KARREEBOSCH WIND FARM (RF) (PTY) LTD

PROPOSED KARREEBOSCH 132KV OVERHEAD POWERLINE AND SUBSTATION

DRAFT BASIC ASSESSMENT REPORT

23 AUGUST 2022

DRAFT

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DRAFT BASIC ASSESSMENT REPORT

KARREEBOSCH WIND FARM (RF) (PTY) LTD

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This Draft Basic Assessment Report (Report) for the proposed Karreebosch 132kV Overhead Powerline and substation, associated with the authorised Karreebosch Wind Energy Facility, has been prepared by WSP Group Africa Proprietary Limited (WSP) on behalf and at the request of Karreebosch Wind Farm (RF) (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

Karreebosch Wind Farm (RF) (Pty) Ltd

PROJECT NAME

Proposed Karreebosch WEF 132kV Overhead Powerline and 33/132kV substation

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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
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DEA&DP	Department of Environmental Affairs and Development Planning
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
HWC	Heritage Western Cape
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
LUPA	Land Use Planning Act (Act 3 of 2014)
MF	Monitoring Forum
MM	Matzikama Municipality
MMIDP	Matzikama Municipality Integrated Development Plan
MMSDF	Matzikama Municipality Spatial Development Framework
MP	Moderately Protected
MSA	Middle Stone Age
MSDS	Material Safety Data Sheets
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
PV	Photovoltaic
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
WCBSP	Western Cape Biodiversity Spatial Plan
WCDM	West Coast District Municipality
WEF	Wind Energy Facility
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** **Section 9.4**
3(1) (h)	A full description of the process followed to reach the proposed alternative within the site	**Section 5** **Section 9.4**
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 3.5**
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 3.4 and 3.5** **Section 6** **Section 7** **Section 8** **Section 9.1 and 9.2**
3(1) (l)	An environmental impact statement	**Section 9**

APPENDIX 1 OF GNR 326	DESCRIPTION	RELEVANT REPORT SECTION
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**
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 3.7**
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 KARREEBOSCH 132KV OVERHEAD POWERLINE

Location of Site	Near Matjiesfontein, Western Cape Province and near Sutherland, Northern Cape Province
Farm Names	— Remainder of Farm Standvastigheid 210 (Saaiplaas) — Portion 2 of Farm Standvastigheid 210 (Komsberg Substation) — Farm Aprils Kraal No. 105 — Portion 1 of Farm Bon Espirange No. 73 — Remainder of Farm Bon Espirange No. 73 — Remainder of Farm Ek Kraal No.199 — Portion 1 of Farm Ek Kraal No. 199 — Portion 2 (Nuwe Kraal) of Farm Ek Kraal No. 199 — Remainder of Farm Karreebosch No. 200 — Remainder of Farm Wilgebosch Rivier No. 188 — Portion 1 of Farm Klipbanks Fontein No. 198 — Remainder of Farm Klipbanks Fontein No. 198 — Farm Rietfontein No. 197
SG Codes	— C07200000000021000000 — C07200000000021000002 — C04300000000010500000 — C04300000000007300001 — C04300000000007300000 — C07200000000019900000 — C07200000000019900001 — C07200000000019900002 — C07200000000020000000 — C07200000000018800000 — C07200000000019800001 — C07200000000019800000 — C07200000000019700000
Size of Buildable Area i.e. project infrastructure footprint (only preferred layout, inclusive of all associated infrastructure)	Length of OHPL Alternatives OHPL Route Option 1: Three (3) OHPL route alternatives are being considered for the link between Substation Option 1 and the Bon Espirange Substation and Komsberg Substation: — Option 1A (approximately 14.51 km in length in its entirety from Substation Option 1 to the Komsberg Substation); — Option 1B (approximately 17.28 km in length in its entirety from Substation Option 1 to the Komsberg Substation); and — Option 1C (approximately 13.91 km in length in its entirety from Substation Option 1 to the Komsberg Substation). OHPL Route Option 2: Three (3) powerline corridor route alternatives were considered for the link between Substation Option 2 and the Bon Espirange Substation and Komsberg Substation:

	— Option 2A (approximately 20.47 km in length in its entirety from Substation Option 2 to the Komsberg Substation); — Option 2B (approximately 16.63 km in length in its entirety from Substation Option 2 to the Komsberg Substation); and — Option 2C (approximately 20.52 km in length in its entirety from Substation Option 2 to the Komsberg Substation). OHPL servitude width = 45m (22.5 m either side of the OHPL, including access roads) Area of Investigation = Approx. 945 000 m^2 (i.e. servitude) Karreebosch onsite substation footprint: up to 30 000m^2 Potential Komsberg substation expansion footprint = up to 30 000m^2

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1 INTRODUCTION

1.1 BACKGROUND AND TERMS OF REFERENCE

Karreebosch Wind Farm (RF) (Pty) Ltd propose to construct a 132kV twin tern double circuit overhead powerline (OHPL), an onsite 33/132kV substation and associated road infrastructure(here after referred to as the Project) to evacuate power for the authorised Karreebosch WEF (Ref: 14/12/16/3/3/2/807/AM3, which is currently undergoing a Part 2 EA amendment, final layout and EMPr approval process) to the existing Komsberg substation via the existing Bon Espirange substation.

The proposed OHPL is situated near Matjiesfontein in the Laingsburg Local Municipality within the Central Karoo District Municipality of the Western Cape Province as well as near Sutherland in the Karoo Hoogland Local Municipality in the Namakwa District Municipality of the Northern Cape, South Africa (**Figure 1-1)**.

The proposed Karreebosch OHPL will evacuate power from the authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3) located in the Northern Cape Province and will connect to the existing Komsberg substation. The WEF site is located approximately 40 km north of Matjiesfontein.

The entire extent of the proposed 132kV Karreebosch OHPL, 33/132kV Substation and associated infrastructure is located within one (1) of the Strategic Transmission Corridors, namely the Central Corridor, as defined in and in terms of the procedures laid out in Government Notice (GN) No. 113. The proposed OHPL and substation project will therefore be subject to a Basic Assessment (BA) Process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 1 of the EIA Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. The competent authority for this BA process is the national Department of Forestry, Fisheries and Environment (DFFE).

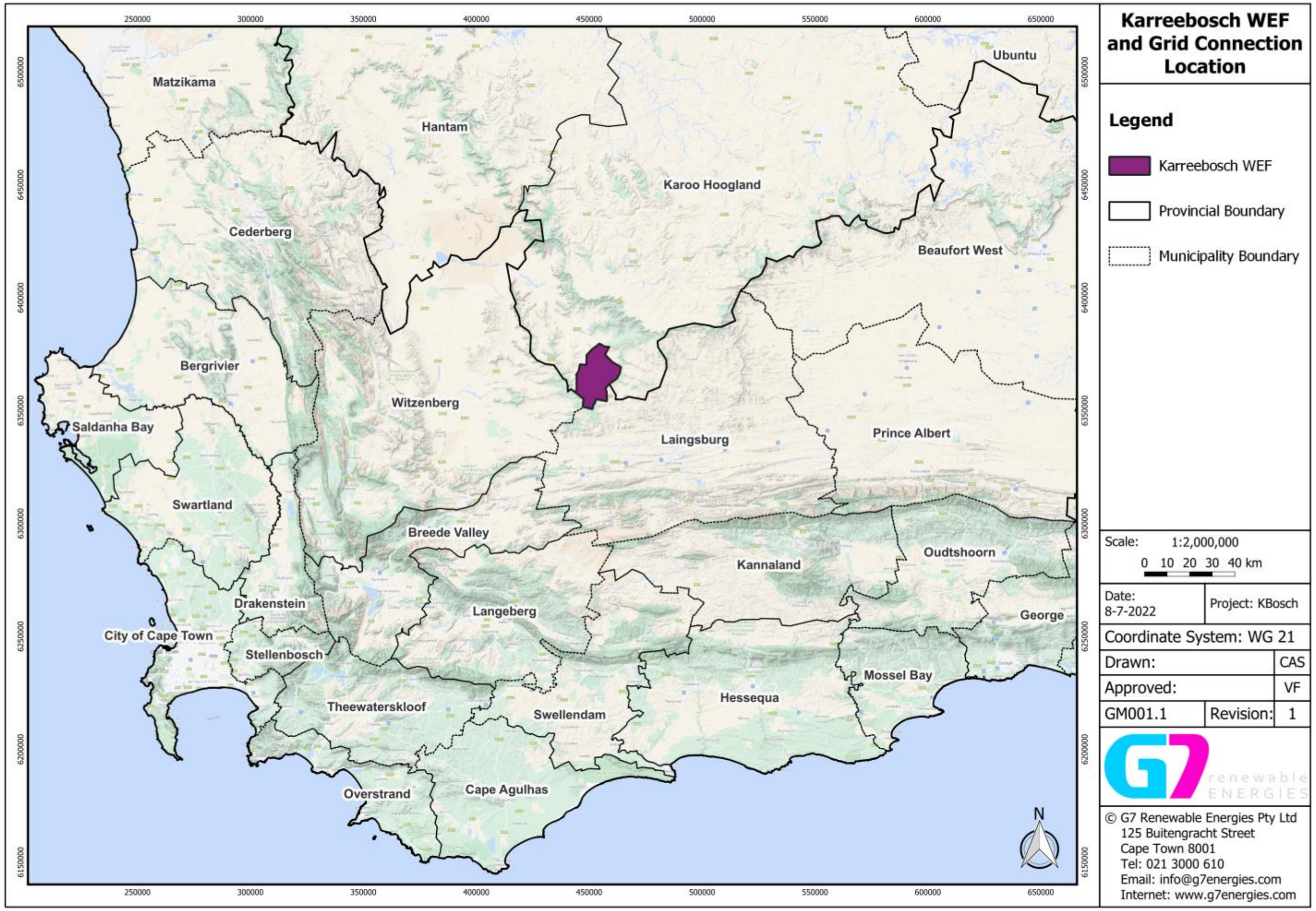

Figure 1-1: Location of the proposed 132kV Karreebosch OHPL and substation.

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 and substation. 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

Karreebosch Wind Farm (RF) (Pty) Ltd. is the project proponent (Applicant) with regards to this application for the construction and operation of the Karreebosch 132kV OHPL and substation. **Table 1-1** provides the relevant details of the project proponent.

Table 1-1: Details of Project Proponent

PROPONENT: KARREEBOSCH WIND FARM (RF) (PTY) LTD

Contact Person:	Dr Kilian Hagemann
Postal Address	125 Buitengracht Street, 5th Floor, Cape Town, 8001
Telephone:	+27 21 300 01613
Email:	karreebosch@g7energies.com

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 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 Karreebosch 132kV OHPL and substation constitutes associated infrastructure of the authorised Karreebosch WEF, DFFE is the CA for the proposed Karreebosch OHPL and substation.

Table 1-2 provides the relevant details of the competent authority on the Project.

Table 1-2: Competent Authority

ASPECT	COMPETENT / COMMENTING AUTHORITY	CONTACT DETAILS
Competent Authority: Environmental Authorisation	Department of Forestry, Fisheries, and the Environment (DFFE)	Case Officer: Zama Langa and Nyiko Nkosi Integrated Environmental Authorisations Tel: 0123999320

The commenting authorities for the project include:

- DFFE: Biodiversity and Conservation;
- DFFE: Protected Areas;
- Department of Agriculture Land Reform and Rural Development
- Department of Water & Sanitation (DWS);
- Eskom SOC Holdings Limited;
- South African National Roads Agency (SANRAL);
- Northern Cape Department of Transport;
- Western Cape Department of Transport;
- Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NC DAEARD&LR);
- Western Cape Department of Environmental Affairs and Development Planning (WC DEA&DP)
- South African Heritage Resources Agency (SAHRA);
- Heritage Western Cape (HWC);
- Central Karoo District Municipality;
- Laingsburg Local Municipality;
- Namakwa District Municipality; and
- Karoo Hoogland Local Municipality

Refer to **Appendix D** for a full list of commenting authorities.

1.3.3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP was appointed in the role of Independent EAP to undertake the BA process for the proposed project. 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
Contact Person:	Ashlea Strong
Physical Address:	Building C, Knightsbridge, 33 Sloane Street, Bryanston, Johannesburg
Postal Address:	P.O. Box 98867, Sloane Park 2151, Johannesburg
Telephone:	011 361 1392
Fax:	011 361 1301
Email:	Ashlea.Strong@wsp.com
EAP Qualifications:	— Masters in Environmental Management, University of the Free State — B Tech, Nature Conservation, Technikon SA — National Diploma in Nature Conservation, Technikon SA
EAPASA Registration Number:	EAPASA (2019/1005)

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 studies are attached in **Appendix F** and their declarations in **Appendix C**.

Table 1-4: Details of Specialists

ASSESSMENT	NAME OF SPECIALIST	COMPANY	SECTIONS IN REPORT	SPECIALIST REPORT ATTACHED AS
Agricultural Potential and Soils	Johann Lanz	Independent consultant	Section 6.1 Section 7 Section 9	Appendix F1
Avifauna	Chris van Rooyen	Chris van Rooyen Consulting	Section 6.1 Section 7 Section 9	Appendix F2
Bats	Werner Marais	Animalia Consultants	Section 7 Section 9	Appendix F3
Biodiversity inclusive of Terrestrial Biodiversity, Plant & Animal Species Assessment	Malcolme Logie	Trusted Partners	Section 6.1 Section 7 Section 9	Appendix F4
Freshwater, Aquatic Biodiversity Assessment	Christel du Preez Stephan van Staden	FEN Consulting (Pty) Ltd	Section 6.1 Section 7 Section 9	Appendix F5
Desktop Geotechnical	Jan Norris	JG Afrika (Pty) Ltd	Section 6.1 Section 7 Section 9	Appendix F6
Heritage, Archaeology and Palaeontology	Jenna Lavin & Nicholas Wiltshire	CTS Heritage	Section 6.2 Section 7 Section 9	Appendix F7
Socio-economic	Tony Barbour	Independent consultant	Section 6.2 Section 7 Section 9	Appendix F8
Traffic	Iris Wink	JG Afrika (Pty) Ltd	Section 4.2 Section 7 Section 9	Appendix F9
Visual	Kerry Schwartz	SLR Consulting (Pty) Ltd	Section 6.2 Section 7 Section 9	Appendix F10

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.
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, 14, 19, 24 and 27, 28, 48, 47 and 56 of GNR 327 and Listed Activities 4, 10, 12, 14, 18 and 23 of GNR 324** are considered applicable to the Karreebosch OHPL and therefore a BA process must be followed to obtain an EA.
Strategic Transmission Corridors: GNR113	Notice of identification in terms of section 24(5)(a) and (b) of the National Environmental Management Act. 1998, of the procedure to be followed in applying for environmental authorisation for large scale electricity transmission and distribution development activities identified in terms of section 24(2)(a) of the National Environmental Management Act. 1998 when occurring n geographical areas of strategic importance. **Applicability:** It is understood that the proposed project infrastructure falls within the approved Strategic Transmission Corridors and as such would only be subject to a Basic Assessment Process, as per GN 113 of 16 February 2018 (repealed by GN 787 of 17 July 2020) as well as a 57 day authority review period
Renewable Energy Development Zones: GNR 145	The Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa, 2015 identified 8 Renewable Energy Development Zones (REDZ) that are of strategic importance for large scale wind and solar photovoltaic development.

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	These REDZ together with the procedures to be followed when applying for environmental authorisation for a large scale wind and solar facility within these areas were published under Government Notice No. 114, Government Gazette 41445 of 16 February 2018. **Applicability:** The associated Karreebosch WEF falls within the *Renewable Energy Development Zone 2: Komsberg '* for Large scale wind and solar photovoltaic energy facilities.
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;* **Applicability:** The project involves the construction of a 132kV OHPL (400m wide corridor) to evacuate electricity from the authorised Karreebosch WEF (Ref 14/12/16/3/3/2/807/AM3) to feed it into the National Grid. The project will also include the Karreebosch on-site 33/132kV substation as well as the potential expansion of the Komsberg Substation. The infrastructure is located outside of the urban edge..
	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 project will entail the construction of OHPL tower structures, access roads and associated infrastructure (buildings and other infrastructure) with a physical footprint of approximately 100m2 or more within a surface water feature / watercourse or within 32m of a surface water feature / watercourse.
	Activity 14: *The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.* **Applicability:** More than 80 m^3 (but less than 500 m^3) of diesel will be temporarily stored in above ground storage tanks within the construction camp for use during the construction phase. It should be noted that the above ground diesel storage tanks will be located within the Karreebosch WEF construction camp to be used for both the WEF and OHPL during construction.
	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.*

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	Applicability: The project will involve the excavation, removal, infilling, depositing and moving of 10m3 or more of soil, sand, shells, shell grit, pebbles or rock from a watercourse for the construction of the OHPL servitude, access roads and substation.
	Activity 24 (ii) *The development of a road—* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;* **Applicability:** The road associated with the OHPL servitude does not have a road reserve and the road may in locations exceed 8m in width, to be developed within the 14m wide road servitude.
	Activity 27: *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.* **Applicability:** The project includes the clearance of an area of 1 hectare (ha) or more, but less than 20ha of indigenous vegetation. This is not triggered as a result of the proposed power line as it is linear infrastructure. The proposed development however involves the construction of one (1) new substation (up to 3ha) and one (1) new O&M building (up to 1ha) which will occupy an area of approximately 4 ha in total. All vegetation on the substation and O&M building sites will need to be cleared for construction. Cleared vegetation will amount to an area of up to approximately 4 ha.
	Activity 28(ii): *Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.* **Applicability:** The project will entail the construction of OHPL tower structures, access roads and associated infrastructure (buildings and other infrastructure) with a physical footprint of greater than 1 ha outside of an urban area on land that is zoned for agriculture.
	Activity 47 *The expansion of facilities or infrastructure for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.* ***Applicability:*** The project will also include potential expansion of the 400kV Komsberg Substation
	Activity 48(i)(a)(c): *The expansion of –*

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; *where such expansion 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 require the expansion of roads and other infrastructure by 100m2 or more within a watercourse or within 32m from a watercourse. Some of the existing access roads will need to be upgraded to be used as the OHPL servitude access roads and will traverse watercourses.
	Activity 56(i) and (ii): *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.* **Applicability:** For the OHPL, internal access roads will be required to access the substation, O&M building and powerline towers. Existing roads will be used wherever possible; however, where required, existing access roads will need to be upgraded by widening more than 6m and/or by lengthening by more than 1km
Listing Notice 3: GNR 324	***Activity 4 (g) (ii) (bb) and (ee) and (i) (ii) (aa):*** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***<u>g. Northern Cape</u>*** *ii. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* ***<u>i. Western Cape</u>*** *ii. Areas outside urban areas;* *(aa) Areas containing indigenous vegetation;* **Applicability:** The OHPL 400m wide corridor including route alternatives traverse Critical Biodiversity Areas (according to the Western Cape Biodiversity Spatial Plan, 2017 and the Northern Cape Critical Biodiversity Areas, 2016) and fall within a National Protected Areas Expansion Strategy Focus Area. The OHPL will require an access road (of wider than 4m but less than 14m). The OHPL traverses both the Northern Cape and Western Cape Provinces.
	Activity10 (g) (ii) (iii) (bb) (ee) and (i) (ii): *The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* ***<u>g. Northern Cape</u>*** *ii. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;* *iii. Outside urban areas:*

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	(bb) National Protected Area Expansion Strategy Focus areas; *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* ***i. Western Cape*** *ii. All areas outside urban areas;* **Applicability:** More than 80 m3 (but less than 500 m3) of diesel will be temporarily stored in above ground storage tanks within the construction camp for use during the construction period. The OHPL and substation site is outside of an urban area. The site is within Critical Biodiversity Areas (according to the Western Cape Biodiversity Spatial Plan, 2017 and the Northern Cape Critical Biodiversity Areas, 2016) and fall within National Protected Areas Expansion Strategy Focus Areas.
	Activity 12 (g) (ii) and (i) (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.* ***g Northern Cape*** *ii. Within critical biodiversity areas identified in* *bioregional plans;* ***i. Western Cape*** *ii. Within critical biodiversity areas identified in bioregional plans.* **Applicability:** The construction of the OHPL tower structures, access roads and substation(s) will potentially require the clearance of indigenous vegetation where the combined area to be cleared will exceed 300 m^2. The OHPL 400m wide corridor including route alternatives and associated infrastructure traverses Critical Biodiversity Areas (according to the Western Cape Biodiversity Spatial Plan, 2017 and the Northern Cape Critical Biodiversity Areas, 2016). The OHPL traverses both the Northern Cape and Western Cape Provinces.
	Activity 14 (ii) (a) and (c) (g) (ii) (bb) and (ff) (i)(i)(bb)(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;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;.* ***g 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.*

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	i. Western 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:** The proposed development will entail the construction of OHPL tower structures, access roads and associated infrastructure (buildings and other infrastructure) with a physical footprint of approximately 10m2 or more within a surface water feature / watercourse or within 32m of a surface water feature / watercourse. The OHPL 400m wide corridor including route alternatives and associated infrastructure traverses Critical Biodiversity Areas (according to the Western Cape Biodiversity Spatial Plan, 2017 and the Northern Cape Critical Biodiversity Areas, 2016) and falls within National Protected Areas Expansion Strategy Focus Areas. The OHPL traverses both the Northern Cape and Western Cape Provinces.
	Activity 18 (g) (ii) (bb)(ee)(ii), (i)(ii)(aa) *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* ***g. Northern Cape*** *ii. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;* ***i. Western Cape*** *ii. All areas outside urban areas:* *(aa) Areas containing indigenous vegetation;* **Applicability:** For the OHPL, internal access roads will be required to access the substations, O&M building and powerline towers. Existing roads will be used wherever possible; however, where required, existing access roads will need to be upgraded by widening more than 4m and/or by lengthening more than 1km. The roads fall within Critical Biodiversity Areas (according to the Western Cape Biodiversity Spatial Plan, 2017 and the Northern Cape Critical Biodiversity Areas, 2016) and fall within National Protected Areas Expansion Strategy Focus Areas, within a watercourse and within 100m of a watercourse and areas containing indigenous vegetation. The OHPL traverses both the Northern Cape and Western Cape Provinces.
	Activity 23 (ii)(a)(c) (g).(ii) (bb) and (ee)and (i).(i). (bb) and (ff) *The expansion of—* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs—* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *g. Northern Cape* *ii. Outside urban areas:*

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	(bb) National Protected Area Expansion Strategy Focus areas; *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *i. Western 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:** The OHPL will require the expansion of roads and other infrastructure by 10m2 or more within a watercourse or within 32m from a watercourse. Some of the existing access roads will need to be upgraded to be used as the OHPL servitude access roads and will traverse watercourses. The OHPL and roads fall within Critical Biodiversity Areas (according to the Western Cape Biodiversity Spatial Plan, 2017 and the Northern Cape Critical Biodiversity Areas, 2016) and fall within National Protected Areas Expansion Strategy Focus Areas, within a watercourse and within 100m of a watercourse and areas containing indigenous vegetation. The OHPL traverses both the Northern Cape and Western Cape Provinces.
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. SANBI revised the Western Cape datasets during 2017 identifying CBAs as well as ecological support areas and published the 2017 Western Cape Biodiversity Spatial Plan (WCBSP). The identification of CBAs for the Northern Cape was undertaken using a Systematic Conservation Planning approach utilising the Northern Cape CBAs (2016), the Namakwa District Biodiversity Plan (Desmet and Marsh, 2008), and the Succulent Karoo Ecosystem Plan (Driver et al., 2003). The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding to meet national biodiversity objectives. As the proposed Karreebosch OHPL traverses a CBA, as well as the proposed substation site alternatives being situated on a CBA and ESA, a biodiversity impact assessment has been undertaken as part of the BA Process. 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.

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	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 Karreebosch OHPL route and substation site does not fall within any proclaimed protected areas as per NEMPAA. The Tanqua National Park is the closest National Park, situated 56 km to the north-west.
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. The proposed OHPL route and associated servitude access roads has several watercourse crossings. All the natural watercourses associated with the proposed development (including the ephemeral rivers and tributaries with riparian vegetation and the episodic drainage lines with no riparian vegetation) will be regulated by Section 21(c) and (i) of the NWA. All the natural watercourses will thus require authorisation from the Department of Water and Sanitation (DWS). Quantities of water required for the construction of the OHPL and substation are unknown at this stage. However, based on the proposed installation methodology (i.e. no concrete foundations), limited volumes of water will be required for installation of the OHPL and substation. As such, the main demand for water will be for dust suppression (non-potable) and to service the site camp (potable). 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 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 Karreebosch OHPL is approximately up to 20.5km in length, a Notice of Intent to Develop (NID) is required. A Heritage NID was submitted to Heritage Western Cape (HWC) for the project on **3 August 2022**. Construction activities should be conducted carefully, and all activities ceased if any archaeological, cultural and heritage resources are discovered. HWC 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

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	the site-specific Environmental Management Programme (EMPr) as well as the generic EMPrs
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 OHPL and substation, 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.
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. The Sutherland Aerodrome is approximately 38km north east of the OHPL. The DEA Screening Tool Report identified Civil Aviation as having low sensitivity for the proposed OHPL. SACAA 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.
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

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	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. 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.
Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes **(GNR 320, 20 March 2020 and GNR 1150, 30 October 2020)**	The protocols provide the criteria for specialist assessment and minimum report content requirements for impacts for various environmental themes for activities requiring environmental authorisation. The protocols replace the requirements of Appendix 6 of the EIA Regulations, 2014, as amended. The assessment and reporting requirements of the protocols are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool).

APPLICABLE LEGISLATION	DESCRIPTION OF LEGISLATION
	The following environmental themes were applicable to the Karreebosch OHPL and Substation project: — 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

Table 2-2: Applicable Policies

APPLICABLE POLICY	DESCRIPTION OF POLICY
National Development Plan	The National Development Plan aims to eliminate poverty and reduce inequality by 2030. The NDP identifies a number of enabling milestones. Of relevance to the proposed development the NDP refers to the need to produce sufficient energy 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 the 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. 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. Chapter 4, Economic infrastructure, notes that economic infrastructure provides the foundation for social and economic development. 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. 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.

APPLICABLE POLICY	DESCRIPTION OF POLICY
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 (23 November 2010)	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 (2012)	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. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, ***electricity plants***, hospitals, schools and dams will contribute to improved economic growth.
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

APPLICABLE POLICY	DESCRIPTION OF POLICY
	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 Karreebosch OHPL and substation falls within the Central Strategic Transmission Corridor of the promulgated Strategic Transmission Corridors per GN 113 and will be subject to the shorter decision-making timeframes.
Integrated Energy Plan (25 November 2016)	The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives are identified, namely: — Objective 1: Ensure security of supply. — Objective 2: Minimise the cost of energy. — Objective 3: Promote the creation of jobs and localisation. — Objective 4: Minimise negative environmental impacts from the energy sector. — Objective 5: Promote the conservation of water. — Objective 6: Diversify supply sources and primary sources of energy. — Objective 7: Promote energy efficiency in the economy. — Objective 8: Increase access to modern energy. The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e., agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and also take into account the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others.

APPLICABLE POLICY	DESCRIPTION OF POLICY
	Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, taking into account a multitude of factors which are embedded in the eight objectives. As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios: — The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term. — The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy. — The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply. — The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met. The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of existing electricity generation capacity, the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result, large investments are required in the electricity sector in order to maintain an adequate supply in support of economic growth. By 2020, various import options become available, and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of demand, constraints on emission limits and the carbon dioxide externality costs. In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy. An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered. In terms of promoting job creation and localisation potential the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution. The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type.
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

APPLICABLE POLICY	DESCRIPTION OF POLICY
	different priority sites based on local requirements, constraints and opportunities (NPAES, 2010, initial draft release 2018). The OHPL and substation falls within an NPAES focus area.

2.2 PROVINCIAL AND MUNICIPAL LEGAL AND REGULATORY FRAMEWORK

Table 2-3: Provincial and Municipal Plans

APPLICABLE PLAN	DESCRIPTION OF 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.
Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000):	This Act lists Protected species, requiring permits for removal (CapeNature) relating to The Nature and Environmental Conservation Ordinance, 1974.
Cape Nature and Environmental Conservation Ordinance (No. 19 of 1974)	The purpose of this ordinance to consolidate and amend the laws relating to nature conservation and to provide for matters incidental thereto. It is proposed in the Western Cape Biodiversity Draft Bill, 2019, that the Ordinance is repealed in so far as it relates to the Western Cape Province.
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;(2018) — 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 Karreebosch OHPL traverses a CBA as well as the substations site options being located on a CBA and ESA, a biodiversity impact assessment has been undertaken as part of the BA Process.
Northern Cape Provincial Growth and Development Plan(2005)	The Northern Cape Provincial Growth and Development Plan (NCPGDP) is aligned with NDP-2030 and seeks to eradicate poverty, inequality and halve unemployment by 2030. The NCPGDP identifies four key drivers to achieve the vision and reduce poverty and unemployment. Economic transformation and growth, social transformation and human welfare and environmental sustainability and resilience are relevant to identifying and assessing needs.

APPLICABLE PLAN	DESCRIPTION OF PLAN
	— Economic transformation and growth, which is aimed at creating employment opportunities and thereby reducing poverty. Skills development and training is identified as a key need. — Social transformation and human welfare, which is aimed at improving education levels, access to affordable and quality health care, improved safety, and security, and creating sustainable human settlements. — Environmental sustainability and resilience, which is aimed at protecting the regions natural resources and addressing the threats posed by climate change.
Northern Cape Provincial Growth and Development Strategy (2005)	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; — 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 Project, 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. 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 Project 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

APPLICABLE PLAN	DESCRIPTION OF PLAN
	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 WEF and associated grid infrastructure, do not affect the tourism potential of the province.
Northern Cape Provincial Spatial Development Framework (2012)	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 Project. 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 — 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

APPLICABLE PLAN	DESCRIPTION OF PLAN
	symbolic, aesthetic, cultural or historic value and should blend in with the surrounding environment to the extent possible. EIAs/BAs undertaken for such construction must assess the impacts of such activities.
Western Cape Spatial Development Framework (2014)	The Western Cape Provincial Spatial Development Framework, 2014 (PSDF) is an approved structure plan in terms of the Spatial Planning and Land Use Management Act (Act 16 of 2013) (SPLUMA) and the Land Use Planning Act (Act 3 of 2014) (LUPA) and aims to give spatial expression to the NDP and One Cape 2040 initiatives. It provides guidelines for district, metropolitan and local municipal spatial initiatives such as Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs). The PSDF is a broad-based document and does not control development or land use proposals at a micro-scale (e.g. individual properties). It is, however, relevant in setting out overarching planning policy guidelines adopted by the Provincial Government, and major development applications need to take guidance from and be evaluated in terms of these policy guidelines. The Western Cape PSDF is underpinned by three interrelated themes, namely: — Sustainable use of the Western Cape's spatial assets (resources); — Opening up opportunities in the Provincial space-economy (space economy); and — Developing integrated and sustainable settlements (settlement). The WCPSDF also includes the following spatial agenda: — Grow the Province's economy in partnership with the private sector, non-government and community based organisations; — Use infrastructure investment as the primary lever to ensure urban and rural spatial transitions; and — Improve the sustainable use of the Province's spatial assets and resources. Key spatial challenges are outlined in Chapter 2 of the PSDF. Energy security and climate change response are identified as key high-level future risk factors. With regard to energy use, the PSDF notes that the Cape Metro (albeit the province's most efficient user) and West Coast regions are the Province's main energy users. It further notes that the Western Cape's electricity is primarily drawn from the national grid, which is dominated by coal-based power stations, and that the province currently has a small emergent renewable energy sector in the form of wind and solar generation facilities located in its more rural, sparsely populated areas. With regard to renewable energy, the following policy provisions are of relevance: — Policy R.4.6: Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use. — R.4.7: Support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, biomass and waste conversion initiatives) in suitable rural locations (as per recommendations of the Strategic Environmental Assessments for wind energy (DEA&DP) and renewable energy (DFFE). Water scarcity is identified as probably the key risk associated with climate change. Policy provisions are made with regard to climate change adaptation and mitigation. Concerning renewable energy, the following is of relevance: — R.4.16: Encourage and support renewable energy generation at scale.
Western Cape Infrastructure Framework (2013)	The Western Cape Infrastructure Framework (WCIF) (2013) was developed by the WCP Provincial Department of Transport and Public Works in terms of the Provincial Government's mandate to coordinate provincial planning under Schedule 5A of the Constitution. The objective of the WCIF is to align the planning, delivery and management of infrastructure to the strategic agenda and vision for the province, as outlined in the 2009-2014 Draft Provincial Strategic Plan. The One Cape 2040 and 2013 Green is Smart strategy were other key informants. The document notes that given the status quo of infrastructure in the province, and the changing and uncertain world facing the Western Cape over the 2-3 decades a new approach to infrastructure is needed. Namely one that satisfies current needs and

APPLICABLE PLAN	DESCRIPTION OF PLAN
	backlogs, maintains the existing infrastructure, and plans proactively for a desired future outcome. The 2040 vision requires a number of transitions to shift fundamentally the way in which infrastructure is provided and the type of infrastructure provided in WCP. The WCIF addresses new infrastructure development under five major 'systems' (themes), and outlines priorities for each. Energy is one of the 'systems' identified. The document notes that a provincial demand increase of 3% per year is anticipated for the period 2012-2040. Key priorities are in matching energy generation/ sourcing with the demand needed for WCP economic growth. Additionally, the energy focus should be on lowering the provincial carbon footprint, with an emphasis on renewable and locally generated energy. Three key transitions are identified for the WCP Energy 'system' infrastructure, namely: — Shifting transport patterns to reduce reliance on liquid fuels. — Promoting natural gas as a transition fuel by introducing gas processing and transport infrastructure. — Promoting the development of renewable energy plants in the province and associated manufacturing capacity
Namakwa Biodiversity Sector Plan (2008)	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 Karreebosch OHPL traverses a CBA, a biodiversity impact assessment has been undertaken as part of the BA Process.
Namakwa Bioregional Plan (2018 draft)	Northern Cape Department of Environment and Nature Conservation released the draft Namakwa Bioregional Plan in 2018. This plan is intended to help guide land-use planning, environmental assessments and authorisations; and, natural resource management in order to promote development which occurs in a sustainable manner. It has been developed to further the awareness of the unique biodiversity in the area, the value this biodiversity represents to people as well as the management mechanisms that can ensure its protection and sustainable utilization. The purpose of this document 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. 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 Karreebosch OHPL traverses a CBA as well as the substations site options being located on CBA and ESA sites, a biodiversity impact assessment has been undertaken as part of the BA Process.
Karoo Hoogland Integrated Development Plan (2017 – 2022)	The KH IDP (2017-2022) identifies four Key Performance Areas (KPAs). KPA 1, Basic Service Delivery and KPA 2, Local Economic Development, are the most relevant to the proposed project. **KPA 1:** Basic Service Delivery — Strategic Objectives: — Provide quality of living human settlements with adequate infrastructure — Outcome:

APPLICABLE PLAN	DESCRIPTION OF PLAN
	— Improved quality of municipal basic service delivery in formalised areas: potable water, waste water, electricity, and solid waste — Improved mobility through the provision of quality municipal roads and storm water drainage — Programme: — Electrification — Water and Sanitation. — Roads and Storm water. — Waste Management. — Health Services. — Education and Libraries. — Safety and Security. — Climate Change. — Public Transport. — Environmental Management **KPA 2:** Local Economic Development — Strategic Objectives: — Transform Urban areas to vibrant economic centres that are safe and secure. — Promote growth and diversification of the local economy. — Promote BBBEE development. — Promote healthy living and working environments. — Promote social cohesion through economic and social development — Outcome: — Renewed urban economic centres. — Growing and diversifying local economy. — Sustainable BBBEE enterprises and SMME's in the local economy. — Improved levels of employment in the local economy. — Improved quality of public health services. — Improved social integration and cohesion — Programme: — Economic growth and development. — Poverty Alleviation. — Tourism. — SMME Development In terms of KPA 2, Local Economic Development (LED), the IDP highlights the importance of private public partnerships for achieving economic development in the KH. The LED policy framework identifies a number of LED Policy Pillars/Thrusts. Of relevance to the Needs Assessment these include building a diverse economic base, developing learning and skilful economies, and enterprise development and support. The IDP identifies a number of projects associated with the LED Pillar/Thrusts. Of relevance these include: **Building a diverse economic base** — Investigate possible opportunities for development of renewable energy. **Developing learning and skilful local economies** — Identify skill gaps and implements skills development and training programmes **Developing inclusive economies** — Support the informal and rural economy. — Support development of women and the youth. — Establish community gardens.

APPLICABLE PLAN	DESCRIPTION OF PLAN
	The IDP also highlights the need to support for the rural economy, with specific reference to the One House Hold One Hectare (1HH1HA) Programme. The Objectives of the 1HH1HA Programme include reducing poverty in rural areas, creating opportunities for Black Commercial Smallholding Farmers, improving security of tenure for historically disadvantaged (HD) rural communities and develop farming skills. The benefits for the 1HH1HA Programme include job creating, poverty alleviation, food security, skills development, security of tenure and restoration of dignity to marginalised HD rural communities. KPA 2, Local Economic Development (LED) identifies the need to address the challenges facing vulnerable groups in the KH, including the youth and physically and mentally challenged members of the community. The high unemployment levels and the lack of meaningful employment opportunities represents a key challenge faced by the youth in the KH. There are also inadequate educational facilities/institutions such as Technikons, FET colleges and Universities in the KH and ND. The IDP also refers to the need to interact with National and Provincial and District agencies aimed at youth development. The provision of quality education at Early Child Development (ECD) is also a key need. The challenges facing ECDs include lack of proper facilities and support material at learning centres, lack of funding, and food security. The IDP also highlights the threat posed by climate change, noting it threatens food security, poverty alleviation and sustainable socio-economic growth. Vulnerable households are at most risk. A combination of increasing temperatures and reduced and/or more variable rainfall could have severe negative impacts for the Namakwa District, including the KHM. In this regard the KHM is characterised by high levels of poverty and inequality, isolated communities, and a large geographical area, which results in a vulnerable population. Large numbers of people, both private and communal, are also directly dependent on agriculture, and therefore on functioning ecosystems and water regimes, for their livelihoods. These communities and households are therefore directly affected by the risks posed by climate change. The IDP notes that the KHM is likely to be one of the most affected municipalities in terms of the impact of climate change on water quality and availability. Addressing these threats and the needs associated with the threat posed by climate change is therefore a key challenge.
Karoo Hoogland Spatial Development Framework (2019)	The KH Spatial Development Framework (SDF) (2019) identifies list four strategies, namely: **Strategy 1: Enhance local connectivity** The objectives of Strategy 1 include improving the connection between the towns of Sutherland, Williston and Fraserberg and the surrounding rural areas, and support for the diversification of economies, tourism, the knowledge economy, the green economy and alternative energy-related enterprise development. **Strategy 2: Protecting local resources** The objectives of Strategy 2 include integrated management and prioritisation of Karoo Hoogland's natural and man-made cultural landscape resources and protection of high value agricultural land. The actions identified include alien vegetation clearing and riverine and wetland management and environmental awareness and education programmes. **Strategy 3: Urban and rural development** The objectives of Strategy 3 include more sustainable land reform process and in areas closer to urban centres, creating opportunities for increased food security and economic development for rural dwellers, creation of sustainable and accessible employment opportunities, and improved opportunities in the Tourism Sector. The actions identified include establishing opportunities for urban agriculture (home, school and community gardens) to promote household food security and improved nutrition, create opportunities for local food producers to market their products (farmers markets, etc.), and establishment of artisan workshops to provide local

APPLICABLE PLAN	DESCRIPTION OF PLAN
	population with the chance to develop skills to participate within the economic sectors. Tourism and the renewable energy sector are identified as key drivers in terms of development in the KH. **Strategy 4: Enhance infrastructure development** The objectives of Strategy 3 include, maintain basic services and addressing backlogs, improving public facilities and access to these facilities, improving public transport and access to public transport and recycling programmes
Laingsburg Municipality Integrated Development Plan (2017 – 2022)	The LM IDP (2017-2022) identifies six priority area of which the following are relevant to the project: — Environmental and Spatial Development. — Local Economic Development. — Basic Service Delivery. — Social and Community Development. **Priority 1: Environmental and Spatial Development** The focus of Priority 1 is on creating a safe municipal area, the conservation of the town's heritage and, or relevance to the renewable energy sector, creating a clean green oasis in the Karoo. It also seeks to restore dignity in rural areas. A number of strategic objectives are associated with each of the priority areas listed in the IDP. **Priority 2: Local Economic Development** The focus of Priority 2 is on creating opportunities to ensure growth and development of the Laingsburg municipal economy. Of relevance to the renewable energy sector the IDP notes the commitment of the municipality create an enabling environment and incentives to attract investment to the area. A number of strategic objectives are associated with each of the priority areas listed in the IDP. *Strategic Objective 2: Promote local economic development* The focus areas for supporting economic development and creating employment are the tourism sector and support for Small Medium Micro Enterprise Developments (SMME's). **Priority 3: Basic Service Delivery** The focus of Priority 3 is to maintain and improve current levels of service delivery in the LM. The IDP also notes that well maintained infrastructure also supports and promote local economic development. **Priority 4: Social and Community Development** The focus of Priority 4 is on promoting equal accessibility for available opportunities for all, especially the poor and the youth. Priority 4 also seeks to create opportunities for moral regeneration by implementing awareness programmes, skills development and training and the provision of free basic services. *Strategic Objective 4: Improve the standards of living of all people in Laingsburg* The IDP lists a number of projects associated with Strategic Objective 3, including implementation of a crime prevention and rehabilitation programme, establishment of ECD Centres, ensuring the effective operation of the towns Thusong Service Centre, and supporting old age facilities in the town. Improved living standards are also linked to a skilled and educated population. The IDP therefore highlights the need to improve overall literacy levels and create opportunities to support education and skills development and training. A SWOT Analysis undertaken as part of the IDP process lists the strengths, weaknesses, opportunities, and threats facing the LM. The following are relevant to the Needs Assessment. **Strengths** — Stable municipality.

APPLICABLE PLAN	DESCRIPTION OF PLAN
	— Well-located in terms of access by road and rail. — Good infrastructure in place. — Nice clean town. — Strong, professional administration with professional. — Good public participatory and ward committee system. — Established tourism office. — Thusong Service Centre. **Weaknesses** — Narrow income base. — Small business sector. **Opportunities** — Establishment of economic development infrastructure. — Development of light industrial area. — Green Energy. — Training and Skills Development. — Establishment of organised Business sector **Threats** — Aging municipal infrastructure. — Climate change and drought. — High level of grant dependency. — Skills shortages and difficulty in retaining scarce skills. — Low literacy rates and high drop-out rates for school children. — Large distances to large towns. — Poor condition of gravel roads in rural areas. — High water losses from municipal infrastructure. The IDP highlights the threat posed by the impact of climate change, specifically given the key role played by the agriculture to the local economy. The key risks are linked to the long term rise in temperature, variability in precipitation and changes in precipitation patterns and growing season etc. The IDP notes that water availability is the most important limiting factor affecting the agriculture sector (crop and animal production) in the LM. Climate change therefore has the potential to impact on employment and food security.
Laingsburg Local Economic Development (LED) and Tourism Strategy (2019-2029)	The Laingsburg Local Economic Development (LED) and Tourism Strategy (2019-2029) is informed by and aligned with relevant national, provincial, district and local policies and plans, including the National Development Plan and Western Cape Strategic Plan (2019-2024). The aim of the LED and Tourism Strategy is to guides the long-term sustainable planning and development of the Laingsburg economy. This includes reducing poverty within the Laingsburg Municipal area. The LED strategy is based on the overall vision outlined in the IDP. The Strategy assesses the current socio-economic environment, outlines strategic goals for the next ten-years, it recommends a series of actions to achieves those goals by leveraging existing assets and strengths, overcoming existing weaknesses and threats, and developing new assets and strengths. The LED Strategy therefore identifies key socio-economic needs facing the LM and strategies to address these needs. The LED aims to create job opportunities by assisting the local economy to grow by developing more small business in the municipal area, specifically for HD members of the community. One of the key drivers for LED is tourism. Tourism has the ability and potential to create long-term work opportunities. The LED and Tourism Strategy identifies a number of key socio-economic trends, challenges and key considerations that have a bearing on the project. These include:

APPLICABLE PLAN	DESCRIPTION OF PLAN
	— Climate changes poses a number of challenges to the agricultural sector in Western Cape, including the LM area. — Laingsburg as a drought prone area is faced with the increased competition for water resources from agricultural and other uses, including urban and industrial. — The Municipality will need to develop and implement strategies to address climate change and the impact of drought. The predicted increase in the frequency and severity of droughts will have a negative impact on agriculture. — Agriculture is the backbone of Laingsburg economy. However, the agriculture sector is not diverse, the dominant activity is sheep (wool and meat) farming. — There is a lack of formal employment, including self-employment opportunities, in the LM. — The LM has high unemployment rates, low-income levels, and high illiteracy rates. The high illiteracy rates are linked to the high percentage of school drop outs. This has resulted in high poverty rates and increasing levels of substance abuse in Laingsburg. — There is a shortage of skilled labour. — There is a high degree of grant dependency. The LED also identifies the development of a renewable energy centre as strategic initiative.

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. — 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**. Karreebosch Wind Farm (RF) (Pty) Ltd will develop 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 Karreebosch Wind Farm (RF) (Pty) Ltd renewable energy projects, from inception, development, construction, operation, and any decommissioning are
	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	

REFERENCE		REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
	1.9	Ongoing Reporting to Affected Communities	required to fully comply with the ESMS requirements and expectations.
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	Even though the nature and scale of the project is considered to be small, PS2 is considered applicable as a contractor will be appointed to undertaken the required scope of work. 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 as part of the project specific ESMS/corporate ESMS
	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.
	3.2	— Pollution Prevention — Air Emissions — Stormwater — Waste Management — Hazardous Materials Management — Pesticide use and Management	The project 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. However, as supporting infrastructure to the Karreebosch WEF, the OHPL and substation seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. 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. 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	The requirements included in PS 4 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; — COVID-19 and HIV/AIDS Management Plan; and — Security Policy.

