercourses;
- Increased sedimentation of the watercourses, leading to smothering of vegetation associated in the watercourses; and
- Proliferation of alien and/or invasive vegetation as a result of disturbances.

The site preparation impact on freshwater is shown in **Table 7-10** below.

Table 7-10: Construction (including site preparation) Impact on Freshwater Ecology and Surface Water

Potential Impacts: / SITE PREPARATION ACTIVITIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	1	3	**27**	**Low**	(-)	High
With Mitigation	1	1	3	1	2	**12**	**Low**	(-)	High
Mitigation and Management Measures	— It is imperative that all construction works be undertaken during periods of low to no rainfall (thus preferably during the dry, winter months) when the flow/level of water is very low in the watercourses; — Due to the accessibility of the sites, no unnecessary crossing of the watercourses may be permitted and it is strongly recommended that the calculated 10 m construction buffer and 32m ZoR be considered a no-go area. This will limit edge effects, erosion and sedimentation of the watercourses during the construction phase; — Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the watercourse areas (including the cryptic wetlands identified within the larger investigation area) and their associated buffer zones; — Any material stockpiled should be kept to a minimum. Should the vegetation not be suitable for reinstatement after the construction phase or be alien/invasive vegetation species, all material must be disposed of at a registered garden refuse site and may not be burned or mulched on site.								

INSTALLATION OF THE SUPPORT STRUCTURES AND SPANNING OF THE PROPOSED POWERLINE

Installation of the support structures and spanning of the proposed powerline entailing the excavation of pits for the support structures leading to stockpiling of soil, and potential movement of construction equipment and

personnel within the watercourses will result in the following potential impacts to freshwater ecology and surface water:

- Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream watercourse areas;
- Disturbances of soil leading to potential impacts to the watercourses and increased sediment runoff from the construction site to the watercourses, in turn leading to altered watercourse habitat;
- Altered runoff patterns, leading to increased erosion and sedimentation of the watercourses where watercourses are within close proximity; and
- Dust pollution during construction which may impact on water quality (if surface water is present).

The installation of support structures and spanning of the powerline impact on freshwater is shown in **Table 7-11** below.

Table 7-11: Construction Impact of Powerline Installation

Potential Impact: / POWERLINE INSTALLATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	1	3	**27**	**Low**	(-)	High
With Mitigation	1	1	3	1	2	**12**	**Low**	(-)	High
Mitigation and Management Measures	— It is imperative that all construction works be undertaken during periods of low to no rainfall (thus preferably during the dry, winter months), and no diversion of flow would be necessary; — It is strongly recommended that all support structures associated with the proposed powerline infrastructure be located outside the delineated extent of the identified watercourses and their calculated 10m construction buffer and 32m NEMA ZoR; — The construction footprint and period should be kept as small and as short as possible, respectively; and construction activities within the delineated watercourses should be avoided; — Only a 5m zone of disturbance should be permitted to be disturbed. This 5m zone of disturbance will limit construction vehicles/ personnel to disturb the surrounding area to watercourses, should the support structures be located in close proximity to a watercourse; — Protect exposed stockpiles (if necessary) from wind and limit the time in which the stockpiled soil is exposed, by covering with a suitable geotextile such as hessian sheeting; — During excavation of the foundation pits, soil must be stockpiled upgradient of the excavated foundation pit and away from the watercourses. Mixture of the lower and upper layers of the excavated soil should be kept to a minimum. The soil must be used to close off the pits, immediately after installation of the support structures; — The bedding layer (such as clean gravel) should be spread evenly and compacted uniformly to the required density using a hand tamper (one-man operator) in order to minimise the use of large machinery within the watercourse or within close proximity to a watercourse; — When the powerline is spun between the support structures, no vehicles may indiscriminately drive through the watercourses, use must be made of the dedicated access roads. <u>Control measures for concrete mixing on site (where applicable):</u> — No mixed concrete may be deposited outside of the designated construction footprint;								

Potential Impact: / POWERLINE INSTALLATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	— As far as possible, concrete mixing should be restricted to the contractor laydown area. Additionally, batter / dagga board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited while it awaits placing; and — Any concrete potentially spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. With regards to backfilling of the excavated material and concrete encasing: — Soil removed for excavating the foundation pit should be used as backfill material; — All excavated foundation pits must be compacted to natural soil compaction levels to prevent the formation of preferential surface flow paths and subsequent erosion. Conversely, areas compacted as a result of construction activities must be loosened to natural soil compaction levels to allow vegetation establishment; — Any remaining soil following the completion of backfilling of the foundation pits is to be spread out thinly surrounding the constructed support structures (outside watercourses) to aid in the natural reclamation process; and — The construction footprint must be limited to the foundation pit area associated with the support structures and recommended 5m construction buffer (to allow for the stockpiling and movement of personnel). The area must be rehabilitated after the completion of the construction phase, including revegetation thereof with indigenous vegetation. — In addition, alien vegetation eradication of the footprint area must be undertaken where applicable.							

PREPARATION FOR THE ACCESS ROUTE "JEEP-TRACK"

Soil compaction for the access route and associated disturbances of soil within the vicinity of the watercourses will result in the following potential impacts to freshwater ecology and surface water:

— Disturbances of soil resulting in altered runoff patterns within the vicinity of the watercourses; and
— Altered runoff patterns, leading to increased erosion and sedimentation of freshwater habitat.

The installation of support structures and spanning of the powerline impact on freshwater is shown in **Table 7-12** below.

Table 7-12: Construction Impact of Powerline Installation

Potential Impact: / POWERLINE INSTALLATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	1	3	**24**	**Low**	(-)	High
With Mitigation	1	1	1	1	2	**8**	**Low**	(-)	High
Mitigation and Management Measures	— All footprint areas must remain as small as possible and vegetation clearing to be limited to what is absolutely essential; — No vegetation clearing must take place in the watercourses; and — No formal paving should be used for the access route. In situ compaction of soil for the "jeep-track" as proposed is preferred.								

7.5.2 OPERATIONAL PHASE

DISTURBANCE OF SOILS AND ALTERED WATER QUALITY

Operation and maintenance of the OHPL is likely to entail potential indiscriminate movement of maintenance vehicles within close proximity to the watercourses. This results in increased risk of sedimentation and/or hydrocarbons entering the watercourses via stormwater runoff from the access roads. Potential impacts during the operation phase are therefore disturbance to soils and ongoing erosion as a result of periodic maintenance activities and altered water quality (if surface water is present) as a result of increased availability of pollutants.

The impact on soil disturbance and altered water quality is shown in **Table 7-13** below.

Table 7-13: Operation Impact on Soil Disturbance and Altered Water Quality

Potential Impact: DISTURBANCE TO SOILS AND ALTERED WATER QUALITY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	1	3	**24**	**Low**	(-)	High
With Mitigation	1	1	1	1	2	**8**	**Low**	(-)	High
Mitigation and Management Measures	— Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the watercourses may be permitted; — During periodic maintenance activities of the powerline, monitoring for erosion should be undertaken; — Should erosion be noted at the base of the support structures, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation; — Monitoring for the establishment of alien and invasive vegetation species must be undertaken, specifically where the support structures are within close proximity (within 32m) to the watercourses and for access roads through or along the watercourses. Should alien and invasive plant species be identified, they must be removed and disposed of as and the area must be revegetated with suitable indigenous vegetation.								

7.6 BIODIVERSITY AND AVIFAUNA

PRESENT IMPACTS TO BIODIVERSITY

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the assessment area. These include:

— Present energy distribution infrastructure, including powerlines;
— Historical sheep grazing land-use;
— Invasive species;
— Roads and associated vehicle traffic and road kills; and
— Fences.

7.6.1 CONSTRUCTION PHASE

DESTRUCTION, FURTHER LOSS AND FRAGMENTATION OF THE HABITATS, ECOSYSTEMS AND VEGETATION COMMUNITY

The proposed vegetation clearance for the pylon footprint and the associated access roads; clearing new roads/servitudes as well as potential widening of existing roads/servitudes will physically remove vegetation as well as remove and fragment communities/ ecosystems for terrestrial plant species. This will result in direct and indirect erosion due to the loss of vegetation cover. The disruption in natural areas of phytomass, disturbance of soil and introduction of alien vegetation by humans will increase the potential and likelihood of establishment of alien and invasive vegetation. These will likely result in the destruction, further loss and fragmentation of the vegetation community/ ecosystems.

The impact of the construction phase on the impact on flora is shown in **Table 7-14** below.

Table 7-14: Assessment of significance of potential impacts on the terrestrial flora associated with the construction phase of the project.

Potential Impact: **DESTRUCTION, FURTHER LOSS AND FRAGMENTATION OF HABITATS, ECOSYSTEMS & VEGETATION COMMUNITY**	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**	**Confidence**
Without Mitigation	4	2	4	5	4	**60**	**Moderate**	(-)	High
With Mitigation	2	2	3	2	3	**27**	**Low**	(-)	High
Mitigation and Management Measures	— The placement of pylons and support structures within High sensitivity areas must be avoided (as much is feasible). An ECO can advise should placement within a High sensitivity area be essential, applicable mitigation measures should be prescribed. The support structures associated with the proposed powerline must be located outside the episodic drainage line. The areas to be developed must be specifically demarcated to prevent movement into highly sensitive surrounding environments. The infrastructure outlines must be realigned within very low/ low and medium sensitivity areas. Pylon placement within the Sandy Grassland need to be planned specifically in order to avoid placing structures footprints on the unstable dunes. This will not only avoid the loss of the unique habitat, but also provide a solid foundation for the infrastructure. — Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. — Existing access routes and walking paths must be made use of, and the development of new routes avoided as much is feasible. Unless realigned within low sensitivity areas. — All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the Project area once the construction/closure phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated Project areas. The storage of the transmission towers/pylons to be installed are not to be stored for extended periods of time and storage areas must be placed in low sensitivity areas.								

INTRODUCTION OF ALIEN SPECIES, ESPECIALLY PLANTS

Clearance of vegetation and movement between areas will increase the potential for the establishment of alien and invasive vegetation. The proposed vegetation clearance for the pylon footprint and the associated access roads;

clearing new roads/servitudes as well as potential widening of existing roads/servitudes will physically remove indigenous vegetation and potentially create an environment where alien species can be introduced.

The impact of the construction phase on the impact on fauna is shown in **Table 7-15** below.

Table 7-15: Assessment of significance of potential impacts on the terrestrial biodiversity associated with the construction phase of the project.

Potential Impact: INTRODUCTION OF ALIEN SPECIES, ESPECIALLY PLANTS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	3	3	3	4	**52**	**Moderate**	(-)	High
With Mitigation	3	2	2	2	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. — All structure footprints to be rehabilitated and landscaped after installation is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. — Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion. — It should be made an offence for any staff to /take bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.								

DESTRUCTION OF POTENTIALLY THREATENED AND PROTECTED PLANT SPECIES

The proposed vegetation clearance for the pylon footprint and the associated access roads; clearing new roads/servitudes as well as potential widening of existing roads/servitudes will physically remove vegetation This will result in direct and indirect erosion due to the loss of vegetation cover. The disruption in natural areas of phytomass, disturbance of soil and introduction of alien vegetation by humans will increase the potential and likelihood of establishment of alien and invasive vegetation. Destruction, further loss and fragmentation of the vegetation community/ ecosystems, including potential SCC individuals. This impact is considered not only due to the threatened plant recorded, as well as the protected species.

The impact of the construction phase on the impact on fauna is shown in **Table 7-16** below.

Table 7-16: Assessment of significance of potential impacts on the terrestrial flora associated with the construction phase of the project.

Potential Impact: DESTRUCTION OF THREATENED PLANT SPECIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	4	5	4	**60**	**Moderate**	(-)	High
With Mitigation	2	2	3	2	3	**27**	**Low**	(-)	High
Mitigation and Management Measures	— The placement of pylons and support structures within High sensitivity areas must be avoided (as much is feasible). An ECO can advise should placement within a High sensitivity area be essential, applicable mitigation measures should be prescribed. The support structures associated with the proposed powerline must be located								

Potential Impact: DESTRUCTION OF THREATENED PLANT SPECIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	outside the episodic drainage line. The areas to be developed must be specifically demarcated to prevent movement into highly sensitive surrounding environments. The infrastructure outlines must be realigned within very low/ low and medium sensitivity areas. — Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. — Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Hi visibility flags must be placed near any threatened/protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Pylon infrastructure, development areas and routes where protected plants cannot be avoided, these plants many being geophytes or small succulents should be removed from the soil and relocated/ re-planted in similar habitats where they should be able to resprout and flourish again. All protected and red-data plants should be relocated, and as many other geophytic species as possible. — For the threatened species that may not be destroyed, it is recommended that professional service providers that deal with plant search and rescue be used to remove such plants and use them either for later rehabilitation work other conservation projects.							

DISPLACEMENT AND FRAGMENTATION OF THE FAUNAL COMMUNITY DUE TO HABITAT LOSS, DIRECT MORTALITIES AND DISTURBANCE (NOISE, DUST AND VIBRATION)

The removal of vegetation will result in the direct loss of habitat, forcing fauna species (including potential IUCN listed species) to move into new areas where more challenges may be present. Disruption of faunal populations by interfering with their movements and/or breeding activities. Direct mortalities from earth moving or transport vehicles and increased traffic due to construction work and the transportation of staff/materials. The unregulated movement of local people will also increase the likelihood of poaching of species in what was previously seen as secluded habitat for fauna species. The unregulated movement of local people could lead to the introduction of diseases and feral species such as cats and dogs.

The impact of the construction phase on the impact on fauna is shown in **Table 7-17** below.

Table 7-17: Assessment of significance of potential impacts on the terrestrial fauna associated with the construction phase of the project.

Potential Impact: DISPLACEMENT AND FRAGMENTATION OF THE FAUNAL COMMUNITY DUE TO HABITAT LOSS, DIRECT MORTALITIES & DISTURBANCE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	3	3	4	4	**56**	**Moderate**	(-)	High
With Mitigation	3	2	3	2	2	**20**	**Low**	(-)	High
Mitigation and Management Measures	— The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into high sensitive areas and the surrounding environments.								

Potential Impact: DISPLACEMENT AND FRAGMENTATION OF THE FAUNAL COMMUNITY DUE TO HABITAT LOSS, DIRECT MORTALITIES & DISTURBANCE	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	— Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight Should the holes be left overnight they must be covered temporarily to ensure no small fauna species fall in. — No trapping, killing, or poisoning of any wildlife is to be allowed. — All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. — Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. — Driving on access roads close to very high and highly sensitive areas at night should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period. — All areas to be developed must be walked through prior to any activity to ensure no nests or birds area found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken. — For transmission towers in high sensitivity locations, it is recommended to install bird guard/spike structures (close to or along drainage features) to prevent birds from landing on and/or nesting on the towers. This has been linked with increases in corvid populations which can impact local reptile and avifauna species. Poles: The poles should be fitted with bird perches on top of the poles to draw birds, particularly vultures, away from the potentially risky insulators. — Appropriate bird mitigation measures should be put in place to avoid bird collisions and direct impacts to the infrastructure, as the likelihood of SCC being present in the area is confirmed. These mitigation measures should entail the installation of 'bird-flappers' and bird-friendly powerline structures. This is particularly relevant to the portions of the proposed powerline which crosses the drainage feature areas as well as the Sandy Grassland areas. Powerline: The span that crosses major drainage lines should be marked with Bird Flight Diverters on the earth wire of the line, five metres apart, alternating black and white. — Ensure that cables and connections are insulated successfully to reduce electrocution risk. — Any exposed parts must be covered (insulated) to reduce electrocution risk.								

7.6.2 OPERATIONAL PHASE

CONTINUED DISTURBANCE OF VEGETATION COMMUNITIES, ESPECIALLY THREATENED SPECIES, AND ENCROACHMENT BY ALIEN INVASIVE PLANT SPECIES

Due to the vegetation communities that were cleared within the footprint area during the construction phase, being entirely transformed, indirect impacts to the surrounding vegetation communities and ecosystems are the main impact considered. The edges of the access and service roads will likely be degraded by impacts such as dust (reduces the effectiveness of photosynthesis and pollination), livestock and alien vegetation will become a concern

in these disturbed areas. The unregulated movement of local people into the areas surrounding the footprint will likely result in plant poaching.

The impact of the operational phase on the impact on flora is shown in **Table 7-18** below.

Table 7-18: Assessment of significance of potential impacts on the terrestrial flora associated with the operational phase of the project.

Potential Impact: CONTINUED DISTURBANCE OF VEGETATION COMMUNITIES, ESPECIALLY THREATENED SPECIES, AND ENCROACHMENT BY ALIEN INVASIVE PLANT SPECIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	1	2	1	2	**14**	**Low**	(-)	High
Mitigation and Management Measures	— Compilation of and implementation of an alien vegetation management plan.								

ONGOING DISPLACEMENT, DIRECT MORTALITIES AND DISTURBANCE OF FAUNAL COMMUNITY DUE TO HABITAT LOSS AND DISTURBANCES (SUCH AS DUST AND NOISE MAINLY THROUGH THE MAINTENANCE OF THE SYSTEM)

Ongoing displacement due to sensory disturbance during operation (noise, light, dust, pollution and vibrations) from the service vehicles. The footprint area will likely be impacted by poaching, litter, roadkill and most importantly electrocutions due to the presence of the powerline and the increase in human presence as the operations continue.

The powerline is anticipated to have a noteworthy impact during operation as during this time the powerline will pose a threat to avifauna, especially sensitive species which are known to occur in the area. If mitigation measures are followed this impact can be reduced as depicted in the table below.

The impact of the operational phase on the impact on fauna is shown in **Table 7-19** below.

Table 7-19: Assessment of significance of potential impacts on the terrestrial fauna associated with the operational phase of the project.

Potential Impact: ONGOING DISPLACEMENT, DIRECT MORTALITIES AND DISTURBANCE OF FAUNAL COMMUNITY DUE TO HABITAT LOSS AND DISTURBANCES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	2	2	1	3	**24**	**Low**	(-)	High
Mitigation and Management Measures	— All personnel and contractors to undergo Environmental Awareness Training. — No trapping, killing, or poisoning of any wildlife is to be allowed. — The appropriate bird mitigation measures structures need to be monitored and serviced and should be made a top priority for the duration of the project.								

7.7 BATS

Within the proposed OHPL corridor, existing impacts on bats are limited to isolated patches where natural habitat has been disturbed by roads, dwellings, furrows, and other anthropogenic activities. Although not assessed, the current disturbance of natural habitat within the corridor is, considered, to be of Low significance.

7.7.1 CONSTRUCTION PHASE

HABITAT DISTURBANCE

Bat-important habitats (i.e. drainage lines, rocky slopes, and buildings) could potentially be disturbed during construction of the OHPL (**Table 7-20**). To mitigate this potential Moderate significant impact, there should be no construction of powerline poles in High sensitive areas. Within Medium-High and Medium sensitive areas, the construction of poles should be, respectively, avoided where possible, and minimized. This impact is unlikely to have a secondary impact on bat ecosystem services.

Table 7-20: Assessment of significance of the potential disturbance of bat-important habitats during construction

Potential Impact: HABITAT DISTURBANCE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	2	5	**35**	**Moderate**	(-)	High
With Mitigation	1	1	3	1	5	**30**	**Low**	(-)	High
Mitigation and Management Measures	— Do not install powerline poles in High sensitive drainage lines. — Avoid (where possible) installing powerline poles in Medium-High sensitive areas. — Minimize the number of powerline poles to be installed in Medium sensitive areas. — Minimize dust, erosion, and alien plant growth throughout the project footprint. — Do not drain, abstract, contaminate, or otherwise disturb any (natural or artificial) water resource. — Rehabilitate all disturbed natural areas a.s.a.p. based on advice from an appropriate specialist(s).								

7.7.2 OPERATIONAL PHASE

BAT ELECTROCUTION

Available evidence indicates that powerlines in general pose a negligible collision risk, and a very Low electrocution risk, for insectivorous bats (EirGrid 2015). Due to their larger size, frugivorous bats are more susceptible to electrocution (Chouhan and Shrivastava 2019). However, no fruit bat species is expected to occur in the OHPL study area. To mitigate the Low significant impact of possible (insectivorous) bat electrocution, there should be no construction of powerline poles in High sensitive areas. Within Medium-High and Medium sensitive areas, the construction of poles should be, respectively, avoided where possible, and minimized. This impact is unlikely to have a secondary impact on bat ecosystem services.

Table 7-21: Assessment of significance of potential bat electrocution during operation

Potential Impact: BAT ELECTROCUTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	1	4	2	**16**	**Low**	(-)	High
With Mitigation	1	1	1	4	2	**14**	**Low**	(-)	High
Mitigation and Management Measures	— Do not install powerline poles in High sensitive drainage lines.								

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
BAT ELECTROCUTION								
	— Avoid (where possible) installing powerline poles in Medium-High sensitive areas. — Minimize the number of powerline poles to be installed in Medium sensitive areas.							

7.8 VISUAL

7.8.1 CONSTRUCTION PHASE

POTENTIAL VISUAL IMPACT OF CONSTRUCTION ACTIVITIES ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED GRID CONNECTION INFRASTRUCTURE

During construction, there may be an increase in heavy vehicles utilising the roads to the power line and substation that may cause, at the very least, a visual nuisance to other road users and landowners in the area.

The construction impact on the visual landscape is indicated in **Table 7-22** below.

Table 7-22: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
VISUAL IMPACT OF CONSTRUCTION ACTIVITIES ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY									
Without Mitigation	2	2	3	2	2	**18**	**Low**	(-)	High
With Mitigation	1	2	3	2	2	**16**	**Low**	(-)	High
Mitigation and Management Measures	— Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. — Ensure that vegetation is not unnecessarily removed during the construction phase. — Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. — Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads. — Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities. — Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). — Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. — Rehabilitate all disturbed areas immediately after the completion of construction works.								

7.8.2 OPERATIONAL PHASE

POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS LOCATED WITHIN A 0.5KM RADIUS OF THE GRID CONNECTION INFRASTRUCTURE DURING THE OPERATIONAL PHASE

The power line is expected to have a low visual impact on observers within a 0.5km radius of the power line structures. This is due to the absence of potentially sensitive visual receptors brought about by the remote location of the infrastructure. The area of potential visual impact (i.e. the Witputs homestead) is unlikely to be affected, as the primary residence is located on the property earmarked for the Sol Invictus Solar PV facilities, implying the land owner's/resident's approval of the proposed infrastructure.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

The operational impact on sensitive visual receptors is indicated in **Table 7-23** below.

Table 7-23: Operational Impact on Sensitive Visual Receptors within Close Proximity

Potential Impact: VISUAL IMPACT ON OBSERVERS TRAVELLING ALONG THE ROADS AND RESIDENTS AT HOMESTEADS IN CLOSE PROXIMITY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	4	2	**26**	**Low**	(-)	High
With Mitigation	4	2	3	4	2	**26**	**Low**	(-)	High
Mitigation and Management Measures	— Maintain the general appearance of the infrastructure.								

POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS WITHIN THE REGION (0.5 – 3KM RADIUS) DURING THE OPERATION OF THE GRID CONNECTION INFRASTRUCTURE

The grid connection infrastructure will have a low visual impact (significance rating = 26) on observers traveling along the roads and residents of homesteads within a 1.5 - 3km radius of the infrastructure. The area of potential visual impact (i.e. a section of the N14 national road) is unlikely to be affected, due to the existing substation structures and the large number of power lines at this location. It is unlikely that observers travelling along this road would be able to distinguish the proposed Sol Invictus power line and busbar from the existing grid connection infrastructure.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

The operational impact on sensitive visual receptors is indicated in **Table 7-24** below.

Table 7-24: Operational Impact on Sensitive Visual Receptors within the Region

Potential Impact: VISUAL IMPACT ON OBSERVERS TRAVELLING ALONG THE ROADS AND RESIDENTS AT HOMESTEADS WITHIN A 0.5 – 3KM RADIUS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	3	3	4	2	**26**	**Low**	(-)	High
With Mitigation	3	3	3	4	2	**26**	**Low**	(-)	High
Mitigation and Management Measures	— Maintain the general appearance of the infrastructure.								

POTENTIAL VISUAL IMPACT OF THE PROPOSED GRID CONNECTION INFRASTRUCTURE ON THE SENSE OF PLACE OF THE REGION

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects

such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a predominantly rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development and power generation/distribution or mining infrastructure represents existing visual disturbances.

The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of low significance.

The operational impact on sense of place is indicated in **Table 7-25** below.

Table 7-25: Operational Impact on Sense of Place of the Region

Potential Impact: POTENTIAL IMPACT OF THE DEVELOPMENT ON THE SENSE OF PLACE OF THE REGION.	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	3	3	4	2	**24**	**Low**	(-)	High
With Mitigation	2	3	3	4	2	**24**	**Low**	(-)	High
Mitigation and Management Measures	— Maintain the general appearance of the infrastructure.								

7.9 WASTE MANAGEMENT

7.9.1 CONSTRUCTION PHASE

Construction-related waste is not anticipated to trigger the need for a Waste Management Licence (WML) in terms of NEMWA (Refer to **Section 2**). Waste management at the Project site will be undertaken in line with the EMPr to consider the correct disposal of general and hazardous waste generated on the Project. **Table 7-26** describes the different waste streams that the proposed Project will likely generate, as well as the various potential management options. Due to the nature of the Project, waste will mainly be generated during the construction phase. During operation, Eskom staff are only on the site for limited amount of time as and when maintenance is required.