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
		— Ecosystem Services — Community Exposure to Disease — Emergency Preparedness and Response	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 WEF results in potential risk of electrocution and potential electromagnetic fields exposure. These risks are qualitatively evaluated in the BA 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 — Private Sector Responsibilities under Government Managed Resettlement	PS5 is not applicable to the proposed Karreebosch OHPL and substation as no physical or economic displacement or livelihood restoration will be required. The proposed OHPL route and substation is located on privately owned land that is utilised for agriculture by the landowners. The land will continue to be used for agriculture (largely small stock grazing) without impediment by the OHPL.
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 OHPL and substation options route traverses a CBA and ESA. A Biodiversity Impact Assessment as well as an Avifaunal Impact Assessment and Freshwater Ecology Impact Assessment have been undertaken for the proposed Karreebosch OHPL and substation. Refer to **Appendix F.** The methodologies for the specialist assessments included a combination of literature review, in-field surveys and

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
			sensitivity mapping. This largely complies with the PS 6 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.		
Aspects	7.1	General — Avoidance of Adverse Impacts — Participation and Consent	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 the prevailing national legislation, a NID has been submitted for this project on 2nd August 2022. Proof of the NID Submission has been included in **Appendix H**. In addition an additional field survey was undertaken by a heritage specialist and an assessment has been undertaken and is provided in **Appendix F7.** 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 118 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, 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	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 (2014, as amended). In addition, a site-specific EMPr has been compiled and is included in Appendix G, which is to be read in conjunction with the generic powerline and substation EMPRs.

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	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.	
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 Performance Standards (PS) and applicable Industry Specific Environmental, Health, and Safety (EHS) Guidelines. 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.	Karreebosch Wind Farm (RF) (Pty) Ltd will have a project specific ESMS which will align 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. The proposed project, from inception, development, construction, operation, and any decommissioning will be required to fully comply with the requirements of the ESMS. The 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 be incorporated into the 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 client will conduct an Informed Consultation and Participation process.	The BA process includes an extensive stakeholder engagement process which complies with the South African EIA Regulations (2014, as amended). The process includes consultations with local communities, nearby businesses and a range of government sector stakeholders (state owned enterprises, national, provincial and local departments). The consultation process will be tailored to the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	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.	making processes; and the needs of disadvantaged and vulnerable groups. No Indigenous People will be affected. 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 and incorporated into the Project specific ESMS.
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 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 that the client retain	This principle will only become applicable in the event that the project is developed in the future.

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	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 (2007) 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 overhead electricity transmission and distribution infrastructure that trigger Activity 11 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]

The generic EMPrs (for both OHPL and Substations) are provided in the Karreebosch 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 in order 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 amended) 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 and substation was generated on 12 July 2022 and is attached as **Appendix I**. 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	✓			

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified through the Screening Report 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 Impact Assessment
— RFI Assessment
— Geotechnical Assessment
— Plant Species Assessment
— Animal Species Assessment

3.2.1 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 as **Appendix F**:

- Soils and Agricultural Potential Assessment;
- Archaeological and Cultural Heritage Assessment;
- Palaeontology Assessment;
- Visual Impact Assessment;
- Biodiversity Impact Assessment (inclusive of terrestrial biodiversity, plant species and animal species);
- Bat Verification Letter;
- Avifauna Impact Assessment;
- Freshwater Assessment;
- Desktop Geotechnical Assessment;
- Socio-economic Impact Assessment; and
- Traffic Assessment.

Three of the identified specialist studies have not been undertaken as part of the BA process for the proposed Karreebosch OHPL and substation. Motivation for the exclusion of these specialist studies is provided below.

CIVIL AVIATION

The Sutherland Aerodrome is approximately 38km north east of the OHPL. As the theme is identified as having a low sensitivity, a formal Civil Aviation Compliance Statement is not required to be submitted 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.

The applicant will be responsible for the submission of the Application for the Approval of Obstacles to the SACAA, as applicable.

RFI ASSESSMENT

A Radio Frequency Interference (RFI) Study will not be undertaken, due to the sensitivity being very low. SKA-SA as well as the South African Radio Astronomy Observatory (SARAO) will however, be engaged with as part of the Public Participation Process.

GEOTECHNICAL

A desktop Geotechnical Assessment has been undertaken and has been incorporated into the BAR. However, a detailed Geotechnical Assessment will not be undertaken as part of the BA Process as this will be undertaken during the detailed design phase prior to construction..

DEFENCE

As the theme is identified as having a low sensitivity, a formal Defence Compliance Statement is not required to be submitted as part of the BA Process. Nevertheless, the relevant Authorities (such as the Department of Defence) will be included on the project stakeholder database.

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 02 August 2022 (meeting minutes included in **Appendix D**) and the application form was submitted to the DFFE on **19 August**

2022. An application 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 May and 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

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.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
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:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very 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.

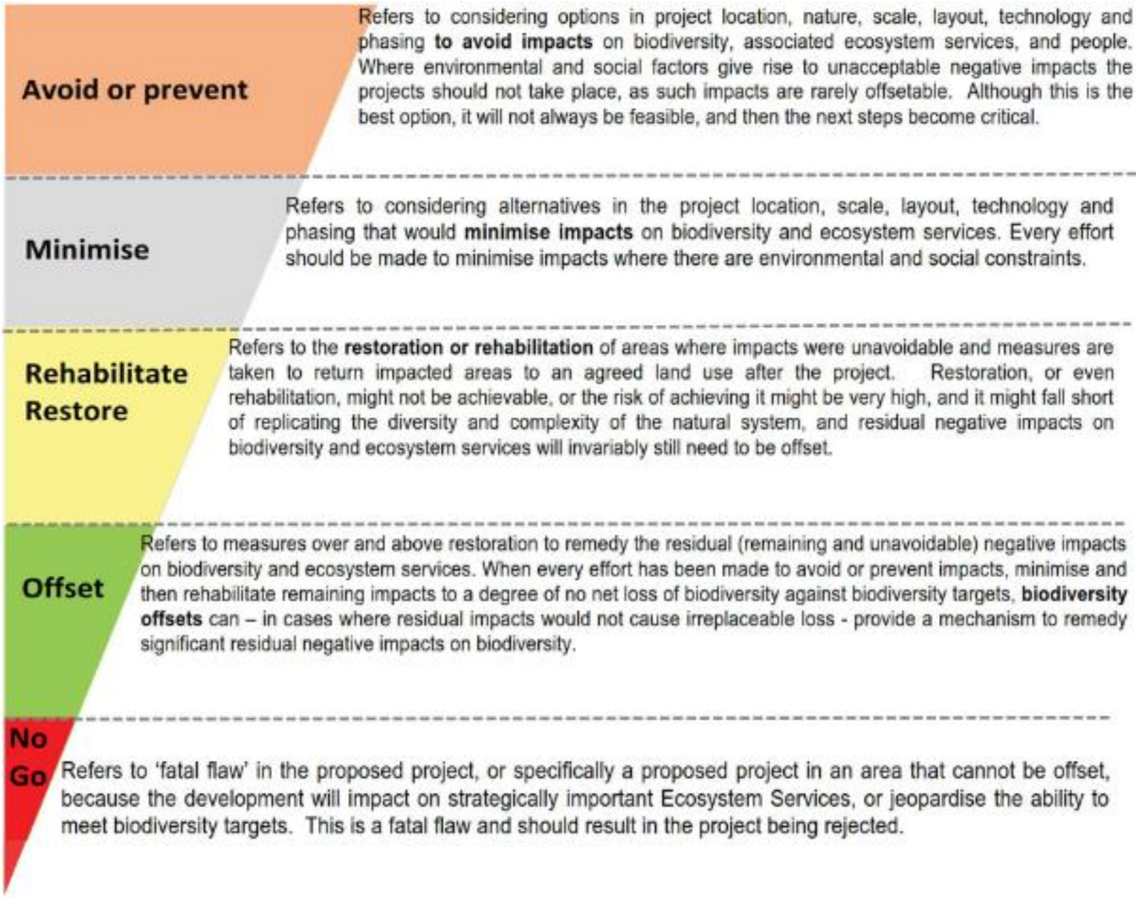

Figure 3-1: Mitigation Sequence/Hierarchy

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.

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 02 August 2022, the proposed plan for public participation was discussed. The meeting minutes were submitted to the DFFE on 3 August 2022.

3.6.2 PUBLIC REVIEW

The Draft BAR will be made available by WSP on request and will be placed on public review for a period of 30 days from **23 August 2022 to 23 September 2022**, at the following public places:

— Sutherland Public Library, Sarel Celliers Street, Sutherland, 6920 (Tel: 023 571 1429);

— Laingsburg Public Library, Van Riebeeck Street, Laingsburg, 6900 (Tel: 023 551 1019);

— G7 Website: https://ppp.g7energies.com/KGRID6v78!

— Available on request from the EAP

WSP will collate comments received during the public review phase and compile a Comments and Responses Report (CRR) that will be included in the SER which will be included in the Final BAR.

3.7 ASSUMPTIONS AND LIMITATIONS

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

— The information provided by Karreebosch Wind Farm (RF) (Pty) Ltd 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:

— Avifauna

- The focus of the study was primarily on the potential impacts of the proposed on-site substation and 132kV OHPL on powerline sensitive species. Powerline sensitive species were defined as species which could potentially be impacted by power line collisions or electrocutions, based on specific morphological and/or behavioural characteristics.
- Cumulative impacts include all wind energy projects with grid connections within a 30km radius that currently have open applications or have been approved by the Competent Authority as per the 2022 Q2 database from the DFFE and are available in the public domain.
- Details of all the proposed grid connections of all the registered wind energy projects within a 30km radius could not be located. The accuracy of the ones that were located can also not be guaranteed as amendments are taking place on an ongoing basis.
- Conclusions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances.

- Although the habitat is fairly marginal for Verreaux's Eagle from a breeding perspective, as the exposed ridge lines are very small, an active nest was recorded during the 2013 – 2014 Karreebosch WEF pre-construction monitoring (Williams 2014) at 32°51'59.27"S 20°30'12.02"E (Beacon Hill) (see Figure 7). Subsequent nest inspections were performed by Dr. Rob Simmons in October 2014, September 2020 and May 2021. No activity was reported at the nest in 2021, and no activity was recorded by this author during the current survey either. However, a pair was in attendance in September 2020. The possibility therefore always remains that the territory could still be active or become active again.

— Soils and Agriculture

- There are no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

— Geotechnical

- The interpretation of the overall geotechnical conditions across the site is based upon a review of available information on the project area. Subsurface and geotechnical conditions have been inferred at a desktop level from available information, past experience in the project area and professional judgement. The information and interpretations are given as a guideline only and there is no guarantee that the information given is totally representative of the entire area in every respect. No responsibility will be accepted for consequences arising out of the fact that actual conditions vary from those inferred. The information must be verified by the undertaking of a detailed geotechnical site investigation.

— Freshwater Ecology

- The ground-truthing and verification of the delineated extent of the watercourses was confined to a single site visit undertaken from the 25th to the 28th of May 2021 of the proposed development. This is a report update following layout changes and addition of the proposed access roads. All watercourses identified within the investigation area were delineated in fulfilment of Government Notice 509 using various desktop methods with limited field verification including the use of topographic maps, historical and current digital satellite imagery and aerial photographs. The watercourses associated with the proposed roads were delineated using desktop methods only as the road layout was only available after the site assessment.
- At the time of this assessment, the positions for the powerline support structures were not available as the outcome of this assessment will guide the placement of these structures. However, a 400m wide overhead powerline corridor (200m on either side of the centre line) has been assessed by the specialists for the purposes of the Basic Assessment (BA) and has been walked down by the specialists for approval to allow for micro siting of powerline support structure positions once the detailed design has been completed.
- Due to the landscape in some areas being rugged and very undeveloped, some reaches of the identified watercourses were inaccessible. Therefore, verification points for watercourses were located at points as close to the watercourse to be verified as possible and, where necessary the conditions at the exact point required were inferred or extrapolated.
- Due to the majority of the watercourses being ephemeral or episodic within the region, very few areas were encountered that displayed more than one watercourse characteristic as defined by the DWAF (2008) method (such as containing alluvial or inundated soil, or hosts riparian vegetation adapted to saturated conditions). As a result, identification of the outer boundary of the temporary watercourse zones and marginal riparian zones proved difficult in some areas and, in particular, in the areas where watercourse conditions and riparian zones are marginal, delineations were augmented with the use of digital satellite imagery. Nevertheless, the watercourse delineations as presented in this report are regarded as a best estimate of the watercourse boundaries based on the site conditions present at the time of assessment and the results obtained are considered sufficiently accurate to allow informed planning and decision making to take place.
- Global Positioning System (GPS) technology is inherently somewhat inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. However, the delineations as provided in this report are deemed accurate enough to fulfil the environmental authorisation requirements as well as the implementation of the mitigation measures provided; Watercourses 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 watercourse boundaries may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results.

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- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, it is expected that the watercourses 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.

— Biodiversity

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.

— Visual

- Substations and powerlines are very large structures by nature and could impact on receptors that are located relatively far away, particularly in areas of very flat terrain. Given the nature of the receiving environment and the height of the various components of the proposed development, the study area or visual assessment zone is assumed to encompass a zone of 5 km from the outer boundary of the combined powerline assessment corridors and substation sites. This 5 km limit on the visual assessment zone relates to the importance of distance when assessing visual impacts. Although the proposed development may still be visible beyond 5 km, the degree of visual impact would diminish considerably and as such the need to assess the impact on potential receptor locations beyond this distance would not be warranted.
- The identification of visual receptors involved a combination of desktop assessment as well as field-based observation. Initially Google Earth imagery was used to identify potential receptors within the study area. Where possible, these receptor locations were verified and assessed during a site visit which was undertaken between the 30th August and the 1st of September 2021.
- Due to the extent of the respective study area and the nature of the terrain, it was not possible to visit or verify every potentially sensitive visual receptor location. As such, several broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development. It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of "Green Energy". Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.
- The potential visual impact at each visual receptor location was assessed using a matrix developed for this purpose. The matrix is based on three main parameters relating to visual impact and, although relatively simplistic, it provides a reasonably accurate indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location.
- As stated above, the exact status of all the receptors could not be verified during the field investigation and as such the receptor impact rating was largely undertaken via desktop means.
- Receptors that were assumed to be farmsteads were still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were thus assessed as part of the VIA.
- Based on the project description provided by Karreebosch, all analysis undertaken for this VIA is based on a worst-case scenario where the maximum height of the powerline tower structures is assumed to be 40m. Substation facilities are assumed to be less than 25m in height.

- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for the study area derived from the National Geo-Spatial Information (NGI)'s 25m DEM is fairly coarse and somewhat inconsistent and as such, localised topographic variations in the landscape may not be reflected on the Digital Elevation Model (DEM) used to generate the viewsheds and visibility analyses conducted in respect of the proposed development.
- In addition, the viewshed / visibility analysis does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.
- No feedback regarding the visual environment has been received from the public participation process to date. Any feedback from the public during the review period of the Draft Basic Assessment Report (DBAR) will however be incorporated into further drafts of this report, if relevant.
- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting required for the proposed development and therefore the potential impact of lighting at night has not been assessed at a detailed level. It is however assumed that operational and security lighting will be required for the proposed substations and general measures to mitigate the impact of additional light sources on the ambient nightscape have been provided accordingly.
- This study includes an assessment of the potential cumulative impacts of other renewable energy developments on the existing landscape character and on the identified sensitive receptors. This assessment is based on the information available at the time of writing the report and where information has not been available, broad assumptions have been made as to the likely impacts of these developments.
- Information for the surrounding planned renewable energy developments, provided by the Environmental Assessment Practitioner (EAP), was factored into the cumulative impact assessment
- No visualisation modelling was undertaken for the proposed development as this is not normally required for linear infrastructure. This can however be provided should the Public Participation Process identify the need for this exercise.
- It should be noted that the site visits were undertaken during late winter (30th August to 1st September 2021). The study area is however typically characterised by low levels of rainfall all year round and therefore the season is not expected to affect the significance of the visual impact of the proposed development.
- Clear weather conditions tend to prevail throughout most of the year in this area, and in these clear conditions, powerlines and associated infrastructure would present a greater contrast with the surrounding landscape than they would on a cloudy overcast day. Both clear and cloudy weather conditions were experienced during the field investigation and these factors were taken into consideration when undertaking this VIA.

— Traffic

- According to the Eskom Specifications for Power Transformers, maximum height, width, and length limitations of 5 000mm, 4 300mm and 10 500mm must be kept when transporting the transformer.
- The Traffic Management Plan is based on the project information provided by the Client
- Maximum vertical height clearances along the haulage routes is 5.2 m for abnormal loads.
- The imported elements will be transported from the most feasible port of entry, the Port of Saldanha.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for constructing internal access roads will be sourced locally as far as possible.
- The decommissioning phase will have a similar transport impact as the construction phase.

— Heritage

- The significance of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.
- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

- However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.

— Socio-economic

- 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. The power line route is also located within Komsberg REDZ and Central Transmission Line Corridor.
- 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 SIA 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 solar energy and the technical, spatial and land use constraints required for solar energy facilities.
  — The route is also located within the Komsberg REDZ and Central Transmission Line Corridor. The area has therefore been identified as being suitable for the establishment renewable energy facilities and associated grid infrastructure.
- Demographic data
  — The information contained in some key policy and land use planning documents, such as Integrated Development Plans etc., may not contain data from Community Household Survey if 2016. However, this will not have a material impact on the findings of the study.

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 Karreebosch Wind Farm (RF) (Pty) Ltd 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 132kV Karreebosch OHPL, 33/132kV Substation and associated infrastructure is located 35km north of Matjiesfontein, and extends across two provinces, namely the Northern and Western Cape Provinces (**Figure 4-1**). The proposed Karreebosch OHPL will extend from the proposed Karreebosch onsite 33/132kV substation, which is situated in Ward 3 of the Karoo Hoogland Local Municipality in the Namakwa District Municipality in the Northern Cape into Ward 2 of the Laingsburg Local Municipality in the Central Karoo District Municipality in the Western Cape Province, where it will connect to the existing 400kV Komsberg substation via the existing Bon Espirange substation.

The proposed Karreebosch OHPL will evacuate power from the authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3 which is currently undergoing of a Part 2 EA amendment, final layout and EMPr approval process), located in the Northern Cape Province and will connect to the existing Komsberg substation. Two alternative locations for the on-site substations (Option 1 and 2) are under consideration in this BAR.

The centre point of the OHPL is located at 32°53'57.00"S 20°30'45.20"E. **Table 4-1** below provides the co-ordinates of existing and proposed substations.

Table 4-1: Co-ordinates of substations along the OHPL route

POINT	CO-ORDINATES	
Proposed Karreebosch WEF Proposed Substation Option 1	32°51'39.93"S	20°28'46.28"E
Karreebosch WEF Substation Option 2	32°48'42.75"S	20°30'24.60"E
Existing Bon Espirange substation	32°55'11.28"S	20°32'3.64"E
Existing Komsberg Substation	32°56'0.70"S	20°35'42.82"E

The proposed Karreebosch OHPL is proposed to be located over thirteen (13) properties (**Table 4-2**). The location and layout of the properties on which the OHPL is located is provided in **Figure 4-2.**

Figure 4-1: Locality of the Karreebosch OHPL

Table 4-2: Farm portions on which the proposed development is located

OHPL AND SUBSTATION ALTERNATIVE	FARM NAME AND NUMBER	21 DIGIT SG CODE	MUNICIPALITY / PROVINCE	FARM SIZE (HA)
Bon Espirange to Komsberg Route	Remainder of Farm Standvastigheid No. 210	C07200000000021000000	Karoo Hoogland LM / Namakwa DM / Northern Cape	5922.12
Komsberg Substation Bon Espirange to Komsberg Route	Portion 2 of Farm Standvastigheid No. 210	C07200000000021000002	Karoo Hoogland LM / Namakwa DM / Northern Cape	29.67
Bon Espirange to Komsberg Route	Farm Aprils Kraal No. 105	C04300000000010500000	Laingsburg LM / Central Karoo DM / Western Cape	559.68
Bon Espirange to Komsberg Route	Portion 1 of Farm Bon Espirange No. 73	C04300000000007300001	Laingsburg LM / Central Karoo DM / Western Cape	1916.64
Bon Espirange Substation Bon Espirange to Komsberg Route Route 3	Remainder of Farm Bon Espirange No. 73	C04300000000007300000	Laingsburg LM / Central Karoo DM / Western Cape	1764.25
Option 1A Option 1B Option 1C Option 2B Option 2C Route 3	Remainder of Farm Ek Kraal No.199	C07200000000019900000	Karoo Hoogland LM / Namakwa DM / Northern Cape	1407.48
Option 2B Option 2C	Portion 1 of Farm Ek Kraal No. 199	C07200000000019900001	Karoo Hoogland LM / Namakwa DM / Northern Cape	1772.90
Option 2B Option 2C	Portion 2 (Nuwe Kraal) of Farm Ek Kraal No. 199	C07200000000019900002	Karoo Hoogland LM / Namakwa DM / Northern Cape	824.94
Option 2B Option 2C	Remainder of Farm Karreebosch No. 200	C07200000000020000000	Karoo Hoogland LM / Namakwa DM / Northern Cape	1538.34

OHPL AND SUBSTATION ALTERNATIVE	FARM NAME AND NUMBER	21 DIGIT SG CODE	MUNICIPALITY / PROVINCE	FARM SIZE (HA)
Substation Option 2 Option 2A Option 2B Option 2C	Remainder of Farm Wilgebosch Rivier No. 188	C07200000000018800000	Karoo Hoogland LM / Namakwa DM / Northern Cape	2898.91
Option 2A	Portion 1 of Farm Klipbanks Fontein No. 198	C07200000000019800001	Karoo Hoogland LM / Namakwa DM / Northern Cape	1886.62
Substation Option 1 Option 1A Option 1B Option 1C Option 2A	Remainder of Farm Klipbanks Fontein No. 198	C07200000000019800000	Karoo Hoogland LM / Namakwa DM / Northern Cape	1886.62
Option 1A Option 1B Option 1C	Farm Rietfontein No. 197	C07200000000019700000	Karoo Hoogland LM / Namakwa DM / Northern Cape	5873.66

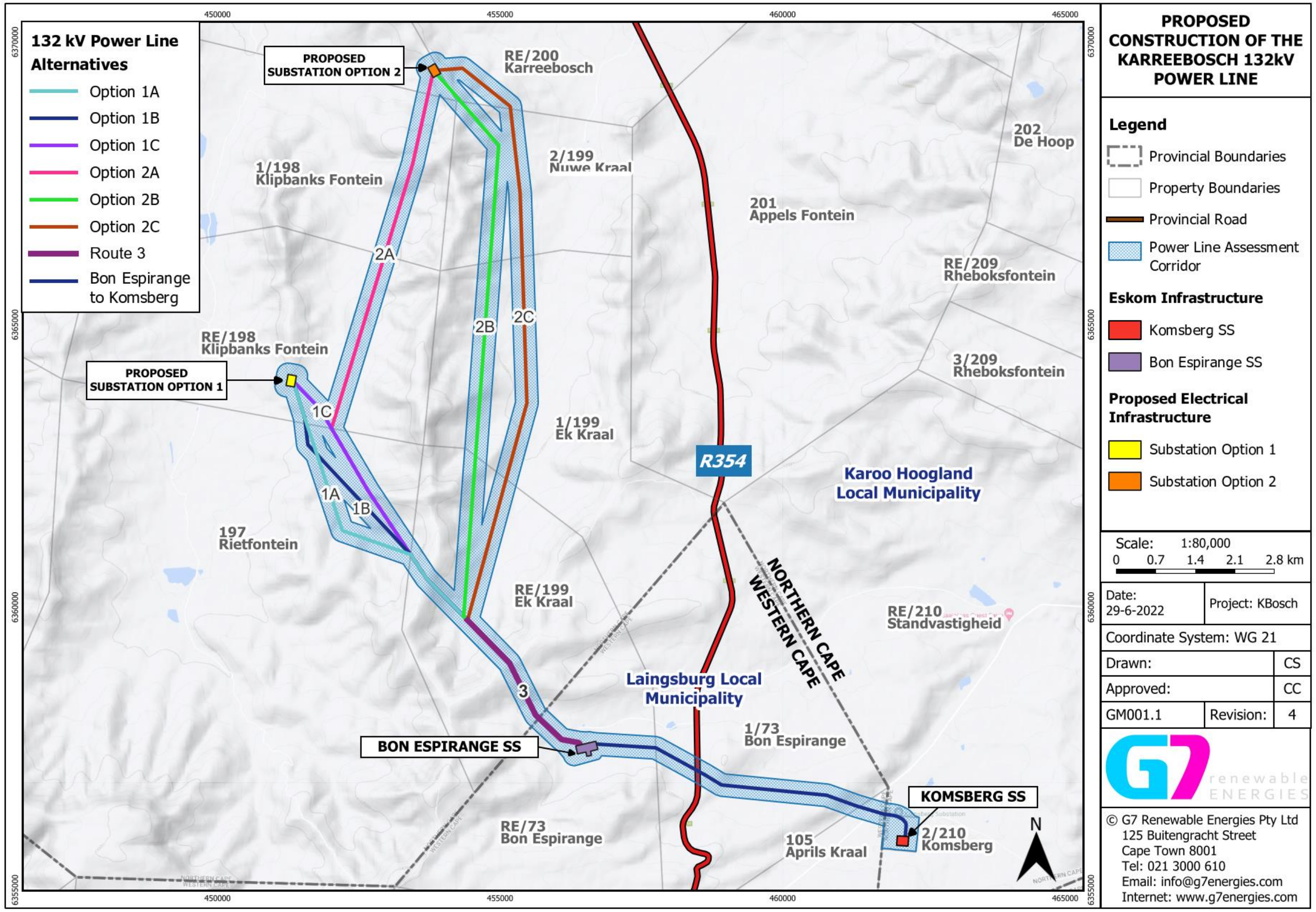


Figure 4-2: The proposed OHPL and substation alternatives in relation to affected land portions

Refer to **Section 6.2.6** of this report for further information regarding the land use of the project area.

4.2 PROJECT INFRASTRUCTURE

The proposed OHPL includes the following components:

— 132kV twin tern double circuit overhead powerline;
— One 33/132kV onsite substation;
— Access road along the powerline servitude; and
— Potential modifications and/or expansions to the existing substation (Komsberg).

4.2.1 OVERHEAD POWERLINE

The OHPL will be a 132kV twin tern double circuit overhead powerline. The powerline towers will either be lattice or monopole structures. Figure 4-3 below provides an example of a conventional lattice tower compared with a monopole structure. Pole positions will only be available once the powerline detail design has been completed for the Eskom Design Review Team (DRT). However, a 400m wide assessment corridor is being considered and has been walked down by the specialists for approval to allow for micro siting of tower positions once the detailed design has been completed. It is anticipated that towers will be located on average 200m to 250m apart; however, longer spans may be needed due to terrain and watercourse crossings.

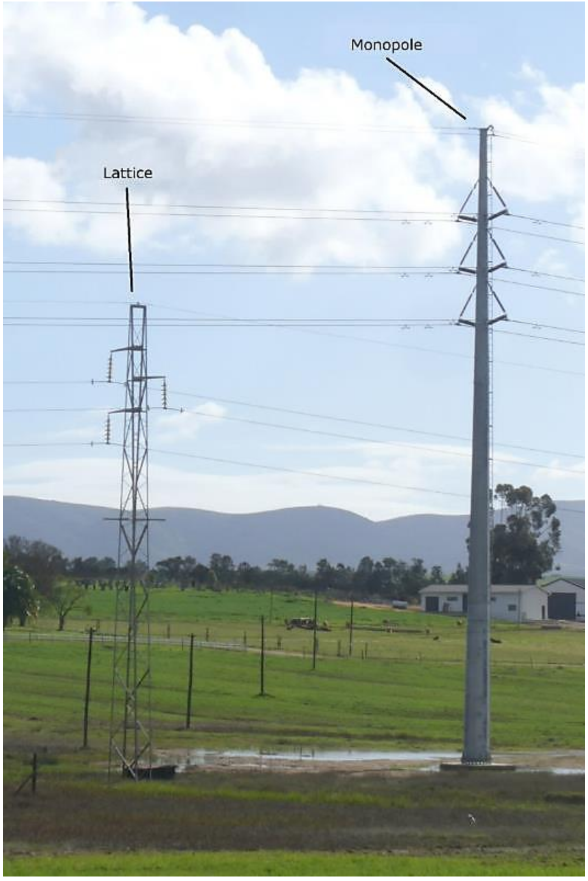


Figure 4-3: Conventional lattice powerline tower compared with a steel monopole structure

4.2.2 SERVITUDE

A 400m wide OHPL corridor (200m on either side of the centre line) has been assessed by the specialists for the purposes of the BAR. The registered servitude will fall within this 400m wide assessment corridor and will be 31m wide (15.5 m on either side of the centre line). The Right of Way servitude (servitude road) will be up to 14m wide (7m on either side of centre line), resulting in a total servitude width of 45m in total. The length of the longest powerline route alterative (Option 2C – see “Alternatives” section below) is 20.52 km, which will result in a servitude area (and area of investigation for this BAR) of up to 92.3 ha. The actual development footprint will however be much less given the nature of the OHPL and substation development.

The servitude is required to ensure safe construction, maintenance and operation of the powerline. Registration of the servitude grants the operator 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. It should be noted that the OHPL and 132kV portion of the onsite substation will be ceded to Eskom post-construction. Construction and operation activities and access to the powerline and substation will 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 SUBSTATIONS

The Karreebosch OHPL will be routed from the proposed onsite Karreebosch 33/132kV substation (associated with the approved Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3) to the existing Bon Espirange substation, after which it will evacuate power from the existing 400kV Komsberg substation.

The switching station portion of the substation (132kV), included in this assessment, will ultimately be transferred to Eskom for their operation and maintenance. The IPP collector portion of the substation (33kV) will remain under the ownership of Karreebosch. Two alternative locations for the 33/132kV switching substation at the Karreebosch WEF site have been assessed as part of this BAR, each with a 200m x 150m (3 ha) footprint.

A 200m assessment area surrounding the proposed substation alternatives have been included as part of this assessment for micro siting, with a slight funnel leading into the existing Bon Espirange and Komsberg substations to allow for greater flexibility for micro siting for incoming proposed line connections. The proposed Karreebosch OHPL may require an extension of the existing 400kV Komsberg substation, and therefore, the entire Komsberg substation property has been assessed as part of this BAR.

4.2.4 SITE ACCESS

The OHPL and associated infrastructure will be accessed via roads forming part of the authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3 which is currently undergoing of a Part 2 EA amendment, final layout and EMPr approval process), where possible. The preferred OHPL routing will require an associated servitude road (following beneath the proposed OHPL) to be constructed which will be used to construct, operate and maintain the powerline. Existing roads will be used as much as possible, where feasible. However, additional access roads may be required to provide access to sections of the powerline route. New sections of access roads will deviate off existing roads (within the 400m wide assessment corridor), as needed to access tower positions. Access roads will be mostly two-track gravel roads up to 14m in width following beneath the OHPL in order to access tower structures for construction and maintenance purposes.

4.3 PROPOSED PROJECT DEVELOPMENT ACTIVITIES

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

- Planning 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 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 make use of the construction camp established for authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3) , 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.

Building materials will most likely be sourced from Worcester approximately 180km from the site or alternatively from Cape Town approximately 300 km from the site. A significant reduction in heavy vehicle trips can be achieved by using mobile batching plants. In addition to this, temporary construction material stockpile yards could be commissioned on vacant land near the proposed site, within the footprint of disturbance anticipated for the project. Delivery of materials to the mobile batch plant and the stockpile yard could be staggered to minimise traffic disruptions.

Components are expected to be locally sourced and transported to site using appropriate National and Provincial routes. It is expected that the components will generally be transported to site with normal heavy load vehicles. Mobile plants 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 Karreebosch is anticipated to require 20 - 30 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 the 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 drilling of holes, planting of monopoles (compaction only, no concrete casting) 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).

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 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 Karreebosch WEF to the national grid, to transmit power.

INSTALLATION OF THE SUBSTATION

The Karreebosch OHPL will be routed from the proposed onsite Karreebosch 33/132kV substation (associated with the approved Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3 which is currently undergoing a Part 2 EA amendment, final layout and EMPr approval process)) to the existing Bon Espirange substation, after which it will connect to the existing 400kV Komsberg substation. Two alternative 33/132kV onsite substation locations at the Karreebosch WEF site have been assessed as part of this BAR, each with a 200m x 150m (3 ha) footprint. A 200m assessment area surrounding the proposed substation alternatives have been included as part of this assessment for micro siting, with a slight funnel leading into the existing Bon Espirange and Komsberg substations to allow for greater flexibility for micro siting for incoming proposed line connections. The proposed Karreebosch OHPL may require an extension of the existing 400kV Komsberg substation, and therefore, the entire Komsberg substation property has been assessed as part of this BAR.

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. Eskom will adhere to all existing Safety Codes and Guidelines for the operation and maintenance of the OHPL 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. This is not expected to occur in the near future.

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 Karreebosch OHPL is located within the Central 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 4-4** below shows the location of the five corridors and the approximate location of the Karreebosch OHPL within the Central Corridor. The associated WEF also falls within the Komsberg REDZ area.

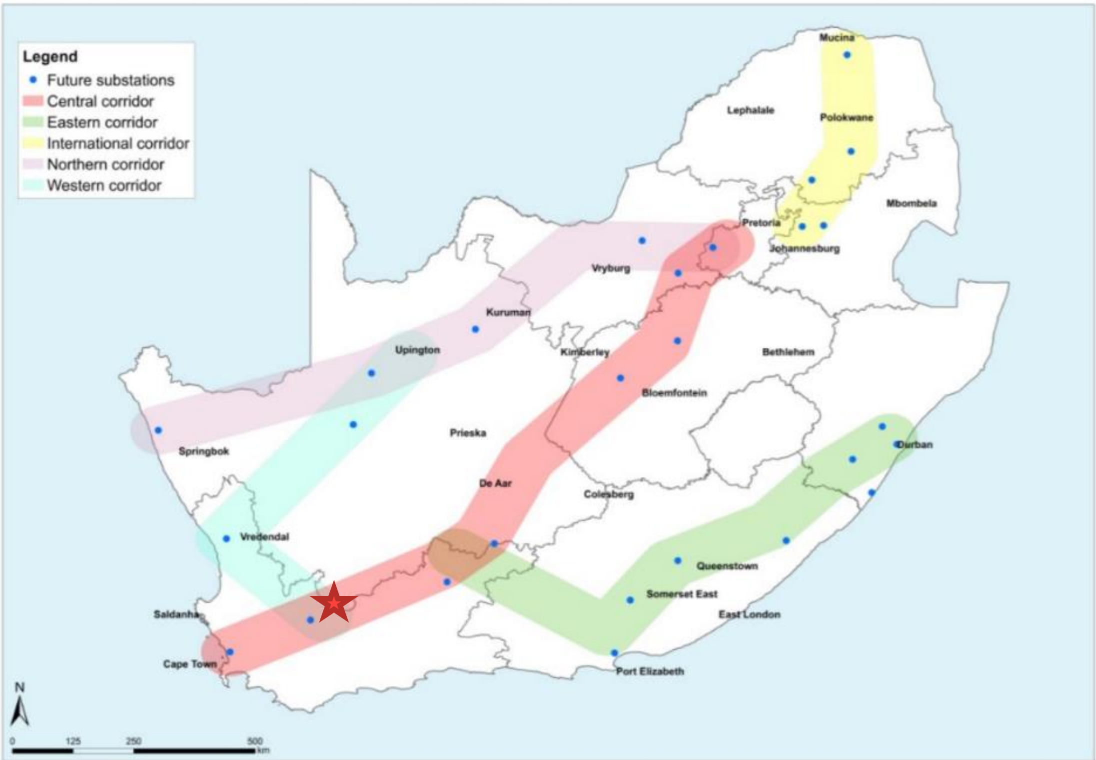


Figure 4-4: Strategic Transmission Corridors (GN 113 of 2018) (red star is approximate location of Karreebosch OHPL)

The energy security benefits associated with the authorised Karreebosch WEF 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 wind 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 authorised Karreebosch WEF site and the existing Komsberg substation. The land is all 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. No physical or economic displacement is anticipated as a result of this project.

Furthermore, negative environmental impacts associated with the activity will be mitigated to acceptable levels in accordance with the site-specific EMPr and generic EMPrs (**Appendix G**). Refer to **Section 7** below for the Environmental Impact Assessment and recommended mitigation measures.

5 PROJECT ALTERNATIVES

In terms of the EIA Regulations (2014, as amended), 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. an overhead powerline and substation). Alternative activities for the current Project are not reasonable or feasible as the purpose of this OHPL and substation is to transmit electrical energy generated by the authorised Karreebosch WEF to the existing Komsberg substation via the existing Bon Espirange 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 CBA 1 and CBA 2 areas in both the Western and Northern Cape Provinces. Underground cables would require extensive trenching and resultant vegetation clearing, which would result in greater environmental impacts. Underground 132kV distribution lines are therefore not considered feasible for the proposed Project.

Therefore, only one technology has been assessed, namely distribution of electricity via a 132 kV OHPL and onsite 33/132kV substation, 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 and onsite substation is to connect the authorised Karreebosch WEF to the national grid. Therefore, the OHPL is required to be located between the proposed Karreebosch WEF onsite substation and the closest existing Eskom substation, namely the Komsberg substation (via the Bon Espirange substation). No alternative location for the proposed Project is deemed viable.

However, two alternative locations for the 33/132kV switching substation at the Karreebosch WEF site have been assessed as part of this BAR, each with a 200m x 150m (3 ha) footprint. These alternatives, are depicted in **Figure 5-1. Table 5-1** outlines the corner co-ordinates of the substation alternative sites.

Table 5-1: Substation Alternative co-ordinates

POINT	LATITUDE	LONGITUDE
Option 1 (Preferred)		
		
S1-1	32°51'35.72"S	20°28'44.23"E
S1-2	32°51'36.70"S	20°28'49.99"E
S1-3	32°51'42.99"S	20°28'48.51"E
S1-4	32°51'42.22"S	20°28'42.93"E
Option 2		
		

POINT	LATITUDE	LONGITUDE
S2-1	32°48'37.68"S	20°30'25.38"E
S2-2	32°48'43.28"S	20°30'29.09"E
S2-3	32°48'45.68"S	20°30'24.12"E
S2-4	32°48'40.01"S	20°30'20.31"E
Potential Komsberg MTS Expansion		

MTS1	32°55'51.18"S	20°35'29.62"E
MTS2	32°55'51.58"S	20°35'52.78"E
MTS3	32°56'11.32"S	20°35'50.70"E
MTS4	32°56'9.59"S	20°35'27.32"E

5.4 LAYOUT ALTERNATIVES

Only one (1) OHPL route is technically feasible for the section of the proposed powerline directly preceding the existing Bon Espirange Substation (Route 3) and for the section connecting the Bon Espirange substation to the Komsberg substation (Bon Espirange to Komsberg Route), which is approximately 9.2 km in length. ***This is due to setbacks requirements from the operational Roggeveld WEF (turbines) and existing OHPLs, and therefore, only this proposed route is able to respect those setbacks. No alternatives can therefore be provided for these two sections of the OHPL (Route 3 and Bon Espirange to Komsberg Route, as per Figure 3 below).***

Six (6) OHPL route alternatives (Options 1A, 1B, 1C, 2A, 2B and 2C) are proposed between the Karreebosch WEF onsite 33/132kV substation (with substation alternatives: Option 1 and Option 2) and

Route 3 preceding the existing Bon Espirange Substation. As noted above, all of the six OHPL route alternatives follow the same routing from their point of convergence on Remainder of Farm Ek Kraal No.199, approximately 3.1 km before the Bon Espirange Substation, to the Komsberg Substation situated on Portion 2 of Farm Standvastigheid No. 210.

These alternatives, as depicted in **Figure 5-1**, are described below:

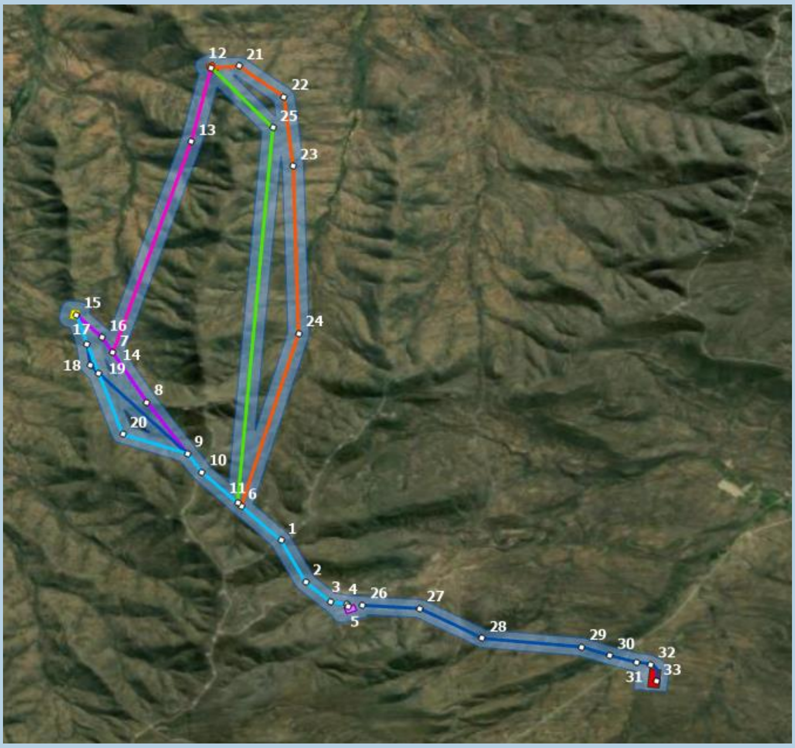
- **OHPL Route Option 1:** Three (3) OHPL route alternatives are being considered for the link between Substation Option 1 and the Bon Espirange Substation and Komsberg Substation:
  - Option 1A (approximately 14.51 km in length in its entirety from Substation Option 1 to the Komsberg Substation);
  - Option 1B (approximately 17.28 km in length in its entirety from Substation Option 1 to the Komsberg Substation); and
  - Option 1C (approximately 13.91 km in length in its entirety from Substation Option 1 to the Komsberg Substation).
- **OHPL Route Option 2:** Three (3) powerline corridor route alternatives were considered for the link between Substation Option 2 and the Bon Espirange Substation and Komsberg Substation:
  - Option 2A (approximately 20.47 km in length in its entirety from Substation Option 2 to the Komsberg Substation);
  - Option 2B (approximately 16.63 km in length in its entirety from Substation Option 2 to the Komsberg Substation); and
  - Option 2C (approximately 20.52 km in length in its entirety from Substation Option 2 to the Komsberg Substation).

Alternatives 1A-C feed out of Substation Option 1 proposed in the south-central portion of the Farm Klipbanksfontein 198/1. Alternatives 2A-C feed out of Substation Option 2 proposed in the south-eastern corner of Wilgebosch Rivier 188/RE.

The co-ordinates for the bend points of each of the above alternatives are included in **Table 5-2**.

Table 5-2: Bend point co-ordinates for the Alternative Powerline Routes

BEND POINT	CO-ORDINATES



BEND POINT	CO-ORDINATES	
Option 1A		
15	20° 28' 47.71" E	32° 51' 39.6" S
17	20° 28' 55.42" E	32° 52' 0.84" S
19	20° 29' 3.62" E	32° 52' 21.72" S
20	20° 29' 20.69" E	32° 53' 5.64" S
9	20° 30' 7.13" E	32° 53' 19.68" S
10	20° 30' 17.71" E	32° 53' 33.0" S
11	20° 30' 43.06" E	32° 53' 55.32" S
Option 1B		
15	20° 28' 47.71" E	32° 51' 39.6" S
17	20° 28' 55.42" E	32° 52' 0.84" S
18	20° 28' 57.5" E	32° 52' 16.32" S
9	20° 30' 7.13" E	32° 53' 19.68" S
10	20° 30' 17.71" E	32° 53' 33.0" S
11	20° 30' 43.06" E	32° 53' 55.32" S
Option 1C		
15	20° 28' 47.71" E	32° 51' 39.6" S
16	20° 29' 6.0" E	32° 51' 55.8" S
8	20° 29' 38.18" E	32° 52' 42.54" S
14	20° 29' 13.67" E	32° 52' 6.96" S
9	20° 30' 7.13" E	32° 53' 19.68" S
10	20° 30' 17.71" E	32° 53' 33.0" S
11	20° 30' 43.06" E	32° 53' 55.32" S
Option 2A		
12	20° 30' 24.26" E	32° 48' 41.4" S
13	20° 30' 9.83" E	32° 49' 35.04" S
7	20° 29' 13.63" E	32° 52' 6.96" S
8	20° 29' 38.18" E	32° 52' 42.54" S
9	20° 30' 7.13" E	32° 53' 19.68" S
10	20° 30' 17.71" E	32° 53' 33.0" S
11	20° 30' 43.06" E	32° 53' 55.32" S
Option 2B		
12	20° 30' 24.26" E	32° 48' 41.4" S
25	20° 31' 8.36" E	32° 49' 24.6" S

BEND POINT	CO-ORDINATES	
11	20° 30' 43.06" E	32° 53' 55.32" S
Option 2C		
12	20° 30' 24.26" E	32° 48' 41.4" S
21	20° 30' 44.06" E	32° 48' 40.32" S
22	20° 31' 16.32" E	32° 49' 2.28" S
23	20° 31' 22.84" E	32° 49' 52.32" S
24	20° 31' 26.8" E	32° 51' 52.92" S
Route 3		
1	20° 31' 14.15" E	32° 54' 22.32" S
2	20° 31' 31.76" E	32° 54' 52.2" S
3	20° 31' 49.37" E	32° 55' 6.24" S
4	20° 32' 1.18" E	32° 55' 8.04" S
5	20° 32' 2.72" E	32° 55' 10.2" S
6	20° 30' 45.68" E	32° 53' 57.48" S
Bon Espirange to Komsberg Route		
26	20° 32' 12.8" E	32° 55' 9.12" S
27	20° 32' 53.52" E	32° 55' 11.28" S
28	20° 33' 38.27" E	32° 55' 32.88" S
29	20° 34' 49.87" E	32° 55' 39.0" S
30	20° 35' 10.07" E	32° 55' 45.12" S
31	20° 35' 29.47" E	32° 55' 50.16" S
32	20° 35' 39.3" E	32° 55' 51.6" S
33	20° 35' 43.3" E	32° 56' 3.84" S

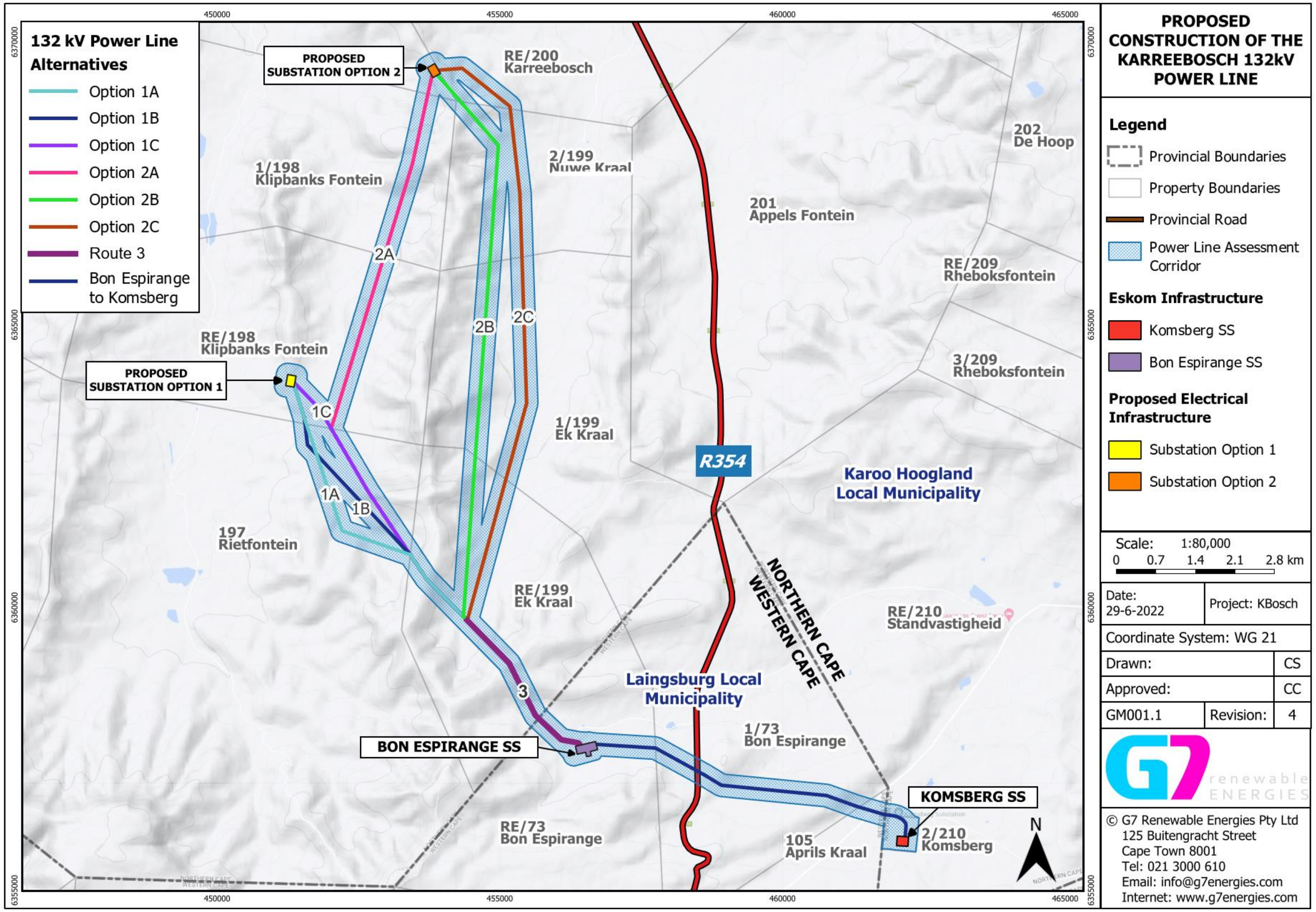


Figure 5-1: Layout alternatives for the proposed Karreebosch OHPL and substation (source: G7, 2022)

5.5 OPERATIONAL ACTIVITIES

Eskom will be responsible for the operation of the OHPL and 132kV portion of the onsite substation once it has been constructed and commissioned. Eskom will be responsible to implement the operational EMPr along with mitigations proposed as a result of this BAR. For this reason, no further consideration has been given to operational alternatives.