Table 7-26: Waste Management Options

WASTE	TYPE OF WASTE	MANAGEMENT OPTIONS
Hydrocarbons (Contaminated soil)	Hazardous	Fuel and oil spillages can be a source of contamination of water sources and the soil. Management options include: — Ensure hazardous waste is stored separately from general waste; — Using spill kits to clean any spillages; — Ensure storage facilities are maintained and meet industry regulations; — Transportation and storage of fuel must be regulated and correctly managed according to the EMPr; — Waste generated along servitude to be taken to the contractor laydown area at the end of each day; — Co-ordinate waste removal with the removal of waste from the contractor laydown area; and — All hazardous waste is to be disposed of at a registered hazardous landfill (safe disposal certificates must be obtained).

WASTE	TYPE OF WASTE	MANAGEMENT OPTIONS
Contaminated Personal Protective Equipment (PPE) / Used oil containers	Hazardous	PPE can be contaminated during handling of hydrocarbons. Management options include: — Store contaminated PPE / used oil containers in hazardous waste bins/skips along the servitude; — Waste generated along servitude to be taken to the contractor laydown area at the end of each day; — Co-ordinate waste removal with the removal of waste from the contractor laydown area; and — Ensure contaminated PPE is disposed of at a registered hazardous landfill (safe disposal certificates must be obtained).
General waste	General	General waste (inorganic matter) can be disposed of as per normal and form part of the municipal waste management system. Management options include: — Ensure waste is stored securely in refuse bins; — Recycling of waste to be undertaken, where possible; — Waste generated along servitude to be taken to the contractor laydown area at the end of each day; and — Co-ordinate waste removal with the removal of waste from the contractor laydown area.
Food waste	General	Food waste is generated as site personnel take their meals on the construction site. Management options include: — Store any waste and packaging into a labelled food waste bin; — Waste generated along servitude to be taken to the contractor laydown area at the end of each day; and — Co-ordinate waste removal with the removal of waste from the contractor laydown area.

The construction impact on improper waste management and littering is indicated in **Table 7-27** below.

Table 7-27: Construction Impact on Improper Waste Management

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
IMPROPER WASTE MANAGEMENT AND LITTERING									
Without Mitigation	3	1	3	1	4	**32**	**Moderate**	(-)	High
With Mitigation	2	1	1	1	3	**15**	**Low**	(-)	High
Mitigation and Management Measures	— Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be stored at the construction camp / laydown area and removed from site on a weekly basis to prevent rodents and pests entering the site; — A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area; — The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility;								

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
IMPROPER WASTE MANAGEMENT AND LITTERING								
	— Hazardous waste must be stored separately in covered containers and appropriately disposed of at a licensed disposal facility; — Recycling should take place, where possible; — Where a registered disposal facility is not available close to the Project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site; and — Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.							

7.9.2 OPERATIONAL PHASE

No operational phase impacts are expected as a maintenance team will only be on site as and when required (intermittently) and for an extremely limited time. As such, the impacts are considered negligible.

7.10 TRAFFIC

7.10.1 CONSTRUCTION PHASE

The impact of additional traffic during construction is expected to be minimal and short term. Trucks delivering construction supplies will predominantly make use of the N14 and existing access roads. The intermittent movement of trucks delivering construction supplies is likely to have a low impact. The construction activities potential impact on traffic is indicated in **Table 7-28** below.

Table 7-28: Construction Impact on Increased Local Traffic

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
INCREASED LOCAL TRAFFIC									
Without Mitigation	2	1	3	1	4	**28**	**Low**	(-)	High
With Mitigation	2	1	1	1	3	**15**	**Low**	(-)	High
Mitigation and Management Measures	— Ensure deliveries are done as and when required; — The road network used to access the Project area will have to be correctly maintained in order to support additional movement of vehicles. Transport of abnormal loads should be limited to non-peak hours; — Ensure that trucks and other vehicles do not block access roads; and — All site vehicles must limit the idle time on access roads.								

7.10.2 OPERATION PHASE

No operational phase traffic-related impacts are expected as a maintenance team will only be on site as and when required (intermittently) and for an extremely limited time. As such, the impacts are considered negligible.

7.11 HERITAGE AND PALAEONTOLOGY

7.11.1 CONSTRUCTION PHASE

IMPACTS ON PRE-COLONIAL ARCHAEOLOGICAL RESOURCES DURING CONSTRUCTION

Few significant pre-colonial archaeological resources are present in the project area. Many of the artefacts are likely to be in secondary context with poor context, and are not considered to be significant resources. A single Later stone age site has limited significance but can be easily mitigated by avoidance through imposition of a buffer.

The potential for any construction impacts on heritage resources is indicated in **Table 7-29** below.

Table 7-29: Construction Impact on Damage to Heritage Resources

Potential Impact: IMPACTS ON PRE-COLONIAL ARCHAEOLOGICAL RESOURCES DURING CONSTRUCTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	5	5	2	**28**	**Low**	(-)	High
With Mitigation	1	2	3	5	1	**22**	**Low**	(+)	High
Mitigation and Management Measures	— Site D008 & D009 must be avoided during construction. No towers can be placed in this area. Buffers of 15 meters diameter must be established around each site centerpoint (S-29.28371698° E18.79869497°) and (S-29.28358999° E18. 79868299°). No disturbance of these areas must occur; — Final pole positions must be presented to the heritage practitioner for desktop assessment and approval; — If any human burials are found during construction, they should not be further disturbed until reported to the Heritage Authority for further action and mitigation.								

IMPACTS ON HISTORIC BUILT ENVIRONMENT DURING POWERLINE CONSTRUCTION

There are very limited historical built environment resources in the project area. The "old" kraal (date uncertain) may have some history, while 2 structures (the latter just outside the corridor) are believed to be less than 60 years old and not considered to be highly significant heritage resources. They lie just outside the corridor and are unlikely to be impacted.

The potential for impacts on the historic built environment is indicated in **Table 7-30** below.

Table 7-30: Construction impact on historic built environment

Potential Impact: HISTORIC BUILT ENVIRONMENT	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	5	5	2	**28**	**Low**	(-)	High
With Mitigation	1	2	3	5	1	**22**	**Low**	(+)	High
Mitigation and Management Measures	— Site D002 must be avoided during construction. No towers can be placed in this area. A buffer of 30 meters diameter must be established around the site centerpoint (S-29. 29208999°; E18.61590302°). No disturbance inside this area must occur;								

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
HISTORIC BUILT ENVIRONMENT								
	— Final pole positions must be presented to the heritage practitioner for desktop assessment and approval.							

IMPACTS ON PALAEONTOLOGY DURING POWERLINE CONSTRUCTION

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old and the wrong type to contain fossils, or young enough but without traps such as palaeo-pans or paleo-springs. Furthermore, the footprint of each powerline pole is very small. Since there is an extremely small chance that fossils from the pans/springs in Tertiary Calcrete may be disturbed a Fossil Chance Find Protocol has been added to this report.

The potential for impacts on palaeontological resources is indicated in **Table 7-32** below.

Table 7-31: Construction impact on palaeontological resources

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
HISTORIC BUILT ENVIRONMENT									
Without Mitigation	2	2	5	5	2	**28**	**Low**	(-)	High
With Mitigation	1	2	3	5	1	**22**	**Low**	(+)	High
Mitigation and Management Measures	— Implement the Fossil Chance Find Protocol								

OPERATIONAL PHASE

There are no anticipated heritage impacts during the operational phase, as any existing resources would have been discovered during excavations and other intrusive construction activities.

7.12 SOCIO-ECONOMIC

Positive socio-economic impacts associated with the proposed OHPL include job creation, skills development and local business opportunities as well as increased energy security. The findings of the SIA indicate that the significance of the potential negative impacts is likely to be low. The potential negative impacts associated with the proposed OHPL can be effectively mitigated if the recommended mitigation measures are implemented.

7.12.1 CONSTRUCTION PHASE

CREATION OF LOCAL EMPLOYMENT, TRAINING, AND BUSINESS OPPORTUNITIES

Based on similar projects the construction phase for the grid connection will extend over a period of approximately 3-6 months and create in the region of 30-40 employment opportunities. Approximately 80% of the jobs will be low-skilled, 15% semi-skilled and 5% skilled. Most of the low and semi-skilled employment opportunities would benefit community members from local towns in the area, including Aggeneys, Poffadder and Keimoes. A percentage of the high skilled positions may also benefit the local community. Most of the employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from these local communities. Given high local unemployment levels and limited job opportunities in the area, this will represent a localised, social benefit. The remainder of the skilled employment opportunities are likely to be associated with the contactors appointed to construct the grid infrastructure. However, in the absence of specific commitments from the developer to maximise local employment targets the potential opportunities for local employment will be limited. The proponent should therefore commit to employing as many local community members as possible. The total wage bill is estimated to be in the region of R 1.5 million (2021 Rand values). This is based on

assumption of R 8 000 per month for low skilled workers, R 12 000 per month for semi-skilled workers and R 25 000 per month for high skilled workers over 4 months. A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in the local municipality. The capital expenditure associated with the construction of grid infrastructure will be ~ R 25 million and will create opportunities for local companies and the regional and local economy. Implementing the enhancement measures listed below can enhance these opportunities. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site. However, given the relatively small scale of the project and short duration of the construction phase these benefits will be limited.

The impact on employment, training and business opportunities is shown in **Table 7-32**.

Table 7-32: Construction Impact on Employment, Training and Business Opportunities

Potential Impact: CREATION OF EMPLOYMENT AND BUSINESS OPPORTUNITIES AND THE OPPORTUNITY FOR SKILLS DEVELOPMENT AND ON-SITE TRAINING	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	0	2	3	**18**	**Low**	(+)	High
With Mitigation	2	3	0	2	4	**28**	**Low**	(+)	High
Mitigation and Management Measures	<u>Employment</u> — Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. — Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. — Before the construction phase commences the proponent should meet with representatives from the NKM and KMM to establish the existence of a skills database for the area. If such a database exists it should be made available to the contractors appointed for the construction phase. — The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the Project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the Project. — Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. — The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. <u>Business</u> — The proponent should liaise with the NKM and KMM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.								

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
CREATION OF EMPLOYMENT AND BUSINESS OPPORTUNITIES AND THE OPPORTUNITY FOR SKILLS DEVELOPMENT AND ON-SITE TRAINING								
	Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.							

IMPACT OF CONSTRUCTION WORKERS ON LOCAL COMMUNITY

The presence of construction workers can pose a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour, mainly of male construction workers, including:

- An increase in alcohol and drug use.
- An increase in crime levels.
- The loss of girlfriends and/or wives to construction workers.
- An increase in teenage and unwanted pregnancies.
- An increase in prostitution.
- An increase in sexually transmitted diseases (STDs), including HIV.

Most of the low and semi-skilled workers are likely to be locally based and form part of the local family and social network and the number of workers will be low, namely ~ 30-40. The towns of Aggeneys and Poffadder have also been exposed to construction workers associated with mining and development of renewable energy projects. They are therefore accustomed to the presence of construction workers. The potential impact of construction workers on the local community is therefore likely to be negligible.

The impact of the presence of construction workers on family structures and social networks is show in **Table 7-33**.

Table 7-33: Construction Impact on Family Structures and Social Networks

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
PRESENCE OF CONSTRUCTION WORKERS AND POTENTIAL IMPACTS ON FAMILY STRUCTURES AND SOCIAL NETWORKS									
Without Mitigation	2	2	3	2	2	**18**	**Low**	(-)	High
With Mitigation	1	1	3	2	2	**14**	**Low**	(-)	High
Mitigation and Management Measures	— Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. — The proponent and the contractor(s) should develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. — The proponent and the contractor should implement an awareness programme for communicable diseases								

Potential Impact: PRESENCE OF CONSTRUCTION WORKERS AND POTENTIAL IMPACTS ON FAMILY STRUCTURES AND SOCIAL NETWORKS	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	(including HIV/AIDS and COVID-19) for all construction workers at the outset of the construction phase. — The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site. — The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days of their contract coming to an end. — No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.							

Residual impacts include impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent residual/cumulative impacts on the affected individuals and/or their families and the community.

IMPACT ASSOCIATED WITH CONSTRUCTION RELATED ACTIVITIES

The movement of heavy construction vehicles during the construction phase has the potential to damage local roads and create noise, dust, and safety impacts for other road users and local communities in the area. Based on the findings of the SIA the potential dust and noise impacts associated with the construction of the power line are likely to be negligible. The owners of Witputs Farm, which is the closest farmstead to the powerline, support the development of the Sol Invictus PV SEF.

The impact of construction vehicles and activities is shown in **Table 7-34**.

Table 7-34: Construction Impact on Noise, Dust and Safety

Potential Impact: NOISE, DUST AND SAFETY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	1	2	3	**21**	**Low**	(-)	High
With Mitigation	2	1	1	2	2	**12**	**Low**	(-)	High
Mitigation and Management Measures	— The proponent should consider the establishment of a Monitoring Forum (MF) to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local farmers and the contractor(s). The MF should also address issues associated with damage to roads and other construction related impacts. — Ongoing communication with landowners and road users during construction period. — Establishment and implementation of a Grievance Mechanism (GM) that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.								

Potential Impact: NOISE, DUST AND SAFETY	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	— Implementation of a road maintenance programme throughout the construction phase to ensure that the affected roads are maintained in a good condition. — Repair of all affected road portions at the end of construction period, where required. — Dust suppression measures must be implemented on un-surfaced roads, such as wetting / speed limits etc. and ensuring that vehicles used to transport loose building materials are fitted with tarpaulins or covers. — All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.							

If damage to local roads is not repaired, then this will affect the other road users and result in higher maintenance costs. The costs will be borne by road users who were not responsible for the damage.

RISK TO SAFETY, LIVESTOCK AND FARM INFRASTRUCTURE

The presence on and movement of construction workers on and off the site will pose a limited risk to local famers and farm workers in the vicinity of the site. This is due to the low intensity of the farming activities in the area due to the low carrying capacity of the veld. The owners of Witputs Farm, which is the closest farmstead to the powerline, support the development of the Sol Invictus PV SEF.

Potential risks (safety, livestock, and farm infrastructure) can be also effectively mitigated by careful planning and managing the movement of construction workers on the site during the construction phase. Mitigation measures to address these risks are outlined below.

The impact safety, stock theft and damage to infrastructure is shown in **Table 7-35**.

Table 7-35: Construction Impact on Safety, Stock Theft and Damage to Property

Potential Impact: SAFETY RISK, STOCK THEFT AND DAMAGE TO FARM INFRASTRUCTURE ASSOCIATED WITH PRESENCE OF CONSTRUCTION WORKERS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	2	2	**18**	**Low**	(-)	High
With Mitigation	1	1	3	2	2	**14**	**Low**	(-)	High
Mitigation and Management Measures	— The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. — All farm gates must be closed after passing through. — Contractors appointed by the proponent are to provide daily transport for low and semi-skilled workers to and from the site. — The proponent should consider the option of establishing a MF that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site.								

Potential Impact: SAFETY RISK, STOCK THEFT AND DAMAGE TO FARM INFRASTRUCTURE ASSOCIATED WITH PRESENCE OF CONSTRUCTION WORKERS	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	— The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities. — The EMPr must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. — Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. — Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. — It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.							

7.12.2 OPERATIONAL PHASE

IMPROVE ENERGY SECURITY AND ESTABLISHMENT OF ENERGY INFRASTRUCTURE

The proposed power line is essential to enable the development and operation of Sol Invictus 1 to 6 PVSEF cluster. The primary goal of the proposed Sol Invictus PVSEF cluster is to improve energy security in South Africa by generating renewable energy. The proposed power line should therefore be viewed within the context of the South Africa's current power supply constraints and the reliance on coal powered energy to meet most of its energy needs.

South Africa's energy crisis, which started in 2007 and is ongoing, has resulted in widespread rolling blackouts (referred to as load shedding) due to supply shortfalls. The load shedding has had a significant impact on all sectors of the economy and on investor confidence. The mining and manufacturing sector have been severely impacted and will continue to be impacted until such time as there is a reliable supply to energy. Load shedding in the first six months of 2015 was estimated to have cost South African businesses R13.72 billion in lost revenue with an additional R716 million was spent by businesses on backup generators[16]. A survey of 3 984 small business owners found that 44% said that they had been severely affected by load shedding with 85% stating that it had reduced their revenue, with 40% of small businesses losing 20% or more or revenue during due to load shedding period.[17]

The operational impact on energy security is shown in **Table 7-36**.

[16] Goldberg, Ariel (9 November 2015). "The economic impact of load shedding: The case of South African retailers" (PDF). Gordon Institute of Business Science. p. 109

[17] "How does load shedding affect small business in SA?". The Yoco Small Business Pulse (3: Q1 2019): 3

Table 7-36: Operational Impact on Improved Energy Security

Potential Impact: DEVELOPMENT OF INFRASTRUCTURE TO IMPROVE ENERGY SECURITY AND REDUCE RELIANCE ON COAL	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	4	0	4	4	**44**	**Moderate**	(+)	High
With Mitigation	3	4	0	4	5	**55**	**Moderate**	(+)	High
Mitigation and Management Measures	— Maximise the number of employment opportunities for local community members. — Implement training and skills development programs for members from the local community. — Maximise opportunities for local content and procurement.								

Residual impacts include improved energy security and overall benefit for economic development and investment, reduction in CO_2 emission and reduction in water consumption for energy generation.

CREATION OF EMPLOYMENT OPPORTUNITIES

The potential employment opportunities associated with the power line will be limited and largely confined to periodic maintenance and repairs. The potential socio-economic benefits will therefore be limited.

The impact on employment opportunities is shown in **Table 7-37**.

Table 7-37: Operational Impact on Employment Opportunities

Potential Impact: CREATION OF EMPLOYMENT OPPORTUNITIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	0	4	2	**12**	**Low**	(+)	High
With Mitigation	2	2	0	4	3	**24**	**Low**	(+)	High
Mitigation and Management Measures	— The enhancement measures to enhance local employment and business opportunities during the construction phase, also apply to the operational phase.								

Residual impacts include the creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area.

IMPACT ON FARMING OPERATIONS DURING MAINTENANCE

The presence on and movement of maintenance workers on and off the site poses a potential risk to farming operations. Farm fence and gates may be damaged and stock losses may also result from gates being left open. The presence of maintenance workers on the site also increases the exposure of their farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime. The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by ensuring the maintenance teams take care to ensure that gates are kept closed and affected property owners are kept informed about timing of maintenance operations.

The impact on farming activities is shown in **Table 7-38**.

Table 7-38: Operational Impact on Farming Activities

Potential Impact: RISKS POSED TO FARMING ACTIVITIES BY MAINTENANCE WORKERS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	3	3	**30**	**Moderate**	(-)	High
With Mitigation	2	2	3	2	3	**27**	**Low**	(-)	High

Potential Impact: RISKS POSED TO FARMING ACTIVITIES BY MAINTENANCE WORKERS	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
Mitigation and Management Measures	— Affected property owners should be notified in advance of the timing and duration of maintenance activities. — Maintenance teams must ensure that all farm gates must be closed after passing through. — Property owners should be compensated for damage to farm property and or loss of livestock or game associated maintenance related activities. — Movement of traffic and maintenance related activities should be strictly contained within designated areas associated with transmission lines and substations. — Strict traffic speed limits must be enforced on the farm. — No maintenance workers should be allowed to stay over-night on the affected properties.							

7.13 HEALTH AND SAFETY

7.13.1 CONSTRUCTION PHASE

During construction, the employees are exposed to health and safety hazards from the mechanical machines and equipment used on the site. Furthermore, there is a potential for snakes and other dangerous animals in the area, to which the employees must be warned about and trained on how to handle situations if any encounters occur. The construction impact on health and safety is indicated in **Table 7-39** below.

Table 7-39: Construction Impact on Employee Health and Safety

Potential Impact: EMPLOYEE HEALTH AND SAFETY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	4	4	**52**	**Moderate**	(-)	High
With Mitigation	2	1	3	4	2	**20**	**Low**	(-)	High
Mitigation and Management Measures	— An HSE officer must be appointed to monitor safety conditions during construction activities; — Ensure employees are properly trained to use specific equipment or machinery; — Train personnel on how to deal with snake encounters, as well as encounters with other dangerous animals known to occur in the area; — Provide suitable personal protective equipment (PPE); — Conduct site and safety induction to raise awareness of the risks associated with the site; — Conduct regular toolbox talks as refreshers to improve health and safety; — Develop safe work instruction method statements that should be used by employees in completing their tasks; — Train all relevant personnel on handling, use and storage of hazardous substances;								

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
EMPLOYEE HEALTH AND SAFETY									
	— Provide Material Safety Data Sheets (MSDS) for all hazardous substances kept onsite; and — All visitors should undergo site induction and be made aware of the risks associated with the site.								

7.13.2 OPERATIONAL PHASE

The operational phase health and safety impacts are expected to be limited to loading and unloading of heavy equipment as well as via the storage and handling of any hazardous material onsite. The impact is expected to be low following mitigation and is indicated in **Table 7-40** below.

Table 7-40: Operation Impact on Employee Health and Safety

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
EMPLOYEE HEALTH AND SAFETY									
Without Mitigation	3	2	3	3	3	**33**	**Moderate**	(-)	High
With Mitigation	2	1	3	4	2	**20**	**Low**	(-)	High
Mitigation and Management Measures	— The HSE officer will monitor safety conditions during activities; — Ensure employees are properly trained to use specific equipment or machinery; — Train personnel on how to deal with snake encounters, as well as encounters with other dangerous animals known to occur in the area; — Provide suitable PPE; — Conduct site and safety induction to raise awareness of the risks associated with the site; — Conduct regular toolbox talks as refreshers to improve health and safety; — Develop safe work instruction method statements that should be used by employees in completing their tasks; — Train all relevant personnel on handling, use and storage of hazardous substances.								

7.14 NO-GO ALTERNATIVE

The no-go alternative will mean none of the negative and positive impacts described above will come into effect.

8 CUMULATIVE IMPACT ASSESSMENT

Although the BA process is essential to assessing and managing the environmental and social impacts of individual projects, it often may be insufficient for identifying and managing incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

IFC PS 1 recognizes that, in some instances, cumulative effects need to be considered in the identification and management of environmental and social impacts and risks. For private sector management of cumulative impacts, IFC considers good practice to be two pronged:

- effective application of and adherence to the mitigation hierarchy in environmental and social management of the specific contributions by the project to the expected cumulative impacts; and
- best efforts to engage in, enhance, and/or contribute to a multi-stakeholder, collaborative approach to implementing management actions that are beyond the capacity of an individual project proponent.

Even though Performance Standard 1 does not expressly require, or put the sole onus on, private sector clients to undertake a cumulative impact assessment (CIA), in paragraph 11 it states that the impact and risk identification process "*will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence*" including "*master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant*."

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities (IFC GPH).

Evaluation of potential cumulative impacts is an integral element of an impact assessment. In reference to the scope for an impact assessment, IFC's Performance Standards specify that "*Risks and impacts will be analysed in the context of the project's area of influence. This area of influence encompasses…areas potentially impacted by cumulative impacts from further planned development of the project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken; and (iv) areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.*" (IFC 2006).

A cumulative impact assessment is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (IFC GPH).

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed OHPL. While one project may not have a significant negative impact on sensitive resources or receptors, the collective impact of the projects may increase the severity of the potential impacts.

Potential cumulative impacts identified are summarised below. Other planned or existing projects that can interact with the Project will be identified during stakeholder engagement and finalisation of the BA process.

BIODIVERSITY

The Renewable Energy Database[18] shows that there are a number of approved and retracted applications for renewable energy projects in the nearby vicinity (**Figure 8-1**). The dataset does not distinguish been approved

[18] http://egis.environment.gov.za/

and retracted applications, but it does provide insight into the interest for renewable energy in the larger area. The high number of developments in the area will have an impact on the cumulative effect on the fauna and flora.