5.6 NO-GO ALTERNATIVE

The no-go option will mean the status quo remains. Both the potential positive and negative impacts from the proposed OHPL and substation 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 Karreebosch WEF 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 and Aquatic Biophysical	— Climate — Air Quality — Noise — Topography — Geology and Soils — Geohydrology — Surface Water — Vegetation — Fauna — Avifauna — Protected Areas — Ecological Processes and Corridors — Habitat — Present Ecological State
Social and Economic	— Administrative — Social — Economic — Heritage — Landscape and Visual — Land Use

6.1 BIOPHYSICAL ENVIRONMENT

6.1.1 CLIMATE

The study area is characterized by a dry climate with a “BWk” classification according to the Köppen-Geiger climate classification. Matjiesfontein receives a relatively low mean annual precipitation of 264 mm. The average lowest rainfall is received in September (14 mm) and the highest in March (27 mm), which is a seasonal variation of 14 mm.

The maximum midday temperatures for Matjiesfontein ranges from 30°C in January and February to 15.2°C in July. The minimum temperatures for Matjiesfontein ranges from 14.4°C in February to 3.8°C in July. The average temperatures vary during the year by 12.3°C. Table 3-1, summarizes the climatic conditions.

6.1.2 AIR QUALITY

According to the revised *Central Karoo District Municipality Air Quality Management Plan* (2015/2016), there are relatively few sources of air pollution on the Central Karoo District and ambient air quality is generally good. The main sources of air pollution are limited industrial operations, agricultural activities, biomass burning (veld fires), domestic fuel burning, vehicle emissions, waste treatment and disposal (landfill and incineration), vehicle entrainment of dust and other fugitive dust sources such as wind erosion of exposed areas.

The closest residential development to the proposed project is the town of Matjiesfontein, which is 34km to the south of the OHPL at the closest point.

6.1.3 NOISE

According to the Modelling Of Noise Impact Assessment – Karreebosch Wind Farm Rf (Pty) Ltd, by SafeTech (11 August 2022), no baseline information was available on the background noise in the area. However, due to the semi-rural nature of the area, noise levels are expected to be low with the most noise generated from vehicles travelling on the R354 regional route. Furthermore, noise receptors in the proposed OHPL project area are at a good distance away as there is a very low density of occupation around the proposed OHPL servitude. Sound generated from the existing WEFs is highly likely to be masked by the wind noise.

6.1.4 TOPOGRAPHY

The following is extracted from the Desktop Geotechnical Assessment, compiled by JG Afrika (July, 2022) and the Visual Impact Assessment compiled by SiVest (July, 2022) included as ***Appendix F10****.*

The study area is drained by non-perennial tributaries of Tankwa River, Wilgebos River and an unnamed River. The tributaries form dendritic drainage patterns. The Tankwa River buffers the northern and the cuts across the central part of the site. The powerline crosses an unnamed perennial river south of the site. The Wilgebos River falls outside of the energy development zone.

The slope gradient map (**Figure 6-1**) indicates that the southern portion of the powerline is characterised by flat to gentle terrain (0˚ – 2.3˚ and 2.3˚ – 5.5˚ slopes). The majority of the powerline route is characterised by gentle to steep terrain (5.5˚ – 17.3˚ slopes). The slope gradient map indicates isolated areas of steep, mountainous terrain (>21˚ slopes) in the valleys of the study site. Spot heights indicate elevation values of 1353m above mean sea level. The slope aspect map (**Figure 6-2**) further highlights the relief difference with elevation values ranging between 900-1100 metres above sea level in the central portion of the site.

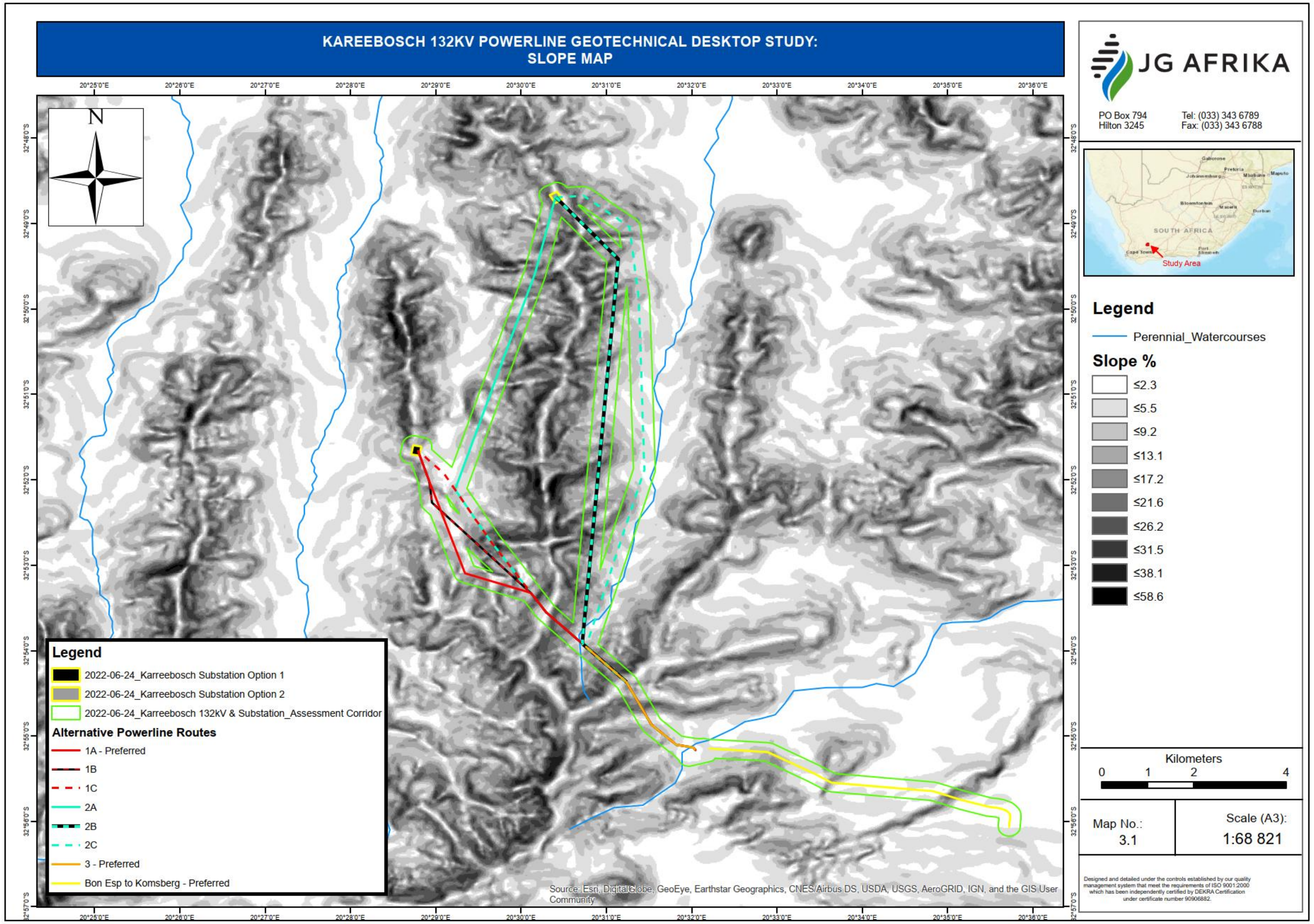


Figure 6-1: Slope and watercourses of the Project area (source: JG Afrika, 2022)

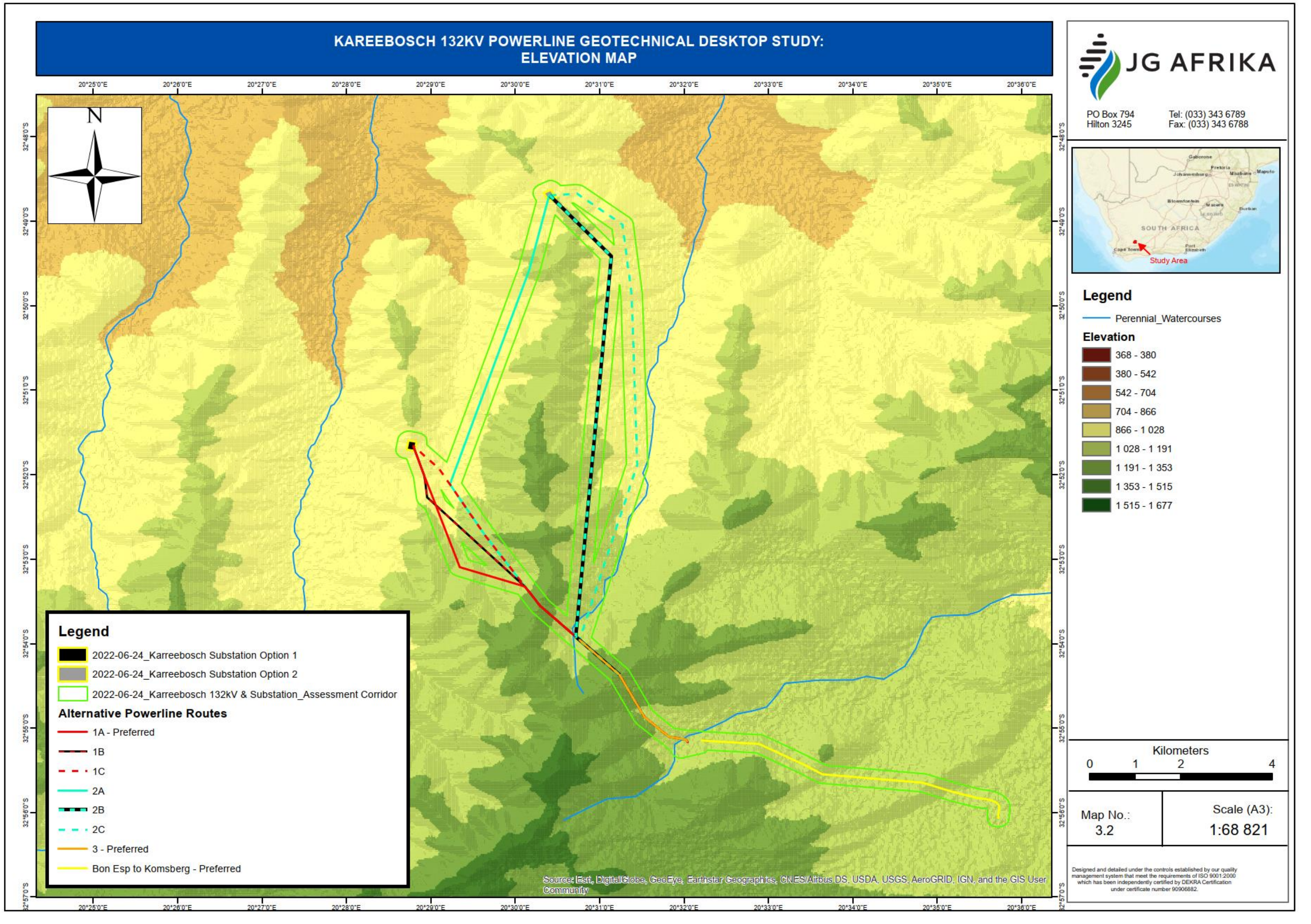


Figure 6-2: Elevation and watercourses of the Project area (source: JG Afrika, 2022)

The proposed powerline and substation are located in the scenic Karoo region of the Western / Northern Cape which is generally associated with wide vistas and mountainous landscapes. The topography in the broader study area is largely dominated by the mountains/hills at the southern end of the Klein Roggeveld range. Much of the study area is therefore dominated by the steep slopes and broad ridges of these mountains and escarpments **(Figure 6-3, Figure 6-4** and **Figure 6-5)**.

Maps showing the topography and slopes within and in the immediate vicinity of the combined assessment area are provided in **Figure 6-6** and **Figure 6-7** below**.**

Figure 6-3: View (SE) from R354 main road showing mountainous terrain associated with the Klein-Roggeveld range to the east

Figure 6-4: View (SSE) from the farmstead on Portion 1 of Klipbanks Fontein No 198 showing the relatively hilly terrain across the study area

Figure 6-5: View (WNE) from R354

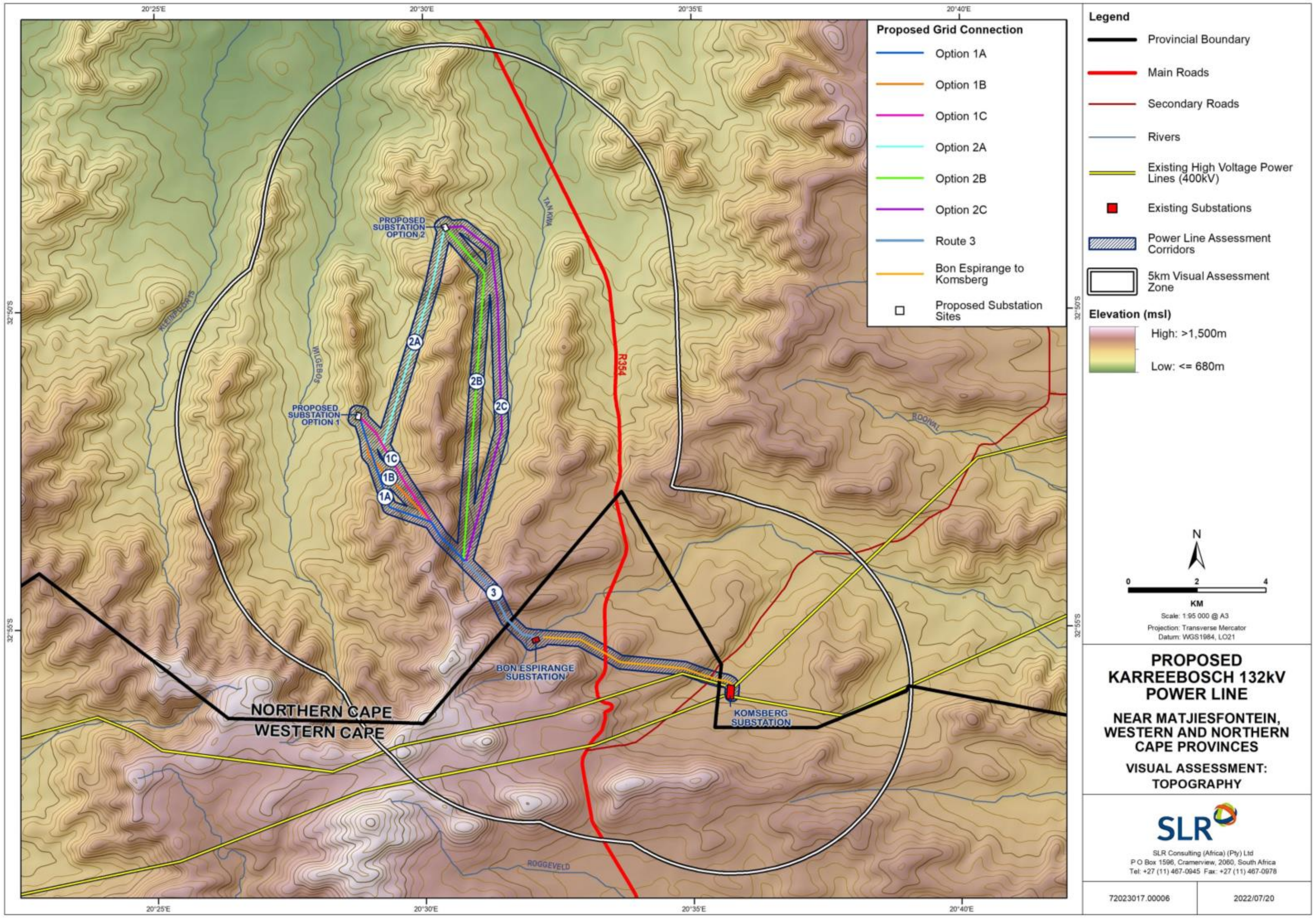


Figure 6-6: Topography of the study area

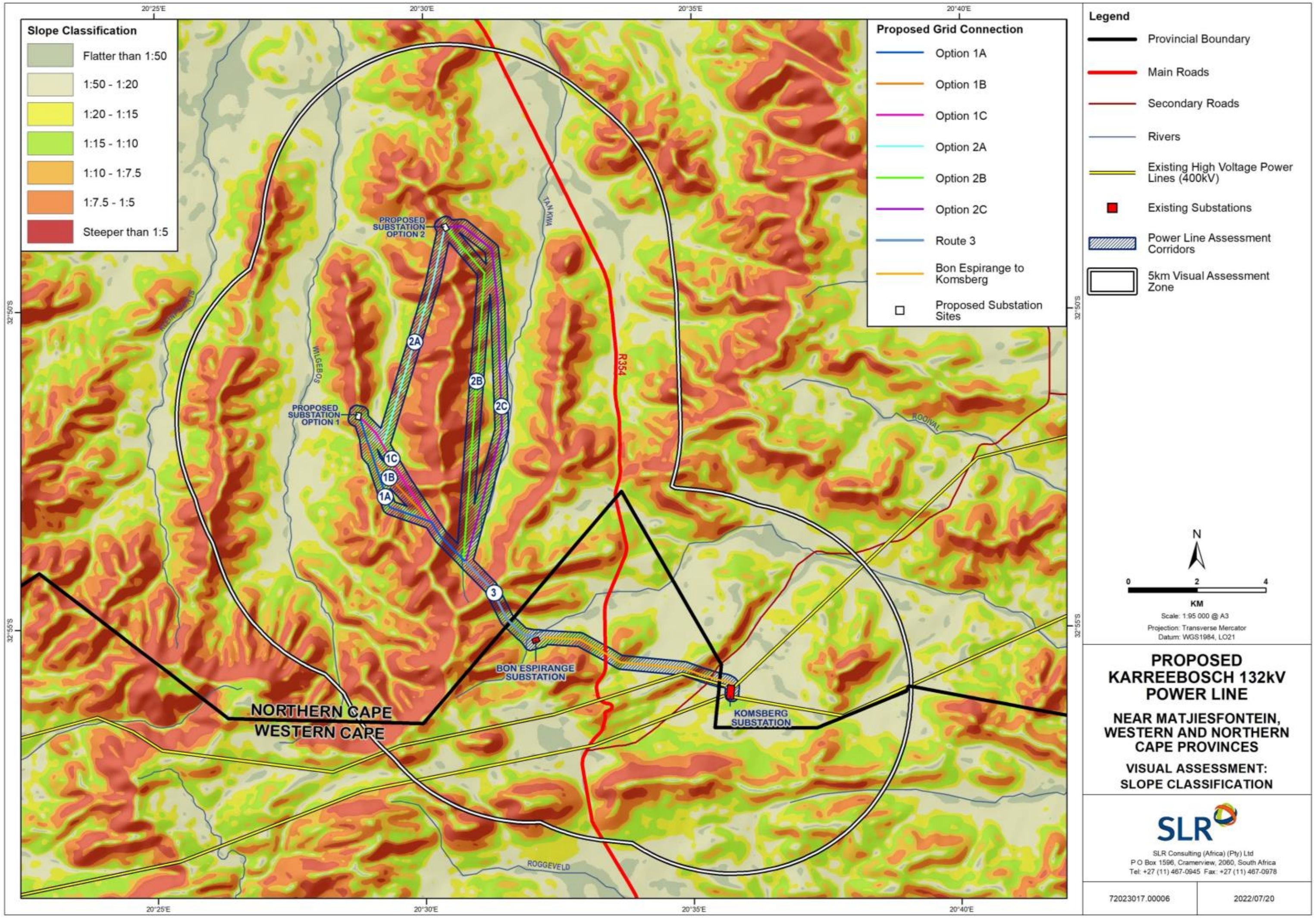


Figure 6-7: Slope classification of the study area

6.1.5 GEOLOGY AND SOILS

*The following is extracted from the Desktop Geotechnical Assessment, compiled by JG Afrika (July, 2022) and included as **Appendix F6**.*

According to the 1: 250 000 Geological Map (3220) of Sutherland published by the Council for Geoscience, the study area is underlain by rock units of the Abrahamskraal (Pa) Formation which forms part of the Adelaide Subgroup, forming part of the Beaufort Group. The Beaufort Groups forms part of the greater Karoo Supergroup (**Figure 6-8**).

The Abrahamskraal Formation (Pa) is represented by grey and green mudstone, siltstone and subordinate sandstone. Thin chert beds are common on the lowermost red mudstones of the Abrahamskraal Formation. Regional measurements indicate that the rock units dip 270° in a westerly direction, 07° in a northerly direction and 315° in a north westerly direction.

The sedimentary rocks in the area have been acted upon by numerous tectonic forces resulting in fold structures. Based upon the geology map, four fold features are located within the study area. The fold axes trend in an E-W direction and represent localized synclines and anticlines which form part of the Cape Fold Belts.

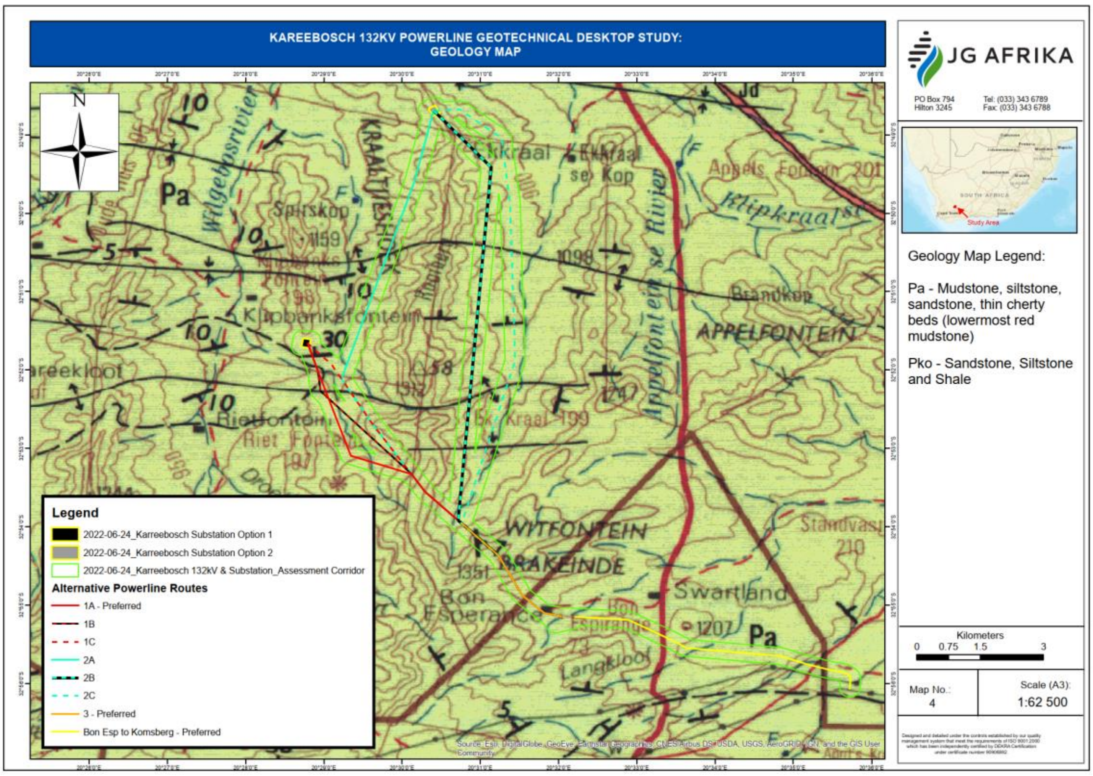


Figure 6-8: Geology of the project area

ENGINEERING GEOLOGY

The engineering geology refers to the engineering characteristics of natural earth material for founding structures and suitability for construction material purposes. The study area is characterized by a Weinert N value of more than 10, meaning that the type of weathering is primarily by mechanical disintegration. Shallow residual soils are commonly granular and gravelly (Brink, 1983). The study area is dominated by the Abrahamskraal Formation. Colluvial deposits can be anticipated along hillslopes with alluvial deposits anticipated near drainage features.

Based on previous investigations in the greater Roggeveld area, blocky, greyish-red mudstone with interbedded grey very fine to medium-grained quartzofeldspathic sandstone can be anticipated.

Weathered, limestone layers of up to 1.5m in thickness may be present. Greenish-grey cherty layers, of a few centimetres to two metres thickness, may also be present in the Abrahamskraal formation. The chert and limestone layers possess potentially soluble properties.

Where material is required for the construction of roads and laydown areas, natural gravely or crushed sandstone bedrock can potentially be a suitable source. Consideration must be given to the presence of excessive pyrite and muscovite which can cause distress where sandstone is used as basecourse (Brink, 1983). In addition, where chemical stabilization is required the clay matrix of sandstones make them suitable for stabilization with lime (Brink, 1983). The occurrence, nature, material quality and quantity of sandstone and other potential construction material will have to be assessed during the detailed geotechnical investigation.

Mudrocks such as siltstone, mudstone and “mud-shales” are not considered suitable for use as construction material, due to their swelling characteristics, excessive absorption of water, poor engineering performance and lack of durability. Slope stability issues can arise in areas where closely intercalated sandstones and mudrock exist. When mudrocks slake or disintegrate the exposed sandstone layers are undercut, this can result in rockfalls (Brink, 1983). Based on previous investigations in the Roggeveld area, concave cave structures can be anticipated through erosion of the less-competent shale and mudstone bedrock beneath the hard sandstone beds when exposed to the elements.

Based on previous investigations in the Sutherland area (Verlatekloof Pass), the Abrahamskraal Formation is represented by maroon mudstone, greenish grey siltstone and olive grey sandstone. These sedimentary units are intercalated and display variable weathering, as described for the Formation.

6.1.6 GEOHYDROLOGY

*The following is extracted from the Desktop Geotechnical Assessment, compiled by JG Afrika (July, 2022) and included as **Appendix F6.***

The northern portion of the study area lies within the E23A catchment area which receives a mean annual precipitation of 254mm. The southern portion lies within the J11D catchment area which receives a mean annual precipitation of 240mm.

According to the 1: 3 000 000 scaled Groundwater Harvest Potential Map of South Africa, Regional yields of sustainable groundwater abstraction rates, indicate that the study area lies in areas with values of 6000 - 10 000 m3/km2/annually and 10 000 – 15 000 m3/km2/annually.

Regional hydrogeological data indicate the aquifer type is classed as ‘b2’ which is a, fractured aquifer type. Regional borehole data indicate relatively low yields, estimated to be in the range of 0.1-0.5 l/s. Fractured aquifers (designation b) form as a result of discontinuities, such as faults, fractures and joints, in hard bedrock. These form the primary porosity conduits in which groundwater moves.

An extract of the regional Hydrogeological Map is presented as **Figure 6-9**. The structural geology in the study area is conducive to the formation of high-yielding aquifer formations.

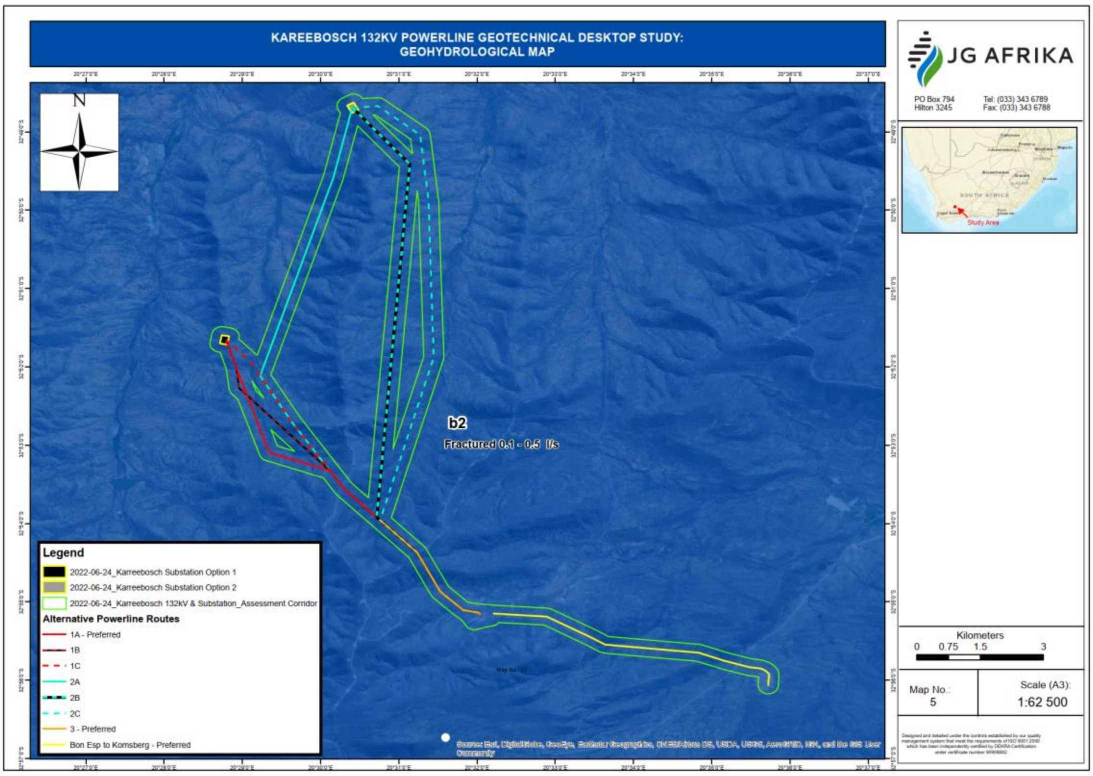


Figure 6-9: Geohydrology of the Project area

6.1.7 HYDROLOGY

The following is extracted from the Hydrological Assessment, Storm Water Management & Erosion Control Plan compiled by NatureStamp (2022) ***(Appendix F11).***

NatureStamp (2022) concluded through the flood analysis that the proposed OHPL infrastructure and associated access roads will not be at risk of damage through flooding from the channels. This is largely due to the general low rainfall in the area and the small catchments on the site, resulting in less accumulated surface runoff (**Figure 6-10**). A Stormwater and erosion management plan has been included in the Hydrology Assessment Report in **Appendix F11**.

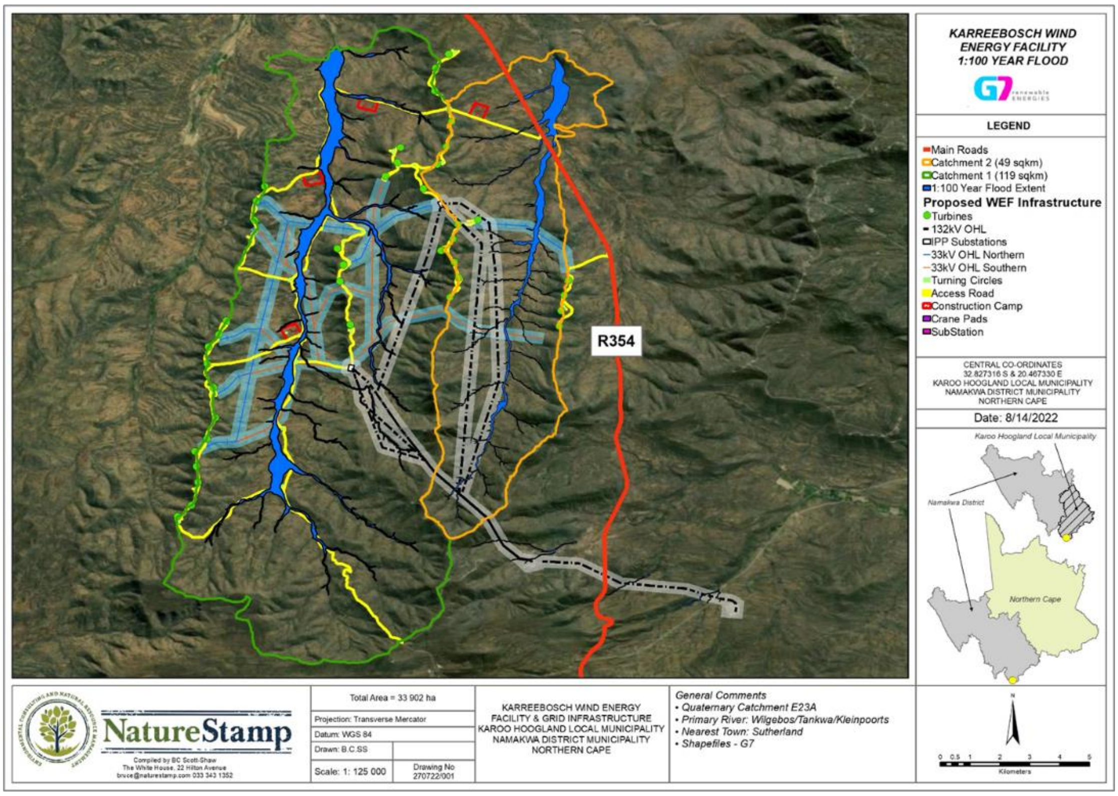


Figure 6-10: Steady state analysis of the 1:100 year flood event for the proposed Karreebosch WEF and Grid infrastructure

6.1.8 SURFACE WATER

*The following is extracted from the Freshwater Ecological Assessment, compiled by FEN Consulting (July, 2022) and included as **Appendix F5**.*

As per the Freshwater Ecological Assessment, compiled by FEN Consulting and included as **Appendix F5,** the proposed OHPL route is located within the Olifants Doorn and Gouritz Water Management Areas (WMA). **Table 6-2** provides a summary of the aquatic ecoregion and subregion of the Project area.

Table 6-2: Aquatic Ecoregion and Subregion of the Project Area

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

Ecoregion	Great Karoo
Catchment	Olifants – Cape and Gourits
Quaternary Catchment	E23A and J11D
WMA	Olifants/Doorn and Gouritz
Sub WMA	Doring and Groot

RIVER AND WETLANDS – NFEPA (2011)

As per the NFEPA database (2011), the headwaters of the Tankwa River and an unnamed tributary of the Meintjiesplaas River system are located in the investigation area (**Figure 6-11**). The Tankwa River is considered to be in a moderately modified ecological condition (RIVCON = C) according to the NFEPA database (2011) and the PES 1999 dataset, while unnamed tributary of the Meintjiesplaas River system is considered to be largely natural with only a few modifications (RIVCON = AB) but considered to be in a moderately modified (Class C) ecological condition by the PES 1999 dataset.

According to the NFEPA database (2011), only two natural wetlands are located within 500m of the southern portion of the investigation area, which was required by DWS. None of these features will be directly traversed by the proposed development. These wetlands are classified as a seep and a channelled valley bottom wetland and considered to be in a moderately modified (WETCON = C) and natural or good (WETCON = AB) ecological condition respectively.

WETLAND VEGETATION TYPES – NFEPA (2011)

The southern portion of the investigation area is located in the Karoo Shale Renosterveld Wetland Vegetation type (least threatened) and the northern portion in the Rainshadow Valley Karoo (Skv) Wetland Vegetation type (critically endangered) (**Figure 6-12**). The threat status of each wetland vegetation type is provided by Mbona et al. (2015). The proposed development will not impact this vegetation type.

SOUTH AFRICAN INVENTORY OF INLAND AQUATIC ECOSYSTEMS (SAIIAE) – NBA (2018)

According to the NBA 2018: SAIIAE the headwaters of the Tankwa River and an unnamed tributary of the Meintjiesplaas River system are located within the investigation area; this corresponds with the rivers identified by the NFEPA Database. These rivers are considered to be in a moderately modified ecological condition (Class C). The Ecosystem Threat Status (ETS) of the rivers are least threatened, and the ecosystem protection level (EPL) thereof is poorly protected. A natural seep and channelled valley wetland are located in the southern portion of the investigation area (corresponding to the two natural wetland identified by the NFEPA database). Both these wetlands are considered to be in a heavily to severely/critically modified ecological condition (WETCON = D/E/F). The ETS of the seep wetland is of least concern but is considered to be critical for the channelled valley bottom wetland. The EPL of both these wetlands are not protected.

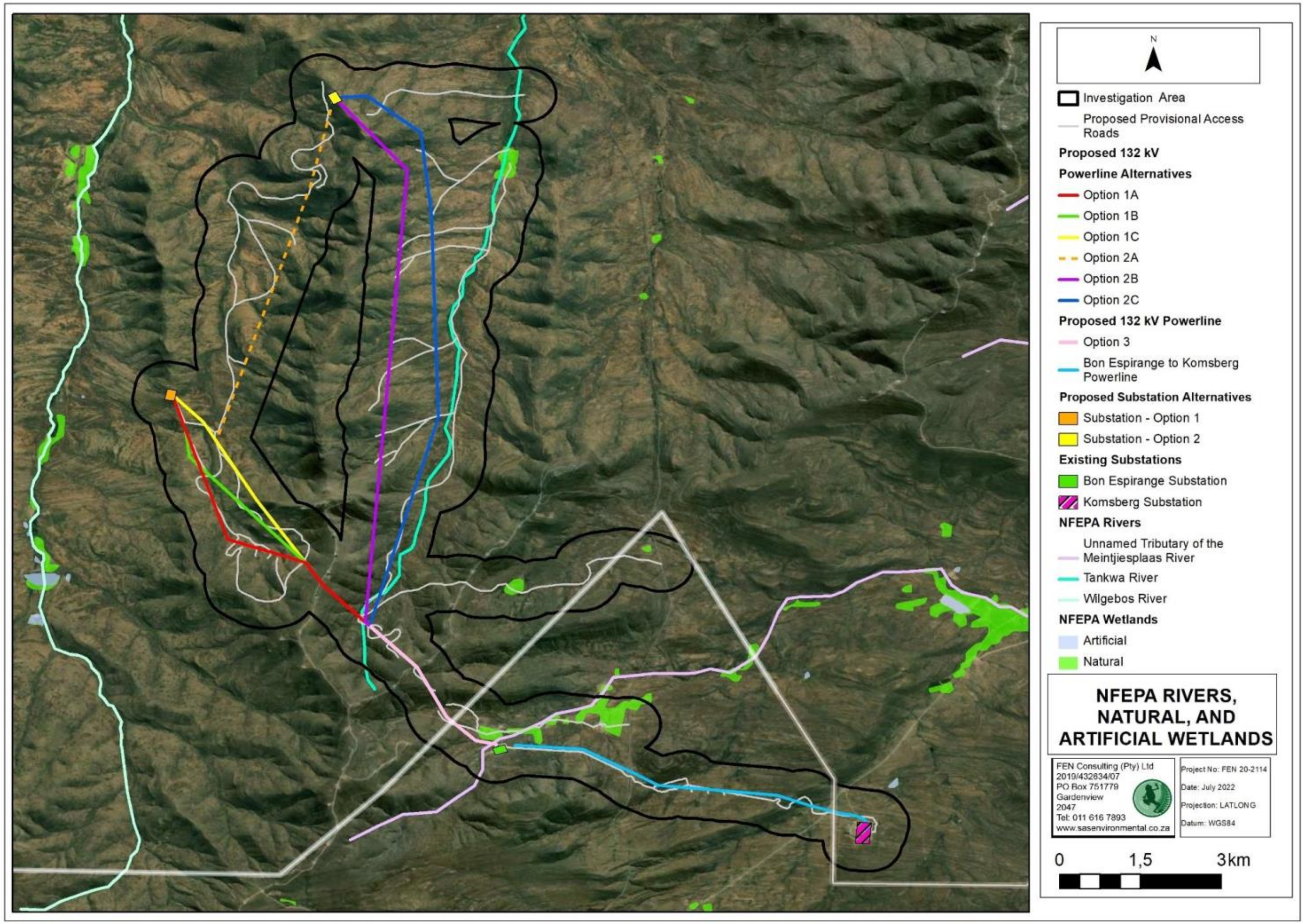


Figure 6-11: Natural and artificial wetlands associated with the proposed development and investigation area, according to the NFEPA database (2011).

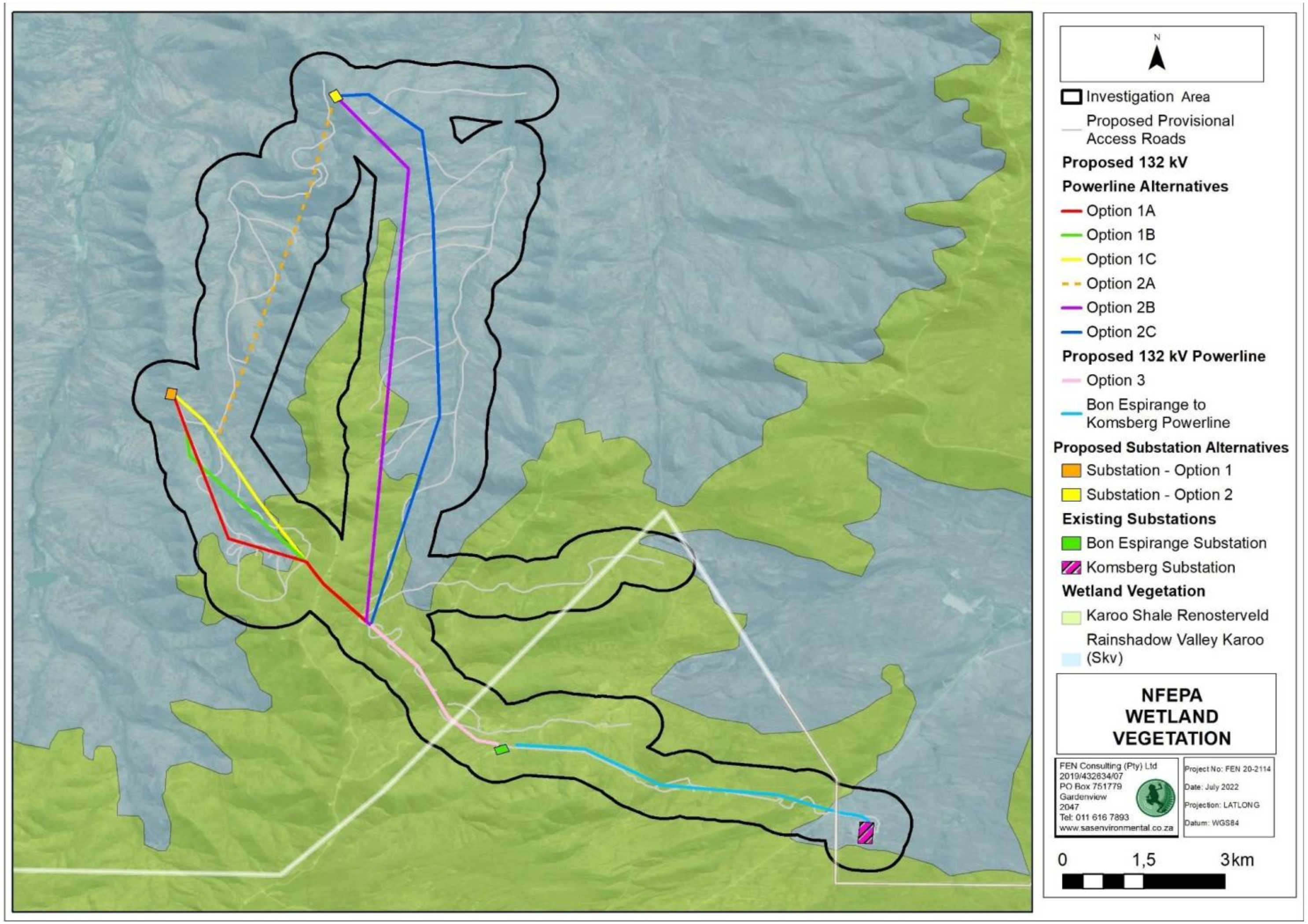


Figure 6-12: Wetland vegetation types associated with the proposed development and investigation area, according to the NFEPA database (2011).

Watercourses associated with the Tankwa River system, Wilgebos River system and Meintjiesplaas River system are traversed by the proposed development.

The watercourses to be traversed by the proposed project (including the OHPL and substation) development and those identified within the investigation area can best be described as headwater episodic[7] drainage lines (EDLs) without riparian vegetation. These systems flow into larger ephemeral tributaries with riparian vegetation, which ultimately flow into the larger riverine systems located outside of the investigation area. Although these EDLs cannot be classified as riparian resources in the traditional sense, due to the lack of saturated soil and riparian vegetation, they do still function as waterways, through episodic conveyance of water.

However, based on the definition of a watercourse water flows regularly or intermittently within these EDLs, conveying water from the upgradient catchment area into the downgradient tributaries and eventually into the larger river systems. As such, they can be considered as watercourses due to their importance for hydrological functioning as they do function as waterways and therefore enjoy protection in terms of the National Water Act, 1998 (Act No. 36 of 1998).

The delineated extent of the identified watercourses associated with the proposed development is presented in **Figure 6-13** to **Figure 6-16**.

[7] "Highly flashy systems that flow or flood only in response to extreme rainfall events, usually high in their catchments. May not flow in a five-year period or may flow only once in several years." (Uys and O'Keeffe, 1997, in Rossouw et. al, 2006).

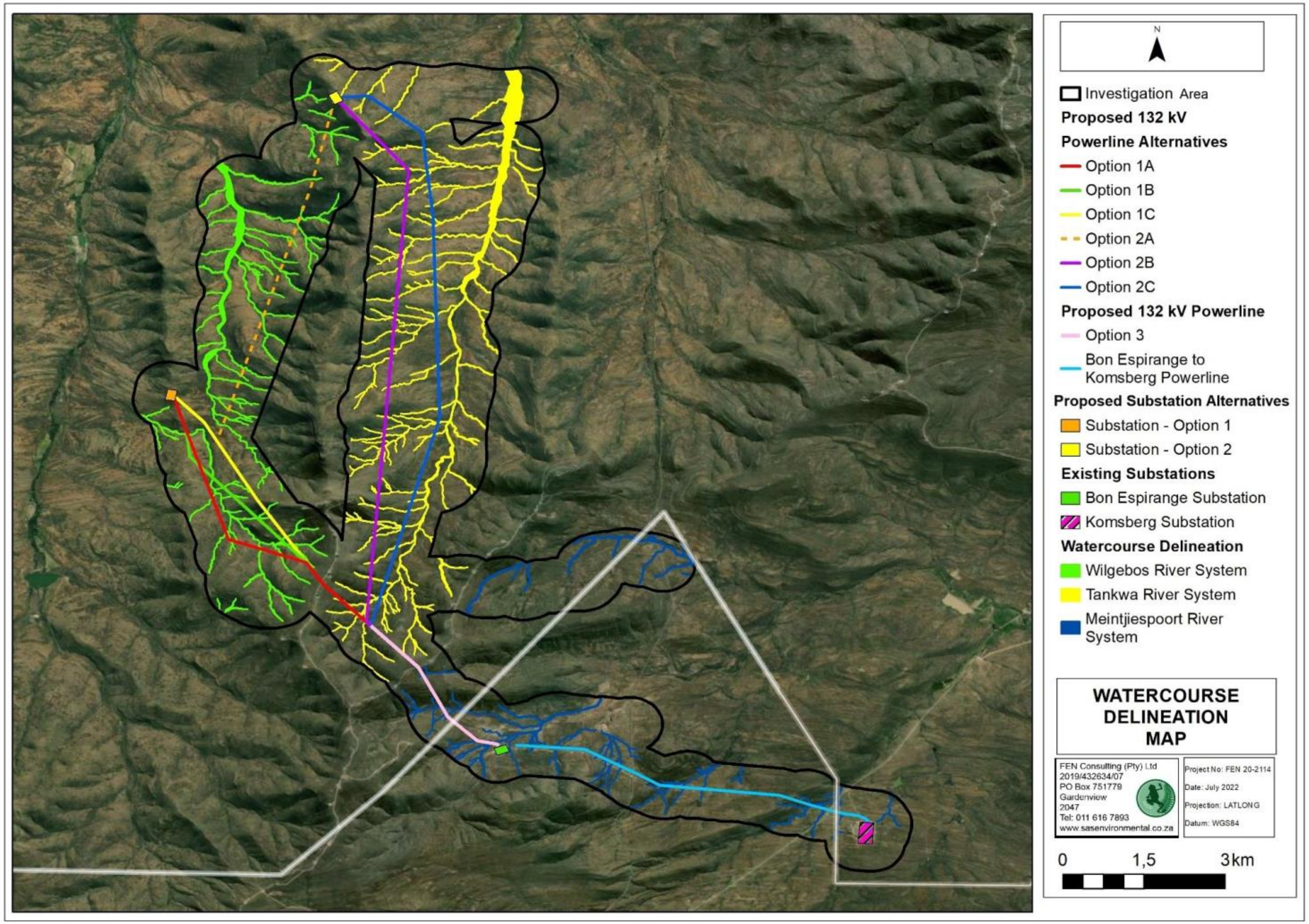


Figure 6-13: The locality of the delineated watercourses associated with the proposed development.

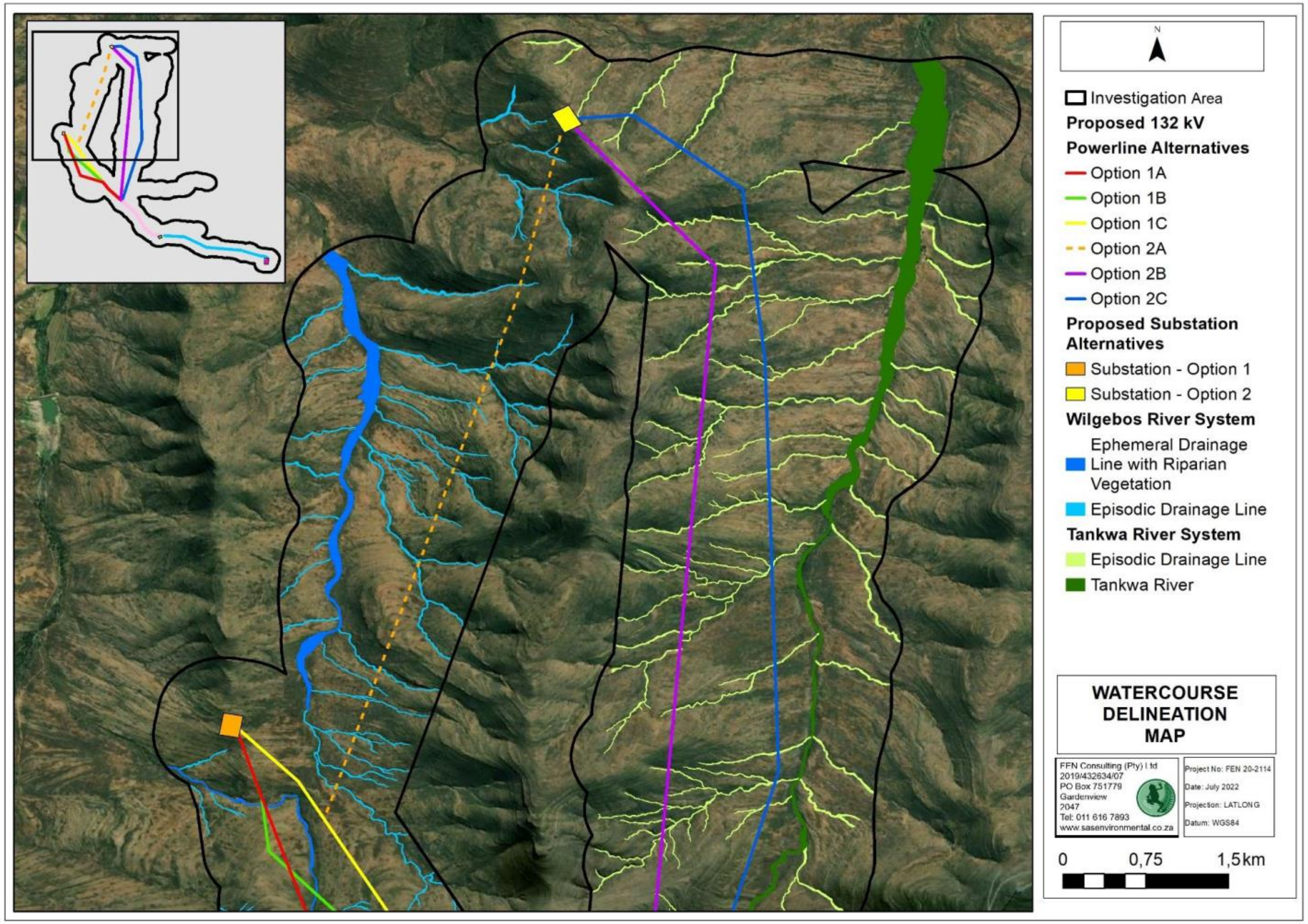


Figure 6-14: The locality of the delineated watercourses of the Wilgebos and Tankwa River system associated with the northern portion of the investigation area (Take note due to the scale of the map: Substation Option 2 is located approximately 20m from the delineated extent of an episodic drainage line).

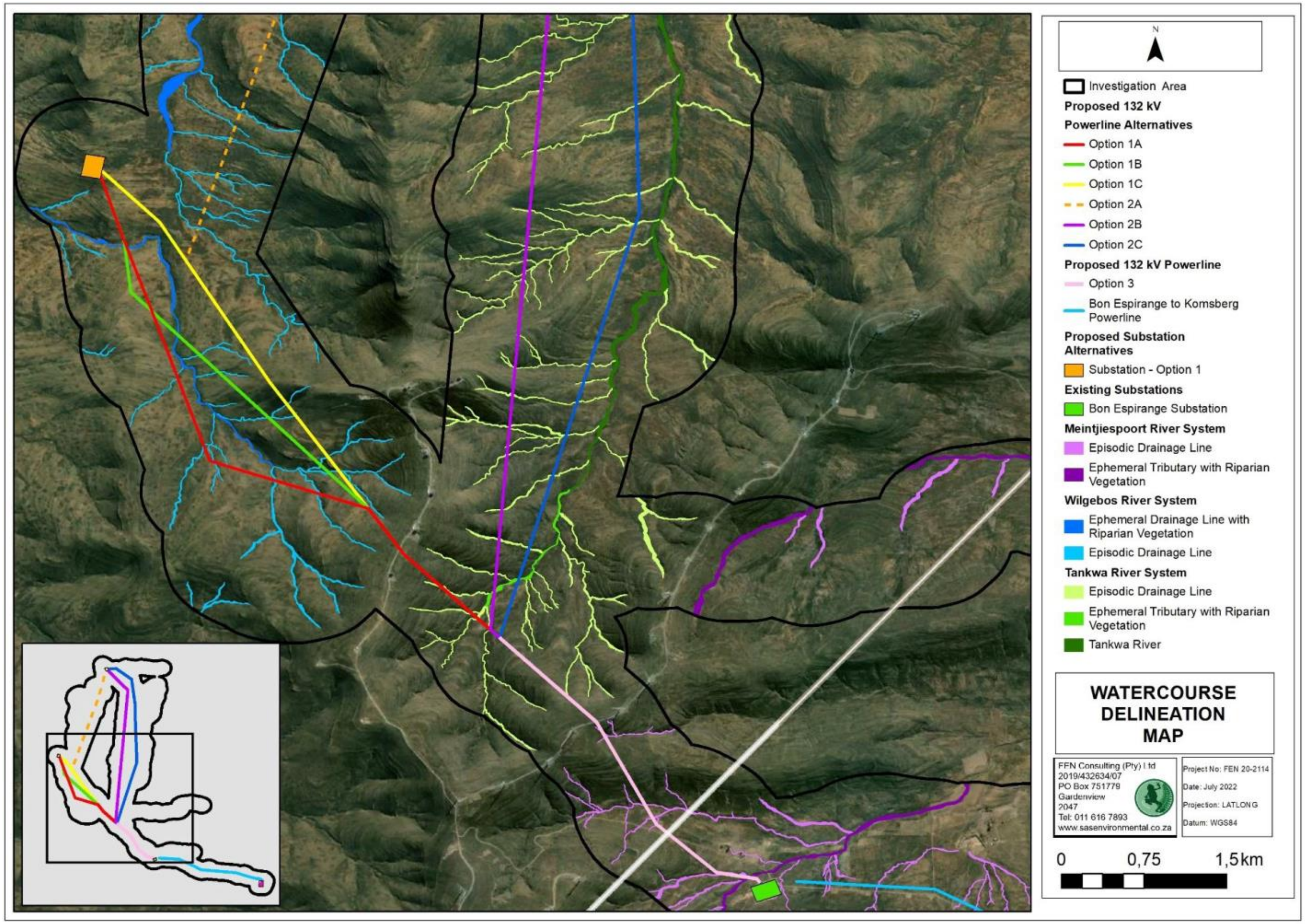


Figure 6-15: The locality of the delineated watercourses of the Wilgebos and Tankwa River system associated with the central portion of the investigation area.

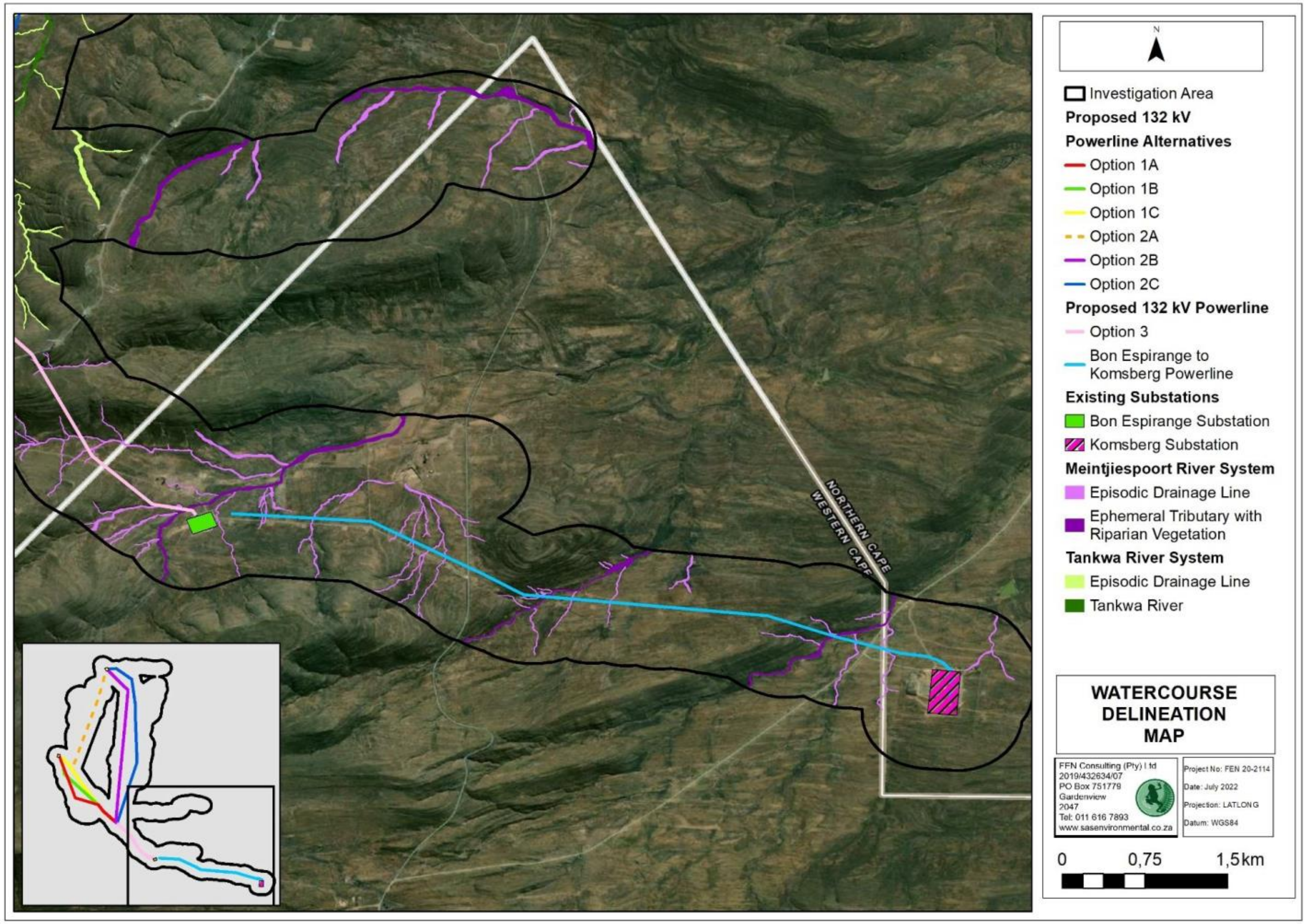


Figure 6-16: The locality of the delineated watercourses of the Tankwa and Meintjiesplaas River system associated with the southern portion of the investigation area.

The watercourses were classified as Inland Systems, located within the Great Karoo Ecoregion. **Table 6-3** below presents the classification from level 3 to 4 of the Wetland Classification System (Ollis et al. 2013).

Table 6-3: Classification of the watercourses associated with the proposed development

WATERCOURSE	LEVEL 3: LANDSCAPE UNIT	LEVEL 4: HYDROGEOMORPHIC (HGM) TYPE
Ephemeral tributaries with riparian vegetation	Valley Floor: the base of a valley, situated between two distinct valley side-slopes, where alluvial or fluvial processes typically dominate.	A linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water
Episodic Drainage Lines	Slope—an inclined stretch of ground typically located on the side of a mountain, hill or valley, not forming part of a valley floor. Includes scarp slopes, mid-slopes and foot-slopes	

EPISODIC DRAINAGE LINES (EDLS) ASSOCIATED WITH THE WILGEBOS, TANKWA AND MEINTJIEPLAAS RIVER SYSTEMS

EDLs arise from the Rooiberg mountainous area located between the Wilgebos and Tankwa River systems, with the EDLs of the Meintjiesplaas River system rising from the southern extent of this mountainous area. The identified EDLs are considered part of the headwaters of these larger river systems, as they are located in the landscape where runoff flows as surface water over impermeable bedrock at the point of outcropping. Road crossings and small instream impoundments within the EDLs have resulted in small changes to existing flow patterns. However, overall, changes to the hydrological functioning of the EDLs are not pronounced and allow for uninterrupted hydrological functionality of the downstream systems. The vegetation associated with the EDLs are predominantly short growing shrubs, but no facultative wetland vegetation species were identified within these EDLs. The vegetation cover within the immediate vicinity of the EDLs (along its active channel) remains fairly intact and indicative of the natural species composition expected of the vegetation type, however some invasive species were present in areas where disturbance has occurred (i.e., road crossings). Some erosion of the downstream reaches of the EDLs just below the instream impoundments and at road crossings were noted, however, it is not considered significant. Despite erosion noted within isolated areas of the EDLs, no significant deposition of sediment was observed.

EPHEMERAL TRIBUTARIES ASSOCIATED WITH THE WILGEBOS, TANKWA AND MEINTJIEPLAAS RIVER SYSTEMS

The ephemeral tributaries identified within the investigation area have remained largely intact, however these watercourses have seen more frequent impacts due to their lower position in the landscape, confluencing with the larger river systems outside the study area (of specific mention in the unnamed tributary of the Meintjiesplaas River which have seen more frequent impact due to the construction of a nearby substation). These disturbances have resulted in some bank erosion, an increase in the presence of alien vegetation species and some loss of tree diversity within the riparian zone (albeit not considered extensive). These tributaries function as migratory corridors due to their connectiveness with the smaller EDLs and larger river systems (thus high hydrological connectivity in the landscape). They also provide habitat for a variety of faunal species, even more so due to the presence of small trees species within the marginal zone.

6.1.9 VEGETATION

*The following is extracted from the Biodiversity Impact Assessment compiled by Trusted Partners (August ,2022) and included as **Appendix F4**.*

Two vegetation units (**Figure 6-17**) are traversed by the proposed powerline and substation (National Vegetation Map, 2018). The site is located within Central Mountain Shale Renosterveld and Koedoesberge-Moordenaars Karoo (both Least Concern). A general description of the vegetation unit is provided below (as per Mucina & Rutherford, 2018) as a reference point for the baseline vegetation composition.

The vegetation occurring within the area surrounding the site and area of influence is Central Mountain Shale Renosterveld on the higher mountains and slopes, transitioning with Koedoesberge-Moordenaars Karoo on the lower mountains and valleys in the south, east and west with strong Tanqua Karroo influences in the west and Tanqua Escarpment Shrubland in the north. Tanqua Wash Riviere elements are found encroaching towards the site from the west, into the lower lying valleys running south, north and westwards (**Figure 6-17**). It is further evident that the Koedoesberge-Moordenaars Karoo present on the west side of the project area has several dominant species not occurring on the western side, with appearance of species such as *Euphorbia hamata* suggesting that the vegetation unit in this area may be more closely aligned with the Tanqua Karoo than with the Moordenaars-Karoo found to the east.

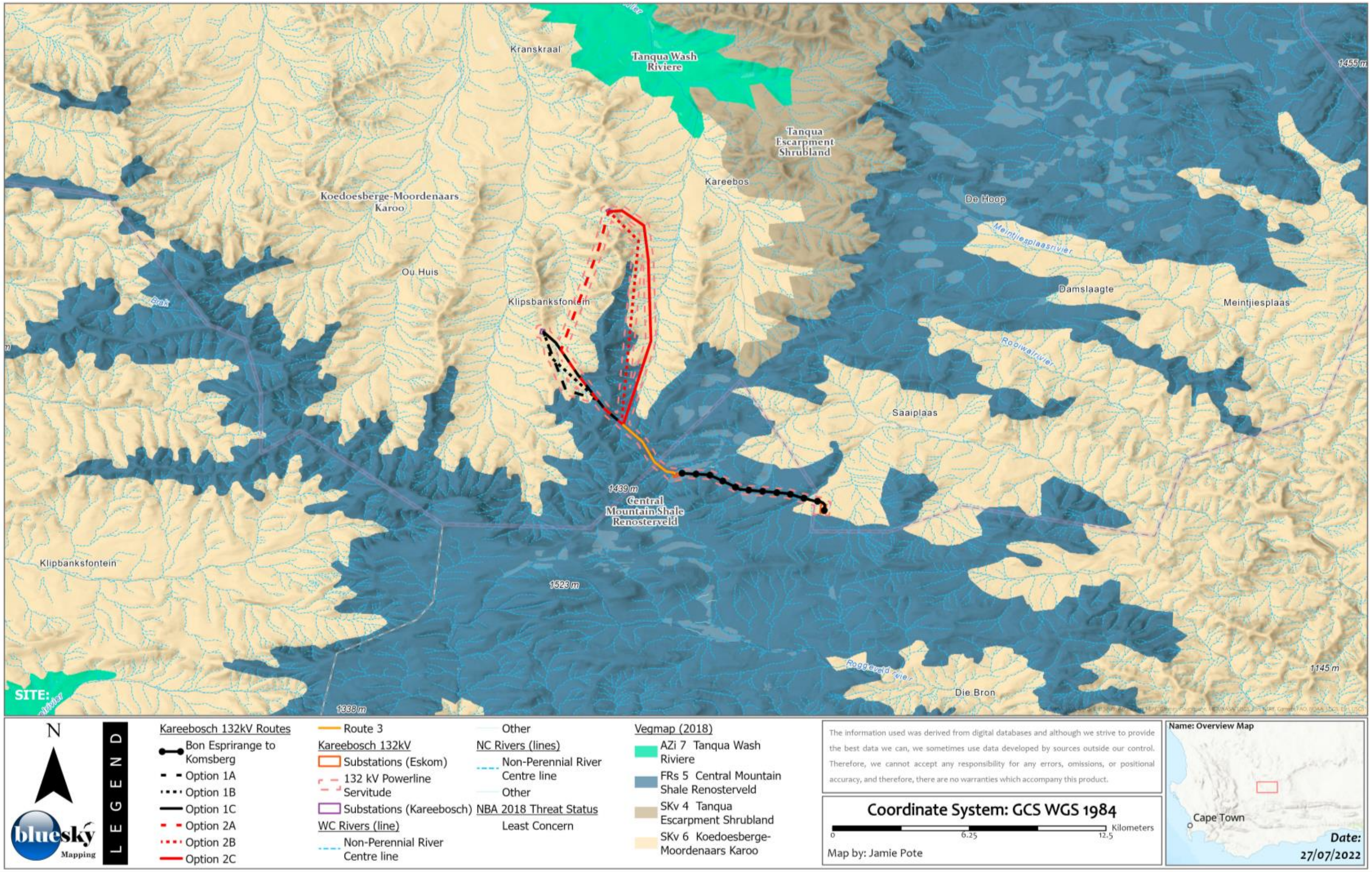


Figure 6-17: National Vegetation Map (2018) and conservation status (NBA, 2019)

Central Mountain Shale Renosterveld is the predominant vegetation occurring on higher lying mountains, slopes and valleys within the site area at an altitude of around 1 050–1 500 m. Regionally, this unit occurs within the Northern and Western Cape Provinces particularly on the southern and south-eastern slopes of the Klein-Roggeveldberge and Komsberg below the Roggeveld section of the Great Escarpment (facing the Moordenaars-Karoo) as well as farther east below the Besemgoedberg and Suurkop, west of Merweville and in the west in the Karookop area between Losper se Berg and high points around Thyshoogte.. The vegetation occurs on slopes and broad ridges of low mountains and escarpments, with tall shrubland dominated by Renosterbos and large suites of mainly non-succulent karoo shrubs and with a rich geophytic flora in the undergrowth or in more open, wetter or rocky habitats.

The Koedoesberge-Moordenaars Karoo vegetation is the predominant vegetation occurring on lower-lying valleys, slopes and mountains at lower elevations, of around 500–1 250 m, to the north, west and south of the project area. Regionally, the unit is found within the Western Cape and Northern Cape provinces in the vicinity of the Koedoesberge and Pienaar se Berg low mountain ranges bordering on southern Tanqua Karoo to the west and separated by the Klein Roggeveld Mountains from the Moordenaars-Karoo in the broad area of Laingsburg and Merweville to the east. The unit also includes the Doesberg region east of Laingsburg and piedmonts of the Elandsberg as far as beyond the Gamkapoort Dam at Excelsior (west of Prince Albert). The vegetation is comprised of a slightly undulating to hilly landscape covered by low succulent scrub and dotted by scattered tall shrubs, patches of 'white' grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia, Drosanthemum* and *Galenia*.

Tanqua Karoo, although not spatially associated with the project area, is represented by species common to the unit along the western sides of the greater project area. Regionally it is found at lower altitudes (240–960 m) in the Western and Northern Cape Provinces in basin encompassing valleys of the Tanqua and Doring Rivers between Cederberg (Swartruggens) in the west, the Roggeveld Escarpment in the east and Klein Roggeveld Mountains in the southeast; towards the north this unit borders on higher elevated plains of the Hantam Karoo.

It is present on slightly undulating intra-mountain basins sheltered by steep slopes of mountain ranges. The plain is interrupted by a series of solitary dolerite butts and elevated ridges, extensive, flat sheet-washes and deeper incised channels of intermittent rivers (these habitats support vegetation of the Tanqua Wash Riviere). The plains are very sparsely vegetated (low succulent shrubland with *Ruschia, Drosanthemum, Aridaria, Augea, Zygophyllum*), in extreme precipitation-poor years appearing barren, while the slopes of the koppies and adjacent mountain piedmonts support well-developed medium-tall succulent *Euphorbia hamata–Pteronia incana* shrubland (Rubin 1998). Small quartz patches occur in the southern Tanqua Basin. Annual flora (*Gazania lichtensteinii, Euryops annuus, Ursinia nana*) becomes conspicuous with sufficient precipitation, while geophytes and grasses play a subordinate role. *Stipagrostis ciliata* and *S. obtusa* can become locally dominant in places. The unit occurs on Mudrocks, Dwyka Group diamictites and sandstones (Bokkeveld Group) and soils are sandy-loamy of various depths. Quartz patches are a rare phenomenon concentrated in the southern portions of the Tanqua Basin.

Although not directly associated with the project footprint, influences from Tanqua Escarpment Shrubland elements are prevalent along the northern and western sides of the greater project area. The unit is present in the Northern Cape province along a narrow belt on northwest-facing slopes of the Klein-Roggeveldberge and on southwest-facing and west-facing slopes of the Roggeveld Escarpment as far north as Bloukrans Pass, south of Calvinia. Generally found at altitudes between 620–1 600 m. The vegetation is found on steep flanks below an escarpment overlooking a basin, generally facing southwest supporting succulent shrubland of medium height with *Tylecodon* (Botterboom) and *Euphorbia mauritanica* (melkboom) prominent and with undergrowth of both succulent (*Aridaria, Crassula*) and non-succulent (*Asparagus, Pteronia*) shrubs.

Also not directly associated with the project footprint, being found in the lower lying alluvial valleys to the west of the project area, Tanqua Wash Riviere elements are represented along watercourses in the valleys that drain towards the north, west and south of the project area. The unit is found within the Western Cape and Northern Cape Provinces along alluvia of the Tankwa and Doring Rivers and sheet-wash plains of their less important tributaries embedded within Tanqua Karoo (SKv 5). It is found at altitude ranging from 300–1 000 m within deeply incised valleys of intermittent rivers supporting a mosaic of succulent shrublands with *Salsola* and *Lycium* alternating with *Acacia karroo* gallery thickets. The broad sheet-wash plains support sparse vegetation of various Salsola species, often building phytogenic hillocks interrupting the monotonous barren face of a sheet wash. Occasional rainfalls in early winter result in localised displays of annuals and early flowering geophytes along washes.

Several endemic and range restricted species are known from the surrounding area. None listed as per the National Screening Tool were confirmed to be present, although it is possible that some individuals of these species could occur, since several similar species were noted to be present as isolated individuals and/or small scattered populations. Note, there is a residual very-low possibility that these species could be present, and cannot be discounted without extensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, and the homogenous nature of the vegetation unit, the risk of a species suffering any significant loss is very low. A flora search and rescue procedure will be required before any clearing commences, as several regionally protected species are present.

RED LISTED, ENDEMIC AND PROTECTED FLORA

Listed species were flagged from the *Biodiversity Impact Assessment compiled by Trusted Partners (August ,2022)* and included as **Appendix F4**. as occurring in the region and having an elevated conservation status. All were cross-checked for distribution overlay and were actively screened for presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. The site falls within the general distribution range of many endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable, Near Threatened or Rare. Some of these species are also only from a single or a few populations. No Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area.

Based on observations made during the site visit, many of the listed species are typically geophytic or succulent species and tend to be present as broadly scattered individuals or occur in small, localised clusters. The more specialised habitats within the broader Renosterveld and Karroid mozaic habitat have been identified and indicated as being of higher sensitivity, including rocky outcrops, which are generally localised. These habitats are generally less resilient to disturbance compared to the vegetation communities present in the widespread sandy habitat and being localised, can be more easily avoided during placement of pylons, by spanning the affected areas, or minimising the number of pylons and access roads and tracks within such areas.

Due to the prevalence of many species belonging to various broadly protected groups, such as the *Aizoaceae*, *Crassulaceae, Iridaceae, Asphodelaceae* and *Amarylidaceae*, protected in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) being present, permits will be required as well as a pre-commencement flora search and rescue. A final site walkdown/assessment of the full corridor was undertaken by the specialist during the appropriate season (early spring), so micro-siting could be done after search and rescue has been completed based on his list of identified Species of Conservation Concern.

Potential and confirmed protected species are listed in the Biodiversity Assessment in **Appendix F4** and include:

— Numerous species protected in terms of the Northern Cape Nature Conservation Act (Act no. 9 of 2009), Schedule 1 or 2 and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) were recorded. These species generally have a more widespread distribution. Permits will be required in terms of the respective Acts for their relocation and/or destruction before commencement.

— Sensitive Species as per the National Environmental Screening Tool having an elevated conservation status were found to occur, although most species were not found.

— No trees protected in terms of the National Forests Act were recorded.

— Several endemic species were recorded and are listed, however all of these are either confirmed to have a wider distribution range and are not deemed to be at risk or are sparse and highly unlikely that any infrastructure will pose any risk, and/or can be easily avoided during final micro siting for the substation, pylon and access road placement.

It is possible that other of the designated sensitive species are present in the surrounding area, however none were recorded within the proposed powerline route and proposed substation locations.

6.1.10 FAUNA

The following is extracted from the Biodiversity Impact Assessment compiled by Trusted Partners(August ,2022) and included as ***Appendix F4****.*

MAMMALS

At least 50 mammal species potentially occur at the site (refer to the Biodiversity Assessment in **Appendix F4**). Due to the diversity of habitats available, which includes rocky uplands, densely vegetated kloofs and riparian areas, as well as open plains and low shrublands, the majority of species with a distribution that includes the site are likely to be present in at least part of the site. The mammalian community is therefore relatively rich and due to the remote and inaccessible nature of the area probably has not been highly impacted by human activities. Larger carnivores such as jackal and caracal are persecuted by the local farmers to reduce livestock losses. Nevertheless, discussions with the local farmers indicate that these species appear to remain relatively common in the area.

There is likely to be quite a large differentiation in community composition between the lowlands and the uplands of the site. The uplands provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Smith's Red Rock Rabbit, *Pronolagus rupestris,* Namaqua Rock Mouse *Micaelamys namaquensis* and Rock Hyrax, *Procavia capensis*. The lowlands are likely to contain an abundance of species associated with lowland habitats such as deeper soils and floodplain habitats, which includes Brants's Whistling Rat *Parotomys brantsii*, the Bush Vlei Rat *Otomys unisulcatus*, Hairy- footed Gerbil *Gerbillurus paeba* and Common Duiker *Sylvicapra grimmia*. In general, the ungulates present at the site are likely to be fairly widespread. Springbuck are confined by fences and occur only where farmers have introduced them or allowed them to persist and should be considered as part of the farming system rather than as wildlife per se. Both Duiker and Steenbok *Raphicerus campestris* are adaptable species that can tolerate high levels of human activity and are not likely to be highly sensitive to the disturbance associated with the development. Klipspringer *Oreotragus oreotragus* and Grey Rhebok *Pelea capreolus* are somewhat more specialized in their habitat requirements and make use of the upper slopes of the site. Klipspringer are associated with steep slopes, cliffs and rocky outcrops and may be more vulnerable to impact from the development due to greater overlap between their habitat and the distribution of the wind turbines.

The Riverine Rabbit which is listed as Critically Endangered (IUCN 2010) and is regarded as the most threatened mammal in South Africa is known to occur within the broad area. Populations of this species occur between Sutherland and Fraserburg to the northeast as well as around Touwsrivier to the southwest. Based on the available information, the habitat at the site does not appear to be suitable for this species and there are no known records from the area, indicating that it is highly unlikely that it occurs at the site. Should it occur at the site it would most likely be associated with the alluvial soils and riparian fringe along the major drainage lines that occur in the lowlands of the site which would not be directly impacted by the development which is restricted to the uplands. It is further established that the site is outside of the typical Riverine Rabbit distribution range.

REPTILES

There is a wide range or environments present for reptiles at the site, including rocky uplands and cliffs, open lowlands and densely vegetated riparian areas. As a result, the site has a rich reptile fauna which is potentially composed of 7 tortoise species, 20 snakes, 17 lizards and skinks, two chameleons and 10 geckos. The site falls within the range of the little-known Fisk's House Snake *Lamprophis fiskii* which is listed as Vulnerable and has usually been recorded in karroid sandy areas. This species may therefore occur within the lowlands of the site and as such would probably not be significantly impacted by the development especially given its nocturnal, largely subterranean and secretive nature. Several protected and listed lizard species are likely to occur at the site including the Namaqua Plated Lizard *Gerrhosaurus typicus* (Near Threatened), the Karoo Girdled Lizard *Cordylus polyzonus* (protected) and the Cape Crag Lizard *Pseudocordylus microlepidotus*. Since the Karoo Girdled Lizard and Cape Crag Lizard are associated with rocky outcrops, it is not likely that these species will be directly affected by the development if the pylons are not positioned in areas with steep slopes where such outcrops are likely to be located. The Namaqua Plated Lizard may be more common than believed (Alexander & Marais 2007) and occurs in karroid succulent veld where it digs burrows at the base of shrubs. This species is therefore likely to be restricted to the lowlands of the site which will be little impacted by the development.

Tortoises were relatively abundant at the site and many Angulate Tortoises, *Chersina angulata* were observed as were several Karoo Tent Tortoises, *Psammobates tentorius tentorius*. Tortoises may be negatively impacted by the development as they are vulnerable to collisions with motor vehicles and predation by avian predators while traversing open areas. Attractive species such as tent tortoises are also vulnerable to collection for use as pets or trade, and the increased accessibility resulting from the new roads that will be constructed as part of the development would raise the risk for these species.

Several outcrops will be marginally affected by the powerline alignments and construction. Rehabilitation measures should be implemented to reduce the overall effects.

AMPHIBIANS

Although there are no perennial rivers at the site, several of the larger drainage lines in the area were observed to contain rocky, sheltered pools that are likely to contain water on a permanent basis. Several wetlands with dense stands of sedges were also observed at the site and are likely to represent important amphibian habitats. Consequently, amphibians which require near-permanent water as well as those adapted to more arid conditions are likely to occur at the site.

Nevertheless, only eight frog and toad species are likely to occur at the site, all of which are quite widespread species of low conservation concern. The Karoo Dainty Frog, *Cacosternum karooicum* is listed as Data Deficient reflecting the little-known distribution and ecology of this species. To date, the Karoo Dainty Frog has been recorded from a few scattered locations across the Karoo in the Western and Northern Cape, but it is likely that it occurs more widely across the karoo in general. The site also falls within the distribution of two other regional endemic species, the Cape Sand Frog, *Tomopterna delalandii* and the Raucous Toad, *Amietophrynus rangeri*. The Cape Sand Frog occurs in lowlands and valleys in fynbos and succulent karoo throughout most of the Western Cape and into Namaqualand. The Raucous Toad is more widely distributed and occurs throughout much of South Africa inland and along the east coast into Gauteng and Mpumalanga. There do not therefore appear to be any range-restricted species which occur at the site which would be vulnerable to population-level impacts. In general, the most important areas for amphibians at the site are the riparian areas, seeps and wetlands and the man-made earth dams which occur in the area. As these are widely recognized as sensitive habitats, the development is likely to avoid these areas as far as possible and the potential conflict between amphibians and the development is likely to be low.

Amphibians are however extremely sensitive to pollutants and the large amount of construction machinery and materials present at the site during the construction phase would pose a risk to amphibians should any spills occur.

INVERTEBRATES

An aggregating, ground-nesting bee (*Hymenoptera*) was observed at several places generally associated with lower-lying alluvial deposits. While it is not possible to accurately identify without collected specimens, it has been determined that it possibly within one of six bee families/subfamilies, based on the fact that they were ground-nesting on flat, non-friable soil with no turrets marking each nest; aggregating in a large population; and some photographed specimens appeared to have pollen on their bodies. These families/subfamilies are *Melittidae, Andrenidae, Colletidae, Halictidae, Megachilidae* (subfamily *Fideliinae*) and *Apinae* (*Tribe Anthophorini*). Based on the robustness of the bodies, it is more likely that they are *Andrenids*, *Megachilids* or in the *Apinae*, as the other groups mentioned above tend to have slimmer body designs (Owen, 2021). All of these groups are largely data-deficient, and it is thus difficult to find information on population sizes, ranges and conservation statuses. None the less, based on available literature sources, ground-nesting bees are vulnerable to any activities that will till the soil, such as agriculture or construction, or loss of their host plants from which they collect pollen or leaf material for nest provisioning (Owen, 2021). All of these groups are important pollinators, although undervalued because of the general focus on the African Honey Bee as a pollinator. Since the bees are found in populations that are not confined to a single burrow, but occupy numerous burrows in a wider area, making relocation not feasible, together with their important ecological role as pollinators, these populations should be retained where identified, as they were found to be uncommon across the broader project area of influence.

Two colonies of ground bees have been identified in the project area, however neither are within the proposed OHP routes.

RED LISTED AND PROTECT FAUNA

The site falls within the general distribution range of a few faunal species as indicated in **Table 6-4** below. Since the project footprint is surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact to faunal species of conservation concern.

No Endangered or Critically fauna species were confirmed to be present, but several are known to be present in proximity to the site. Three red-listed SCC are known from the wider area. The proposed activity is unlikely to significantly affect these species and a pre-commencement fauna search and rescue will allow any less mobile reptiles to be relocated.

The larger mammal and bird species are unlikely to be significantly affected as they are generally mobile, and the site is surrounded by large areas of intact areas that would provide suitable alternative habitat.

Table 6-4: Fauna Species of Conservation Concern

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMENT/PRESENCE
Mammals			
Bunolagus monticularis (Riverine rabbit)	Lagomorpha	CR	**Not Present.** Confined to riparian bush on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo. Presence highly unlikely. Site is outside of known distribution range.
Felis nigripes (Black-footed cat)	Carnivora	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub. May a be transient species.
Reptiles			
Psammobates tentorius tentorius (Karoo Tent Tortoise)	Testudinidae	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads
Psammobates tentorius veroxii (Bushmanland Tent Tortoise)	Testudinidae	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads
Amphibians			
None of Concern			
Invertebrates			
ORTHOPTERA (GRASSHOPPERS)			
None of Concern			
LEPIDOPTERA (BUTTERFLIES)			
Aloeides thyra orientis (Red copper)	Lycaenidae	LC	In vicinity of known distribution range of related subspecies (Brenton Blue). Host plants are not present on site. Not recorded.

[8] IUCN: Least Concern (**LC**), Near Threatened (**NT**), Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**); **CITIES** - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMENT/PRESENCE
HYMENOPTERA (BEES)			
Unidentified aggregating, ground-nesting Bee		Unknown	Present in low lying alluvial areas, forming large, aggregated colonies covering area up to ± 100 m^2. Although status is unknown, such colonies are rare within the site and deemed to be important ecologically as pollinators and relocation is not feasible due to dispersed nests.
SCORPIONS AND SPIDERS			
Baboon Spiders	Baboon Spiders	ToPS, NC	Various species likely present
Scorpions	Scorpions	ToPS, NC	Various species likely present

6.1.11 AVIFAUNA

*The following is extracted from the Avifauna Impact Assessment compiled by Chris van Rooyen Consulting (July, 2022) and included as **Appendix F2**.*

IMPORTANT BIRD AREAS

There are no Important Bird Areas (IBA) within the confines of the study area. The closest IBA (Anysberg Nature Reserve) is located a 40km south of the proposed Karreebosch grid connection (**Figure 6-18**). It is therefore highly unlikely that the proposed on-site substation and 132kV overhead power line will have a negative impact on the IBAs within the broader area.

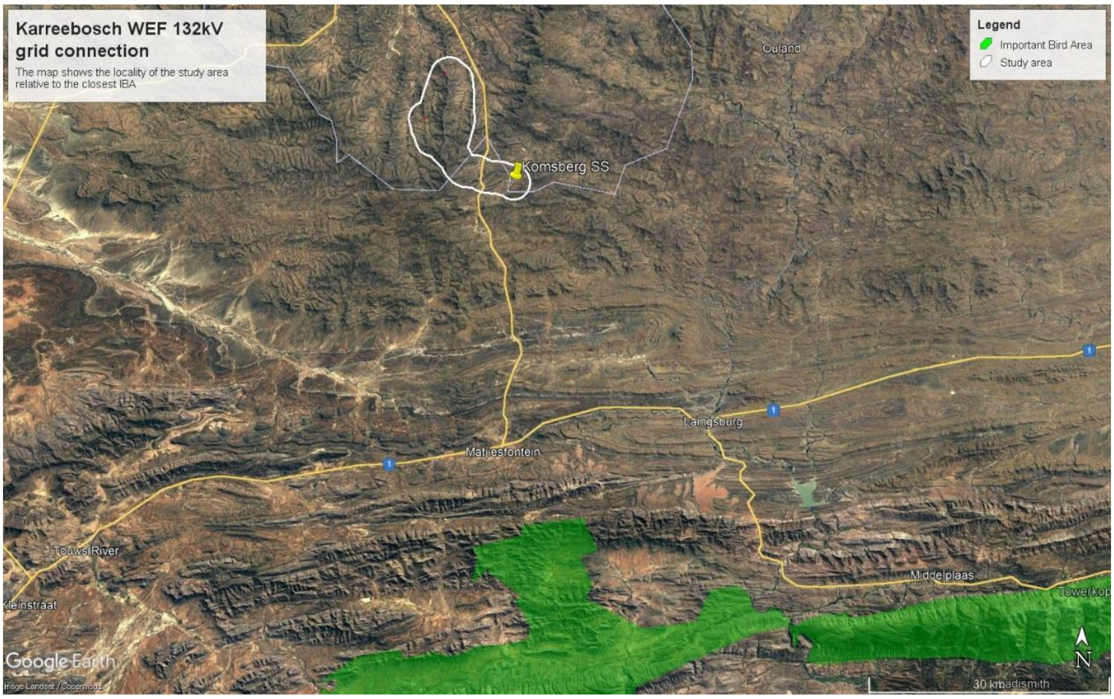


Figure 6-18: Regional map detailing the location of the proposed Karreebosch on-site substation and 132kV grid overhead power line project in relation to IBAs

BIRD HABITATS

RENOSTERVELD/KAROO

The Fynbos biome is dominated by low shrubs and has two major vegetation divisions: fynbos proper, characterised by restioid, erioid and proteoid components; and renosterveld, dominated by *Asteraceae*, specifically Renosterbos *Elytropappus rhinocerotis*, with geophytes and some grasses. Renosterveld, unlike fynbos, extend into the karoo shales, where rainfall patterns allow a high grass cover and abundance of non-succulent shrubs. Shale renosterveld shows strong affinities with neighbouring succulent Karoo vegetation (Mucina & Rutherford 2006). This biome is characterised by a high level of diversity and endemism in its botanical composition, which is not paralleled in its terrestrial avifauna, which is depauperate relative to other southern African biomes (Harrison *et al*. 1997). Priority species that may occur in renosterveld in the study area are Ludwig's Bustard, Common Buzzard *Buteo buteo*, Jackal Buzzard *Buteo rufofuscus*, Cape Crow *Corvus capensis*, Pied Crow *Corvus albus*, Black-chested Snake-Eagle *Circaetus pectoralis*, Booted Eagle *Hieraaetus pennatus*, Black Harrier *Circus maurus*, Martial Eagle *Polemaetus bellicosus*, Verreaux's Eagle, Helmeted Guineafowl *Numida meleagris*, Lesser Kestrel *Falco naumanni*, Rock Kestrel *Falco rupicolus*, Black-winged Kite *Elanus caeruleus*, Karoo Korhaan *Eupodotis vigorsii*, Southern Black Korhaan *Afrotis afra* and Secretarybird *Sagittarius serpentarius* may occur, especially in ecotonal areas between renosterveld and succulent Karoo.