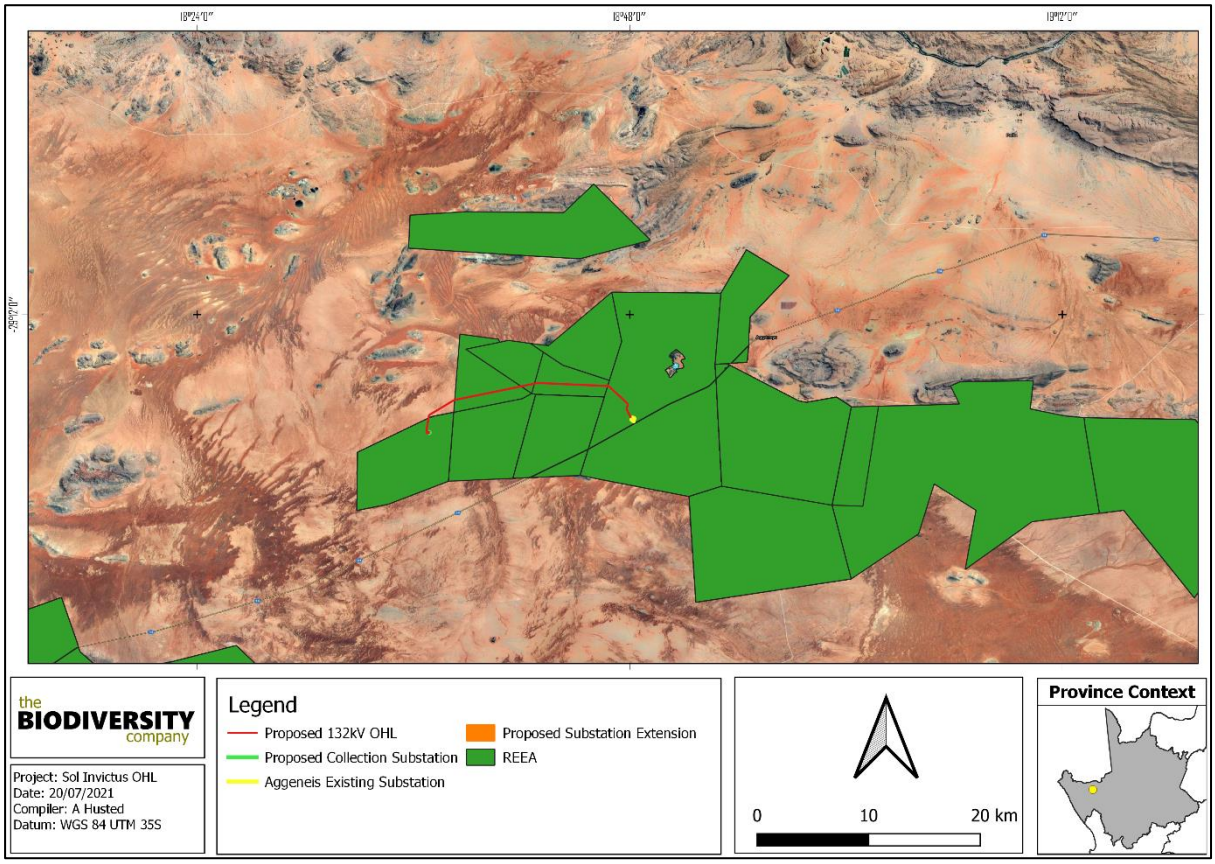


Figure 8-1: The project area in relation to nearby renewable energy projects

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation, this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system.

Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as other powerlines and the associated roads and within the area). These include dust deposition, noise and vibration, disruption of wildlife corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport. The expected cumulative impact is expected to be low to moderately detrimental.

FRESHWATER

Since no surface infrastructure associated with the proposed powerline is located within any of the identified cryptic wetlands and episodic drainage line, the significance of the cumulative impacts of the proposed project is regarded to be insignificant. If the recommended mitigation measures are adhered to, impacts from the proposed powerline construction activities will not exceed the boundaries of the investigation area and will not contribute significantly to cumulative impacts on watercourses on a regional scale.

BATS

In addition to existing localized habitat disturbance within the OHPL corridor, localized habitat disturbance during construction and the low risk of bat electrocution during operation, will cumulatively have a medium significant cumulative impact on bats. To mitigate the medium significant cumulative impacts of the proposed OHPL, there

should be no construction of powerline poles in high sensitive areas. Within Medium-High and Medium sensitive areas, the construction of poles should be, respectively, avoided where possible, and minimized. This impact is unlikely to have an appreciable secondary impact on bat ecosystem services.

HERITAGE

Cumulative impacts on palaeontological/archaeological and built heritage resources appear to be limited overall due to the existence of very few such resources. Baseline information suggests that the existing powerlines in the vicinity appear to have had limited impact on physical heritage resources as far as can be determined. Farming and mining will have had some impacts but are likely to have been limited in the vicinity of the project site. The installation of the Sol Invictus OHPL is unlikely to impact significant heritage resources provided that the mitigation of Later Stone Age archaeological sites proposed by Orton (2016 a-d) are implemented.

POTENTIAL CUMULATIVE VISUAL EXPOSURE

Cumulative visual impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments. In this case the 'development' would be a new 132kV power line and an extension to an existing substation, and existing grid connection infrastructure in close proximity.

Cumulative visual impacts may be:

- Combined, where several power lines are within the observer's arc of vision at the same time;
- Successive, where the observer has to turn his or her head to see the various structures of a power line; and
- Sequential, when the observer has to move to another viewpoint to see different power line structures, or different views of the same power line (such as when travelling along a route).

The visual impact assessor is required (by the competent authority) to identify and quantify the cumulative visual impacts and to propose potential mitigating measures. This is often problematic as most regulatory bodies do not have specific rules, regulations or standards for completing a cumulative visual assessment, nor do they offer meaningful guidance regarding appropriate assessment methods. There are also not any authoritative thresholds or restrictions related to the capacity of certain landscapes to absorb the cumulative visual impacts of the power line infrastructure.

To complicate matters even further, cumulative visual impact is not just the sum of the impacts of two developments. The combined effect of both may be much greater than the sum of the two individual effects, or even less.

The cumulative impact of the proposed grid connection infrastructure on the landscape and visual amenity is a product of:

- The distance between the power lines and substation structures;
- The distance over which the structures are visible;
- The overall character of the landscape and its sensitivity to the structures;
- The siting and design of the power line, switching station or substation; and
- The way in which the landscape is experienced.

The specialist is required to conclude if the proposed 'development' will result in any unacceptable loss of visual resource considering the industrial infrastructure proposed in the area.

The proposed busbar is located immediately adjacent to the Aggeneis Substation and associated power lines. It is expected that the existing visual disturbance at this site will largely absorb the potential visual exposure of the proposed substation extension i.e. the visual amenity of this site has already been compromised.

It should also be noted that the area has been subjected to a number of renewable energy applications. It must be noted that the database is not always updated regularly and therefore some projects may no longer be considered for development, or no longer have valid EAs.

The large number of approved renewable energy generation applications within the Springbok REDZ and this area in particular, is expected to increase the cumulative visual impact should all of these projects be constructed, both for the primary project components and for the ancillary components (i.e. grid connection infrastructure).

However, considering the purpose of the establishment of the Springbok REDZ (i.e. to concentrate renewable energy applications within this area) the cumulative visual impact is considered to be within acceptable limits. It is further recommended that proposed future developments should be contained within this zone, rather than be located further afield and ultimately spreading the visual impacts over larger areas.

The construction of the grid connection infrastructure for the Sol Invictus Solar PV facilities may increase the cumulative visual impact of industrial type infrastructure within the region. The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of moderate significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the proposed infrastructure and the presence of the existing electricity infrastructure.

9 ENVIRONMENTAL IMPACT STATEMENT

The essence of any impact assessment process is aimed at ensuring informed decision-making, environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA, the commitment to sustainable development is evident in the provision that "*development must be socially, environmentally and economically sustainable…. and requires the consideration of all relevant factors…*". NEMA also imposes a duty of care, which places an obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act No. 108 of 1996) should be anticipated and prevented, and where they cannot be prevented altogether, they must be minimised and remedied in terms of "reasonable measures".

In assessing the environmental feasibility of the proposed construction of the powerline, the requirements of all relevant legislation have been considered. The identification and development of appropriate mitigation measures that should be implemented to minimise potentially significant impacts associated with the project, has been informed by best practice principles, past experience, and the relevant legislation (where applicable).

The conclusions of this BA are the result of comprehensive assessments. These assessments were based on issues identified through the BA process and public participation undertaken to date. The BAR will be subject to public review, which will be undertaken according to the requirements of NEMA with every effort made to include representatives of all stakeholders within the process. The BAR will be updated and finalised taking into consideration all comments received during the public review period before being submitted to the CA for consideration.

9.1 ENVIRONMENTAL SENSITIVITIES

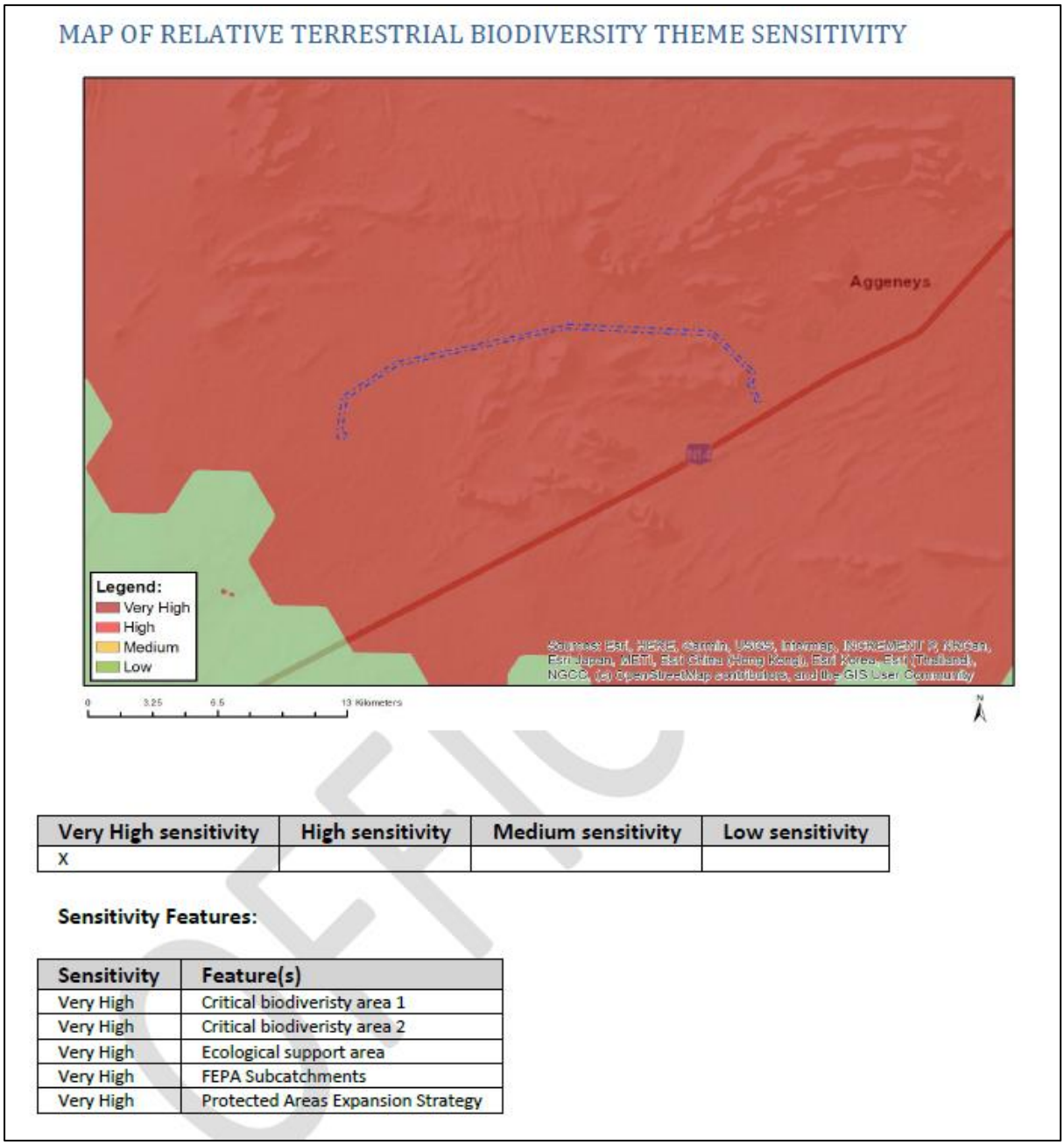
The following environmental sensitivities were identified on the site, as a result of the Project location and proposed activities, and will require specific applications or measures for mitigation to minimise impact.

- **Biodiversity:**
  - Critical Biodiversity Area (CBA)
  - Ecological Support Area (ESA)
  - One (1) Endangered avifauna species
  - Unique and low resilience habitats
  - A high richness of protected fauna species was present within the assessment area
- **Freshwater:**
  - NEMA zone of regulation
- **Bats:**
  - Local rocky ridges, cliff faces, steep slopes, and outcrops
  - Local buildings
  - Freshwater Ecosystem Priority Areas and other local rivers, wetlands, and other natural and artificial surface water resources

The above sensitivities are discussed in the following sub-sections (i.e. Section 9.1.1 - 9.1.3).

9.1.1 BIODIVERSITY

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the project area being with a CBA1, CBA2 and ESA (**Figure 9-1)**.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	Ecological support area
Very High	FEPA Subcatchments
Very High	Protected Areas Expansion Strategy

Figure 9-1: Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.

Based on the criteria provided in the Terrestrial Biodiversity Impact Assessment (**Appendix F2**), all habitats within the assessment area of the proposed project were allocated a sensitivity category (**Table 9-1** and **Table 9-2**). The following criteria were used in assigning sensitivities ratings for the habitat units:

- All habitats within the assessment area were observed to be utilised by threatened species during the field survey, these species comprised of:
  - One (1) EN avifauna species;
- Unique and low resilience habitats; and
- A high richness of protected fauna species was present within the assessment area.

Table 9-1: SEI Summary of habitat types delineated within field assessment area of project area

Habitat (Area)	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Drainage areas	High	High	High	Medium	High
Sandy Grassland	Medium	Medium	Medium	Medium	Medium
Artificial Wetland	Low	Medium	Medium	Low	Medium
Vygieveld	Medium	Medium	Medium	Medium	Medium
Arid Grassland	Medium	Low	Low	Medium	Low
Disturbed	Medium	Low	Low	Medium	Low

Table 9-2: Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

The sensitivities of the habitat types delineated are illustrated in **Figure 9-2**.