SURFACE WATER

Man-made impoundments, although artificial in nature, can be very important for a variety of birds, particularly water birds. Apart from the water quality, the structure of the dam, and specifically the margins and the associated shoreline and vegetation, plays a big role in determining the species that will be attracted to the dam. The study area contains a few dams and the larger impoundments probably support good numbers of waterbirds in wet years. Priority species recorded in the broader area by SABAP2 that could be attracted to these dams include Red-knobbed Coot *Fulica cristata*, Reed Cormorant *Microcarbo africanus*, White-breasted Cormorant *Phalacrocorax lucidus*, Maccoa Duck *Oxyura maccoa*, Yellow-billed Duck *Anas undulata*, African Black Duck *Anas sparsa*, Greater Flamingo *Phoenicopterus roseus*, Egyptian Goose *Alopochen aegyptiaca*, Spur-winged Goose *Plectropterus gambensis*, Black-necked Grebe *Podiceps nigricollis*, Greater Crested Grebe *Podiceps cristatus*, Little Grebe *Tachybaptus ruficollis*, Black-headed Heron *Ardea melanocephala*, Grey Heron *Ardea cinerea*, African Sacred Ibis *Threskiornis aethiopicus*, Hadeda Ibis *Bostrychia hagedash*, Common Moorhen *Gallinula chloropus*, Southern Pochard *Netta erythrophthalma*, South African Shelduck *Tadorna cana*, Cape Shoveler *Spatula smithii*, African Spoonbill *Platalea alba*, Black Stork *Ciconia nigra*, Cape Teal *Anas capensis*, Red-billed Teal *Anas erythrorhyncha* and Hamerkop *Scopus umbretta*.

RIDGES, CLIFFS AND ROCKY OUTCROPS

Steep terrain is another identified habitat within the project area. Ridges are potentially important roosting, breeding and foraging habitat for a variety of priority species, e.g., Jackal Buzzard, Booted Eagle, Verreaux's Eagle, Rock Kestrel, White-necked Raven *Corvus albicollis* and Black Stork. Although the habitat is fairly marginal for Verreaux's Eagle from a breeding perspective, as the exposed ridge lines are very small, an active nest was recorded during the 2013 – 2014 pre-construction monitoring (Williams 2014) at 32°51'59.27"S 20°30'12.02"E (Beacon Hill) (**Figure 6-19**). Subsequent nest inspections were performed by Dr. Rob Simmons in October 2014, September 2020 and May 2021. No activity was reported at the nest in 2021, and no activity was recorded by this author during the current survey either. However, a pair was in attendance in September 2020. The possibility therefore always remains that the territory could still be active or become active again.

CULTIVATED LANDS

Arable or cultivated land represents a significant feeding area for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources suddenly accessible to birds and other predators; the crop or pasture plants cultivated are often eaten by birds, or attract insects which are in turn eaten by birds. Relevant to this study, pastures grown as supplementary fodder for small stock farming occur within the study area and are likely draw cards for several priority species e.g. Ludwig's Bustard, Common Buzzard, Egyptian Goose, Spur-winged Goose, Helmeted Guineafowl, Black-headed Heron, Hadeda Ibis, Lesser Kestrel and Black-winged Kite.

EXOTIC TREES

Although stands of *Eucalyptus* are strictly-speaking invader species, they have become important refuges for certain species of raptors, particularly Amur Falcon, a Palearctic migrant, which will commonly roost in small stands of *Eucalyptus* in suburbs of small towns. Black Sparrowhawk *Accipiter melanoleucus* and Ovambo Sparrowhawk *Accipiter ovampensis* are another two species that use these trees for roosting and breeding purposes. Relevant to this project Common Buzzard, Jackal Buzzard, Cape Crow, Pied Crow, Black-chested Snake-eagle, Booted Eagle, Martial Eagle, Verreaux's Eagle, Spotted Eagle-Owl *Bubo africanus*, Egyptian Goose, Pale Chanting Goshawk *Melierax canorus*, Helmeted Guineafowl, Black-headed Heron, Grey Heron, African Sacred Ibis, Hadeda Ibis, Lesser Kestrel, Rock Kestrel, Black-winged Kite, White-necked Raven, Rufous-breasted Sparrowhawk *Accipiter rufiventris*, African Spoonbill and Secretarybird may utilise this habitat type occasionally. There are very few large trees in the study area, and they are associated with homesteads.

POWERLINES

Eskom power line pylons/towers are regularly used as roosting, hunting and/or nesting habitat by certain species. The Droërivier-Kappa 2x400kV, Bacchus-Droërivier 1x400kV and Gamma Kappa 1x765 kV transmission lines that run through the southern part of the study area are utilised by Martial Eagle further to the west beyond the impact zone of the proposed power line. Relevant to this project, Common Buzzard, Jackal Buzzard, Cape Crow, Pied Crow, Black-chested Snake-eagle, Booted Eagle, Martial Eagle, Verreaux's Eagle, Spotted Eagle-Owl, Pale Chanting Goshawk, Helmeted Guineafowl, Black-headed Heron, Hadeda Ibis, Lesser Kestrel, Rock Kestrel and Black-winged Kite may utilise power line infrastructure for perching, roosting, and (in some instances) breeding.

SOUTH AFRICAN BIRD ATLAS PROJECT 2

The South African Bird Atlas Project 2 (SABAP2) data indicates that a total of 151 bird species could potentially occur within the broader area. Of these, 46 species are classified as priority species and ten of these are South African Red List species. Of the priority species, 18 are likely to occur regularly at the study area and immediate surrounding area, and another 28 could occur sporadically. Refer to the Avifauna Impact Assessment attached as **Appendix F2** for a full list of species and the possible impact on the respective species by the proposed on-site substation and 132kV overhead power line.

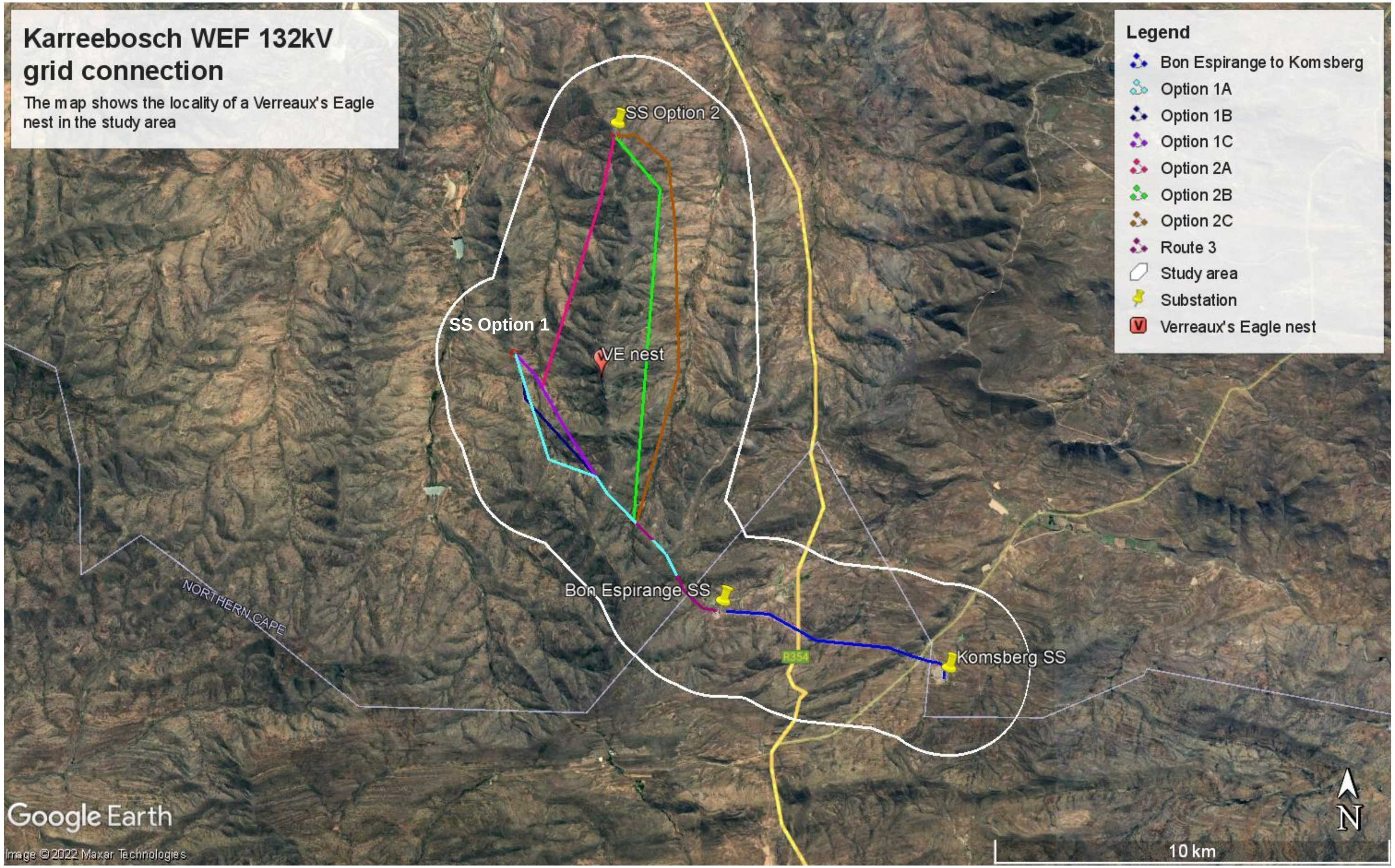


Figure 6-19: Verreaux's Eagle nest location in relation to the proposed Karreebosch on-site substation and 132kV overhead power line alignment

6.1.12 PROTECTED AREAS

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (**Table 6-5**, **Figure 6-20**). The Tanqua National Park is the closest National Park, situated 56 km to the north-west. Other nearby protected areas include the Anysberg Nature Reserve, being the closest Nature Reserve (41 km to the south) with several other small nature reserves and protected areas to the south and west, all greater than 50 km away.

Table 6-5: List of Protected Areas in vicinity

NAME	DISTANCE
Tanqua National Park. and	56 km to the north-west
Anysberg Nature Reserve	41 km to the south
Other Private Nature Reserves	Several > 50 km to the south and west

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria.

Neither these protected areas nor any ecological processes associated with them are likely to be affected by the proposed Project. The site does fall within designated NPAES (Final, 2016) areas, however the direct loss of habitat and impact to ecological processes will be negligible

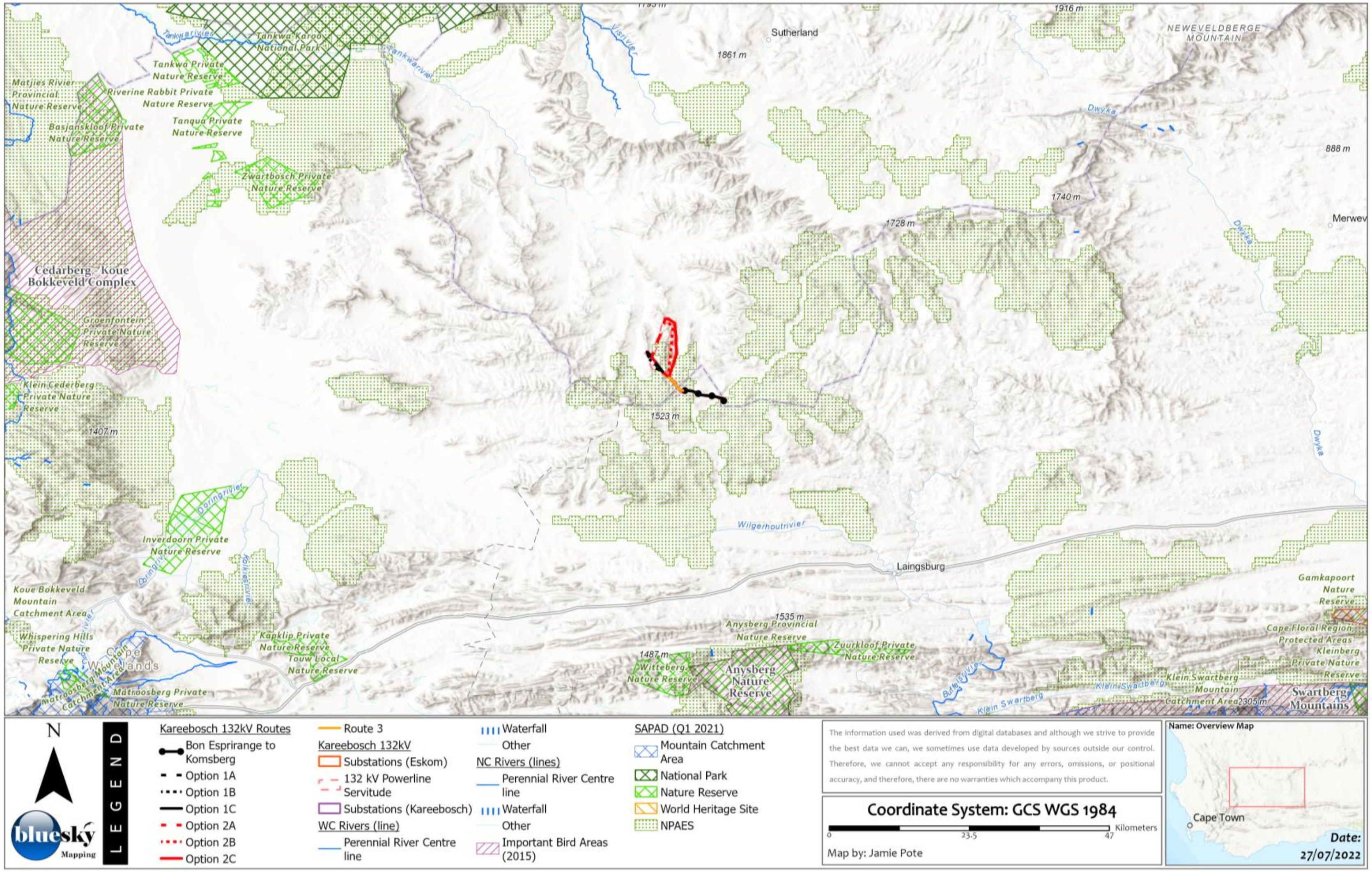


Figure 6-20: Protected areas and NPAES in the vicinity of the site

6.1.13 ECOLOGICAL PROCESSES AND CORRIDORS

*The following is extracted from the Biodiversity & Terrestrial Ecological Impact Assessment compiled by Trusted Partners (August, 2022) and included as **Appendix F4.***

CRITICAL BIODIVERSITY AREAS

The development and implementation of the Western Cape Biodiversity Spatial Plan (WC BSP, 2017) is a core output for the Provincial Biodiversity Strategy and Action Plan (2016) which is aligned to the Aichi Targets for the United Nations Convention on Biological Diversity as well as the National Biodiversity Strategy and Action Plan (2015). The *Western Cape Biodiversity Spatial Plan* provides stakeholders with the strategic and practical guidance on how to ensure that planning and decision-making build resilience of our ecological infrastructure. Critically, the WC BSP must be used to inform how we invest in ecological infrastructure to ensure that our natural resources are managed to improve resilience and water security into the future. This will be crucial in enabling "future proof" development as part of our response to climate change, including adaptation and disaster risk reduction.

The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan (Desmet and Marsh, 2008), the Succulent Karoo Ecosystem Plan (Driver et al., 2003), national estuary priorities (Turpie et al., 2012), and the National Freshwater Ecosystem Priority Areas (NFEPA) (Nel et al., 2011) were incorporated.

The CBA map (**Figure 6-21**) indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate areas that need to be safeguarded in order to meet national biodiversity thresholds; areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or important locations for biodiversity features or rare species. Critical Biodiversity Areas are present within the site or immediate vicinity. Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. CBAs and ESAs are present within the site or immediate vicinity.

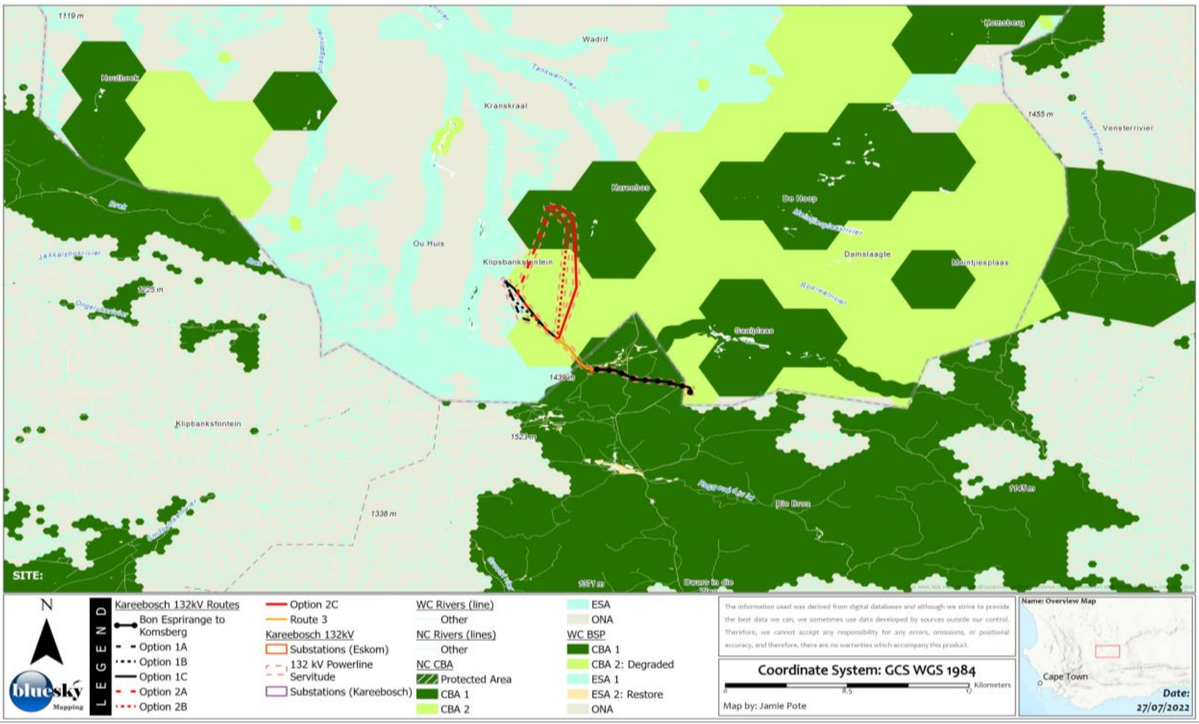


Figure 6-21: Northern Cape and Western Cape Critical Biodiversity Areas

ECOSYSTEM PROCESSES AND FUNCTION AND ECOLOGICAL SUPPORT AREAS

In the Succulent Karoo, distinct processes have been associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g., environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow.

ESAs include supporting zones required to prevent the degradation of CBAs and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. ESA's are generally extensions to the CBA area incorporating small areas that are perhaps no longer natural, or are comprised of secondary vegetation, generally following the drainage line ecological corridors within the wider surrounding landscape that will improve connectivity.

Land-use guidelines generally recommend the following for ESAs:

— Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.

For areas classified as ESA 1, the following objectives apply:

— These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.
— These systems may vary in condition and maintaining function is the main objective, therefore:
— Ecosystems still in natural, near natural state should be maintained.
— Ecosystems that are moderately disturbed/degraded should be restored.

ESAs generally include:

— Biodiversity Corridors: Whole landscape-level biodiversity corridor network aimed at retaining connectivity between all geographic areas in the district and nationally. Corridor network identified based on existing corridor networks and following alignment guidelines laid out in the NSBA (2004) such as upland-lowland, climatic and latitudinal gradients.
— Wetland Buffer Areas: The buffer zone around wetlands and rivers where land-use activities can impact the ecological functioning and integrity these features. Criteria:
— 500 m radius buffer around all pans and estuaries
— 100 m radius buffer around all wetlands and rivers
— All farm dams.
— Limited areas area available for agricultural expansion that are not excluded due to slope and/or soil suitability. It would be feasible to investigate options where ecological functioning and connectivity can still be maintained within the local and broader landscape. This could include mitigation measures that will support maintain ecological function and connectivity.

The following implications are relevant to the proposed OHPL and substation:

— The land use of the immediate area is classed primarily as natural land. The site falls within area designated as CBA, ESA and ONA.
— The substation Option 1 falls within the ESA and CBA 2 , whereas the Option 2 for the substation falls within the CBA 1.
— Several alternatives routes are assessed with similar risks to CBAs, however alternative routes 1 are shorter and therefore require less vegetation clearance.
— The proposed powerline will not significantly undermine the ecological functioning of the designated CBA and ESA areas.
— Loss of vegetation and habitat will be limited to pylon footprints, which are generally limited in extent.
— Access roads associated with 132kV powerlines generally consist of two-tracks rather than constructed formal roads, which are used primarily during construction and to some extent thereafter for occasional inspections and maintenance. Vegetation cover tends to regenerate within a season cycle or two once construction is completed.

— Substations and OHPLs do not pose any significant barriers to terrestrial ecological processes, including gene dispersal, seed gemination and foraging activities of terrestrial fauna.
— Mitigation measures will include minimising footprints and identifying and avoiding more sensitive micro-habitats within the broader landscape (including rocky outcrops, weeps, wetlands and/or sub-populations of species of conservation concern, where possible.
— The proposed powerline and associated infrastructure is thus unlikely to have any significant impact to terrestrial ecological processes.

ECOSYSTEM SERVICES

"Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling". (Millennium Ecosystem Assessment (MEA), 2005)

Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide[9], buffers against natural hazards such as fire and floods[(e)]; carbon sequestration (storage), important for reducing the impacts of climate change[(e)]; regulation of water supply[(e)]; grazing for wild animals and livestock[(e)]; natural spaces for recreation & tourism[(e)]; the air we breathe[(e)]; spiritual, ritual and ceremonies; horticultural & wildflower industries[(e)]; natural heritage[(e)] and food, timber, fibre & medicinal plants[(e)]

Rivers are central to human welfare and economic development. They provide water for agricultural, industrial and domestic uses[(e)]; flood attenuation and regulation[(e)]; food and medicinal plants [(e)]; transport and/or purification of biodegradable wastes; tourism, recreational and cultural use[(e)] & enhanced property values[(e)].

Estuaries (not present), together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to subsistence fishing, commercial fisheries (as they provide a refuge for commercial fishes when they are young), wildlife habitat e.g., nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles), tourism, recreational, cultural use and craft materials and enhanced property values .

Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:

— support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g., fire, pollination, seed dispersal), in response to global climate change. [(e)]
— are important areas for storing carbon to reduce the impacts of global climate change? [(e)]
— are important areas for regulating water supply (e.g., filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments) [(e)]
— supply good quality water from mountain catchment areas, surface and groundwater. [(e)]
— the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services). [(e)]
— are of important scenic value, contributing to tourism and the 'sense of place'. [(e)]
— Coastal & marine areas
— Subsistence & commercial fishing (food)
— Medicinal & Cosmetic resources e.g., kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
— Mining (sand and heavy mineral)
— Recreational value (sport and fishing)
— Retail value (market-value of housing) [(e)]

Net Primary production:[(e)] This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as

[9] Within the study area, potential terrestrial ecosystem services are marked [(e)].

overgrazing reduces the vegetations' ability to maintain this ecosystem process. This ecological process is especially significant for the OHPL, as the main land use comprises of small stock livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

Water production: [e] In more arid areas, many municipalities, towns and farms rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

Species movement corridors and climatic refuges: Global climate change is undoubtedly a threat in the coming decades. A key action to mitigate its effects is the maintenance of species' ability to migrate to new locations as the climatic conditions which they require move across the landscape. These corridor and refuge migration strategies occur on both a micro and macro level. On the macro scale corridors provide for species movement at landscape scales. This entails the ability of fauna and flora to undertake large scale movements towards areas which continue to provide the conditions required by a species for growth and reproduction. Movements could entail migrations of up to hundreds of kilometres, and corridors of mostly natural or near natural vegetation across the landscape are needed to permit this to occur. Climactic refuges can be localized areas that have moderated climates – such as mountain kloofs and south facing slopes. These areas provide cooler habitats where species under threat from changing climates can colonise or species and vegetation not widely found in surrounding area.

Within the site, the most important ecosystem services are the provision of habitat for flora and faunal species (including foraging & nesting) and potentially livestock/game farming as well as energy production. There is minimal change to ecosystem services from pre-development conditions because of surrounding historical rural development and historical agricultural use of the site.

The following implications are relevant to the proposed OHPL:

- The rural communities are generally highly dependent on local ecosystem services for a range or resources. These will however not be significantly affected by the proposed activity.
- The contribution of the site to any ecosystem services of an ecological or biodiversity nature is low to moderate at a regional scale.
- The proposed activity will not significantly affect ecosystem services as described above.

CRITICAL/IMPORTANT TERRESTRIAL HABITATS

Special Habitats include areas that are rare within a region, or which support important species, ecosystems or ecological processes. Species of Conservation Concern (SCC) refers to red data species and important habitats include the locations where these species are known to occur.

Red data species are plant, animal or other organisms (e.g., reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the Red Data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such Red-data species that are under threat of extinction. These include:

- Experts Areas: Areas in the terrestrial environments identified by experts as being most critical or important for biodiversity.
- Quartz Patches: Vegetation with quartz or other types of gravel patches, which can be refuges for a wide range of succulent species.
- South-facing Slopes: All areas with steep south-facing mountain slopes larger than 25 Ha in extent. These represent an important climate change refugia for biodiversity.
- Kloofs: All kloofs larger than 50 Ha in extent. These represent a keystone resource for biodiversity (e.g., presence of springs) and important climate change refugia for biodiversity.
- Riverine Rabbit: Modelled Riverine Rabbit habitat based on observed records.

- Rocky Outcrops: Rocky outcrops can provide habitat for geophytic species that often have limited distributions. Several rocky outcrops are present within the OHPL assessment corridor. These will be assessed in more detail in the assessment section of this report.
- Wetland habitat: Wetlands are special habitats as they provide a refuge for birds and other organism, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be CBAs. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. Wetlands are protected by various pieces of legislation, such as:
  - The National Water Act (NWA) 36 of 1998, which stipulates that reserve determination studies need to be undertaken to identify the ecological reserve requirements of a wetland.
  - The NEMA in terms of principle (r) and the listed activities (Section 24).
  - The Conservation of Agricultural Resources Act (CARA) 43 of 1983; in which no activities are allowed within the flood area or within 10 meters horizontally outside the flood area.

Being an arid area, water resources would be considered to be important habitat and will be assessed accordingly in the assessment section of this report.

- Forest: All forest is protected by the National Forests Act.
- Fynbos: Fynbos vegetation is known for its high localised biodiversity.
- Colonies or Populations of Threatened or Protected Species: Includes colonies, populations and sub-populations of threatened fauna or flora species.

Important terrestrial habitats within the site include south facing slopes, rocky outcrops, some wetland and seep habitat and some localised sub-populations of threatened or protected species. These habitats will be assessed, and appropriate mitigation measures recommended in the habitat and impact assessment sections of this report.

6.1.14 HABITAT

It is notable across the vegetation types that a suite of species tends to be represented across most of the area (**Figure 6-22**), but dominant species vary depending on climatic factors which are influenced by aspect and altitude. Slight variations in community structure, composition and dominant species are also noted within the vegetation units represented on site.

Within the mountainous area, more specifically the Renosterveld, there is a distinct and visible difference between north and south facing slopes, with north-facing slopes being drier and having a strong succulent shrub composition. Wetter south-facing slopes have a notable lower succulent shrub composition, with herbaceous shrubs dominating. This difference is less noticeable in lower lying areas, within the Moordenaars Karoo, where north and south facing slopes tend to both have more prominent succulent shrub and herb component.

Within lower lying areas, dominant species include shrubs such as *Ruschia intricata, Eriocephalus microphyllus var. microphyllus, Chrysocoma ciliata, Hirpicium alienatum, Asparagus capensis, Amphiglossa tomentosa, Pteronia ciliata, Pteronia sordida, Pentzia incana, Tripteris sinuata* and *Oedera genistifolia*, grasses including *Ehrharta calycina* and *Merxmuellera stricta* and succulents such as *Tylecodon wallichii* and *Crassula tetragona subsp. connivens.*

There is a clear change in the vegetation discernible above 1 350 m, where the cooler and wetter conditions result in a change in composition compared to the lower elevation areas. Although the vegetation is broadly similar in terms of the dominant species as listed above, species which characterise these areas which are not present or uncommon at lower elevations include *Rosenia spinescens*, *Eriocephalus grandiflorus* (Rare), *Ehrharta eburnea* (NT) and *Tribolium purpureum*, *Pelargonium griseum*, *Zygophyllum spinosum, Berkheya heterophylla* var. *heterophylla* and *Ruschia lineolata*. The abundance of geophytes and other species of potential concern are significantly higher within the slopes and higher lying areas, compared to the lower lying plains and river valleys.

Figure 6-22: Overview of typical landscape with mountains and broad valleys

Observations made during the walkdown (Trusted Partners, 2022) and supplemented by previous ecological and biodiversity assessments undertaken for the Karreebosch WEF and adjacent WEF projects by Todd (2011, 2014, 2016, 2019) identify the following vegetation and flora characteristics:

— Most of the central uplands of the project area are classified as Central Mountain Shale Renosterveld, transitioning to Koedoesberge-Moordenaars Karoo on the south and east sides. Although the vegetation on the west side is designated as Koedoesberge-Moordenaars Karoo, the composition is clearly different to the same unit on the east side where the vegetation appears to transition towards Tanqua Karoo rather than Koedoesberge-Moordenaars Karoo. Furthermore, there is a transition towards Tanqua Escarpment Shrubland towards the north and Tanqua Karoo to the west, with elements of both these units being represented within the peripheral boundaries of the project area, even though they do not overlap with the mapped vegetation as per the National Vegetation Map (2018).

— In the field, the vegetation unit distinction is not always obvious and there is a large overlap in the species composition of the units with a distinct transitional aspect. At a local level, altitude, aspect and soil depth are the dominant drivers of vegetation composition. High-lying areas are dominated by typical Renosterveld species while the proportion of succulents and karroid species increased with decreasing altitude or on drier aspects, thus transitioning into the surrounding low-lying drier Karroid vegetation. Higher altitude south-facing slopes are also distinctly less arid compared to north-facing slopes.

— High-lying areas and cooler southern aspects are typically dominated largely by woody shrubs such as *Elytropappus rhinocerotis, Euryops lateriflorus, Eriocephalus africanus and Eriocephalus grandiflorus, Pteronia ambrariifolia, Pteronia glomerata, Pteronia glauca, Rosenia glandulosa* and *Asparagus capensis;* succulents such as *Ruschia cradockensis, Leipoldtia schultzei, Crassula deltoidea, Crassula tetragona*. Grasses tend to be scarce but become more common in patches where there is some soil present. Common grasses tend to be restricted to the tufted species including *Tenaxia (Merxmuellera) stricta*, *Ehrharta calycina* and *Karroochloa purpurea*. Grasses tend to be scarce in the rocky outcrops, stone benches and rocky pavements. It has also been postulated that south-facing slopes are likely to represent an important climate change refugia for biodiversity, and these areas have been designated as such in the Namakwa Biodiversity Sector Plan (2008).

- The drier, sunny aspects and lower lying areas contain a larger proportion of succulent species and are dominated by succulents such as *Ruschia cradockensis*, *Crassula rupestris*, *Crassula deltoidea*, *Crassula nudicaulis*, *Tylecodon reticulatus*, *Sarcocaulon patersonii*, common woody or herbaceous shrubs include *Pteronia glomerata*, *Pteronia sordida*, *Eriocephalus ericoides*, *Pelargonium magenteum* and *Pelargonium abrotanifolium*.
- Although Renosterveld is usually a fire-prone ecosystem, there is little evidence of regular fires at the site. Discussions with the local farmers also confirmed that although fires do occasionally occur, they are not a regular feature and are not used by farmers as a veld management tool. Within arid Renosterveld types, the significance of fire is reduced, and it does not appear that fire is an important ecosystem driver at the site that may be disrupted by the development. Fire scars in the broader area indicate that occasional fires may be caused by lightning ground-strikes, but their subsequent spread appears to be limited to high-lying areas of dense vegetation along south-facing slopes.
- In terms of unique and sensitive habitats at the site, a few different potentially sensitive environments are identified.
  - In general, the slopes are more speciose and contained a greater variety of habitat types than the lower lying valleys and mountain ridges and crests, which tend to be more broadly homogenous. The varied aspects as well as microhabitats created by rocky outcrops on the slopes, is likely to be a contributing factor to the higher diversity.
  - There are several wetlands and rivers within the study area which should be avoided by the development as these are important habitats for plants as well as fauna and are especially sensitive to disturbance. Several specific sites have been identified that are at risk from the current layout.
  - Sensitive Species 142 which is listed as Vulnerable, is widespread across the project area, from lower lying areas to mid-slope and occasionally on lower mountain tops. It is also found sporadically along riverbanks of watercourses with one notable sub-population found on an upper order tributary of the Groot River. Several small to large sized population of a few Ha was noted to be present in the broader area with many unaffected but some within or near project component footprints. The specific species will require relocation, where affected by project components, but due to the extensive coverage in the wider project area, it is not anticipated that the project specific impact will be significant to the species as a whole.
  - Several other species of conservation concern were found to be present, as small scattered and localised populations or very few individuals to single individual occasionally noted within the areas surveyed. These include *Indigofera hantamensis, Antimima androsacea, Euryops sulcatus, Antimima loganii, Geissorhiza karooica, Lotononis venosa, Romulea eburnea, Romulea hallii, Romulea syringodeoflora* and *Romulea tortuosa*.
  - Although no quartz patches were observed at the site, several gravel patches and rock pavements are present, particularly along ridges. Although these often look biologically depauperate due to their low plant cover, they frequently contain rare or endemic geophytes and dwarf succulent species and should also not be disturbed. They are also likely to a somewhat unique landscape feature for specific faunal species, including reptiles.

MAPPED VEGETATION AND SENSITIVE AREAS

Typically, the National Vegetation Map (Mucina & Rutherford, 2018) differentiates vegetation units at quite a course scale, and often several distinct communities can be differentiated. Within the proposed powerline 400m assessment corridor, several such communities can be differentiated. For the most part, this may not serve a purpose, however in some cases, smaller, more specialised habitats and communities can be differentiated which may differ from the surrounding vegetation matrix. Such communities and micro-habitats may also serve as faunal habitat for a suite of more specialised faunal species not common to the surrounding landscape. The flora and fauna species that are present in these areas may be different from the surrounding vegetation matrix, giving it a higher overall sensitivity. Where applicable, such Sensitive Areas have been identified (**Figure 6-27** to **Figure 6-29**).

Mapping of these communities has been undertaken based on site confirmation and most recent available aerial photos. Mapping of smaller features is not exhaustive and may differentiate smaller features under 1 Ha that may be scattered within the broader mozaic of vegetation communities. Such areas will none the less be described and their sensitivity highlighted. The Specialist study included a walkdown of the corridor (400m wide) to be approved for micro-siting later. Once pylons locations are known, Search & Rescue will be undertaken prior to construction.

Figure 6-23 to **Figure 6-26** below provide an overview of the landscape in which the proposed powerline is situated.

Figure 6-23: West of Substation Option 1

Figure 6-24: Western alternatives (1A, 1B & 1C)

Figure 6-25: Northern OHPL alternatives along Tankwa River (Route Alterntaives 2B & 2C)

Figure 6-26: Western OHPL alternative (Route Alternative 1C)

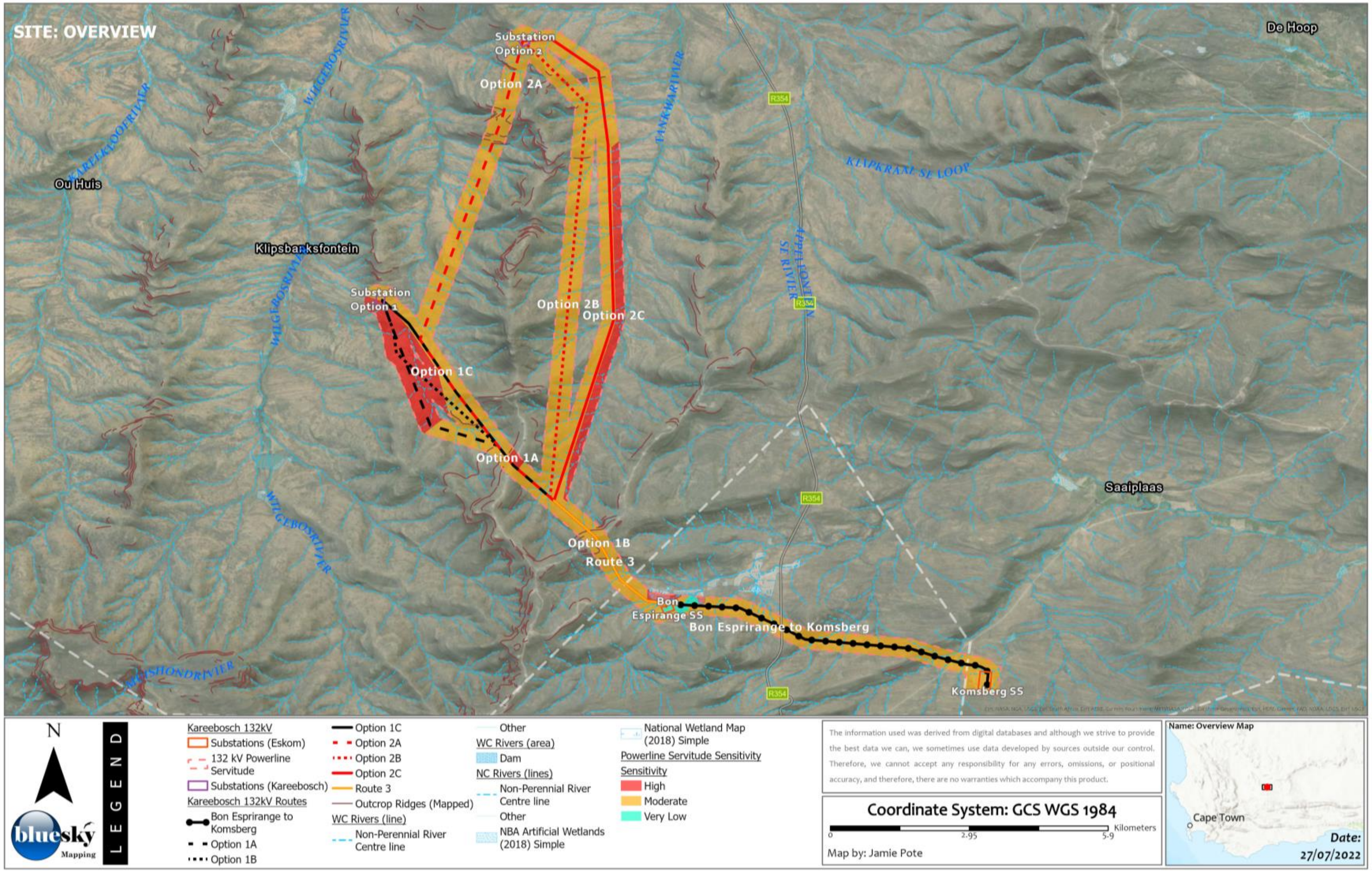


Figure 6-27: Mapped Vegetation and Sensitive Areas (OHPL Options: 1A – black dashed; 1B – black dotted; 1C – black solid; 2A – red dashed; 2B – red dotted; 2C – red solid).

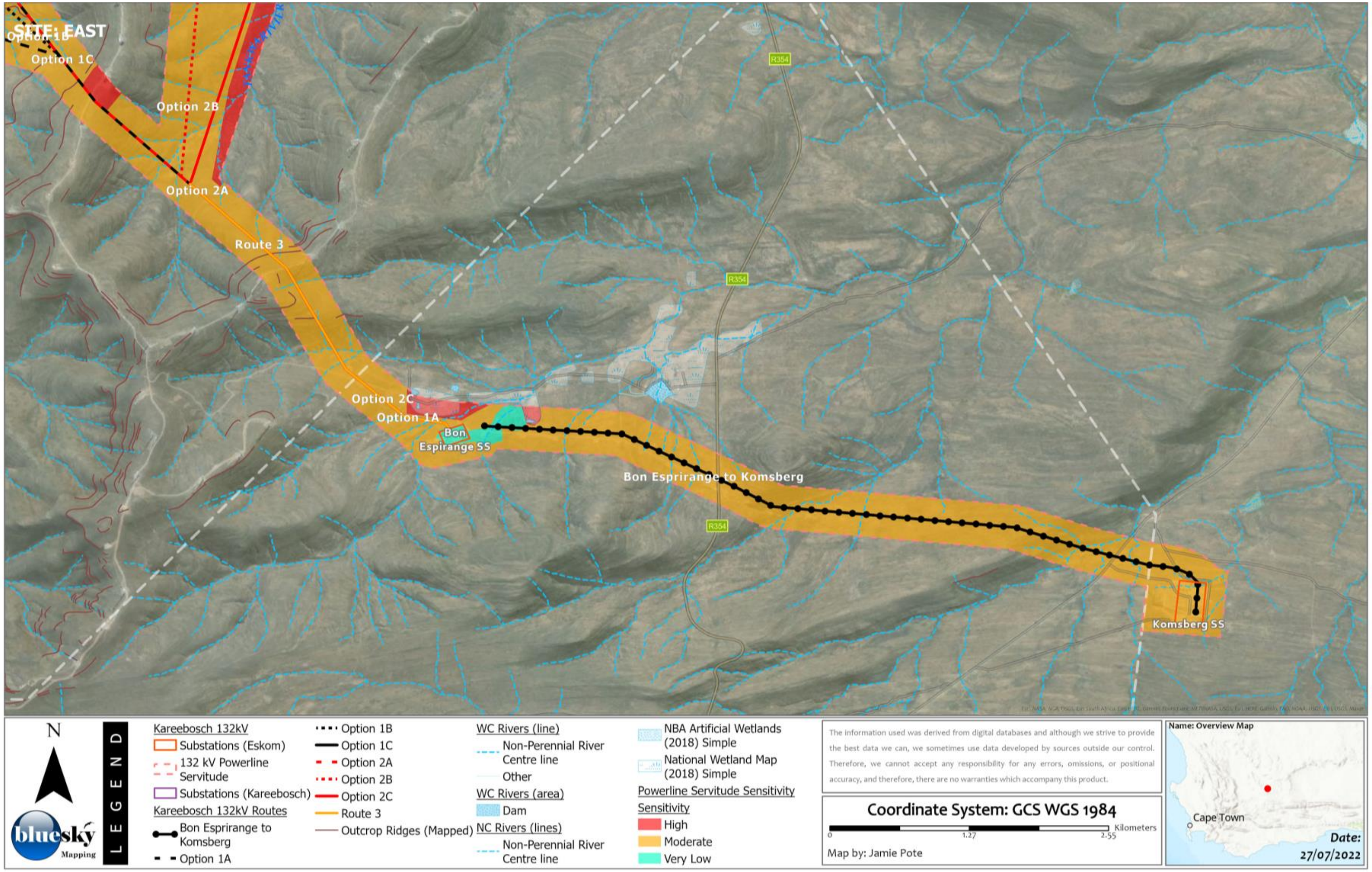


Figure 6-28: Mapped Vegetation and sensitive areas (OHPL Options: 1A – black dashed; 1B – black dotted; 1C – black solid; 2A – red dashed; 2B – red dotted; 2C – red solid).

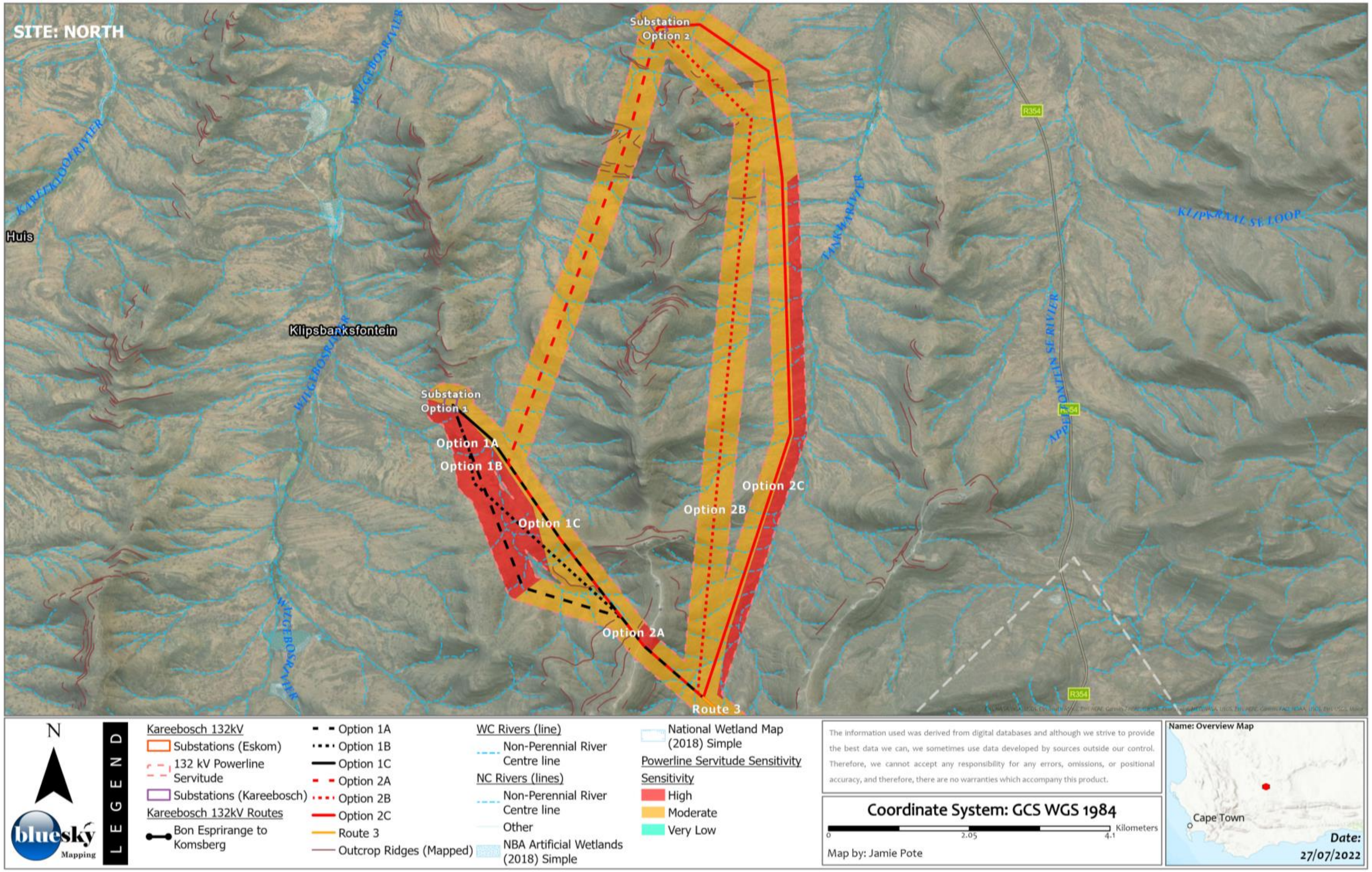


Figure 6-29: Mapped Vegetation and sensitive areas (North; OHPL Options: 1A – black dashed; 1B – black dotted; 1C – black solid; 2A – red dashed; 2B – red dotted; 2C – red solid),

CRITICAL HABITAT[10]

Special Habitats include areas that are rare within a region, or which support important species, ecosystems or ecological processes. SCC refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal or other organisms (e.g., reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such Red-data species that are under threat of extinction.

The following Critical Habitat (not a Critical Habitat Assessment as defined by the IFC Performance Standards) features have been identified within the site:

- Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
  - No Endangered or Critically Endangered Flora species were recorded. Several species known from general area were screened to confirm that most likely localities do not overlap with the Project site.
  - No Endangered or Critically Endangered Mammals, Reptiles, Amphibians, or Invertebrates are known to be present on the site or are likely to directly be affected (other than temporary displacement during construction).
- Criterion 2: Habitat for Endemic or restricted-range species
  - Several range restricted flora species are potentially present in the surrounding area and vegetation types. Refer to species assessment section for specific species assessments. Numerous endemic species are present, due to the specific arid vegetation units; however, these generally have a widespread regional distribution and would not be considered to be at risk by the highly localised activity.
  - Several range-restricted faunal species are known from the surrounding area which provide suitable habitat. These species are generally mobile and even though they were not observed during the site visit, the intact vegetation is suitable as a transient visitor.
- Criterion 3: Habitat for Migratory or congregatory species
  - No such terrestrial habitat will be directly or indirectly affected by the proposed Project.
- Criterion 4: Habitat for Highly threatened and/or unique ecosystems
  - Vegetation units have a low conservation status and are currently not considered to be under threat.
- Criterion 5: Habitat for Key evolutionary processes
  - No such terrestrial habitat will be directly or indirectly affected by the proposed Project.

6.1.15 PRESENT ECOLOGICAL STATE

The following is extracted from the Biodiversity Impact Assessment compiled by Trusted Partners (August, 2022) and included as ***Appendix F4****.*

Table 6-6 provides a comprehensive description and assessment of biodiversity and ecological indicators for the site.

[10] This report is not a Critical Habitat Assessment as defined by the IFC Performance Standards

Table 6-6: Summary of Key Biodiversity and Ecological Indicators

ASPECT	DESCRIPTION
LANDSCAPE AND COMMUNITY DESCRIPTION	
Aspect, Slope, Topography	Mountainous with wide lowland valleys.
Substrate	Shallow rocky soils on mountains and deeper alluvial soils in valleys
Vegetation units	Central Mountain Shale Renosterveld & Koedoesberge-Moordenaars Karoo
Total Ground Cover (%)	> 60%
Tree Height (m) – Median	Trees are generally absent
Tree Cover (%) Aerial	N/A
Shrub Cover (%)	~ 50%
Herbaceous Cover (%)	
Grass Cover (%)	< 1% (estimated)
Bare soil/rock (%) and disturbed	10 - 40%
TERRESTRIAL LANDSCAPE FEATURES	
Forest	No Forest is present.
Thicket	No Thicket is present.
Grassland	No Grassland present
Fynbos	True Fynbos elements are generally not present, although Renosterveld is considered to have fynbos elements.
Riparian	Riparian vegetation is limited, due to arid nature of the area.
Wetland	Natural wetland habitat is present including extensive seep areas. Wetlands mostly transformed or degraded for water storage.
Estuaries	No estuaries are present.
Dunes/Coastal	Inland dune habitat is absent.
Rocky Outcrop Habitat	Rocky outcrops are present and common on slopes.
Fauna Nesting Sites	No specific sites known. (Refer to avifaunal assessment.)
Fauna Feeding Grounds	Faunal species were noted to be prevalent.
Ecotones	No Ecotones are present
Ecological Corridors	Ecological corridors are considered to be associated with watercourses and valleys, in particular due to the arid nature of the area. The mountain ridges would also serve as corridors for species adapted to the elevated environment.
Evolutionary Processes	None of significance within terrestrial environment.
Transformed (housing)	Several farm dwellings are present in the vicinity.
Transformed (other)	Transformation is low, consisting of a few isolated patches including dwellings and other disturbed areas associated with agriculture (grazing).
Degraded (modified)	Secondary vegetation is similar to intact vegetation in composition.
Secondary vegetation	

ASPECT	DESCRIPTION
DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION	
Human disturbances	Human disturbance due to agricultural development is locally low on site and generally confined to the lowland valleys.
Habitat fragmentation	Fragmentation is low locally.
Invasive Alien Plants	Invasive Alien species are not common.
Other degradation	Minimal, some roads and infrastructure and WEF's being constructed in vicinity.
Remaining intact habitat:	Most of the site can be considered to be intact (natural) to semi-intact (near natural).
Grazing (livestock)	Surrounding area is used extensively historically for livestock grazing, predominantly sheep and goats.
Hunting	Present in the area.
Conservation (passive)	General area does contribute to passive conservation, comprising an extensive area of natural vegetation.
Recreational (sport)	Tourism (flowers) is considered to be an important economic use of the broader area.
Other	None
PATTERNS OF BIODIVERSITY	
Flora	Flora diversity is moderate to high.
Fauna	Fauna diversity is moderate.
Species of Conservation Concern	Several species are potentially found in the region, vegetation unit and broader landscape. Refer to species assessment section.
ECOLOGICAL PROCESSES	
Gene dispersal barriers	Roads, agricultural lands, fences, low in surrounding areas.
Gene dispersal corridors	Watercourses and Rivers are important corridors in the arid landscape.
Aeolian (dune) processes	Inland dunes are absent.
Climatic gradients	Present, due to the mountains landscape, climatic gradients are present affecting both temperature and precipitation (rain and mist)
Rivers and Drainage Lines (Riparian Vegetation)	Valleys drained by several non- perennial watercourse to the north and south-east.
Refuges (outcrops/islands)	Rocky outcrops and pavements and other refuges are common within the site but limited to mid to upper slopes of mountains.
Fire	Fire is considered to be an important component of the vegetation represented, however does not appear to be a common occurrence.
Ecotones/Tension zones	None
Erosion	Erosion is generally low within the site, being relatively rocky on slopes and having low rainfall, however the sandy alluvial soils do show evidence of occasional erosion where heavily disturbed.
ECOLOGICAL SERVICES	
Carbon storage	Vegetation is considered a low to medium carbon accumulator.

ASPECT	DESCRIPTION
Provisioning Services	Livestock grazing: Grazing is likely to have been historically prevalent in the area, although having a low grazing capacity. Timber (Building materials): None. Fuelwood: None. Food: None known Fibre: None known Medicinal plants: Several species are known from the surrounding area have medicinal properties and are most likely harvested informally.
Other (ornamentals)	Several succulent and geophytic species are present that are known to be or are potentially ornamentals.
CONSERVATION IMPORTANCE	
Current Distribution (extent)	Vegetation units have a widespread historical regional distribution covering an extensive area. More than 60% is considered to be intact, all having a low regional conservation status (Least Concern).
Red Listed Species and other Species of Conservation Concern	Several species are potentially found in the region, vegetation unit and broader landscape. Refer to species assessment section.
Habitat for SCC	Several SCCs are known from the general area, as well as the vegetation unit that is present. Several species were confirmed to be present in the broader are having an elevated conservation status. It is however evident that further investigations are likely required for these species is order to adequately assess their conservation status. The site is likely to provide habitat viable potential for any of the mostly mobile faunal species as well as several flora species.
Relative Conservation importance	The site has a low overall significance and is mostly not identified as priority conservation area in terms of the respective bioregional plans.
OTHER SENSITIVITIES	
Conservation importance	Low
Topography	Mountainous with wide lowland valleys.
Wetlands	Natural wetland habitat is present including extensive seep areas. Wetlands mostly transformed or degraded for water storage.
Rehabilitation potential	Rehabilitation potential is moderate, however significant transformation does result in biophysical changes that generally preclude the rehabilitation of sites to pre-existing state. The vegetation is likely adapted to high disturbance levels due to arid conditions and areas outside of rocky outcrops will most likely rehabilitate effectively with minimal input. It is noted that may species produce large amounts of seed, which would spread during windy conditions. Importantly, during rehabilitation, measures should be implemented that would trap such seeds.
Community structure	Community structure is relatively simple, with vegetation being primarily comprised of shrub, herb, succulent and geophytic elements, with a limited grassy component.

6.2 SOCIAL AND ECONOMIC

6.2.1 ADMINISTRATIVE CONTEXT

*The following is extracted from the Social Impact Assessment compiled by Tony Barbour (July, 2022) and included as **Appendix F8**.*

The majority of the proposed Karreebosch grid connection is located in the Karoo Hoogland (KHLM with a small section in the Laingsburg LM, which are located in the Northern and Western Cape Province respectively (**Figure 6-30**).

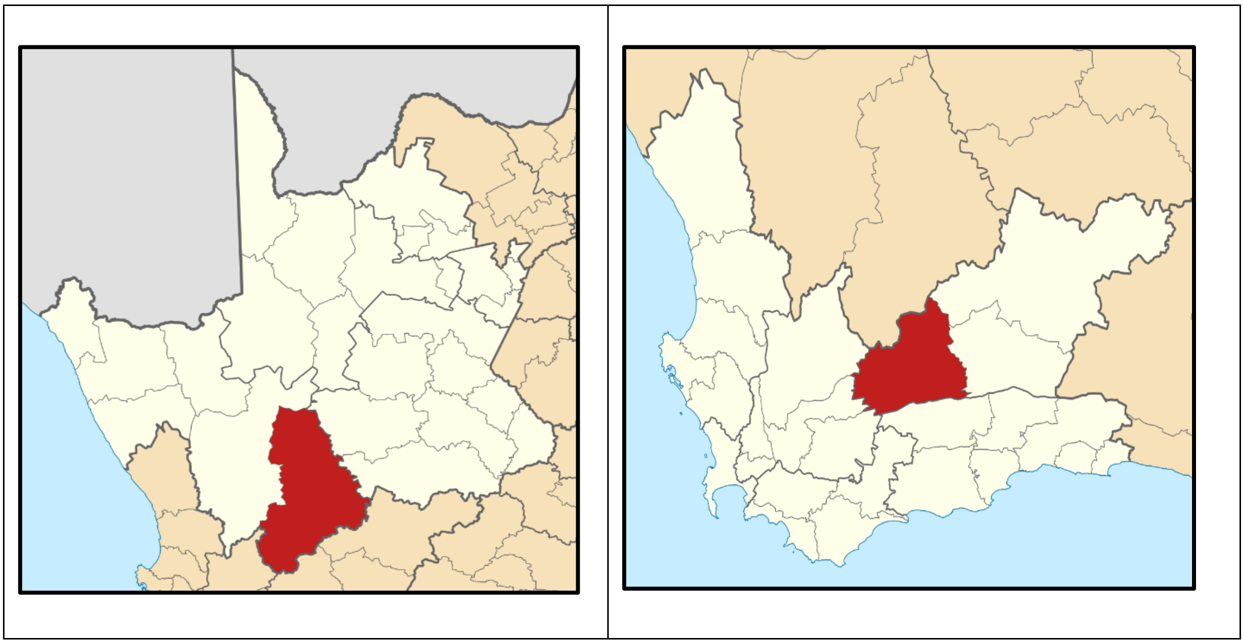


Figure 6-30: Location of Karoo Hoogland and Laingsburg and Municipality within Northern and Western Cape Province

The KH is one of six local municipalities that make up the Namakwa District (ND) Municipality (**Figure 6-31**). The LM is one of three local municipalities that make up the Central Karoo District (CKD) Municipality (**Figure 6-32**). Springbok and Williston are the administrative seats of the ND and KH respectively. Beaufort West and Laingsburg are the administrative seats of the CKD and LM respectively.

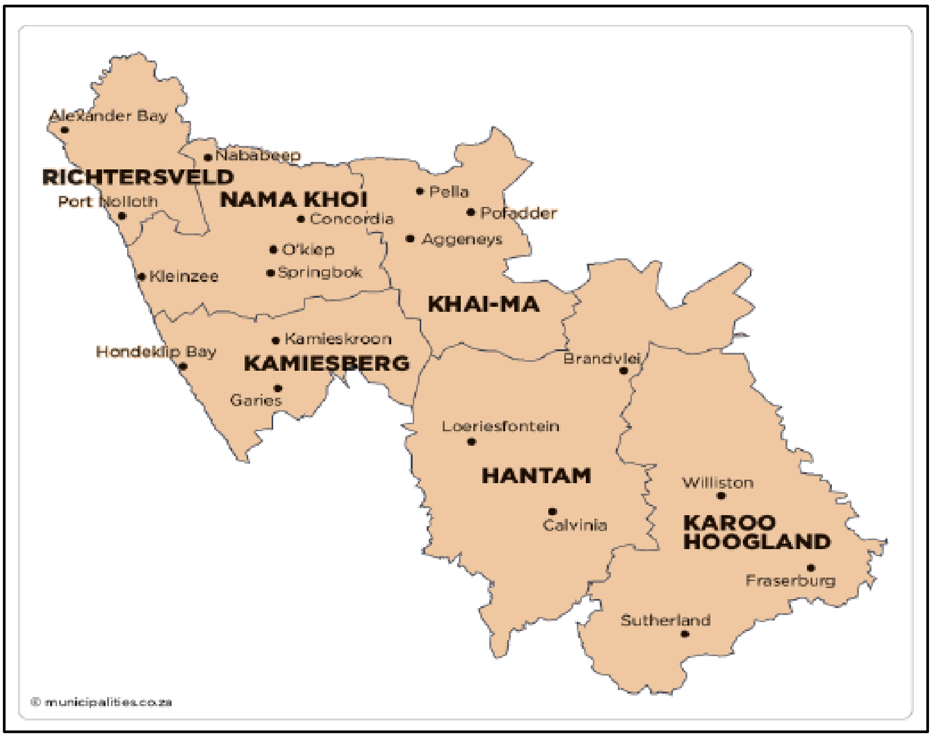


Figure 6-31: Local municipalities within Namakwa District

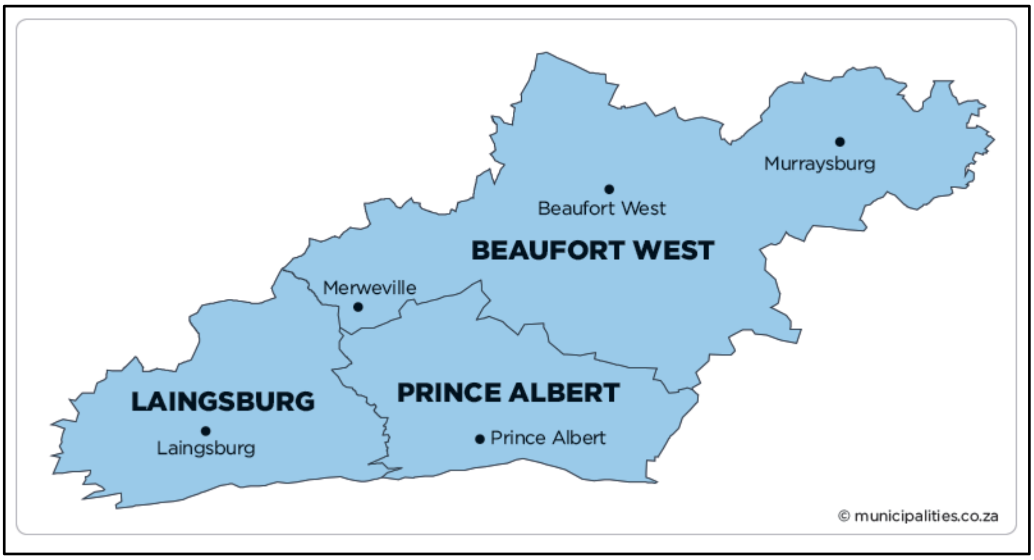


Figure 6-32: Local municipalities within Central Karoo District

The town of Sutherland in the KH is located ~ 48 km north of the site. The small settlement of Matjiesfontein and the town of Laingsburg are located ~ 34 km and 38 km to the south and south east of the site, respectively.

Sutherland

The three main towns in Karoo Hoogland are Williston, Fraserburg and Sutherland. The town of Sutherland was founded in 1855 as a church and market town to serve the sheep farming community in the area. The town is located approximately 100 km north of the small village of Matjiesfontein and is accessed via the R 354. The main economic activities include tourism and sheep farming. South African Astronomical Observatory (SAAO) was established outside the town in 1972 and plays a key role in the town's tourism related economy.

Matjiesfontein

Matjiesfontein was founded in 1884, three years after Laingsburg, by James Douglas Logan during the early stages of the 1st Anglo-Boer war. The Lord Milner Hotel was initially a military hospital. By 1899 the hotel and associated facilities was converted to convalescent centre for patients with respiratory ailments. The hotel and adjacent buildings that make up the village was restored in 1970 and declared a national monument. The village consists of two sections, the historic, Victorian section located to the north of the railway line, and a residential, low-income area, including a clinic and school, located to the south of the railway line. The spatial layout of the village reflects apartheid planning.

Laingsburg

The LM has one main settlement, Laingsburg, and one secondary settlement, Matjiesfontein. They are connected via the N1 Freeway and the main Cape Town to Gauteng railway line. Laingsburg serves as the main service centre, providing medical, educational, as well as limited commercial activities as well as administrative services. Other smaller rural farm settlements include Vleiland in the south-east and Rouxpos. Vleiland has a church and a shop. They are essentially farming communities located to the south of Laingsburg along the R323. Laingsburg is strategically situated on the N1 and rail transport corridor between Gauteng and Cape Town. Laingsburg town is the administrative seat of local government and serves as an agricultural service centre. Matjiesfontein's economic base is essentially a single tourist resort comprising a Victorian village across the railway line. The population largely comprises hotel staff and a few government employees.

Laingsburg is the largest node in the municipal area. The town was established as a trading post in 1881 and became a municipality in 1904. The national road through the town was completed in 1942. The town serves as the administrative seat of the Laingsburg Municipality and houses the key municipal facilities and commercial services, including the municipal offices, schools, hospitals, clinics, police station, tourism centre, museum, old age home, petrol stations and facilities for motorist and long-haul trucks.

6.2.2 SOCIAL

*The following is extracted from the Social Impact Assessment compiled by Tony Barbour (July, 2022) and included as **Appendix F8**.*

KAROO HOOGLAND MUNICIPALITY

POPULATION

Based on the 2016 Community Household Survey the population of the KH was 13 010. In terms of race groups, Coloureds made up 79.3%, followed by Whites (19.7%) and Black Africans (0.7%). The main first language spoken in the KH was Afrikaans (98.5%), followed by IsiXhosa (0.4%) and English (0.3%) (Community Household Survey 2016).

In terms of age, the 2016 Household Community Survey found that 31% of the population were under the age of 18, 58% were between 18 and 64, and the remaining 11% were 65 and older (**Table 6-7**). The KHM therefore has a relatively large young population. This creates challenges in terms of creating employment opportunities.

Table 6-7: Population by age category

AGE	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
Under 18	31%	4,034	29.3%	33,776	35.7%	426,616
18 to 64	58%	7,546	61.2%	70,705	57.7%	688,405
65 and over	11%	1,429	9.5%	11,006	6.6%	78,759

Source: Wazimap: 2016 Household Community Survey

The high percentage of young people also means that a large percentage of the population is dependent on a smaller productive sector. 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. The national dependency ratio in 2011 was 52.7%, lower than the figure for the Northern Cape (55.7%). The dependency ratio for the KH in 2011 was 50.9%. The traditional approach is based people younger than 15 or older than 64. The 2016 information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e. they are still likely to be at school or dependent upon their parents or other family members).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratio for the KHM (2016) was 72%. This figure is significantly higher than the national, provincial, and municipal levels in 2011. The higher dependency ratio reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality.

HOUSEHOLDS, HOUSE TYPES AND OWNERSHIP

Based on the information from the 2016 Household Community Survey there were 4621 households in the KH. The overwhelming majority of households resided in formal houses (97.6%). This is higher than the figure for the District (88.4%) and significantly higher than the figure for the Northern Cape (74.4%). Only 0.4% of the households in the KH resided in shacks, compared to 2.3% and 12.8% for the District and Province, respectively (**Table 6-8**). In terms of ownership, 63.6% of houses are owned and fully paid off, 4.4% are owned but in the process of being paid off and 8.5% are rented. The high percentage of formal houses coupled with high level of homeownership reflects a stable, middle class community. However, as indicated below, household income levels are low.

Table 6-8: Households by type of dwelling

DWELLING	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
House	97.6%	4,506	88.4%	33,308	74.4%	263,123
Semi-detached house	1.3%	58	2.8%	1,042	1.6%	5,602
Townhouse	0.6%	29	0.1%	40	0.4%	1,375
Shack	0.4%	19	2.3%	870	12.8%	45,246
Other	0.1%	6	6.4%	2,411	10.9%	38,364

Source: Wazimap: 2016 Household Community Survey

Based on the information from the 2016 Community Household Survey 32.4% of the households in the KH are headed by females. Although the figures are lower than the NDM (37.5%) and Northern Cape (38.8%), the relatively high number of female-headed households at the local municipal level reflects the lack on formal employment and economic opportunities in the KHM. As a result, job seekers from the LM need to seek work in the larger centres, specifically Cape Town and Winelands area. The majority of the job seekers are likely to be males. This is due to traditional rural patriarchal societies where the role of the women is usually linked to maintaining the house and raising the children, while the men tend to be the ones that migrate to other areas in search of employment.

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 6.6% of the population of the KH had no formal income, 2.4% earned less than R 4 800, 5% earned between R 5 000 and R 10 000 per annum, 24.6% between R 10 000 and R 20 000 per annum and 26.2% between R 20 000 and R 40 000 per annum (2016).

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 (~ 40 000 per annum). Based on this measure, in the region of 64.8% of the households in the KH live close to or below the poverty line. The figures for the ND and Northern Cape were 58.1% and 62.5% respectively. The low-income levels in the KH reflect the limited employment opportunities and dependence on the agricultural sector. 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 KH. This in turn impacts on the ability of the KH to maintain and provide services.

The low household income levels are reflected in the number of indigent households in the KH, which had 944 registered indigent households in 2016. This represents 20% of the total number of households in the KH.

EMPLOYMENT

Based on the 2011 Census the official unemployment figure for the KH was 8%. The figures also indicate that the majority of the population are not economically active, namely 40.4%. The unemployment figure is lower than the official unemployment rate for the ND (11.1%) and Northern Cape (14.5%). While the level of unemployed is low, this needs to be considered within in the context of the low-income levels and the dependence on the agricultural sector.

EDUCATION

Education levels in the KH are reflected by the percentage of the population under the age of 20 that have no education, the percentage that have some primary and or have completed primary school, and the percentage that have passed grade 12 (matric). Based on the 2016 Household Community Survey, 13.2% of the population over the age of 20 had not formal education. This is significantly higher than the figures for ND (4.4%) and Northern Cape (7.9%) and reflects the rural nature of large parts of the KH. The percentage with some primary and primary school was 14%, compared to 12.6% and 13.4% for the ND and Northern Cape Province, respectively. The percentage with matric was 29.2%, which was higher than the ND (27.1%) and Northern Cape (29.1%) (**Table 6-9**). The higher matric rates are interesting, specifically given the figure for no formal education. However, despite the higher matric pass rates, the Namakwa IDP notes that the KH has the lowest functional literacy rate in the ND. defines functional literacy as the number of people in a region that are 20 years and older and have completed at least their primary education (i.e. grade 7). Functional literacy describes the reading and writing skills that are adequate for an individual to cope with the demands of everyday life - including the demands posed in the workplace. This is contrasted with illiteracy in the strictest sense, meaning the inability to read or write. Functional literacy enables individuals to enter the labour market and contribute towards economic growth thereby reducing poverty.

Table 6-9: Population by highest educational level

EDUCATION	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
None	13.2%	1,157	4.4%	3,537	7.9%	58,818
Other	0%	0	0.5%	368	0.5%	3,786
Some primary	14%	1,228	12.6%	10,083	13.4%	100,079
Primary	8.3%	732	8.1%	6,481	5.8%	43,349
Some secondary	25.4%	2,238	39.9%	31,934	36.2%	269,520
Grade 12 (Matric)	29.2%	2,572	27.1%	21,696	29.1%	216,562
Undergrad	5.6%	492	2.8%	2,255	2.6%	19,707
Post-grad	2.4%	215	1.7%	1,391	1.9%	14,354
N/A	1.9%	166	3%	2,381	2.6%	19,029

Source: Wazimap: 2016 Household Community Survey

ELECTRICITY

Based on the information from the 2016 Community Survey 96.6% of households in the LM had access to electricity. Of this total 66.7% had in-house prepaid meters, while 6.6% have conventional in-house meters, and 20.3% had solar power. Only 3.4% of households did not have access to electricity, this is marginally higher than the figures for the ND (2.2%), but higher than the figure for the Northern Cape (6.7%). Based on the 2016 Community Survey most of the households in the LM (74.3%) are supplied with electricity by the KH (**Table 6-10**). The high percentage of households that use solar energy reflects the rural nature of the area.

Table 6-10: Population by electricity access

ELECTRICITY	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
In-house prepaid meter	67.7%	8,809	84%	96,978	79.9%	953,855
Solar home system	20.3%	2,645	4.2%	4,873	1%	12,244

ELECTRICITY	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
In-house conventional meter	6.6%	856	7.7%	8,865	10.5%	125,627
No access to electricity	3.4%	444	2.2%	2,571	6.7%	79,622
Other	2%	256	1.9%	2,200	1.9%	22,432

Source: Wazimap: 2016 Household Community Survey

ACCESS TO WATER

Based on the information from the 2016 Community Survey 69% of households were supplied by a regional or local service provider, while 30.4% relies on their own source of water. The higher percentage of households that rely on their own source of water reflects the rural nature of the area, where large distances make difficult and expensive to provide services to all areas, specifically farms. In terms of access to water, 74.9% of the households in the KH had had piped water inside their houses, while 21.4% relied on piped water inside the yard. The figures piped water supplied inside of homes for the ND and Northern Cape were 72.1% and 45.3% respectively (**Table 6-11**). The figures for the KH are therefore higher than both the district and provincial levels. The figure for water supplied by boreholes (2.4%) is higher than both the ND (0.8%) and Northern Cape (1.3%). This reflects the rural character of large areas of the KH. Based on the 2016 Community Survey most of the households in the KH (99.4%) have access to potable water, with 69% being supplied by a regional or local service provider.

Table 6-11: Population by water source

COLUMN	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
Piped water inside house	74.9%	9,738	72.1%	83,258	45.3%	540,743
Piped water inside yard	21.4%	2,788	23.9%	27,565	34.3%	409,636
Borehole in yard	2.4%	307	0.8%	880	1.3%	15,056
Borehole outside yard	0.7%	90	1.2%	1,341	0.8%	8,981
Other	0.7%	86	2.1%	2,444	18.4%	219,364

Source: Wazimap: 2016 Household Community Survey

SANITATION

Based on the information from the 2016 Community Survey, 69.7% of households have access to flush toilets, 17.4% rely on pit toilets, 9.3% use bucket toilets, and 2.7% reported no access to toilet facilities. The access to flush toilets is significantly lower than the ND (82.3%) and marginally lower than the Northern Cape (71.6%). The figures for no access are higher than the ND (1.9%) but lower than the Northern Cape (4%). Based on the 2016 Community Survey most of the households in the KH (69.7%) have access to flush toilet facilities, with only 2.7% reporting having no access to toilet facilities (**Table 6-12**).

Table 6-12: Population by toilet facilities

COLUMN	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
Flush toilet	69.7%	9,065	82.3%	94,056	71.6%	849,803
Pit toilet	17.4%	2,263	12.6%	14,341	19%	225,522
Bucket toilet	9.3%	1,205	2.6%	3,016	4.4%	52,084
None	2.7%	348	1.9%	2,119	4%	48,008
Other	1%	129	0.7%	768	1%	11,566

Source: Wazimap: 2016 Household Community Survey

REFUSE COLLECTION

Based on the information from the 2016 Community Survey, 67.9% of households have their refuse collected by a local authority of private company on a regular basis, while 30% rely on their own waste disposal dump. The high number of households that dispose of their waste at their own dump reflects the rural nature of the KH. The majority of these households are likely to be associated with farms in the KH. Based on the 2016 Community Survey most of the households in the KH (67.9%) have their waste collected on a regular basis by a service provider (**Table 6-13**). This percentage is likely to represent the majority of households located in the three towns in the KH.

Table 6-13: Population by refuse disposal

	KAROO HOOGLAND		NAMAKWA		NORTHERN CAPE	
Service provider (regularly)	67.9%	8,830	86.2%	99,585	64.9%	774,691
Own dump	30%	3,907	8.3%	9,540	21.5%	256,078
Other	1%	135	0.7%	783	1.9%	22,143
Service provider (not regularly)	0.5%	60	3.6%	4,171	3%	35,551

Source: Wazimap: 2016 Household Community Survey

In summary, based on the 2016 Community Survey the service levels in the KH can be describe as relatively high. In this regard 74.3% of households are supplied with electricity, while 20.3% have access to solar power, 99.4% have access to potable water, with 69% being supplied by a regional or local service provider, 69.7% have access to flush toilet facilities, with only 2.7% reporting having no access to toilet facilities, and 67.9% have their waste collected on a regular basis by a service provider. The percentages should also be considered within in the context of the rural nature of large parts of the KH. In this regard the service levels in the three towns in the KH are likely to be higher than for the entire KH.

EDUCATION FACILITIES

In terms of school facilities, each of the three towns in the KH serviced by a primary and a high school (**Table 6-14**). The high school in Sutherland was damaged by a fire in 2018. The Northern Cape Provincial Health Department Annual Report (2018/19) notes that the ND, which includes the KH, is one of the largest district municipalities in the Northern Cape but at the same time is home to the lowest population. Most schools in this ND are located in remote areas and a large number of them have infrastructure assets which are under-utilised. The ND also has the largest number of school hostels in the Province, due to its geographical size.

Table 6-14: Education facilities in the KH

TOWN	PRE PRIMARY SCHOOL	PRIMARY SCHOOL	SECONDARY SCHOOL	HIGH SCHOOL	COMBINED SCHOOL	SPECIAL SCHOOL
Fraserberg	-	1	-	1	-	-
Sutherland	-	1	-	1	-	-
Williston	-	1	-	1	-	-

There are no Further Education and Training (FET) colleges in Sutherland with the closest one is located in Worcester, which is located in the Breede Valley Municipality in the Western Cape. There is also a training college in Beaufort West, which is located in the Central Karoo District Municipality.

HEALTH CARE FACILITIES

Access to healthcare services is a basic human right and one that is directly affected by the number and spread of facilities within their geographical area. The provision of health care and the associated services is a provincial function provided by the Western Cape Department of Health. The IDP notes that the services provided in the KH are not satisfactory due to shortage of doctors, ambulances as well as inferior conditions of the road infrastructure between the towns. There are 3 clinics in the municipal area, one in each of the three towns, namely Williston, Fraserburg and Sutherland. Due to the distance rural nature of the area and the distances involved, rural communities have requested mobile clinics. There is currently no resident doctor in Sutherland. There are two doctors at the clinic in Calvina (160 km). Most residents that require a doctor travel to the hospital in Worcester.

LAINGSBURG MUNICIPALITY

POPULATION

Based on the 2016 Community Household Survey, the population of the LM was 8 895. The LM IDP indicates that ~ 80% population reside in Laingsburg, while ~15% live in the rural parts of the municipal area and 5% reside in the small settlement of Matjiesfontein. In terms of race groups, Coloureds made up 88.2%, followed by Whites (10%) and Black Africans (1.7%). The main first language spoken in the LM was Afrikaans (96%), followed by English (1%) and IsiXhosa (0.8%) (Community Household Survey 2016).

The 2019 Socio-Economic Profile for the Laingsburg Municipality (LM) prepared by the Western Cape Department of Social Development, indicates that the population of the Laingsburg Municipality in 2021 is projected to be 9 024, increasing to 9 367 by 2023 (**Figure 6-33**). This equates to a 1.1 % annual average growth rate. The estimated population growth rate of Laingsburg is therefore slightly above the estimated population growth of the CKD of 0.5%.

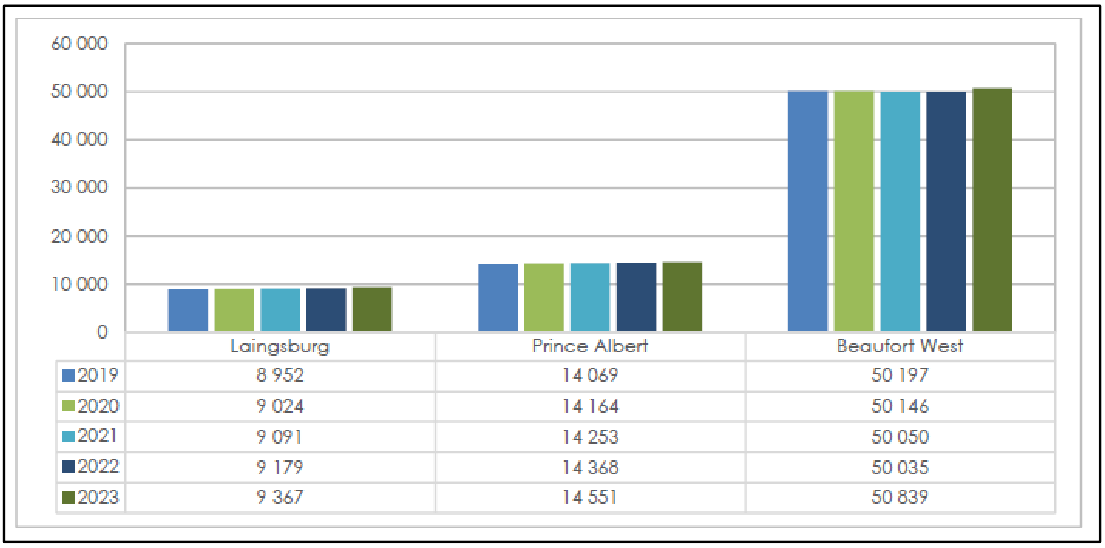


Figure 6-33: Population projections for Laingsburg Municipality

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

In terms of age, the 2016 Household Community Survey found that 29.5% of the population were under the age of 18, 62.5% were between 18 and 64, and the remaining 8% were 65 and older. The LM therefore has a relatively large young population. This creates challenges in terms of creating employment opportunities.

The high percentage of young people also means that a large percentage of the population is dependent on a smaller productive sector. 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. The national dependency ratio in 2011 was 52.7%, significantly higher than that of the Western Cape (45%). The dependency ratio for the LM in 2011 was 50.9%. The traditional approach is based people younger than 15 or older than 64. The 2016 information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e. they are still likely to be at school or dependent upon their parents or other family members).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratio for the LM (2016) was 60%. This figure is higher than the national, provincial, and municipal levels in 2011. The higher dependency ratio reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality.

The 2019 Socio-Economic Profile for the Laingsburg Municipality indicates that 27% of the population in 2019 fell within the 0-14 age group, 63% fell within the economically active age group of 15 to 65, and 10% were over the age of 65 (**Figure 6-34**). This translates in a dependency ratio of 57.5%. In terms of projected population growth, the largest population growth is expected to be in the over 65 age group, which is projected to increase at a rate of 2.6%, compared to 1.1% for the economically active group. This will result in a marginal increase in the dependency ratio from 57.5% in 2019 to 57.7% in 2025.

Laingsburg Age Cohorts, 2019 – 2025				
Year	Children 0 – 14 Years	Working Age 16 – 65 Years	Aged 65+	Dependency Ratio
2019	2 438	5 684	830	57.5
2022	2 399	5 880	900	56.1
2025	2 538	6 071	968	57.7
Growth	0.7%	1.1%	2.6%	-

Figure 6-34: Age breakdown of Laingsburg population

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

HOUSEHOLDS, HOUSE TYPES AND OWNERSHIP

Based on the information from the 2016 Household Community Survey, there were 2861 households in the LM. The overwhelming majority of households resided in formal houses (96.5%). This is similar to the figure for the District (97.3%) and significantly higher than the figure for the Western Cape (72.2%). Only 1.6% of the households in the LM resided in shacks. In terms of ownership, 55.7% of houses are owned and fully paid off, 5.3% are owned but in the process of being paid off, 17.9% are rented, and 10.3% are occupied rent free. The high percentage of formal houses coupled with high level of homeownership reflects a stable, middle class community. However, as indicated below, household income levels are low.

Based on the information from the 2016 Community Household Survey, 31.8% of the households in the LM are headed by females. Although the figures are lower than the CKD (40.8%) and Western Cape (38%), the relatively high number of female-headed households at the local municipal level reflects the lack on formal employment and economic opportunities in the LM. As a result, job seekers from the LM need to seek work in the larger centres, specifically Cape Town and Winelands area. The majority of the job seekers are likely to be males. This is due to traditional rural patriarchal societies where the role of the women is usually linked to maintaining the house and raising the children, while the men tend to be the ones that migrate to other areas in search of employment.

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 5.5% of the population of the LM had no formal income, 2% earned less than R 4 800, 2.8% earned between R 5 000 and R 10 000 per annum, 20.7% between R 10 000 and R 20 000 per annum and 25.3% between R 20 000 and R 40 000 per annum (2016).

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 (~ 40 000 per annum). Based on this measure, in the region of 56.3% of the households in the LM live close to or below the poverty line. The figures for the CKD and Western Cape were 62.9% and 50.1% respectively. The low-income levels reflect the limited employment opportunities and dependence on the agricultural sector. 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 LM. This in turn impacts on the ability of the LM to maintain and provide services.

EMPLOYMENT

The 2019 Socio-Economic Profile for the LM notes that the unemployment rate in the LM has fluctuated between 14.8 and 17.7 % over the last 10 years (**Figure 6-35**). Unemployment in Laingsburg area started at 15.9 per cent in 2008, rising steadily to 17.7% in 2010 and then dropping to 15.6% in 2018. The unemployment in the LM in 2018 (15.6%) is lower than the figure for the CKD (20.7%) and Western Cape (17.7%).

Unemployment Rates for the Western Cape (%)											
Area	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Laingsburg	15.9	16.8	17.7	17.5	17.0	16.2	16.4	14.8	15.4	16.0	15.6
Central Karoo District	20.5	21.4	22.3	22.1	21.6	20.9	21.0	19.6	20.5	21.2	20.7
Western Cape	12.7	14.0	15.4	15.5	15.6	15.5	15.9	15.9	17.1	17.8	17.7

Figure 6-35: Unemployment rates for Laingsburg Municipality

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

EDUCATION

Education levels in the LM are reflected by the percentage of the population under the age of 20 that have no education, the percentage that have some primary and or have completed primary school, and the percentage that have passed grade 12 (matric). Based on the 2016 Household Community Survey, 9.2% of the population over the age of 20 had not formal education. This is significantly higher than the figures for Central Karoo (5.8%) and Western Cape (2.4%) and reflects the rural nature of large parts of the LM. The percentage with some primary and primary school was 14.4%, compared to 14.1% and 8.2% for the Central Karoo District and Western Cape Province, respectively. The percentage with matric was 26.2%, which compares favourably with the 29.9% for the CKD, but is lower than the 35.2% for the Western Cape (**Table 6-15**).

The education levels in the LM are therefore lower than the Western Cape Provincial figures. This is understandable given the small size of the towns and the large rural nature of the area. However, of interest the matric pass rates in the LM are the highest in the KD. The matric pass rate in the LM was 80.6% in 2018, compared to 79.2% and 71.2 in the Beaufort West and Prince Albert Municipalities, respectively. However, the rate in 2016 was 90.3%. The decrease in the matric pass rate in the LM is an indicator of potential decrease in the quality of education on the area. The drop in the pass rate also reduces the chances of learners gaining access to higher education and employment opportunities. The limited opportunities for gaining access to higher education are reflected in the low percentage of the population in the LM over the age of 20 with undergraduate (0.2%) and post graduate qualifications (0.8%). This is likely to be a function of both the quality of the education available and limited ability of the majority of households to afford the costs associated with accessing tertiary education. As indicated in the data on household income, 56.3% percent of households earn less than R 4000 per month.

Table 6-15: Population by highest educational level

	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
None	9.2%	554	5.8%	2,731	2.4%	99,112
Other	2.1%	124	0.6%	278	0.6%	22,923
Some primary	14.4%	873	14.1%	6,608	8.2%	341,614
Primary	6.6%	398	6.6%	3,110	4.9%	203,457
Some secondary	39.3%	2,377	38.9%	18,272	36.4%	1,510,481
Grade 12 (Matric)	26.3%	1,589	29.9%	14,084	35.2%	1,461,693
Undergrad	0.2%	11	1.3%	630	4.9%	201,354

	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
Post-grad	0.8%	49	1.1%	523	4.5%	187,570
N/A	1.3%	79	1.7%	802	2.9%	120,830

Source: Wazimap: 2016 Household Community Survey

LEARNER RETENTION

The leaner retention rates[11], which reflect the number of students that start Grade 12 as a percentage of the number of students that enrolled in Grade 10, are also a cause for concern. Although the retention rates in the LM improved between 2016 (27.7%) and 2018 (40.0%), the 2018 figure still implies that the majority (60%) of the students that started Grade 10 did not make it or enrol in Grade 12. The average for the CKD in 2018 was 55.8% (**Figure 6-36**). The reasons why learners drop out of school vary but are strongly linked to a range of interrelated socio-economic factors, including lack of disposable income, lack for support from parents, and the perception that a matric qualification will not enhance the chance of finding employment.

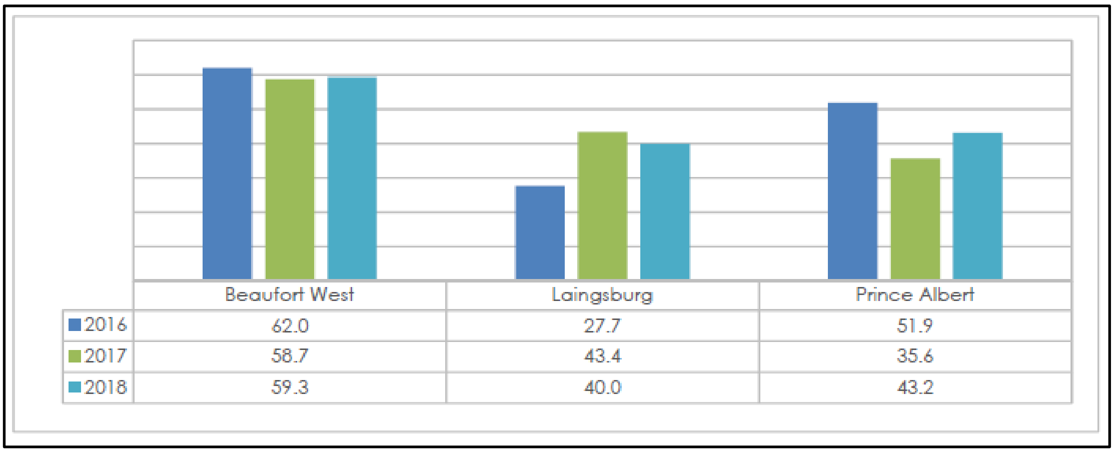


Figure 6-36: Learner retention for Laingsburg Municipality

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

ELECTRICITY

Based on the information from the 2016 Community Survey, 98.6% of households in the LM had access to electricity. Of this total 84.8% had in-house prepaid meters, while 8% have conventional in-house meters, and 3% had solar power. Only 1.4% of households did not have access to electricity, this is similar to the figures for the CKD (1.29%) and Western Cape (1.85%). Based on the 2016 Community Survey most of the households in the LM (92.8%) are supplied with electricity by the LM (**Table 6-16**).

Table 6-16: Population by electricity access

ELECTRICITY	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
In-house prepaid meter	84.8%	7,541	88.7%	65,855	77.5%	4,868,696
In-house conventional meter	8%	708	8%	5,925	16.9%	1,059,707

[11] Also referred to as the drop-out rate.

ELECTRICITY	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
Solar home system	3%	263	0.8%	619	0.1%	4,781
Other	2.2%	195	0.9%	673	0.6%	40,039

Source: Wazimap: 2016 Household Community Survey

ACCESS TO WATER

Based on the information from the 2016 Community Survey, 89.4% of households were supplied by a regional or local service provider. In terms of access to water, 94.5% of the households in the LM has access to water. Of this total 63.3% had piped water inside their houses, while 31.2% relied on piped water inside the yard (**Table 6-17**). The figures piped water supplied inside of homes for the CKD and Western Cape were 75.7% and 80.7% respectively. The figures for the LM are therefore lower than the district and provincial levels. The figure for water supplied by boreholes (4.7%) is higher than both the CKD (1.1%) and Western Cape (0.2%). This reflects the rural character of large areas of the LM. Based on the 2016 Community Survey most of the households in the LM (94.5%) have access to potable water, with 89.4% being supplied by a regional or local service provider.

Table 6-17: Population by water source

WATER SOURCE	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
Piped water inside house	63.3%	5,632	75.7%	56,235	80.7%	5,069,195
Piped water inside yard	31.2%	2,773	20.5%	15,220	10.8%	680,929
Borehole in yard	4.7%	414	1.1%	841	0.2%	12,143
Borehole outside yard	0.5%	48	0.4%	307	0.1%	6,916
Other	0.3%	29	2.2%	1,644	8.1%	510,547

Source: Wazimap: 2016 Household Community Survey

SANITATION

Based on the information from the 2016 Community Survey, 97.7% of households have access to flush toilets, while 1.5% rely on bucket toilets and only 0.3% reported no access to toilet facilities. The access to flush toilets is marginally higher than the CKD (97.5%) and Western Cape (95/6%). The figures for no access are also lower than CKD (0.4%) and Western Cape (0.7%). Based on the 2016 Community Survey most of the households in the LM (97.7%) have access to flush toilet facilities, with only 0.3% reporting having no access to toilet facilities (**Table 6-18**).