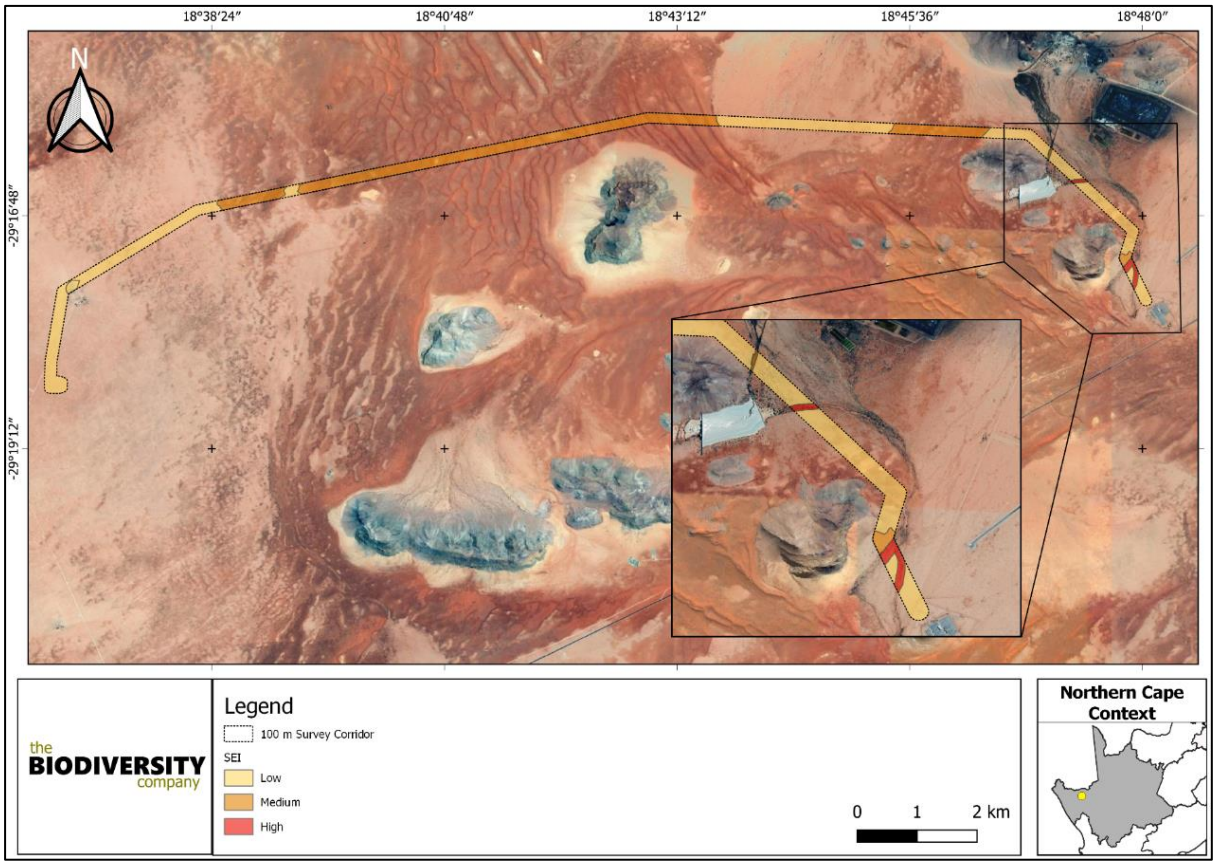


Figure 9-2: Terrestrial biodiversity sensitivity for the OHPL

9.1.2 FRESHWATER

It is important to note that in terms of the definition of a watercourse as per the National Water Act, 1998 (Act No. 36 of 1998), all of the natural watercourses within the investigation area will be regulated by Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) as well as the applicable zones of regulation. All of the natural watercourses will thus require further authorisation from the Department of Agriculture, Environmental Affairs, Land Reform and Rural Development (DAEARDL) and the Department of Water and Sanitation (DWS).

According to Macfarlane et al. (2015), the definition of a buffer zone is variable, depending on the purpose of the buffer zone, however, in summary, it is considered to be "*a strip of land with a use, function or zoning specifically designed to protect one area of land against impacts from another*". Buffer zones are considered to be important to provide protection of basic ecosystem processes (in this case, the protection of aquatic and wetland ecological services), reduce impacts on watercourses arising from upstream activities (e.g. by removing or filtering sediment and pollutants), provision of habitat for aquatic and wetland species as well as for certain terrestrial species, and a range of ancillary societal benefits (Macfarlane et. al, 2015). It should be noted, however, that buffer zones are not considered to be effective mitigation against impacts such as hydrological changes arising from stream flow reduction, impoundments or abstraction, nor are they considered to be effective in the management of point-source discharges or contamination of groundwater, both of which require site-specific mitigation measures (Macfarlane et. al, 2015).

The following Zones of Regulation (ZoR) are applicable to the cryptic wetlands and episodic drainage line identified within the investigation area **(Figure 9-3** and **Figure 9-4**):

- A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) was assigned for the cryptic wetlands and episodic drainage line;
- A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) was assigned to the episodic drainage line; and
- A 500 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) was assigned to the cryptic wetlands.

In line with the Water Use Licence (WUL) Application process, a construction and operational phase buffer was also calculated for the cryptic wetlands within the investigation area using the "Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries" as developed by Macfarlane et al. (2015).

The results of the buffer tool indicate that a 10 m buffer is applicable to the construction phase and a 12 m buffer is applicable to the operational phase of the proposed powerline.

The activities associated with the construction and operational phases of the proposed powerline based on the alignment provided by the proponent, which include site preparation, excavation of foundation pits and installation of the support structures associated by the proposed powerline, pose a low risk to the identified cryptic wetlands and episodic drainage line, should no physical footprint (i.e., support structures) be located within the identified watercourses and their calculated 10 m construction, 12 m operational phase buffers and 32 m NEMA ZoR, as a minimum. Should the recommended mitigation measures be implemented, with specific mention of ensuring that the support structures associated with the proposed powerline are located outside the identified watercourses and their associated buffer zone, as well as keeping the construction footprints as small as possible with suitable rehabilitation post-construction, no significant direct negative impacts to the watercourses, including their characteristics and goods and services provision are expected.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed powerline are likely to be reduced during the construction and operational phases assuming that a high level of mitigation takes place.

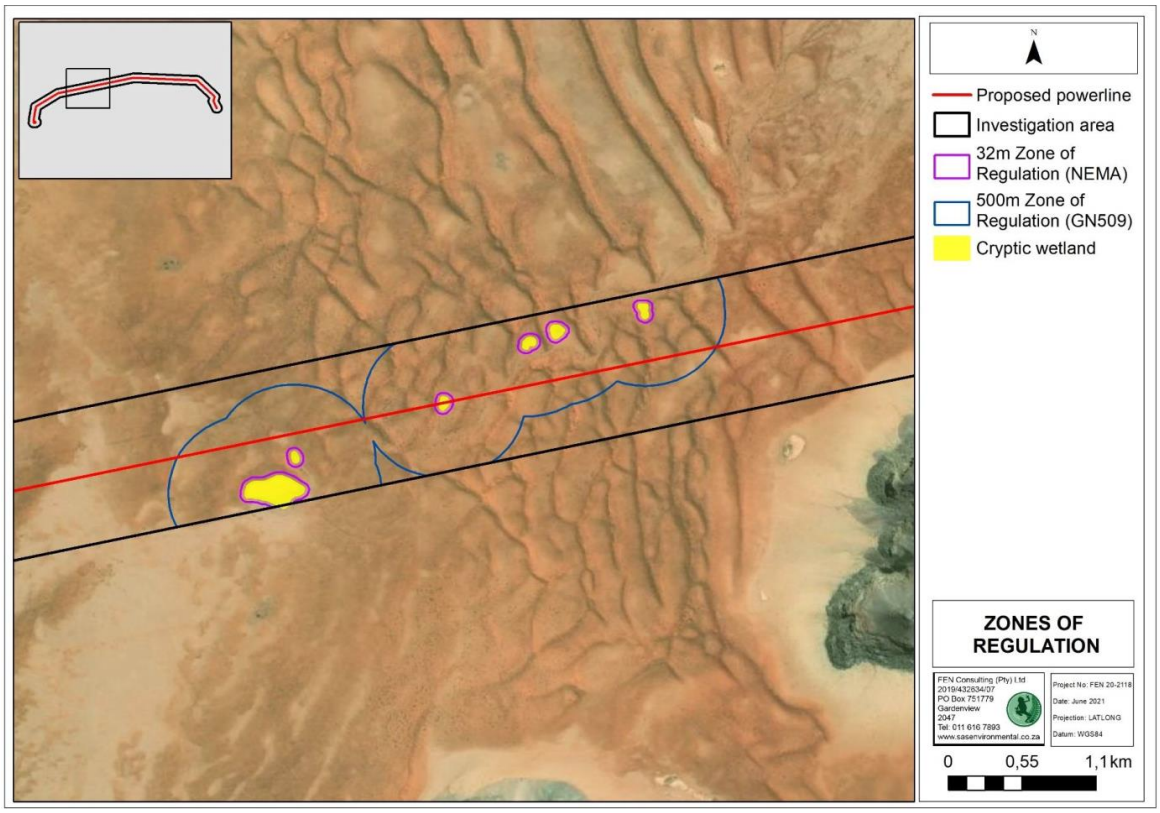


Figure 9-3: Cryptic wetlands identified within the investigation area of the proposed powerline with the associated zones of regulation in terms of NEMA and GN509 as it relates to the NWA

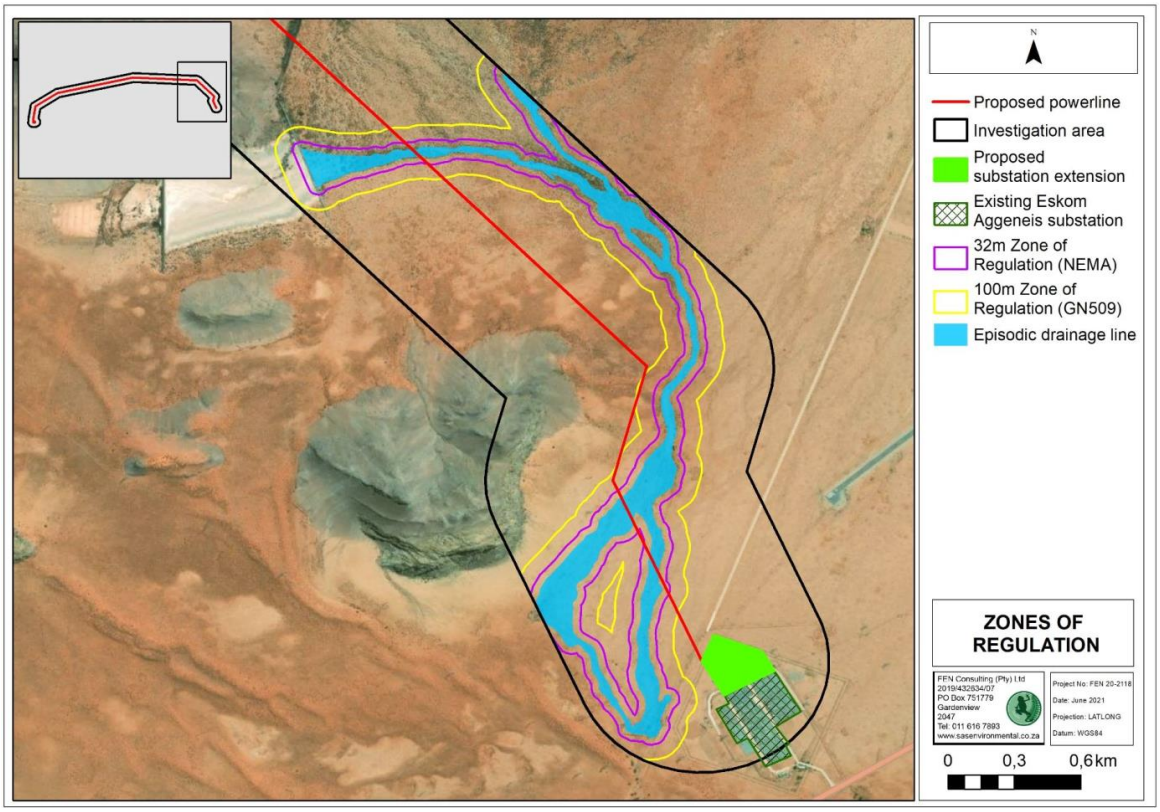


Figure 9-4: The episodic drainage line associated with the eastern portion of the proposed powerline and investigation area with the associated zones of regulation in terms of NEMA and GN509 as it relates to the NWA

9.1.3 BATS

A bat habitat sensitivity map was compiled, which took into consideration the following features of known importance for bats:

- Regional known significant bat roosts (African Chiroptera Report 2020; IWS unpubl. data).
- Local rocky ridges, cliff faces, steep slopes, and outcrops (delineated using contours; CDNGI 2020).
- Local buildings (CDNGI 2020).
- Freshwater Ecosystem Priority Areas (Nel 2011) and other local rivers, wetlands, and other natural and artificial surface water resources (CDNGI 2020).