Table 6-18: Population by toilet facilities

TOILET	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
Flush toilet	97.7%	8,693	97.5%	72,372	95.6%	5,951,904
Bucket toilet	1.5%	129	0.8%	594	2.9%	180,258
Other	0.5%	42	0.7%	511	0.4%	24,692

TOILET	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
None	0.3%	24	0.4%	274	0.7%	45,605

Source: Wazimap: 2016 Household Community Survey

REFUSE COLLECTION

Based on the information from the 2016 Community Survey, 89.9% of households have their refuse collected by a local authority of private company on a regular basis, while 9.2% rely on their own waste disposal dump. The relatively high number that dispose of their waste at their own dump reflects the rural nature of the LM. The majority of these households are likely to be associated with farms in the LM. Based on the 2016 Community Survey most of the households in the LM (89.7%) have their waste collected on a regular basis by a service provider (**Table 6-19**).

Table 6-19: Population by refuse disposal

REFUSE	LAINGSBURG		CENTRAL KAROO		WESTERN CAPE	
Service provider (regularly)	89.2%	7,937	93.9%	69,696	88.7%	5,570,202
Own dump	9.2%	814	3.8%	2,841	2%	125,124
Service provider (not regularly)	0.8%	70	0.5%	374	3%	187,367
Communal dump	0.6%	49	0.6%	450	1.5%	95,488
Other	0.3%	26	1.2%	888	4.8%	301,550

Source: Wazimap: 2016 Household Community Survey

In summary, based on the 2016 Community Survey, the service levels in the LM can be describe as high. In this regard 92.8% of households are supplied with electricity, 94.5% have access to potable water, with 89.4% being supplied by a regional or local service provider, 97.7% have access to flush toilet facilities, with only 0.3% reporting having no access to toilet facilities, and 89.7% have their waste collected on a regular basis by a service provider.

EDUCATION FACILITIES

In terms of school facilities, there are four primary schools in the LM. Two are located in Laingsburg, one Matjiesfontein and one in Vleiland. Three of the primary schools are government schools and one is private. The majority of the students from the private school complete their schooling at schools located outside of the LM. There is only secondary school in Laingsburg, the Laingsburg High School. The IDP notes that the Laingsburg High School is under financial pressure. Many of the scholars that attend the school are unable to pay school fees as the majority are from previously disadvantaged areas. Despite this the LM achieved a 100% matric pass rate in 2020. However, as indicated under learner rendition, there is a high drop-out rate between Grade 10 and 12.

The Laingsburg High School was recently declared a non-fee school which reflects the low household income and high poverty levels in the area. Due to staff shortages, the high school does not offer maths and science. Pupils that wish to study maths and science therefore have to attend schools in Touws River or Worcester. This requires them to become borders which increases the costs to parents.

Of the four government schools, 50% (2) were equipped with libraries in 2018. However, the shortage of funds as schools, such as the Laingsburg High School, is likely to impact on the quality of the libraries. There are no Further Education and Training (FET) colleges in Laingsburg with the closest one is located in Worcester, which falls outside the Central Karoo District. Further away is Beaufort West, Oudtshoorn, Paarl, Stellenbosch, George and Mosselbay.

HEALTH CARE FACILITIES

Access to healthcare services is a basic human right and one that is directly affected by the number and spread of facilities within their geographical area. In terms of healthcare facilities, Laingsburg had 3 primary healthcare clinics (PHC) in 2018, which consisted of 1 fixed and 2 mobile clinics. In addition, there is also a district hospital, the Laingsburg District Hospital, located in Laingsburg. There are also three Tuberculosis and one Antiretroviral and 3 clinics/sites (**Table 6-20**).

There are no health facilities located in the area to the north of the N1 and none in the other rural areas. The rural areas are served by mobile clinic routes. The Department of Provincial Health has identified 17 mobile clinic routes within the LM. At least one route is covered per day, sometimes even two. In the event of medical emergencies patients are transported to either to Laingsburg or the clinic in Matjiesfontein. The LM had 1 ambulance per 10 000 inhabitants in 2018, which is on par with the CKD average of 1 ambulance per 10 000 people. However, the large distances associated with the isolated rural communities impacts on the efficiency of the ambulance services within the LM.

Table 6-20: Health facilities in Laingsburg Municipality

AREA	PHC CLINICS		COMMUNITY HEALTH CENTRES	COMMUNITY DAY CENTRES	HOSPITALS		TREATMENT SITES	
	Fixed	Non Fixed			District	Regional	ART Clinics	TB Clinics
Laingsburg	1	2	0	0	1	0	1	3
Central District Karoo	8	10	0	1	4	0	12	22

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

CHILD HEALTH

Child health is a key indicator of well-being and potential needs. The United Nations Sustainable Development Goals (SDGs) aim to end preventable deaths of new-borns and children under 5 years of age by 2030, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1 000 live births and under-5 mortalities to at least as low as 25 per 1 000 live births (Source: UN SDG's). Key criteria used to measure child health include immunisation rates[12], percentage of malnourished children[13], neonatal mortality rate[14] and birth weight[15].

The immunisation coverage rate for children under the age of one in the LM dropped from 80.7% in 2017/18 to 59.1% in 2018/19. The CKD average for 2018/19 was 71.3%. The drop on the immunisation rate is a concern. However, the number of malnourished children under five years (per 100 000) in 2017/18 was 1.3. This decreased to zero in 2018/19. The neonatal mortality rate (NMR) (deaths per 1 000 live births before 28 days of life) for the Laingsburg municipal area remained at zero deaths in

[12] **Immunisation:** *The immunisation rate is calculated as the number of children immunised as a percentage of the total number of children less than one year of age.* Immunisation protects both adults and children against preventable infectious diseases. Low immunisation rates speak to the need for parents to understand the critical importance of immunisation, as well as the need to encourage parents to have their young children immunised.

[13] **Malnutrition:** *Expressed as the number of malnourished children under five years per 100 000 people.* Malnutrition (either under- or over-nutrition) refers to the condition whereby an individual does not receive adequate amounts or receives excessive amounts of nutrients.

[14] **Neonatal mortality rate:** *Measured as the number of neonates dying before reaching 28 days of age, per 1 000 live births in a given year.* The first 28 days of life (neonatal period) represent the most vulnerable time for a child's survival. The Province's target for 2019 is 6.0 per 1 000 live births.

[15] **Low birth weight:** *Percentage of all babies born in facility that weighed less than 2 500 g.* Low birth weight is associated with a range of both short- and long-term consequences.

2017/18 and 2018/19. The low-birth weight indicator for Laingsburg increased slightly from 25.7% in 2017/18 to 26.6 % in 2018/19. The decrease in the number of malnourished children under five years and NMR to zero in 2018/19 represents a positive improvement in child health and supports the achievement of SDGs. Although the low birth rate has increased, this has not impacted on the NMR (**Table 6-21**).

Table 6-21: Child health statistics for Laingsburg Municipality

AREA	IMMUNISATION RATE		MALNUTRITION		NEONATAL MORTALITY RATE		LOW BIRTH WEIGHT	
	2017/18	2018/19	2017/18	2018/19	2017/18	2018/19	2017/18	2018/19
Laingsburg	80.7	59.1	1.3	0.0	0.0	0.0	25.7	26.6
Central District Karoo	73.0	71.3	5.6	3.8	19.9	12.1	21.9	23.4

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

6.2.3 ECONOMIC

The following is extracted from the Social Impact Assessment compiled by Tony Barbour (July, 2022) and included as ***Appendix F8****.*

KAROO HOOGLAND MUNICIPALITY[16]

Economic activity in the KH plays a key role in terms of creating employment opportunities and addressing poverty and human development. The ability of households to pay for services such as water, electricity, sanitation, and refuse removal is dependent upon the ability to generate income from economic activities. A slowdown or deterioration in economic activities typically results in job losses and the inability of households to pay for services, which in turn impacts on municipal revenues and the ability to provide and maintain services and municipal infrastructure.

ECONOMIC SECTORS

In terms of key sectors, the local economy in the KH was dominated by the agriculture, forestry and fishing which contributed 34% to Gross Value Added (GVA)[17] in 2017, followed by Community services (21%), trade (17%) and transport (12%). The sectors that contributed the least were the mining (0%), electricity (1%) and manufacturing (1%) (**Figure 6-37**).

The Gross Domestic Product (GDP) growth in KH has been fairly consistent over the years since 1996 till 2014. The rate ranges from nearly 2, 2% in 2005 to 0.02% in 1998. The periods when droughts or other factors have played a part are reflected by periodic declines in 1998, 2002, 2006, 2015. These effects are due to the dominant role played by the agriculture and community services sector. On average the growth over the period was 0,9% which shows the consistent contribution by the agriculture sector over this time period. The steepest decline was experienced during 2005 and 2015 during drought years.

[16] Information on the local economy is based on the 2019 Socio-Economic Profile of the LM prepared by the Western Cape Provincial Government.

[17] Gross value added (**GVA**) is an economic productivity metric that measures the contribution of a corporate subsidiary, company, or municipality to an economy, producer, sector, or region. Gross value added (**GVA**) is the value addition done to a product resulting in the production of final product whereas Gross Domestic Product (**GDP**) is the total value of products produced in the country.

The local economy, like the national economy, will also have been negatively impacted by the COVID-19 pandemic and associated lockdowns during 2020 extending into 2021.

EMPLOYMENT

In terms of employment, the agriculture sector was the most important sector in 2015, making up 33% of all jobs, followed community services (32%), trade (14%), households (11%), and finance (6%). The COVID-19 pandemic is likely to have resulted in job losses during 2020, extending into 2021. The reliance of the KH on the agriculture sector also makes the KH vulnerable to droughts and fluctuations in commodity prices. Added to this the community services sector which accounts for 32% of all jobs is associated with reliance on municipal and government aid and functions.

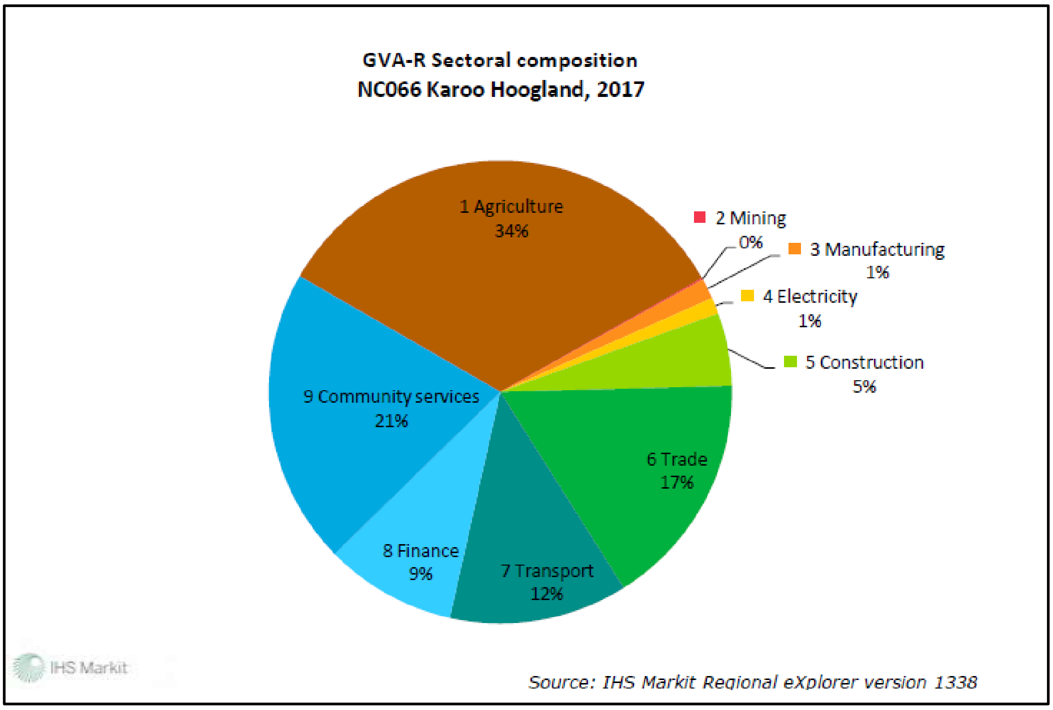


Figure 6-37: Key economic sectors in the KH

LAINGSBURG MUNICIPALITY[18]

Economic activity in the LM plays a key role in terms of creating employment opportunities and addressing poverty and human development. The ability of households to pay for services such as water, electricity, sanitation, and refuse removal is dependent upon the ability to generate income from economic activities. A slowdown or deterioration in economic activities typically results in job losses and the inability of households to pay for services, which in turn impacts on municipal revenues and the ability to provide and maintain services and municipal infrastructure.

ECONOMIC SECTORS

In terms of key sectors, the local economy in the LM was dominated by the agriculture, forestry and fishing which contributed 27% to Geographical Gross Domestic Product (GGDP)[19] in 2017, followed by general government (18.7%) and wholesale and retail trade, catering and accommodation (13.4 %). These three sectors made up 56.7% of the LMs GGDP in 2017, estimated to be worth R425.4 million. While there was strong growth of 10.5% in the agriculture, forestry, and fishing sector in 2017, the sector was expected to contract by 2.4 % in 2018 due to the drought at the time. The local economy, like the

[18] Information on the local economy is based on the 2019 Socio-Economic Profile of the LM prepared by the Western Cape Provincial Government.
[19] Geographical Gross domestic product (GGDP) is the standard measure of the value added created through the production of goods and services in a region (the LM) during a certain period.

national economy, will also have been negatively impacted by the COVID-19 pandemic and associated lockdowns during 2020 extending into 2021.

EMPLOYMENT

In terms of employment, the agriculture, forestry and fishing sector was the most important sector in 2017, making up 31.2% of all jobs, followed by wholesale and retail trade, catering and accommodation (19.1%), community, social and personal services (17.2%) and general government (16.1 %). The agriculture, forestry and fishing sector in the Laingsburg municipal area reported net job losses (-285) between 2008 and 2017. This is a major cause for concern given the key role played by the sector in the Laingsburg economy. The sector which reported the largest increase in jobs between 2008 and 2017 was community and, social & personal services (159) followed by general government (147), wholesale and retail trade, catering, and accommodation (86) and construction (85) sectors. The COVID-19 pandemic is likely to have resulted in job losses during 2020, extending into 2021.

In terms of skills levels, the labour forces in the LM in 2017 consisted mainly of semi-skilled (49.6 %) and low-skilled (34.3 %) workers. The semi-skilled and low-skilled categories (4.2%) grew notably faster than the skilled category (3.2 %) between 2014 and 2018 (**Table 6-22**). This is due to the relatively undeveloped nature of the local economy and limited demand for skilled workers. Of relevance to the Needs Assessment, the 2019 Socio-Economic Profile for the Laingsburg Municipality notes that the development of renewable energy facilities in the area will result in an increase in the demand for skilled labour which will create skills and development opportunities for low-skilled and semi-skilled workers.

Table 6-22: Labour forces trends in Laingsburg Municipality

FORMAL EMPLOYMENT BY SKILL	SKILL LEVEL CONTRIBUTION (%)	AVERAGE GROWTH (%)	NUMBER OF JOBS	
	2017	2014-2018	2017	2018
Skilled	16.1	3.2	380	392
Semi-skilled	49.6	4.2	1168	1198
Low-skilled	34.3	4.2	809	822
Total Laingsburg	**100.00**	**4.0**	**2357**	**2412**

Source: 2019 Socio-Economic Profile for the Laingsburg Municipality

6.2.4 HERITAGE

The following is extracted from the Heritage Impact Assessment compiled by CTS Heritage (August, 2022) and included as ***Appendix F7.***

PALAEONTOLOGY

According to the SAHRIS Palaeosensitivity Map (**Figure 6-38**), the area proposed for the Project is underlain by sediments of very high palaeontological sensitivity belonging to the Abrahamskraal Formation of the Beaufort Group. A Palaeontological Assessment was conducted by Almond (2015) for the Karrebosch WEF which covers a larger portion of the area proposed for the OHPL and substation development, and covered the proposed OHPL route and substation alternatives specifically (Figure 2b, Appendix to the ACO Report 2015, SAHRIS Ref 183350).

According to Almond (2015), "*The fluvial Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) that underlies almost the entire wind farm study area is known for its diverse fauna of Permian fossil vertebrates - notably various small- to large-bodied therapsids and reptiles - as well as fossil plants of the Glossopteris Flora and low diversity trace fossil assemblages. However, desktop analysis of known fossil distribution within the Main Karoo Basin shows a marked paucity of fossil localities in the study region between Matjiesfontein and Sutherland where sediments belonging only to the lower part of the thick Abrahamskraal Formation succession are represented.*

Bedrock exposure levels in the Karreebosch Wind Farm study area are generally very poor due to the pervasive cover by superficial sediments (colluvium, alluvium, soils, calcrete) and vegetation. Nevertheless, a su ciently large outcrop area of Abrahamskraal Formation sediments, exposed in stream and riverbanks, borrow pits, erosion gullies as well as road cuttings along the R354, has been examined during the present fieldwork to infer that macroscopic fossil remains of any sort are very rare indeed here. Exceptions include common trace fossil assemblages (invertebrate burrows) and occasional fragmentary plant remains (horsetail ferns). Levels of tectonic deformation of the bedrocks are generally low and baking by dolerite intrusions (Early Jurassic Karoo Dolerite Suite) is very minor. It is concluded that the Lower Beaufort Group bedrocks in the study area are generally of low palaeontological sensitivity and this also applies to the overlying Late Caenozoic superficial sediments (colluvium, alluvium, calcrete, soils etc).”

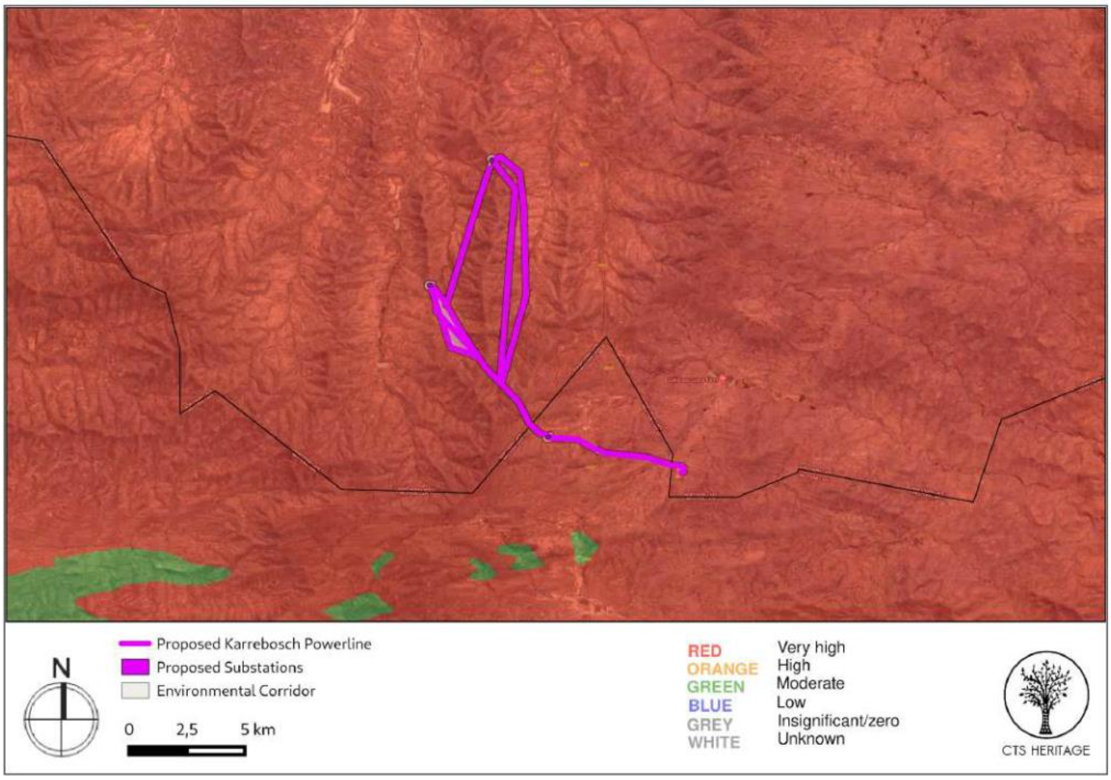


Figure 6-38: Palaeontological sensitivity of the area surrounding the broader study area

The Project area is underlain at depth by potentially fossiliferous continental sediments within the lower part of the Abrahamskraal Formation (Lower Beaufort Group / Adelaide Subgroup, Karoo Supergroup) of Middle Permian age. Sparse fossil assemblages in this sector of the Klein-Roggeveldberge region – including extremely rare vertebrate skeletal remains, tetrapod and lungfish burrows, invertebrate traces and vascular plants - are inferred to belong to the Eodicynodon Assemblage Zone and contribute to our understanding of the earliest terrestrial biotas that colonised the Main Karoo Basin in Middle Permian times (c. 270 Ma / million years ago). The palaeosensitivity of the project area is provisionally rated as High based on the Lower Beaufort Group bedrocks (SAHRIS website / DFFE screening tool).

However, previous field-based palaeontological surveys in the neighbouring Roggeveld WEF project area have only yielded scrappy plant remains as well as low-diversity trace fossils. With the exception of fragmentary fossil remains of very rare temnospondyl amphibians found on Rietfontein RE/197, close to the powerline Option 1B, additional fossil sites recorded during a recent 2-day palaeontological site visit to the Roggeveld WEF grid connection project area are mostly of low scientific / conservation value and lie outside or on the margins of the Karreebosch grid corridors under investigation.

ARCHAEOLOGY

The Karreebosch HIA (2015) “*revealed that the study area is relatively austere in terms of pre-colonial heritage, however valley bottoms contain evidence of early trekboer cultural landscapes – ruins, graves* *and occasional middens. These consist of collections of ruined stone and mud buildings, threshing floors and kraals located exclusively in the valley areas between the high longitudinal ridges that characterise the study area. There are a number of existing farm houses that contain 19th century fabric, however very few of these have anything more than moderate heritage significance. Parts of the study area enjoy very high aesthetic qualities with the area known by locals as "Gods Window" having grade II aesthetic qualities, hence the significance of the study area lies mainly with its undeveloped wilderness qualities. Interestingly, pre-colonial or stone age heritage and archaeology is extremely scarce in the areas that were searched. Very few archaeological sites of these kinds were recorded despite the fact that overall 9 experienced archaeologists were involved in scouring the landscape."*

The HIA for the Karreebosch WEF notes that "*The most important colonial archaeological sites in the study area are associated with Ekkraal Valley, the Rietfontein-Wilgebosch River valley and the Krans Kraal-Karrekraal valley. The valley bottoms are archaeologically sensitive...".* Similar findings were made by ACO in their report (2010, SAHRIS Ref: 53187) over the development area. As the proposed OHPL route alternatives traverse the valley areas which have been determined to be archaeologically sensitive, it is likely that significant archaeological heritage resources may be impacted by the proposed development.

Very few archaeological resources were identified during the archaeological field assessment completed for the proposed OHPL and substation development. The resources that were identified were all single artefact occurrences or low density artefact scatters, none of which were determined to have any scientific cultural value.

While the survey of the Karreebosch OHPL and substation must be taken in context with the broader assessments of the wind farms that have necessitated the development of the OHPL and substation, the findings were particularly limited due to the route taken for the OHPL. 132kV lines typically have a very small development footprint and can be constructed without the large roads needed to build the WEFs. The routes chosen by the engineers for the various OHPL alternatives follow very rugged, mid-slope paths where almost no archaeological material or ruins were found. The substation site options also did not present any significant heritage resources. Where archaeological material was found, lithics consisted of local quartzites used to manufacture Middle and Later Stone Age flakes as well as cherts that were sourced in the more general region such as the Tanqua and Ceres Karoo by people in the Later Stone Age.

There have now been a rather large number of studies conducted for the various WEFs between Sutherland, Matjiesfontein, Laingsburg and the Ceres Karoo which have greatly improved our understanding of the Stone Age and historical settlement patterns in this area. Rock art sites are rare where suitable surfaces are not found in abundance near the valley floors. Isolated Stone Age material from the Middle to the Later Stone Age is found in very low numbers on the ridges, particularly the more accessible ones. It is possible that these areas were used as lookout/observation areas by hunter-gatherers as no evidence of larger campsites were found on the ridges. The historical farms have left a more obvious trace on the valley floors where arable land was taken up for agriculture during the last couple of hundred years. This is also the ground where most of the evidence for Later and Middle Stone Age occupation areas were found.

Figure 6-39 to **Figure 6-41** illustrate the heritage resources identified during the field assessment.

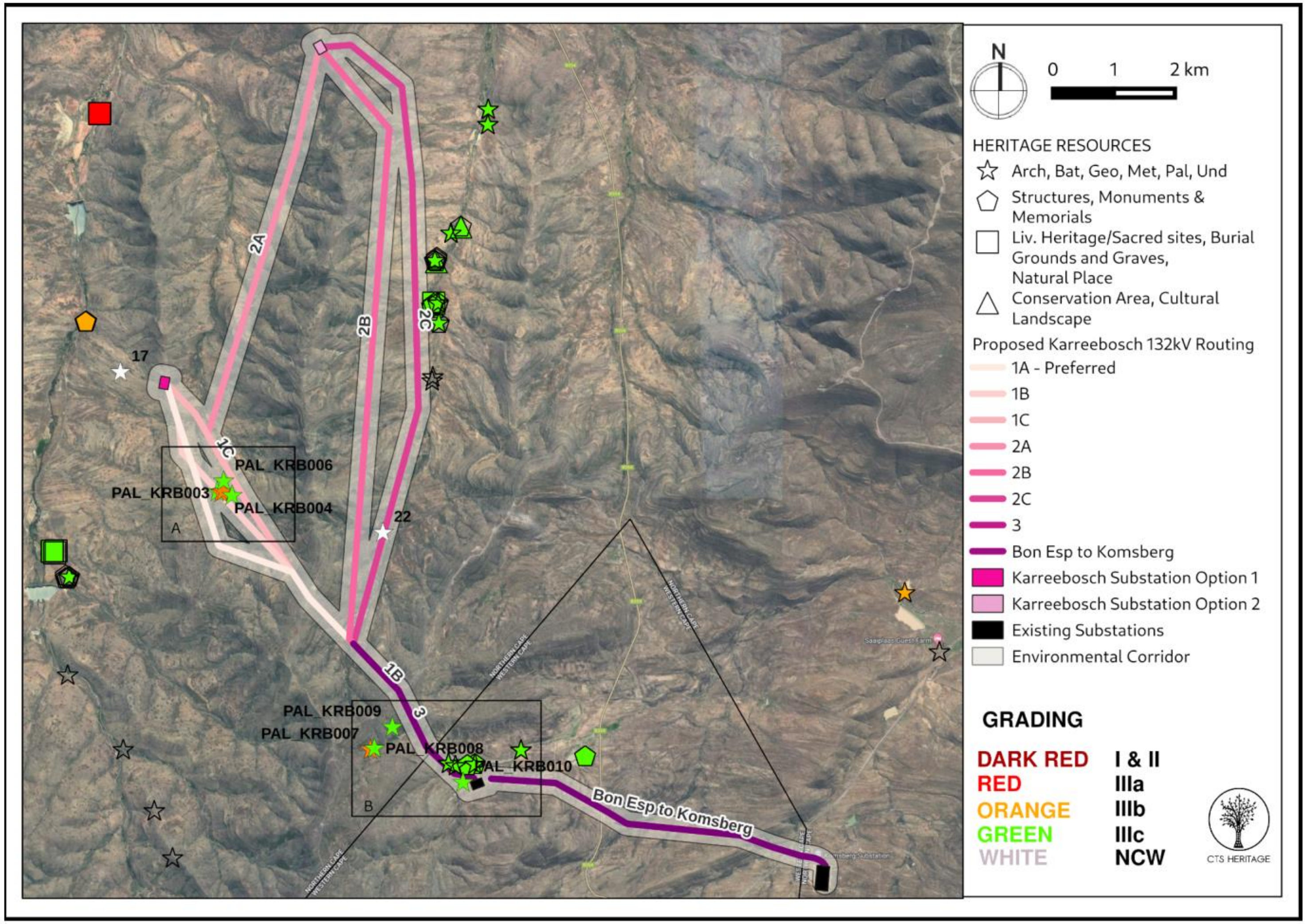


Figure 6-39: Map of heritage resources identified during the field assessment

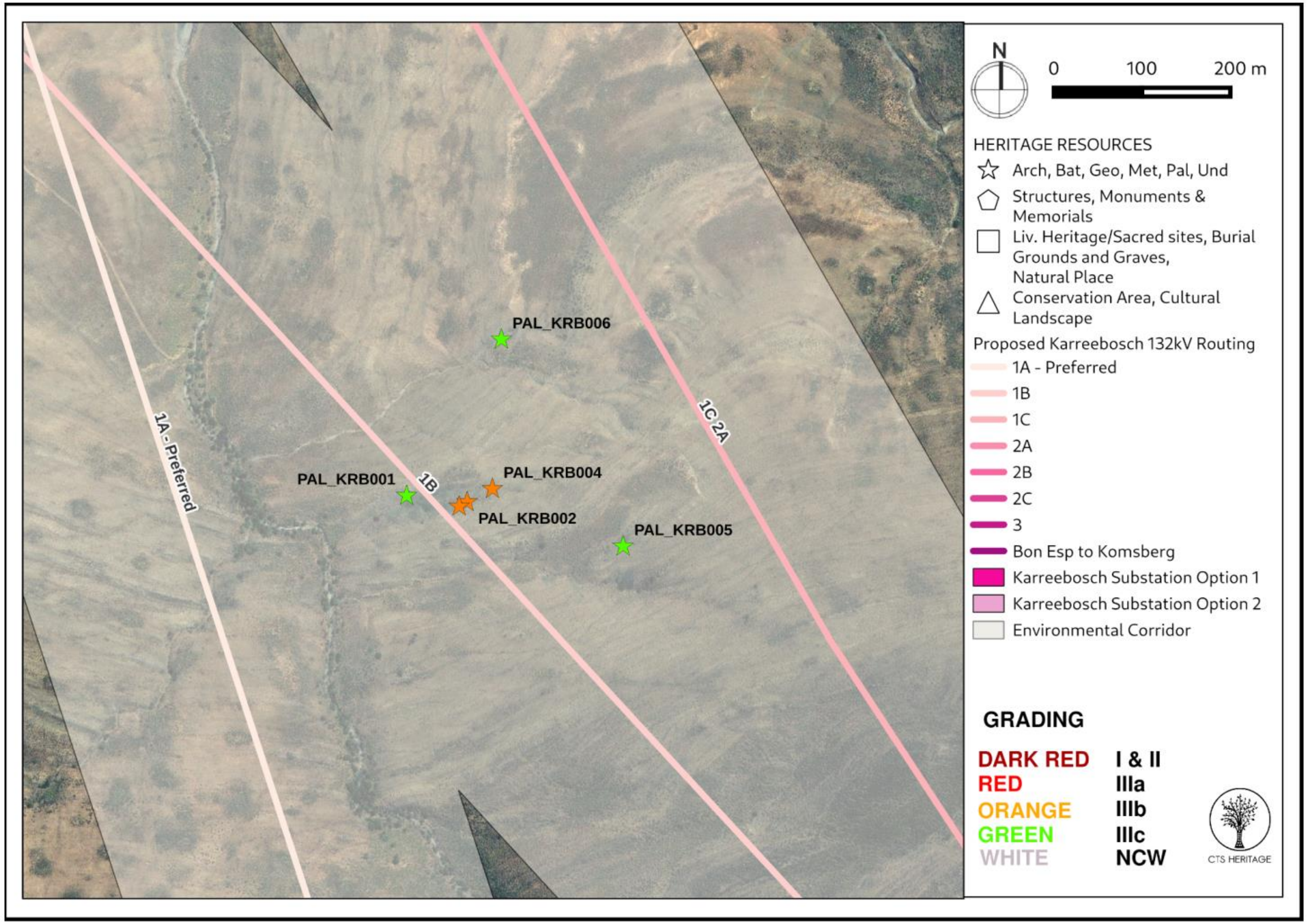


Figure 6-40: Inset A

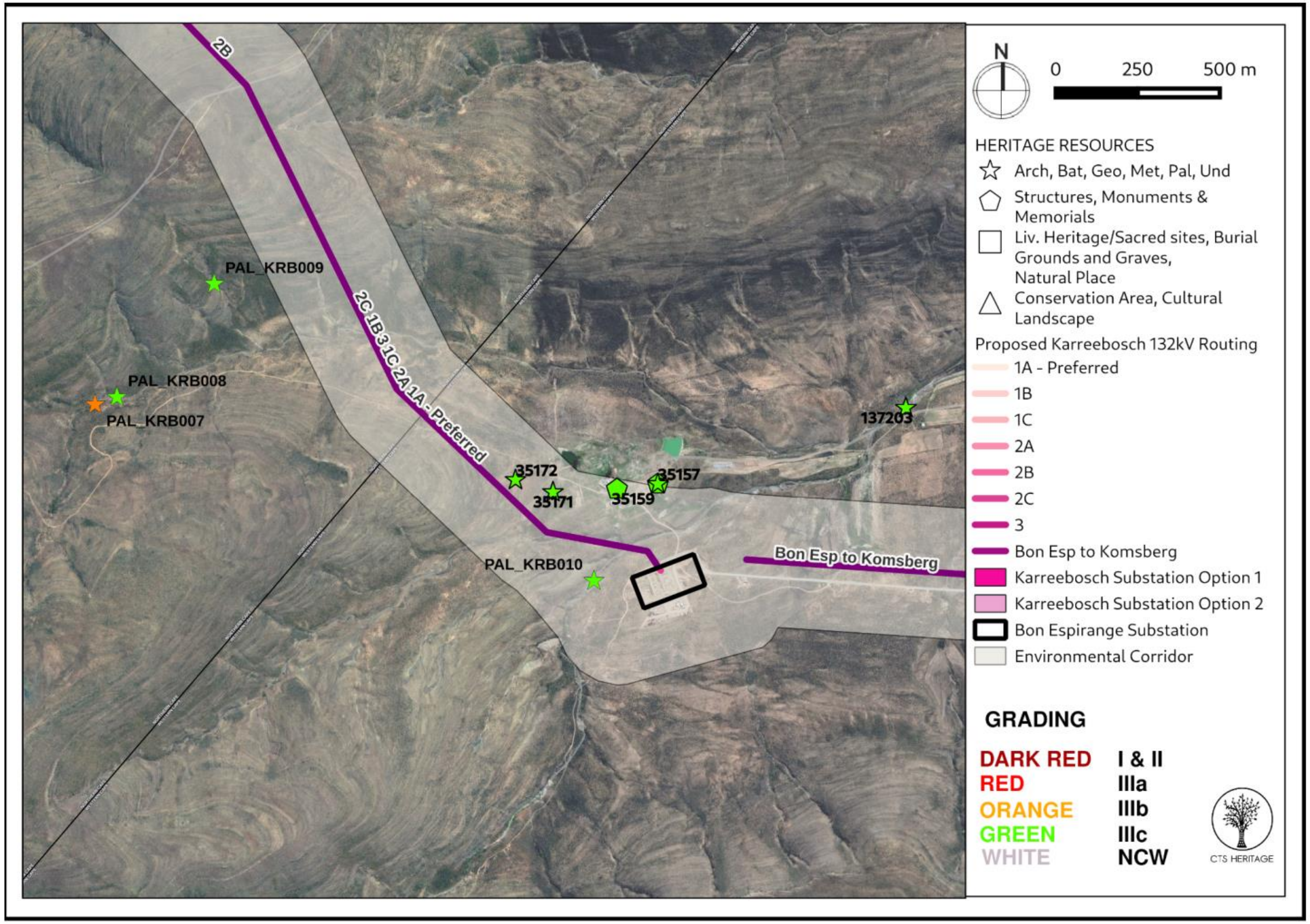


Figure 6-41: Inset B

CULTURAL LANDSCAPE

According to the ACO reports (2011, 2013 and 2015) and confirmed by CTS (2022), parts of the study area enjoy very high aesthetic qualities hence the significance of the study area lies mainly with its undeveloped wilderness qualities which may be negatively impacted by the development of the proposed powerline. However, it must be noted that the proposed powerline is located within a Renewable Energy Development Zone which has been identified for this kind of development. In REDZ areas, there is a reasonable expectation that the cultural landscape of an area will be changed to be dominated, or at least heavily altered, by renewable energy development and its associated infrastructure. In fact, this is the intention of the REDZ areas. Furthermore, the proposed Project is located within a suite of authorised renewable energy facilities and as such, the impact of this proposed powerline on the cultural landscape is likely to be negligible. The findings of this field assessment largely correlate with the findings of the ACO in the HIA completed for the Karreebosch WEF (Kendrick and Hart, 2015, SAHRIS Ref 183350) and the Roggeveld WEF (Hart and Webley, 2013, SAHRIS Ref 152531). The archaeological resources identified within the area proposed for development are all ex situ and are of limited scientific and heritage significance.

The final layout for the Karreebosch WEF avoids impact to all known significant heritage resources present within the development area. The walkdown of the final layout revealed no new significant heritage resources that are likely to be impacted. There are no preferred alternatives for the proposed access roads, construction camps or substations from a heritage perspective. It was concluded by CTS (August, 2022) that no further specialist cultural/heritage landscape assessment is recommended.

6.2.5 LANDSCAPE AND VISUAL

The following is extracted from the Visual Impact Assessment (July, 2022) compiled by SiVest and included as ***Appendix F10****.*

The proposed powerline and substation are located in the scenic Karoo region of the Western / Northern Cape which is generally associated with wide vistas and mountainous landscapes. The topography in the broader study area is largely dominated by the mountains/hills at the southern end of the Klein Roggeveld range. Much of the study area is therefore dominated by the steep slopes and broad ridges of these mountains and escarpments

Areas of flatter relief, including plains and higher-lying plateaus, are characterised by wide ranging vistas (**Figure 6-42**), although views from the east and south will be somewhat constrained by the hilly terrain in these sectors of the study area which enclose the visual envelope. In the hillier and higher-lying terrain, the vistas will depend on the position of the viewer. Viewers located within some of the more incised valleys for example, would have limited vistas, whereas much wider vistas would be experienced from higher-lying ridge tops or slopes. Importantly in the context of this study, the same is true of objects placed at different elevations and within different landscape settings. Objects placed on high-elevation slopes or ridge tops would be highly visible, while those placed in valleys or on enclosed plateaus would be far less visible.

Bearing in mind that power line towers and substations are large structures (towers could potentially be up to 40 m in height), these elements of the grid connection infrastructure could be visible from a relatively extensive area around the grid connection infrastructure. However, topographic shielding provided by the hills and prominent ridges across the study area would reduce the visibility of the power lines and substations from many of the locally occurring receptor locations, and also from much of the R354 main road.

Figure 6-42: View (N) from the farm Rietfontein No 197 in south-western section of the study area (-32.939518S; 20.490003E) showing wide-ranging vistas experienced from higher elevations.

GIS technology was used to undertake a preliminary visibility analysis for the proposed power line route alignments and substation sites. This analysis was based on points at 250 m intervals along the centre line of the corridor alternatives, and assumes a tower height of 40 m. The resulting viewshed indicates the geographical area from where the proposed power lines and substation sites would theoretically be visible, i.e. the zone of visual influence or viewshed. This analysis is based entirely on topography (relative elevation and aspect) and does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development. In addition, detailed topographic data was not available for the broader study area and as such the viewshed analysis does not take into account any localised topographic variations which may constrain views. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.

The results of this analysis, as per **Figure 6-43** below, show that although elements of the proposed grid connection infrastructure would be visible from many parts of the study area, the prominent ridges on the site have resulted in significant portions of the study area being outside the combined viewshed for the proposed power line and substation sites.

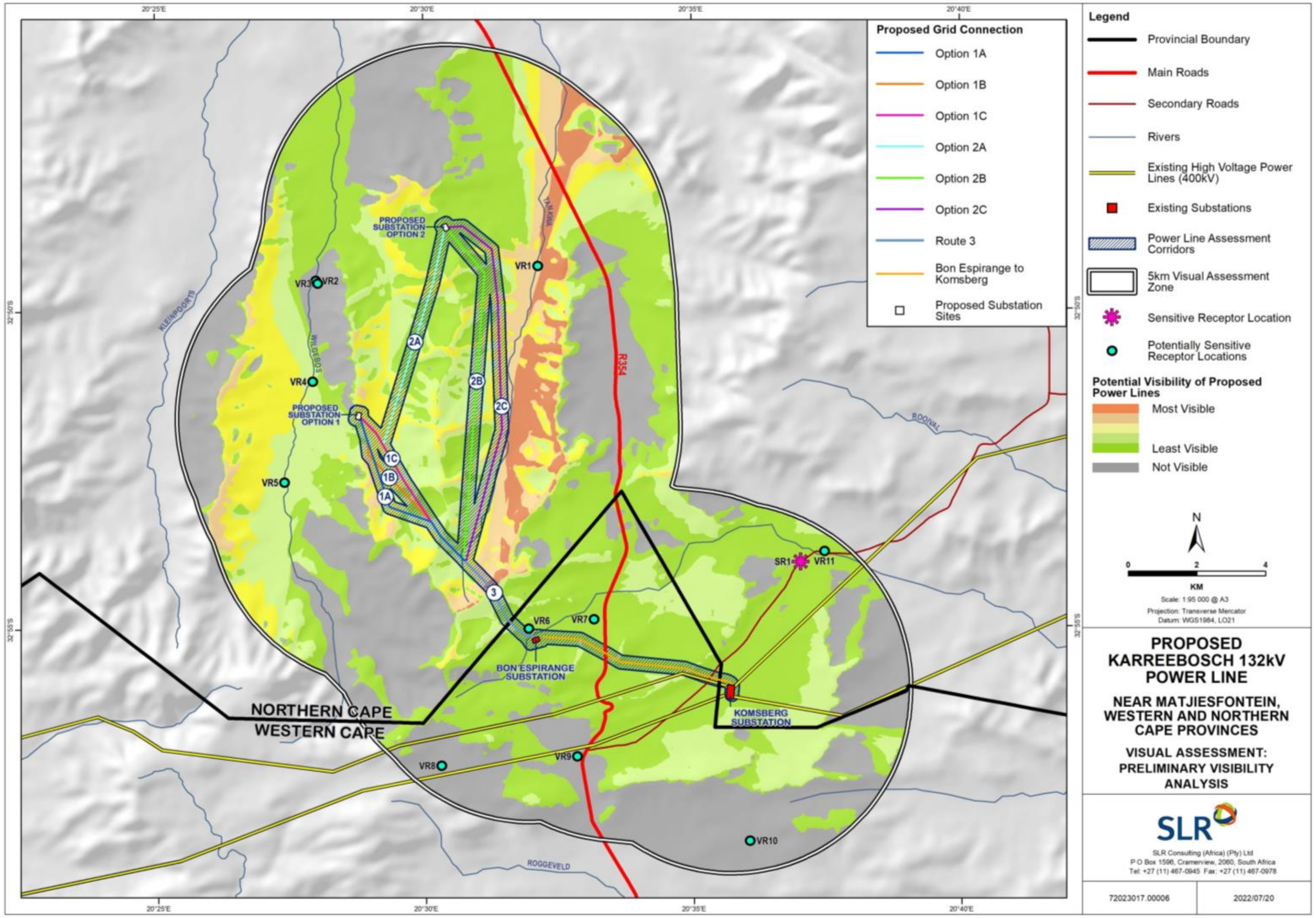


Figure 6-43: Preliminary visibility analysis of proposed development

According to the South African National Land Cover dataset (GeoTerra Image 2020), much of the visual assessment area is characterised by natural vegetation which is dominated by Karoo and Fynbos shrubland interspersed with natural grassland (**Figure 6-44)**.

Agricultural activity in the area is restricted by the arid nature of the local climate and areas of cultivation are largely confined to relatively small patches of land distributed along drainage lines. As such, the natural vegetation has been retained across much of the study area. Livestock farming (mostly sheep) is the dominant activity, although the climatic and soil conditions have resulted in low densities of livestock and relatively large farm properties across the area. Thus, the area has a very low density of rural settlement, with relatively few scattered farmsteads in evidence (**Figure 6-45**). Built form in much of the study area is limited to isolated farmsteads, including farm worker's dwellings and ancillary farm buildings, gravel access roads, telephone lines, fences and windmills (**Figure 6-46**).

High voltage (400kV and above) power lines in the study area (**Figure 6-47**) however form significant man-made features in an otherwise undeveloped landscape. These power lines bisect the southern sector of the study area in a south-west to north-east alignment, linking in to the Komsberg 400kV substation, situated at the southern end of the OHPL assessment corridor. This substation is a substantial anthropogenic feature with a distinctly more industrial character, resulting in a significant degree of transformation in the landscape (**Figure 6-48**). Further human influence is visible in the area in the form of the R354 man road which traverses the study area in a north to south direction (**Figure 6-49**).

Much of the central portion of the study area lies within the project area for the operational Roggeveld WEF (**Figure 6-50**). This facility, including wind turbines located along ridge-tops, access roads, powerlines and the recently constructed Bon Espirange substation has (**Figure 6-51)** resulted in significant transformation of the landscape.

The closest built-up area is the small town Matjiesfontein which is situated approximately 34km south of Komsberg Substation while Laingsburg is some 37kms to the south-east. These small towns are well outside the visual assessment zone and thus not expected to have an impact on the visual character of the study area.