As there are currently no South African bat-specific buffer and sensitivity mapping guidelines for developments other than wind farms, IWS used the South African guidelines on bat monitoring for proposed wind farms (MacEwan et al. 2020a) as an approximate reference. Described in **Table 9-3** and shown in **Figure 9-5**, is the relative sensitivity (i.e. the conservation importance for bats) of different natural and artificial habitats, and the recommended buffers around these, within the 100 m-wide corridor on either side of the proposed OHPL.

Table 9-3: Relative sensitivity of different bat habitats and buffers within the OHPL corridor

FEATURE	Delineation and Sensitivity
Natural	
River and wetland Freshwater Ecosystem Priority Areas	Lines/Polygons
Buffer around FEPAs	0-500 m
Seasonal water resources	Lines/Polygons
Buffer around other seasonal water resources	0-200 m
Ephemeral water resources	Lines/Polygons
Buffer around ephemeral water resources	0-50 m
Dry water courses	Lines/Polygons
Rocky ridges, cliff faces, steep slopes, and outcrops	Polygons
Buffer around rocky ridges, cliff faces, steep slopes, and outcrops	0-200 m
Artificial	
Buildings	Points
Buffer around buildings	0-500 m

South African Freshwater Ecosystem Priority Areas (Nel et al. 2011) and seasonal water resources were rated with High sensitivity and assigned a 0-500 m and a 0-200 m Medium-High sensitive buffer, respectively. In arid environments especially, (natural and artificial) surface water resources provide bats with essential drinking water, concentrated available insect prey and possible roosting and fruiting trees, as well as landmarks and corridors for movement (Serra-Cobo et al. 2000; Salata 2012; Sirami et al. 2013). Ephemeral water resources were assigned Medium-High sensitivity and buffered with a 0-50 m Medium sensitive buffer. Dry water courses were rated as Medium sensitive areas.

Rocky ridges, cliff faces, steep slopes, and outcrops were assigned High sensitivity and 0-200 m Medium-High sensitive buffer, since rocky terrain is likely to provide suitable natural roosting habitat for many, if not all the listed potentially occurring bat species. Buildings, some of which are likely to provide roosting habitat for certain bat species, were assigned Medium-High sensitivity and buffered with a 0-500m Medium buffer.

The bat sensitivity map (**Figure 9-5**) should be interpreted as follows:

- Powerline poles must not be installed where the OHPL route coincides with High (red) sensitive drainage lines.
- Where Medium-High sensitive (orange) areas are intersected by the OHPL route, the installation of powerline poles should be avoided, where possible.
- In Medium sensitive (yellow) areas, the installation of powerline poles should be minimized.
- In remaining Low sensitive areas, rehabilitation alone is considered sufficient to mitigate disturbance of natural habitat.

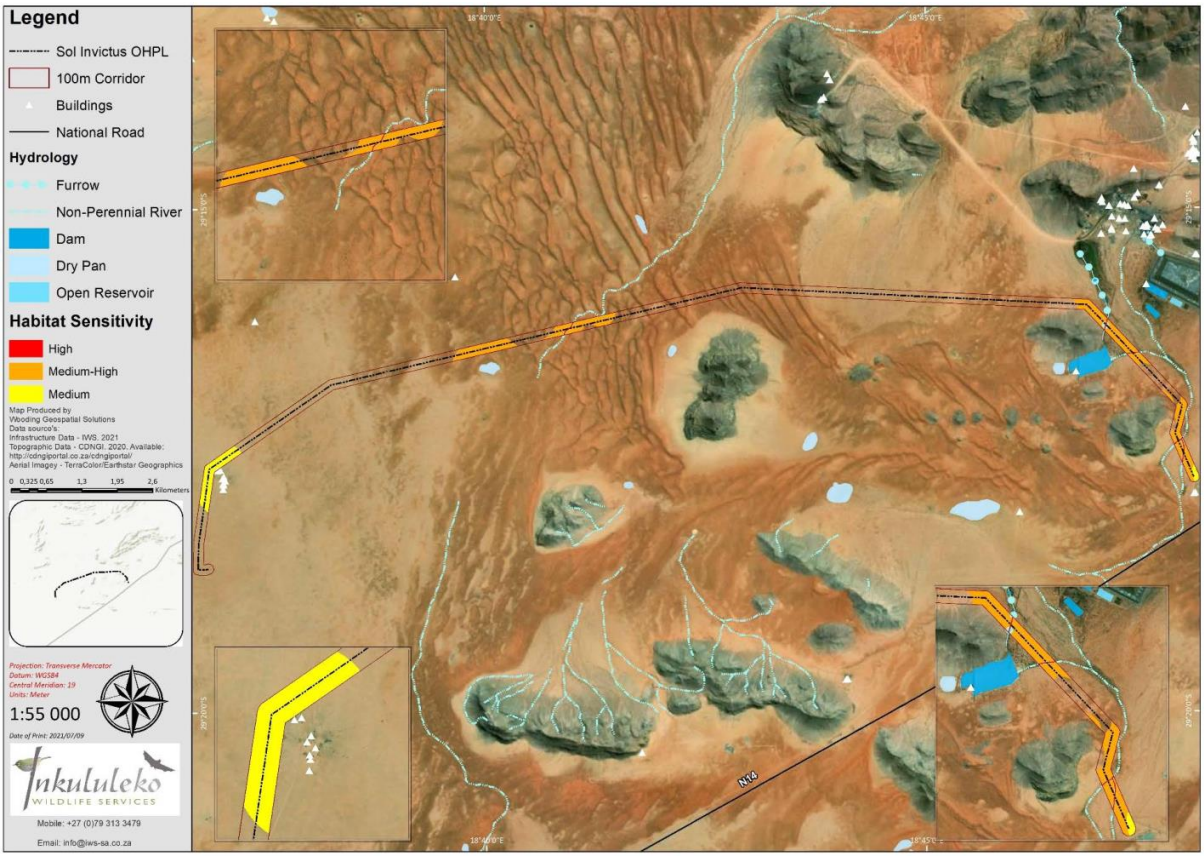


Figure 9-5: Bat sensitivity map for the proposed Sol Invictus Overhead Power Line

9.2 SPECIALIST CONCLUSIONS

9.2.1 FESHWATER ASSESSMENT

During the site assessment undertaken in June 2021, one cryptic wetland and an episodic drainage line (considered to be watercourses) were identified to be traversed by the proposed powerline. The episodic drainage line was identified within the eastern portion of the proposed powerline and is augmented by seepage from the upgradient mining area. Five cryptic wetlands were also identified within the larger investigation area for which no quantum of risk is anticipated as a result of the proposed powerline. The results of the ecological assessment of the cryptic wetland and episodic drainage line to be traversed by the proposed powerline are summarised in **Table 9-4**.

Table 9-4: Summary of results of the field assessment

Watercourse	PES	Ecoservices	EIS	REC, RMO & BAS
Cryptic wetland	A/B (Largely natural with only a few modifications)	Moderately Low (0,9)	Moderate (1,4)	REC: Category A/B BAS: Category: A/B RMO: Maintain
Episodic drainage line	Category: C (Moderately Modified)	Intermediate (1,2)	Moderate (1,6)	REC: Category C BAS: Category: C RMO: Maintain

Based on the findings of the watercourse assessment and the results of the the DWS Risk Assessment and Impact Assessment, it is the opinion of the ecologist that the proposed powerline poses a Low impact to the integrity of the watercourses proposed to be traversed provided that adherence to cogent, well-conceived and ecologically sensitive construction plans are implemented and the mitigation measures provided in this report as well as general good construction practice are adhered to. Should the recommended mitigation measures as provided in this document be implmented, with specific mention of ensuring that the support structures associated with the proposed powerline are located outside the identified watercourses and their calculated 10 m construction, 12 m operational phase buffers and 32 m NEMA ZoR, as well as keeping the construction footrpints as small as possible with suitable rehabilitation post-construction, no signficant direct negative impacts to the watercourses are expected.

The results of this assessment show that assuming mitigation measures are strictly enforced, a low impact to the overall integrity of the watercourses are expected. It is, therefore, the opinion of the freshwater ecologist that the proposed powerline be considered favourably, from a freshwater ecological resource management point of view, provided that all mitigation measures as set-out in this report are implemented.

9.2.2 BIODIVERSITY

The following further recommendations are provided:

- The infrastructure layout for the proposed access roads or use of existing roads need to be provided in order to assess the impact more accurately;
- A survey in the correct season to confirm the presence/absence of the red data plants expected. This may be undertaken as a walkdown of the line prior to placement of the poles;
- A vegetation alien invasive management plan should be implemented from the onset of the construction phase of the project;
- A rehabilitation plan needs to be implemented in the disturbed areas. This is in accordance with the mitigation hierarchy; and
- Due to the overall low post-mitigation risks, it is evident that minimisation (as per the mitigation hierarchy) of impact significance can be achieved. Further to this, rehabilitation of disturbed areas, resulting from the project activities and from historical land use can also be rehabilitated. Based on this, a biodiversity offset is not likely because of the measures taken to address any residual, adverse impacts.

The completion of a comprehensive desktop study, literature review in conjunction with the results from the field survey, suggest there is a high confidence in the information provided. The survey ensured that there was a suitable groundtruth coverage of the assessment area and major habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed. The conservation status of the ecosystem is classified as Least Concern albeit the protection level is regarded as Not Protected. Moreover, the proposed activity overlaps with ESA and CBA1 & 2 (screening tool), a NPAES, Succulent Karoo Ecosystem Programme unique bird habitat as well as with Haramoep and Black Mountain Mine Important Bird and Biodiversity Area.

The current layout falls within sensitive habitats and other areas of high biodiversity potential. The current layout as well as the expected access and service road of the development would be considered to have a negative impact as it would directly affect the habitat of threatened plant species and expected listed avifaunal species that use these ecosystems:

- The assessment area possesses a high diversity and abundance of threatened (one DDT flora species) / protected flora species. Moreover, protected flora and fauna are ubiquitous within the assessment area and surrounding landscape; and
- Two threatened species of avifauna were observed to occur and utilise the habitats within the assessment area during the survey period and comprised of three avifauna species and one mammal species. *Neotis ludwigii* (Ludwigs Bustard) and *Polemaetus bellicosus* (Eagle, Martial), possess high priority scores indicating that they are particularly susceptible to collisions with powerlines. Excessive noise will lead to displacement of the species and the vehicle traffic potentially will lead to direct mortality.

Historically, overgrazing from sheep and mismanagement has led to the deterioration these habits. However, the high sensitivity areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging, water resource and movement corridors for fauna within the landscape.

The habitat existence and importance of these habitats is regarded as important, due to the species recorded as well as the role of this intact unique habitat to biodiversity within a very fragmented disturbed local landscape, not to mention the sensitivity according to various ecological datasets.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project.

Any development on the high/medium sensitivity areas will lead the direct destruction and loss of portions of functional CBA/ESA, and also the floral and faunal species that are expected to utilise this habitat, however these are expected to be minimal. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigations and management regarding these impacts will be the most important factor of this project and must be considered by the issuing authority.

The majority of the proposed infrastructure does occur within low sensitivity areas and is not expected to have a significant post-mitigation impact. Special consideration needs to be taken regarding the construction and operational phase impacts of the access and service road infrastructure, as they could result in large scale detrimental impacts if not planned, managed and monitored appropriately.

The main expected impacts of the proposed OHPL and associated infrastructure will include the following:

- Habitat loss and fragmentation, including the loss of floral SCC;
- Degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality of avifauna colliding with the power lines, as well as possible electrocutions with power line infrastructure.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an overall acceptable level of risk. Considering that this area that has been identified as being of significance for biodiversity maintenance and ecological processes (CBAs and ESAs), development may proceed with caution. All mitigation measures prescribed herein must be considered by the issuing authority for authorisation. No fatal flaws are evident for the proposed project, especially if the high sensitivity areas are avoided.

Due to the overall low post-mitigation risks, and the potential for rehabilitation of disturbed areas, a biodiversity offset is not likely to be required because of the measures taken to address any residual, adverse impacts.

9.2.3 SOCIO-ECONOMIC ASSESSMENT

The development of renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy and associated energy distribution infrastructure is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure. The proposed powerline is also located within the Springbok REDZ and Northern Strategic Transmission Corridor. The development of the proposed power line is therefore supported by key policy and planning documents.

The No-Development option would represent a lost opportunity for South Africa to improve energy security and supplement is current energy needs with renewable energy. Given South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a negative social cost.

The energy security benefits associated with the proposed Sol Invictus PVSEF cluster are dependent upon it being able to connect to the national grid via the establishment of the Sol Invictus grid connection infrastructure.

The findings of the SIA indicate that the significance of the potential negative social impacts for both the construction and operational phase of the proposed overhead power line are Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The establishment of proposed powerline is therefore supported by the findings of the SIA.

9.2.4 VISUAL ASSESSMENT

The construction and operation of the proposed grid connection infrastructure for the Sol Invictus Solar PV facilities, may have a visual impact on the study area, especially within (but potentially not restricted to) a 0.5km radius of the power line and substation extension structures. The visual impact will differ amongst places, depending on the distance from the infrastructure.

This impact is applicable to the proposed grid connection infrastructure and to the potential cumulative visual impact of the infrastructure in association with existing power line infrastructure (and future power generation infrastructure) within the region.

The following is a summary of impacts, assuming mitigation as recommended is exercised:

- During the construction, there may be an increase in heavy vehicles utilising the roads to the power line that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a low temporary negative visual impact after mitigation.
- The grid connection infrastructure is expected to have a low negative visual impact on observers traveling along the roads and residents of homesteads within a 0.5km radius of the structures.
- The grid connection infrastructure is expected to have a low negative visual impact on observers traveling along the roads and residents of homesteads within a 0.5 - 3km radius of the structures.
- The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of low negative significance. This is due to the relatively low viewer incidence within close proximity to the proposed grid connection infrastructure.
- The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of moderate negative significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the power line and the presence of the existing electricity infrastructure.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from moderate to low significance. No visual impacts of a high significance are expected to occur. Anticipated visual impacts on sensitive visual receptors in close proximity to the power line are not considered to be fatal flaws for the proposed project.

Considering all factors, it is recommended that the development of the grid connection infrastructure as proposed be supported; subject to the implementation of the recommended mitigation measures and management programme.

Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the generally undeveloped character of the landscape. No visual impacts of a high significance are expected to occur.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed grid connection infrastructure.

If mitigation is implemented as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the grid connection infrastructure for the Sol Invictus Solar PV facilities is considered to be acceptable from a visual impact perspective.

9.2.5 HERITAGE ASSESSMENT

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old and the wrong type to contain fossils, or young enough but without traps such as palaeo-pans or paleo-springs. Furthermore, the footprint of each powerline pole is very small. Since there is an extremely small chance that fossils from the pans/springs in Tertiary Calcrete may be disturbed a Fossil Chance Find Protocol has been included within the EMPr.

A very small number of pre-colonial heritage resources are located in the powerline corridor and the proposed activities are not expected to result in the loss of significant heritage resources. Very limited mitigation of two

sites (D008 and D009) has been proposed through imposition of 15m diameter buffer areas around each. If any human burials are found during construction, they should not be further disturbed until reported to the Heritage Authority for further action and mitigation.

The built environment is largely limited to a single probable historical kraal (D002). Mitigation consists of the imposition of a 30m diameter buffer area around that structure.

The findings of the impact assessment suggest that impacts on palaeontological/archaeological and historic built environment heritage resources will be low negative without mitigation, and low positive with mitigation. Limited mitigation has been proposed in the form of buffer areas around two archaeological, and one built environment resource. A chance finds protocol has been included in the EMPr, to cover the very low possibility of fossil material being recognised during construction or geotechnical work.

Overall, it was found the proposed powerline (and any position within the corridor) will result in little loss of any significant heritage resources. Mitigation of heritage resources of marginal significance has been proposed in the form of buffer areas. Pending the desktop inspection of final pole positions, there is no reason to reject the powerline development on heritage grounds provided to proposed mitigation is implemented.

9.2.6 BATS

As no major bat concern or High significant bat impact was identified during the Bat Impact Assessment, a field survey for further investigation and validation is not considered necessary, and the proposed OHPL with avoidance of High sensitive areas is considered acceptable from a bat impact perspective.

9.2.7 SOILS

The predominant land use within the project area is limited, extensive grazing. The soils identified have different characteristics, however, the predominant land capability of the site was deemed to be Class VII; Grazing, and it is suitable only for light, extensive (widespread) grazing and natural vegetation. This is owed primarily to the site being dominated by the Namib soil form / Arenosols in the form of red sand dunes, and the low rainfall in the area.

The more easily mitigatable risk identified to the soils at the site is contamination. Change in land use, land capability and erosion can be mitigated against to a very limited extent on such sandy, structureless soils. The inevitable changes in the surface profile, as a result of the development, cannot be mitigated against. Implementation of mitigation measures will be most important during the construction phase.

It is the specialist's opinion that, as a result of the impact assessment methodology rating, the significance of the impacts identified are assessed to be higher than anticipated. Additionally, no fatal flaws are evident for the proposed project and mitigation measures, as described in this report, can be implemented to reduce the significance of the risk to an overall acceptable level.

9.3 IMPACT SUMMARY

A summary of the identified impacts and corresponding significance ratings for the proposed powerline is provided in **Table 9-5** below.

Table 9-5: Impact Summary

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
Air Quality	Generation of Dust and PM	Construction	**Moderate**	(-)	**Low**	(-)
Noise	Noise Emissions	Construction	**Low**	(-)	**Low**	(-)

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
Soils and Land	Wind Erosion	Construction	**High**	(-)	**Moderate**	(-)
	Change in Surface Profile	Construction	**Moderate**	(-)	**Moderate**	(-)
	Change in Land Use	Construction	**Moderate**	(-)	**Moderate**	(-)
	Change in Land Capability	Construction	**High**	(-)	**Moderate**	(-)
	Soil Contamination	Construction	**Moderate**	(-)	**Low**	(-)
Groundwater	Deterioration of Groundwater Quality	Construction	**Moderate**	(-)	**Low**	(-)
Freshwater	Freshwater Ecology and Surface Water	Construction	**Low**	(-)	**Low**	(-)
	Disturbance of Soils and Altered Runoff Patterns	Construction	**Low**	(-)	**Low**	(-)
	Access Road	Construction	**Low**	(-)	**Low**	(-)
	Disturbance of Soils and Altered Water Quality	Operation	**Low**	(-)	**Low**	(-)
Biodiversity	Destruction, Loss and Fragmentation of Habitats, Ecosystems & Vegetation Community	Construction	**Moderate**	(-)	**Low**	(-)
	Introduction of Alien Species	Construction	**Moderate**	(-)	**Low**	(-)
	Destruction of Threatened Plant Species	Construction	**Moderate**	(-)	**Low**	(-)
	Displacement and Fragmentation of Faunal Community due to Habitat Loss, Direct Mortalities & Disturbance	Construction	**Moderate**	(-)	**Low**	(-)
	Continued Disturbance of Vegetation Communities, especially Threatened Species and Encroachment by AIS	Operation	**Moderate**	(-)	**Low**	(-)
	Ongoing Displacement, Direct Mortalities & Disturbance of Faunal Community due to Habitat Loss and Diturbances	Operation	**Moderate**	(-)	**Low**	(-)
Visual	Visual Disturbance (close proximity)	Construction	**Low**	(-)	**Low**	(-)
	Visual Disturbance (Local)	Operation	**Low**	(-)	**Low**	(-)
	Visual Disturbance (Regional)	Operation	**Low**	(-)	**Low**	(-)
	Sense of Place	Operation	**Low**	(-)	**Low**	(-)
Waste	Improper Waste Management	Construction	**Moderate**	(-)	**Low**	(-)

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
Traffic	Increased Local Traffic	Construction	**Low**	(-)	**Low**	(-)
Heritage	Damage to Heritage Resources	Construction	**Low**	(-)	**Low**	(+)
	Historic Built Environment	Construction	**Low**	(-)	**Low**	(+)
	Palaeontology	Construction	**Low**	(-)	**Low**	(+)
Socio-economic	Creation of Employment, Business Development and Skills Development	Construction	**Low**	(+)	**Low**	(+)
	Presence of Construction Workers and Impact on Family Structures and Social Networks	Construction	**Low**	(-)	**Low**	(-)
	Noise, Dust and Safety	Construction	**Low**	(-)	**Low**	(-)
	Safety, Stock Theft and Damage to Property	Construction	**Low**	(-)	**Low**	(-)
	Development of Infrastructure to Improve Energy Security and Reduce Reliance on Coal	Operation	**Moderate**	(+)	**Moderate**	(+)
	Creation of Employment Opportunities	Operation	**Low**	(+)	**Low**	(+)
	Risks to Farming Activities by Maintenance Workers	Operation	**Moderate**	(-)	**Low**	(-)
Health and Safety	Employee Health & Safety	Construction	**Moderate**	(-)	**Low**	(-)
	Employee Health & Safety	Operation	**Moderate**	(-)	**Low**	(-)

9.4 ALTERNATIVES ASSESSMENT

Project alternatives in terms of activity, technology, location and layout were considered as part of the BA process. Only the preferred alternative has been assessed (i.e. the 132kV OHPL connecting the proposed Sol Invictus 1 – 6 PVSEF to the existing Aggeneis substation as well as the expansion of the Aggeneis substation). Alternative activities for the current Project are not considered reasonable or feasible as the purpose of this OHPL is to transmit electrical energy generated by the proposed Sol Invictus PVSEF to the existing Aggeneis substation for distribution via the national electrical grid network. Similarly, distribution of electricity via an overhead 132kV powerline utilising the assessed route is considered the most appropriate technology and layout and is in line with Eskom design requirements.

The no-go option would represent a lost opportunity for South Africa to improve energy security and supplement its current energy needs with renewable energy given that energy security benefits associated with the proposed Sol Invictus PVSEF are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. Considering South Africa's current energy security challenges and its position as one of the highest per capita producer of carbon emissions in the world, this would represent a significant socio-economic cost. Accordingly, the no-go option is not the preferred option.

9.5 RECOMMENDATIONS

The following recommendation are made in respect of the proposed 132kV OHPL:

- In the opinion of the Biodiversity Specialist, a survey in the correct season to confirm the presence/absence of the red data plants expected. This may be undertaken as a walkdown of the line prior to placement of the poles
- All proposed mitigation measures included in this BA Report and in the EMPr (**Appendix G**) must be implemented in order to reduce possible impacts to an acceptable level.

9.6 CONCLUSION AND AUTHORISATION OPINION

The overall objective of the BA is to provide sufficient information to enable informed decision-making by the authorities. This was undertaken through consideration of the proposed Project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures.

It is the opinion of WSP that the information contained in this document (read in conjunction the EMPr) is sufficient for DFFE to make an informed decision for the environmental authorisation being applied for in respect of this Project.

Mitigation measures have been developed, where applicable, for the above aspects and are presented within the EMPr (**Appendix G**). It is imperative that all impact mitigation recommendations contained in the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

Considering the findings of the respective studies, no fatal flaws were identified for the proposed Project. Should the avoidance and mitigation measures prescribed be implemented, the significance of the considered impacts for all negative aspects pertaining to the environmental aspects is expected to be low. It is thus the opinion of the EAP that the Project can proceed, and that all the prescribed mitigation measures and recommendations are considered by the issuing authority.

10 WAY FORWARD

Sol Invictus proposes to construct a 132 kV OHPL approximately 23 km in length to connect the proposed Sol Invictus 1 to 6 PVSEF onsite substation to the national grid via the existing Eskom Aggeneis substation. Furthermore, Sol Invictus proposes to expand the Eskom Aggeneis substation, involving the extension of the 400kV busbar and adding a 400/132kV 500MVA transformer and 132kV busbars. This report provides a description of the proposed Project and details the aspects associated with the construction and operation. The report also includes the methodology followed to undertake the BA process. A detailed description on the existing environment (biophysical as well as socio-economic) is provided based on findings from the specialist surveys and existing information. Stakeholder engagement undertaken from the onset of the assessment to date, has been conducted in a transparent and comprehensive manner. This report will be subjected to a public review period in line with NEMA EIA Regulations, 2014 as amended. Outcomes of all comments received from the public review period will be recorded and responded to in the Final BAR. Based on the environmental description, specialist surveys as well as the stakeholder engagement undertaken to date, a detailed impact assessment was undertaken and, where relevant, the necessary management measures have been recommended.

In summary, the BA process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. The biophysical impact assessment revealed that there are no fatal flaws and no significant negative impacts associated with the proposed Project should mitigation and management measures be implemented. In addition, it should be noted that there are positive (albeit limited) socio-economic impacts associated with the Project.

The Draft BAR (this report) has been made available for public review from **26 November 2021** to **17 January 2022**. All issues and comments are to be submitted to WSP (as per the contact details provided below) and will be incorporated in the Comments and Response Report (CRR) which will be attached as an appendix to the Final BAR.

The Draft BAR has also been submitted to the competent authorities. It is the opinion of WSP that the information contained in this document is sufficient for the DFFE to make an informed decision for the EA being applied for in respect of this Project.

Please submit all comments or queries to:

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