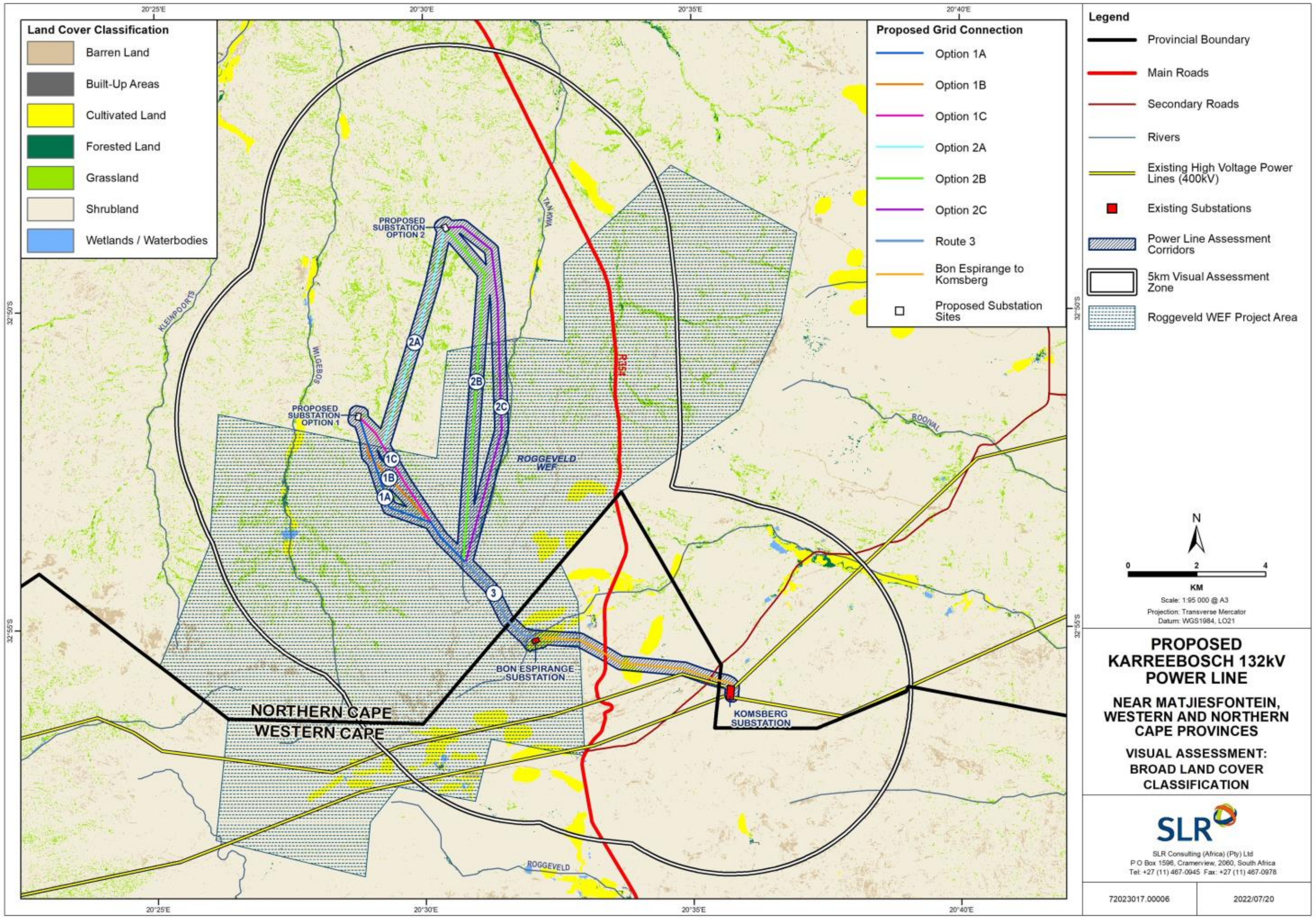


Figure 6-44: Land Cover Classification of the study area

Figure 6-45: **Isolated farmstead on Portion 1 of the Farm Klipbanks Fontein No 198**

Figure 6-46: Typical view of built form in the study area, including farmhouses, telephone poles and a windmill

Figure 6-47: View of high voltage power lines in the study area

Figure 6-48: Komsberg Substation

Figure 6-49: R354 main road is a prominent feature in the landscape.

Figure 6-50: Roggeveld WEF

Figure 6-51: Bon Espirange Substation under construction (now existing)

Sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements. In addition, there are no towns or settlements in the study area and thus, there are very low levels of human transformation and visual degradation across much of the study area.

Significant elements of human transformation are however present in the central and southern sectors of the study area, including the operational Roggeveld WEF, high voltage power lines and Komsberg Substation. These elements are considered to have degraded the visual character of the study area to some degree.

VISUAL CHARACTER AND CULTURAL VALUE

The above physical and land use-related characteristics of the study area contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other objects such as telephone or electricity infrastructure. The visual character of an area largely determines the sense of place relevant to the area. This is the unique quality or character of a place, whether natural, rural or urban which results in a uniqueness, distinctiveness or strong identity.

Agricultural activities in the area have not transformed the natural landscape to any significant degree and there are no towns or built-up areas in the study area influencing the overall visual character. Hence the natural character has been retained across much of the study area.

Prominent anthropogenic elements in the study area however include a large electrical substation (Komsberg), associated high voltage powerlines and the Roggeveld WEF and associated infrastructure. The presence of this infrastructure is an important factor in this context, as the introduction of the proposed powerline and substation infrastructure would result in less visual contrast where other anthropogenic elements are already present.

The construction of the Roggeveld WEF (now operational) and the associated 132kV powerline and substation is a significant factor in the visual character of the study area. WEFs and their associated infrastructure typically consist of very large structures which are highly visible. As such, this facility has already significantly altered the visual character and baseline across the central sector of the study area, resulting in a more industrial-type visual character.

It is important to note that several renewable energy facilities (solar and wind) are proposed within relatively close proximity to the proposed powerline. These facilities and their associated infrastructure, typically consist of very large structures which are highly visible. As such, if these facilities are constructed they will further alter the visual character and baseline in the study area towards a more industrial-type visual character. Although this will lessen the degree to which the proposed powerline would contrast with the elements and form in the surrounding environment, the cumulative impact on each sensitive receptor location would increase..

The scenic quality of the landscape is also an important factor contributing to the visual character of an area or the inherent sense of place. Visual appeal is often associated with unique natural features or distinct variations in landform. As such, the hilly / mountainous terrain which occurs across much of the study area is considered to be an important feature that increases the scenic appeal and visual interest in the area. The R354 Main Road is in fact considered to have high scenic and rural value.

The greater area surrounding the proposed development is an important component when assessing visual character. The area can be considered to be typical of a Karoo or “platteland” landscape that would characteristically be encountered across the high-lying dry western and central interior of South Africa. Much of South Africa’s dry Karoo interior consists of wide open, uninhabited spaces sparsely punctuated by scattered farmsteads and small towns. Over the last couple of decades an increasing number of tourism routes have been established in the Karoo and in a context of increasing urbanisation in South Africa’s major centres, the Karoo is being marketed as an undisturbed getaway.

The typical Karoo landscape can be considered a valuable ‘cultural landscape’ in the South African context. Although the cultural landscape concept is relatively new, it is becoming an increasingly important concept in terms of the preservation and management of rural and urban settings across the world (Breedlove, 2002).

The Karoo landscape, consisting of wide-open plains, and isolated relief, interspersed with isolated farmsteads, windmills and stock holding pens, is an important part of the cultural matrix of the South African environment. The Karoo farmstead is also a representation of how the harsh arid nature of the environment in this part of the country has shaped the predominant land use and economic activity practiced in the area, as well as the patterns of human habitation and interaction. The presence of small towns, such as Matjiesfontein, engulfed by an otherwise rural, almost barren environment, form an integral part of the wider Karoo landscape. As such, the Karoo landscape as it exists today has value as a cultural landscape in the South African context.

In light of this, it is important to assess whether the introduction of a new powerline and associated infrastructure into the study area would be a degrading factor in the context of the natural Karoo character of the landscape. Broadly speaking, visual impacts on the cultural landscape in the area around the proposed development would be reduced by the fact that the area is very remote and there are few significant tourism enterprises attracting visitors into the study area. In addition, although a recognised scenic route (R354) traverses the study area, visual impacts on travelers using this route will be considerably reduced by distance from the proposed powerline and the hilly terrain across the study area. In addition, it could be argued that this type of development is not considered to be a significant degrading factor in the context of the natural Karoo character of the study area, due to the fact that electrical infrastructure is frequently part of the typical form present within the Karoo landscape

VISUAL SENSITIVITY

Visual sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer: 2005). A viewer's perception is usually shaped by the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational tourism) which may be based on this aesthetic appeal.

In order to assess the visual sensitivity of the area, SLR has developed a matrix based on the characteristics of the receiving environment which, according to the Guidelines for Involving Visual and Aesthetic Specialists in the EIA Processes, indicate that visibility and aesthetics are likely to be 'key issues' (Oberholzer: 2005).

Based on the criteria in the matrix (**Table 6-23**), the visual sensitivity of the area is broken up into a number of categories, as described below:

- **High** - The introduction of a new development such as a power line and/or substation would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors.
- **Moderate** – Receptors are present, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.
- **Low** - The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

Table 6-23: Environmental factors used to define visual sensitivity of the study area

FACTORS	DESCRIPTION	RATING									
		LOW									*HIGH*
		1	2	3	4	5	6	7	8	9	10
Pristine / natural / scenic character of the environment	Study area is largely natural with areas of scenic value and some pastoral elements.										
Presence of sensitive visual receptors	Relatively few sensitive receptors have been identified in the study area.										
Aesthetic sense of place / visual character	Visual character is typical of Karoo Cultural landscape.										
Irreplaceability / uniqueness / scarcity value	Although there are areas of scenic value within the study area, these are not rated as highly unique.										
Cultural or symbolic meaning	Much of the area is typical of a Karoo Cultural landscape.										
Protected / conservation areas in the study area	No protected or conservation areas were identified in the study area.										
Sites of special interest present in the study area	No sites of special interest were identified in the study area.										
Economic dependency on scenic quality	Few tourism/leisure-based facilities in the area										
International / regional / local status of the environment	Study area is typical of Karoo landscapes										
****Scenic quality under threat / at risk of change**	Introduction of grid connection infrastructure will alter the visual character and sense of place. In addition, the development of other renewable energy facilities in the broader area as planned or under construction will introduce an increasingly industrial character, giving rise to significant cumulative impacts										

**Any rating above '5' for this specific aspect will trigger the need to undertake an assessment of cumulative visual impacts.

Low **Moderate** **High**

10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**

Based on the matrix above, the total score for the study area is 41, which according to the scale above, would result in the area being rated as having a low visual sensitivity. It should be stressed however that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts, and is based on the physical characteristics of the study area, economic activities and land use that predominates. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.

No formal protected areas were identified within the study area and relatively few sensitive or potentially sensitive receptors were found to be present.

As part of the visual sensitivity assessment, a screening exercise was undertaken with the aim of indicating any areas that should be precluded from the proposed development footprint. From a visual perspective, these are areas where the establishment of power lines and/or substations would result in the greatest probability of visual impacts on sensitive or potentially sensitive visual receptors.

Using GIS-based visibility analysis, it was possible to determine which sectors of the application site would be visible to the highest numbers of receptors in the study area **(Figure 6-52**). This analysis considered all the sensitive and potentially sensitive receptor locations identified. Due to hilly terrain and the fact that there are relatively few receptors, widely scattered across the area, sections of Corridor Options 1A, 1B, 1C and 2A are outside the viewshed and none of the remaining sections of the proposed route alignments were found to be significantly more visible than any others. It was however determined that one of the potentially sensitive receptors (VR6) is within 500 m of the combined power line assessment corridor and could potentially be affected by the proposed development. It has been noted that this farmstead is located within the Roggeveld WEF project area, in close proximity to the Bon Espirange Substation, and as such it is assumed that the occupants have a vested interest in the WEF development. Thus although a 500m potential visual sensitivity zone has been delineated around this receptor, this zone is <u>not considered to be a "no go area"</u>, but rather should be viewed as a zone where visual impacts could occur, depending on the sentiments of nearby residents.

It should be noted that the visibility analysis is based purely on topographic data available for the broader study area and does not take into account any localised topographic variations or any existing infrastructure and / or vegetation that may constrain views. In addition, the analysis does not consider differing perceptions of the viewer which would largely determine the degree of visual impact being experienced.

The visual sensitivity analysis should therefore be seen as a conceptual representation or a worst-case scenario which rates the visibility of the site in relation to potentially sensitive receptors. These areas of visual sensitivity are shown in **Figure 6-52** below.

In assessing visual sensitivity, the proposed development was examined in relation to the Landscape Theme of the National Environmental Screening Tool to determine the relative landscape sensitivity for the development of grid connection infrastructure. The tool does not however identify any landscape sensitivities in respect of the proposed power line or substation.

VISUAL ABSORPTION CAPACITY

Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape.

Although the hilly nature of the topography in the study area would increase the visual absorption capacity, this would be offset by the lack of screening provided by the dominant shrubland vegetation. A significant portion of the study area has however already undergone significant transformation as a result of the Komsberg substation and associated high voltage power lines and further transformation has occurred with the construction of the Roggeveld WEF (now operational), thus increasing the visual absorption capacity of the landscape.

Visual absorption capacity in the study area is therefore rated as **moderate**.

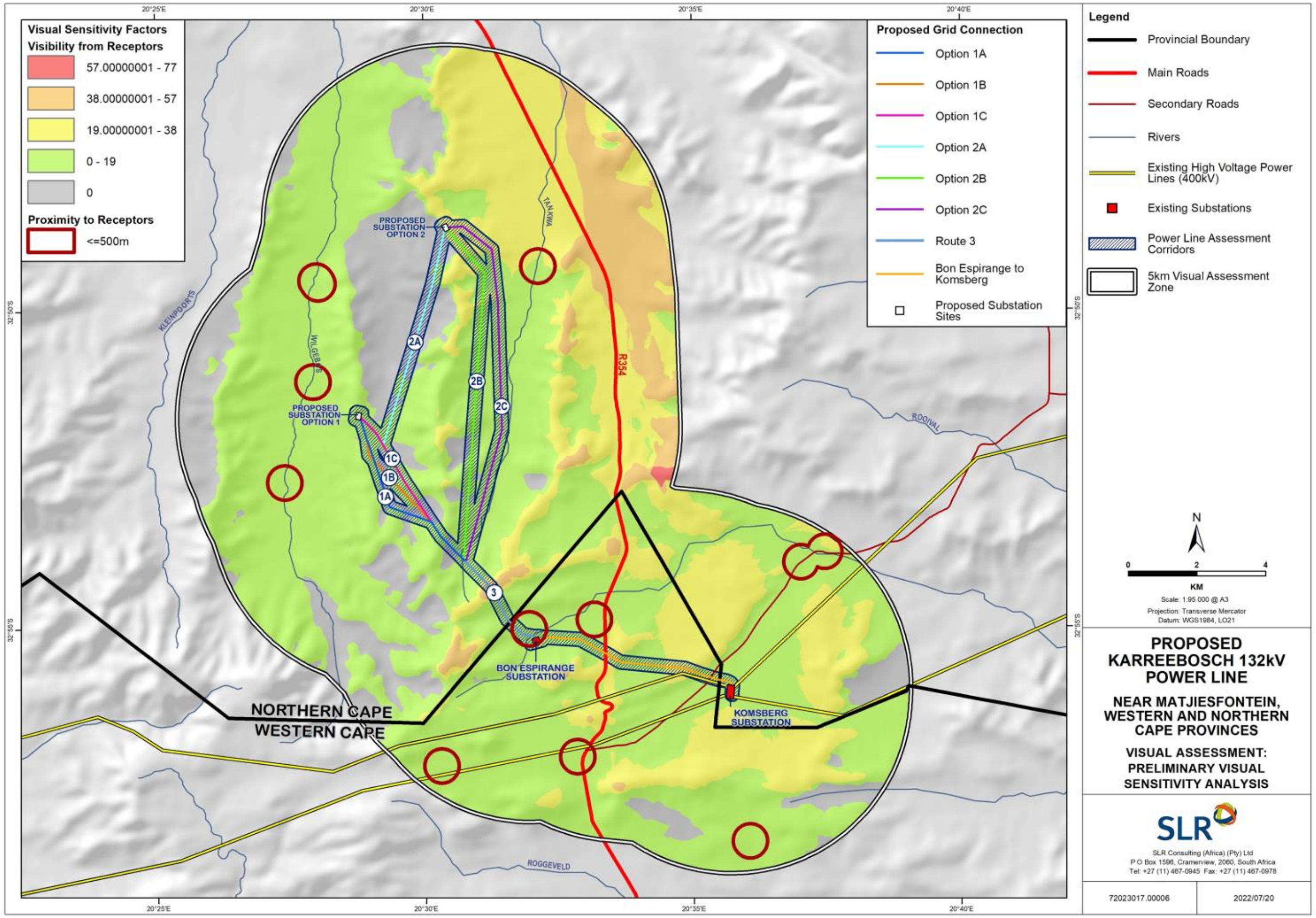


Figure 6-52: Preliminary visual sensitivity analysis of proposed development

6.2.6 LAND USE

*The following is extracted from the Social Impact Assessment (July, 2022) compiled by Tony Barbour and included as **Appendix F8**.*

The study area properties are located in the transition area between the Tankwa Karoo and Roggeveld regions, both of which fall within the eastern extreme of the winter rainfall zone. The R354 is locally considered as a rough demarcation of the transition from the Tankwa Karoo and the Klein Roggeveld. The Moordenaarskaroo located to the east of the Klein Roggeveld and the Roggeveld located on the escarpment are summer rainfall areas. The Roggeveld is well-known for its cold summers, while the low-lying Tanqua Karoo and Moordenaarskaroo are known for their hot summers. The Klein Roggeveld is located at mid-elevation.

The broader region is arid, and essentially consists of veld used for extensive grazing, mainly by small stock (**Figure 6-53**). Stock-carrying capacities are low, around 4-6 ha per sheep. Farming operations in the broader region typically consist of a number of (owned or leased) extensive properties, often spread over the various sub-regions to exploit differences in altitude and rainfall season. Base operations are typically located in the Roggeveld and Klein Roggeveld, with most Tankwa Karoo properties only inhabited by the owners during the winter months. Caretaker staff reside permanently on some properties.

Figure 6-53: Karroid scrub veld located on Swartland farm to east of R354

Relatively small areas located in valley floors are used for irrigated cropping activities (**Figure 6-54**). Most properties are used for the cropping of fodder, typically for own use. The area's relative isolation makes it ideal for the commercial cropping of vegetable seed (**Figure 6-55**).

Figure 6-54: Irrigated fodder crops on Saaiplaas (Standvastigheid 210/RE) north of Eskom Komsberg substation

Figure 6-55: Irrigated onion seed on Klipbanks Fontein 198/1 cultivated in one of the valleys at the headwaters of the Tankwa River

The settlement pattern is sparse, and essentially confined to a number of valleys in predominantly broken terrain (**Figure 6-56** and **Figure 6-57**). Local tourism in the study area is limited to self-catering guest accommodation facilities on working farms in the area, namely on Fortuin, Saaiplaas and De Kom (**Figure 6-58**). None are in significant proximity to the proposed 132kV Karreebosch powerline alignment(s).

Figure 6-56: Swartland farmstead viewed from the south-west, R354 in background. Swartland, Bon Espirange, Fortuin and Nuwerus are some of the few permanently inhabited farms immediately west of the R354

Figure 6-57: Caretaker staff accommodation foreground) and farmstead on Klipbanks Fontein 198/1. The property form part of an operation based in the Moordenaarskaroo

Figure 6-58: Entrance to Nuwerus and Fortuin farmsteads. The self-catering accommodation facility on Fortuin is currently leased out to contractors

The Klein Roggeveld and southern Tankwa Karoo fall within the Komsberg REDZ. Three WEFs in the study area which recently reached commercial operation, namely the Roggeveld WEF to the west of the R354, and the Karusa and Soetwater WEFs along the Komsberg gravel road along the Komsberg gravel road (**Figure 6-59**). The Roggeveld WEF is partly located on properties which would also be affected by the proposed Karreebosch powerline. The Roggeveld WEF substation has recently been completed on Bon Espirange farm ~1.4 km west of the R354 (**Figure 6-60**).

Figure 6-59: Entrance to Roggeveld WEF from the R354 on Swartland

Figure 6-60: Roggeveld WEF substation on Bon Espirange viewed from near the farmstead located to the north-west

Eskom's Komsberg substation is located along the Komsberg road, approximately 4.5 km (linear) east of the R354 intersection (**Figure 6-61**). Two 400 kV and a 765 kV Eskom lines currently feed into

Komsberg in a broad west-east aligned corridor. Eskom’s small Roggeveld substation (near Komsberg mountain) is not located in significant proximity to the study area.

Figure 6-61: Eskom’s Komsberg substation, viewed from the entrance along the Komsberg Road

Environmental approvals (and some amended approvals) have been issued for a number of facilities, including the Karreebosch WEF and the Gunsfontein WEF to the north of the Komsberg. Approvals for two WEFs are currently proposed to the south of the Komsberg, namely Maralla West and Maralla East. Most of the relevant WEFs envisage linking up directly or indirectly into Eskom’s Komsberg substation. The lines from the Roggeveld, Karusa and Soetwater WEFs are completed. The exact alignments could not be established.

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 and substation. **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, 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 installation thereof, all of which involves the movement of large plant and trucks along unpaved roads and exposing of soils. The emissions will, however, have short-term impacts on the immediate surrounding areas that can be easily mitigated and thus the authorisation 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 site specifc 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	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
GENERATION OF DUST AND PM									
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 of exposed soft soil surfaces as needed.; 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 in a phased manner as construction progresses 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 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.

7.1.3 DECOMMISSIONING PHASE

The impacts associated with air quality during the decommissioning phase are anticipated to be similar to the construction phase.

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	1	2	1	4	2	**16**	**low**	(-)	High
With Mitigation	1	2	1	4	2	**16**	**low**	(-)	High
Mitigation and Management Measures	The equipment must be in maintained in good working order, within service dates, and inspected before use;								

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.

7.2.3 DECOMMISSIONING PHASE

The impacts associated with noise during the decommissioning phase are anticipated to be similar to the construction phase.

7.3 GEOTECHNICAL

Competent founding conditions for the powerline pylons are anticipated at relatively shallow depths in slightly weathered bedrock, which will have to be assessed during the detailed investigation stage of the project prior to construction.

Consideration can be given to the following foundation type for the pylons:

— Drilled shaft/bored piles – these foundations are suitable in areas where shallow bedrock conditions are encountered or in poor, non-cohesive soils, where helical or screw-in piles are not suitable. The advantages of drilled shafts are they can support high loads, they have minimal settlement and deformation and minimum excavation during construction.

The proposed substation sites are underlain by the Abrahamskraal Formation. The sites lie on gentle slopes of 2.3-5.5˚ likely to be shallow transported soils. The three sites do not traverse any drainage features. Consideration can be given to the following foundation types for the substation:

— Normal strip footings

— Spread footings

It is important to select the correct foundation type and optimize the design, as such a detailed and comprehensive geotechnical investigation is required this will be undertaken prior to construction and upon finalisation of the layout plan.

The presence of uplift and downward forces in the form of wind loads must be taken into consideration during foundation design.

The Karoo Supergroup is known for its fossil bearing sedimentary units. The project area was concluded as having a low paleo-sensitivity in the Palaeontological report as part of the Heritage impact assessment completed for the study area (CTS, 2022). The removal of rock which contain these fossils will result in the destruction of these fossils. No fatal geotechnical constraints have been identified, which rendered a powerline alternative or substation site to be non-suitable.

The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock referred to in this report as "subsoils". The levelling of areas to create building platforms for the substation will also result in the displacement and exposure of subsoils. The potential impact of the development on the terrain and geological environment, will be the increased potential for soil erosion, caused by construction activities and the removal of vegetation. The powerline route and substation is considered suitable for construction provided that recommendations presented in this report are adhered too.

7.3.1 CONSTRUCTION PHASE

SOIL EROSION FROM SUBSOIL REMOVAL

The construction impact on soil erosion is indicated in **Table 7-4** below.

Table 7-4: Construction Impact on Soil Erosion

Potential Impact: SOIL EROSION FROM SUBSOIL REMOVAL	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	1	3	3	5	**50**	**Moderate**	(-)	High
With Mitigation	2	1	1	2	2	**12**	**Very Low**	(-)	High
Mitigation and Management Measures	— Temporary berms must be constructed, and surface water must be diverted into drainage channels. — Construction must make use of existing road network and access tracks, where possible. — Rehabilitation of affected areas (such as re-grassing, mechanical stabilization) must be implemented. — The correct engineering design and construction of gravel roads over water crossings must be applied. — Correct construction methods for foundation installations and cut to fill configurations.								

7.3.2 OPERATIONAL PHASE

SOIL EROSION FROM SUBSOIL REMOVAL

The operational impact on soil erosion is indicated in **Table 7-5** below.

Table 7-5: Operational Impact on Soil Erosion

Potential Impact: SOIL EROSION FROM SUBSOIL REMOVAL	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	4	3	**27**	**Low**	(-)	High
With Mitigation	1	1	1	4	2	**14**	**Very Low**	(-)	High
Mitigation and Management Measures	— Rehabilitation of affected areas (such as regrassing, mechanical stabilization) must be implemented.								

7.3.3 DECOMMISSIONING PHASE

SOIL EROSION FROM SUBSOIL REMOVAL

The decommissioning impact on soil erosion is indicated in **Table 7-6** below.

Table 7-6: Decommissioning Impact on Soil Erosion

Potential Impact: SOIL EROSION FROM SUBSOIL REMOVAL	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	4	3	**27**	**Low**	(-)	High
With Mitigation	1	1	1	4	2	**14**	**Very Low**	(-)	High
Mitigation and Management Measures	— Temporary berms must be constructed, and surface water must be diverted into drainage channels. — Rehabilitation of affected areas (such as regrassing, mechanical stabilization) must be implemented.								

7.4 AGRICULTURAL POTENTIAL

The proposed electrical grid infrastructure has negligible agricultural impact for three reasons:

— Overhead transmission lines have no agricultural impact because all agricultural activities that are viable in this environment, can continue completely unhindered underneath transmission lines.

— The direct, permanent, physical footprint of the development, including the substation alternatives and access roads that has any potential to interfere with agriculture is insignificantly small. The affected land has very low agricultural potential.

The only possible source of impact is minimal disturbance to the land during construction and decommissioning. The single agricultural impact is therefore minimal soil and land degradation (erosion and topsoil loss) as a result of land disturbance. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads and laydown areas. Soil degradation will reduce the ability of the soil to support vegetation growth. This is a direct, negative impact that applies to only two of the phases of the development (construction and decommissioning).

This impact can be completely mitigated. The agricultural impact of the proposed development is deemed to be negligible.

7.5 SOILS

7.5.1 CONSTRUCTION PHASE

SOIL CONTAMINATION

During construction activities, construction vehicles/trucks/machinery as well as hazardous substances stored on the site might spill and contaminate the soil. The impact of the construction phase on soil pollution is indicated in **Table 7-7** below.

Table 7-7: Construction Impact on Soil Contamination

Potential Impact: SOIL CONTAMINATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	3	4	**36**	**Moderate**	(-)	High
With Mitigation	1	1	3	2	3	**21**	**Low**	(-)	High

Mitigation and Management Measures	All construction vehicles, plant, machinery and equipment must be properly maintained to prevent leaks; Plant and vehicles are to be repaired immediately upon developing leaks; Drip trays shall be supplied for all idle vehicles and machinery; No major repair work may be undertaken on machinery onsite or within the site camp area; Drip trays are to be utilised during daily greasing and re-fuelling of machinery and to catch incidental spills and pollutants; Drip trays are to be inspected daily for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow; Ensure appropriate handling of hazardous substances; Keep adequate spill kits onsite and train personnel to use them appropriately; Fuels and chemicals must be stored in adequate storage facilities that are secure, enclosed and bunded; and Implement stormwater management measures that will help to reduce the speed of the water flows.

7.5.2 OPERATIONAL PHASE

SOIL CONTAMINATION

Soil contamination is expected to be limited during the operational phase as maintenance activities will occur as and when required and will be extremely short-term. The operational impact on soil contamination is indicated in **Table 7-8** below.

Table 7-8: Operation Impact on Soil Contamination

Potential Impact: **SOIL CONTAMINATION**	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**	**Confidence**
Without Mitigation	2	1	3	3	3	**27**	**Low**	(-)	High
With Mitigation	1	1	3	2	2	**14**	**Very Low**	(-)	High
Mitigation and Management Measures	All vehicles, plant, machinery and equipment must be properly maintained to prevent leaks; Vehicles and machinery are to be repaired immediately upon developing leaks; Drip trays shall be supplied for all idle vehicles and machinery; No major repair work may be undertaken on machinery on site; Drip trays are to be utilised during daily greasing and re-fuelling of machinery and to catch incidental spills and pollutants; Drip trays are to be inspected daily for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow; Ensure appropriate handling of hazardous substances; Keep a spill kit on site and train personnel to use it appropriately; and Fuels and chemicals must be stored in adequate storage facilities that are secure, enclosed and bunded.								

7.5.3 DECOMMISSIONING PHASE

The impacts associated with soils during the decommissioning phase are anticipated to be similar to the construction phase.

7.6 HYDROLOGY

7.6.1 CONSTRUCTION PHASE

IMPACT ON LOCAL HYDROLOGY

There is a potential to affect the local hydrology in the area in the area. This includes the increase in surface runoff due to hardened surfaces, the increase in the erosion potential due to concentrated flow paths, and the reduction in infiltration reducing groundwater recharge. The impact of construction on hydrology is shown in **Table 7-9** below.

Table 7-9: Construction Impact on Hydrology

Potential Impact: DETERIORATION IN GROUNDWATER QUALITY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	2	2	3	**27**	**Low**	(-)	High
With Mitigation	1	2	2	2	2	**14**	**Very Low**	(-)	High
Mitigation and Management Measures	— Ensure the storm water management plan (**Appendix F-11**) is implemented by an appropriate engineer. Here, the engineer should ensure both natural run-off (that which can be released into the natural landscape with no detrimental effect) and excess artificial run-off generated by the proposed development structures. Other structures that may be considered are semi-permeable surfaces that can absorb artificial run-off but releases a certain amount into the landscape. Energy dissipating structures can also be used.								

POTENTIAL SPILLS CONTAMINATING SURFACE WATER

There is a potential to affect the surface water in the area in the area as a result of spills. This includes Spills from machinery, vehicles, cement mixing areas, Litter from staff and the increased risk of pollutants being washed into the nearby watercourse systems. The impact of construction on hydrology is shown in **Table 7-9** below.

Table 7-10: Construction Impact on Deterioration in Surface water Quality

Potential Impact: DETERIORATION IN GROUNDWATER QUALITY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	2	2	3	**30**	**Medium**	(-)	High
With Mitigation	3	2	2	2	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— Spill prevention kits must be available on site. Eco-friendly alternatives are recommended. — Construction activities to stop during heavy rainfall periods.								

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
DETERIORATION IN GROUNDWATER QUALITY									
	— Drip trays to be present and maintenance only to occur in designated lined areas.								

7.6.2 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.

7.6.3 DECOMMISSIONING PHASE

The impacts associated with groundwater during the decommissioning phase are anticipated to be similar to the construction phase.

7.7 FRESHWATER

7.7.1 CONSTRUCTION PHASE

VEHICULAR MOVEMENT (TRANSPORTATION OF CONSTRUCTION MATERIALS)

The following impacts are expected to result from vehicular movement on site:

- Loss of watercourse vegetation, associated habitat and ecosystem services;
- Transportation of construction materials can result in disturbances to soil, and increased risk of sedimentation/erosion; and
- Soil and stormwater contamination from potentially spilled oils and hydrocarbons originating from construction vehicles.

The impact of vehicular movement in the construction phase is shown in **Table 7-11** below.

Table 7-11: Assessment of significance of vehicular movement on surface water associated with the construction phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
VEHICULAR MOVEMENT									
Without Mitigation	3	2	3	2	2	20	Low	(-)	High
With Mitigation	2	2	1	2	2	14	Very Low	(-)	High
Mitigation and Management Measures	It is assumed that the proposed powerline support structures will be located outside of the watercourses and at least 32 m (as far as possible/feasible) from the delineated edge of a watercourses – this in itself is considered a mitigation measure, which entails no direct negative impacts from occurring on the watercourses. — Due to the accessibility of the sites, limit the crossings of watercourse where possible. Use must be made of existing								

Potential Impact: VEHICULAR MOVEMENT	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	watercourse crossing to access the project sites where possible. This will limit edge effects, erosion and sedimentation of the watercourses during the construction phase; — The reaches of the watercourses where no activities are planned (i.e., no support structures and no spanning of the powerline over the watercourse) must be considered no-go areas; — Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the watercourses and their associated 32 m NEMA Zone of Regulation (ZoR); — Removed vegetation must be stockpiled outside of the delineated boundary of the watercourse, if possible. Should it not be possible, the removed vegetation may be stockpiled in the watercourse, for the duration of the construction period. The footprint areas and height of these stockpiles 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.							

REMOVAL OF VEGETATION AND ASSOCIATED DISTURBANCES TO SOIL, AND ACCESS TO THE SITE

The removal of vegetation and associated disturbances to soil, and access to the site, including grading of existing informal farm roads (access roads will be maintained as informal gravel roads, or a typical jeep track type road) will likely result in the following impacts:

- Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream watercourse areas;
- Exposure of soil, 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.

No powerline support structures may be constructed within the delineated extent of the EDLs or ephemeral tributaries. However, existing roads traversing some EDLs and tributaries may be upgraded (with limited new watercourse road crossings to be developed). Such activities were identified to pose a direct negative impact to the EDLs and tributaries. Should road upgrading/grading activities within the EDLs only be constructed only within the dry period (that will not require any kind of diversion of flow) and the recommended mitigation measures be applied, the impact significance can be reduced to a low risk significance.

The impact of vegetation removal in the construction phase is shown in **Table 7-12** below.

Table 7-12: Assessment of significance of vegetation removal on surface water associated with the construction phase of the project.

Potential Impact: REMOVAL OF VEGETATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	30	Low	(-)	High
With Mitigation	2	2	1	2	3	21	Low	(-)	High
Mitigation and Management Measures	— The same mitigations as outlined in Table 7-10 above apply								

EXCAVATIONS

Excavation of pits for the support structures and for the substation construction area leading to stockpiling of soil is likely to result in the following impacts:

— Disturbances of soil leading to potential impacts to the watercourse vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered watercourse habitat; and

— Altered runoff patterns, leading to increased erosion and sedimentation of the watercourses.

The impact of excavations in the construction phase is shown in **Table 7-13** below.

Table 7-13: Assessment of significance of excavations on surface water associated with the construction phase of the project.

Potential Impact: EXCAVATIONS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	30	Low	(-)	High
With Mitigation	2	2	1	2	3	21	Low	(-)	High
Mitigation and Management Measures	— Due to the pollution risk associated with any potential transformer leakage such as substations, substation Option 2 is not preferred as it is located in close proximity to the delineated extent of the watercourses (at least 20 m of a watercourse). Therefore, if substation Option 2 were to be constructed, it must be relocated as far away from the watercourse as possible in order to lower this potential pollution risk. — Excavation of pits for the support structures foundation and the foundation of the substation may result in loose sediments within the landscape, specifically if works are taken during a period of rainfall (if applicable). As such, sediment traps should also be installed downstream/downgradient of the construction area where practically feasible. Sediment traps can be created by pegging an appropriate geotextile across the entire width of the work area at the specified support tower, held down by cobbles/boulders or by geotextile wrapped hay bales spanning the width of the work area and staked into position; — No stockpiling of topsoil is to take place within close proximity to a watercourse, and suitable dust suppression actions (as needed) must be implemented for the duration of the construction works, especially considering the action of wind within these semi-arid landscapes; — During excavation activities, soil must be stockpiled upgradient of the excavated area. Mixture of the lower and								

Potential Impact: EXCAVATIONS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
	upper layers of the excavated soil should be kept to a minimum. This soil must be used to backfill the pits (support structures), immediately after installation of the support structures and/or other infrastructure; — Material used as bedding material (at the bottom of the excavated pit) should be stockpiled outside of the 32m NEMA ZoR and as close as possible to the support structures footprint area. Once the pit has been excavated, the bedding material should directly be placed within the pit, rather than stockpiling it alongside the pit — When the powerline is strung between the support structures and during final construction of the substation, no vehicles my indiscriminately drive through the watercourses, use must be made of the dedicated access roads									

CONSTRUCTION EQUIPMENT

Potential movement of construction equipment and personnel in the areas surrounding watercourses is likely to result in the following impacts:

— Disturbances of soil leading to potential impacts to the watercourse vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered watercourse habitat; and

— Altered runoff patterns, leading to increased erosion and sedimentation of the watercourses.

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

Table 7-14: Assessment of significance of construction equipment on surface water associated with the construction phase of the project.

Potential Impact: MOVEMENT OF CONSTRUCTION EQUIPMENT	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
With Mitigation	2	2	1	2	3	**21**	**Low**	(-)	High
Mitigation and Management Measures	— The same mitigations as listed in Table 7-12 above apply								

MIXING AND CASTING OF CONCRETE FOR FOUNDATIONS

Mixing and casting of concrete for foundations is likely to result in the potential contamination of surface water (if present). The impact of concrete mixing and casting in the construction phase is shown in **Table 7-15** below.

Table 7-15: Assessment of significance of concrete mixing and casting on surface water associated with the construction phase of the project.

Potential Impact: CONCRETE MIXING AND CASTING	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
With Mitigation	2	2	1	2	3	**21**	**Low**	(-)	High

<table>
<tr><td>Potential Impact:</td><td rowspan="2">Magnitude</td><td rowspan="2">Extent</td><td rowspan="2">Reversibility</td><td rowspan="2">Duration</td><td rowspan="2">Probability</td><td rowspan="2">Significance</td><td rowspan="2">Character</td><td rowspan="2">Confidence</td></tr>
<tr><td>CONCRETE MIXING AND CASTING</td></tr>
<tr><td>Mitigation and Management Measures</td><td colspan="8"><u>Control measures for concrete mixing on site:</u>
— No mixed concrete may be deposited outside of the designated construction footprint;
— As far as possible, concrete mixing should be restricted to the batching plant. 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
— Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.
<u>With regards to backfilling of the concrete encasing:</u>
— Soil removed for excavating the pit should be used as backfill material;
— All excavated 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 (within the 5 m buffer zone) must be loosened to natural soil compaction levels;
— Any remaining soil following the completion of backfilling of the pits are to be spread out thinly surrounding the installed support structures (outside of the delineated watercourses) to aid in the natural reclamation process; and
— The construction footprint must be limited to the pit area and an additional 5 m 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.</td></tr>
</table>

CREATION OF NEW ROAD CROSSINGS

Creation of new road crossings within watercourses will involve:

- Site preparation prior to construction activities including movement of construction machinery/vehicles within the watercourses and removal of vegetation;
- Ground-breaking and excavations within/adjacent to the watercourses; and
- Placement of culvert structures atop concrete base.

Earthworks and exposure of soil could result in sedimentation of the watercourses, which may be transported as runoff into the downstream watercourse areas and may smother vegetation associated with the watercourses; altered water quality (if surface water is present) as a result of vehicle movement and construction activities; and the proliferation of alien and/or invasive vegetation as a result of disturbance.

The impact of creating new road crossings in the construction phase is shown in **Table 7-16** below.

Table 7-16: Assessment of significance of new road crossing on surface water associated with the construction phase of the project.

Potential Impact: CREATION OF NEW ROAD CROSSINGS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	4	**40**	**Moderate**	(-)	High
With Mitigation	2	2	1	2	3	**21**	**Low**	(-)	High
Mitigation and Management Measures	— It is imperative that all construction works be undertaken during the dry periods when there is no flow within the watercourses, and thus no diversion of flow would be necessary; — The throughflow structures must be designed to ensure that the structures are geotechnically sound and that they are hydraulically stable, even if a 1:100 year flood event was to occur. The designs should include culverts installed intermittently to ensure a free draining landscape. It is recommended that a suitably qualified hydrologist be consulted to provide guidance on the relevant sizes and width requirements to ensure that hydraulic functioning of the system is maintained; — In addition, the crossings must be designed such that should they be overtopped, they remain stable and do not lead to excessive downstream erosion and incision. It must be ensured that the final design accounts for appropriate wetting frequencies and patterns are maintained in the pre-development condition (with input from the freshwater ecologist, where necessary); — The reaches of the EDLs where no activities are planned to occur must be considered no-go areas. These no-go areas can be marked at a maximum distance of 5 m upstream and downstream of the proposed road upgrade crossing. This 5 m buffer area would allow for construction personal, vehicles (if applicable) to enter the watercourse crossing where the road is proposed to be constructed; — The removed vegetation must be stockpiled outside of the delineated boundary of the watercourse. The footprint areas of these stockpiles should be kept to a minimum, and may not exceed a height of 2 m. 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. — Preference is given to the proposed access roads associated with the powerline options 1A/1B/1C as they won't impact on the Tankwa River;									

UPGRADING OF EXISTING ACCESS ROADS WITHIN WATERCOURSES

Upgrading of existing access roads within watercourses associated with the Tankwa River system, Wilgebos River system and Meintjiesplaas River system, will result in:

— Excavation within the watercourse for the removal of existing infrastructure and casting of a base (where applicable);

— Placement of culvert structures atop concrete base; and

— Upgrading of existing roads within close proximity (within 32 m) to a watercourse.

Earthworks and exposure of soil could result in sedimentation of the watercourses, which may be transported as runoff into the downstream watercourse areas and may smother vegetation associated with the watercourses, and proliferation of alien and/or invasive vegetation may occur as a result of disturbances.

The impact of upgrading existing road crossings in the construction phase is shown in **Table 7-17** below.

Table 7-17: Assessment of significance of new road crossing on surface water associated with the construction phase of the project.

Potential Impact: UPGRADING OF EXISTING ROADS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	4	**40**	**Moderate**	(-)	High
With Mitigation	2	2	1	2	3	**21**	**Low**	(-)	High
Mitigation and Management Measures	— The construction footprint must be limited to a construction Right of Way that comprises a 5 m construction buffer (upstream and downstream of the watercourse crossing) only. — Upgrading of the informal roads must take cognisance of the delineated extent of the watercourse traversed by this existing informal access road and that located within close proximity to the road. Should the road be increased in width, the road must be expanded on the side opposite of the watercourse, to ensure that the remaining natural buffer between the access road and the watercourse remains intact; — Material to be used (gravel – if applicable) as part of the upgrading of the existing roads must be stockpiled outside the delineated extent of the watercourses (preferably at least 32 m from the watercourse) to prevent sedimentation thereof and to avoid any other vegetation being impacted by the construction activities. These stockpiles may not exceed a height of 2 m and should be protected from wind using tarpaulins; — The disturbed area surrounding the road must be revegetated with suitable indigenous vegetation to prevent the establishment of alien vegetation species and to prevent erosion from occurring; — The alien vegetation management plan as compiled by the terrestrial/botanical ecologist is highly recommended and supported by the freshwater specialist and must be implemented concurrently with the commencement of construction; and — All existing alien and invasive vegetation should be removed. All material must be disposed of at a registered garden refuse site and may not be burned or mulched on site. <u>With regards to excavation and soil compaction activities within the watercourses:</u> — During the excavation activities, any soil/sediment or silt removed from the watercourse may be temporarily stockpiled in the road reserve but outside the delineated extent of the watercourse. These stockpiles may not exceed 2 m in height, and their footprint should be kept to a minimum. Stockpiling of removed materials may only be temporary (may only be stockpiled during the period of construction at a particular site) and should be disposed of at a registered waste disposal facility; — Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up. Mixture of the lower and upper layers of the excavated soil should be									

Potential Impact: UPGRADING OF EXISTING ROADS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
	kept to a minimum, for later usage as backfill material or as part of rehabilitation activities; — Care must be taken to ensure that no scouring or erosion occurs as a result of the proposed culvert crossing. Installation of riprap or gabion mattresses and/or concrete aprons associated with any culverts; — All construction material (with specific mention of prefabricated culvert structures) must be stockpiled in the laydown area and must only be imported to the construction site when required; — Machinery/vehicles used to install culvert structures must be parked on the existing road surface and may not enter the watercourses; and — Reno-mattresses or riprap must be installed at the outlet side of the culvert/bridge structures to ensure energy dissipation and prevent concentrated runoff into the downstream watercourse. The reno mattress/riprap must be installed flush with the culvert outlet.								

7.7.2 OPERATIONAL PHASE

VEHICULAR MOVEMENT ALONG THE POWERLINE DUE TO OPERATION AND MAINTENANCE OF THE POWERLINE AND SUBSTATION

Potential indiscriminate movement of maintenance vehicles within the watercourses or within close proximity to the watercourses and increased risk of sedimentation and/or hydrocarbons entering the watercourses via stormwater runoff from the access roads are likely to result in the following impacts:

— Disturbance to soil 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 operational impact of vehicular movement on freshwater is shown in **Table 7-18** below.

Table 7-18: Operation Impact of vehicular movement on freshwater

Potential Impact: VEHICULAR MOVEMENT	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**	**Very 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 and substation, monitoring for erosion should be undertaken; — Should erosion be noted at the base of the support structure that may potentially impact on a watercourse in the surrounding area, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation; — Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess								

	sediment must be removed by hand to prevent future flooding and potential damage to infrastructure; — Routine maintenance of the roads must be undertaken to ensure that no concentration of flow and subsequent erosion occurs due to the road crossings/instream infrastructure. Such maintenance activities must specifically be undertaken after high rainfall events; — Stormwater runoff from the road crossings should be monitored (by the Operation and Maintenance (O&M) Manager), to ensure it does not result in erosion of the watercourses. Stormwater should be allowed to diffusely spread across the landscape, by ensuring adequate surface roughness in the watercourse (through vegetation and rocky areas); and — Monitoring for the establishment for alien and invasive vegetation species must be undertaken, specifically for access roads through or along the watercourses used to service the powerline and substation. Should alien and invasive plan species be identified, they must be removed and disposed of as per an alien and invasive species control plan and the area must be revegetated with suitable indigenous vegetation.

OPERATION AND MAINTENANCE OF THE PROPOSED MAIN ACCESS ROAD AND OTHER EXISTING ROADS TRAVERSING WATERCOURSES (WHERE APPLICABLE).

Concentrated runoff entering the watercourses; and disturbance to the vegetation within and surrounding the watercourses during operation and maintenance of the proposed main access road and other existing roads traversing watercourses are likely to result in the following impacts:

— Concentrated runoff from the road crossings leading to erosion and subsequent sedimentation of the watercourses (increase in the sediment load) and turbulent flows when surface water is present;

— Higher flood peaks into the watercourses due to reduced surface roughness in the watercourses.

The operational impact of vehicular movement on freshwater is shown in **Table 7-19** below.

Table 7-19: Operation Impact of vehicular movement on freshwater

Potential Impact: VEHICULAR MOVEMENT	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**	**Very Low**	(-)	High
Mitigation and Management Measures	— As per the mitigation measures in the **Table 7-18** above.								

7.7.3 DECOMMISSIONING PHASE

The impacts associated with freshwater during the decommissioning phase are anticipated to be similar to the construction phase.

7.8 BIODIVERSITY

The primary direct impacts to terrestrial biodiversity are summarised in **Table 7-20**.

Table 7-20: Potential Impacts to Terrestrial Biodiversity

IMPACT	NATURE OF IMPACT
Vegetation	Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	Loss of flora Species of Conservation Concern during pre-construction site clearing activities. Several special of concern are known from surrounding areas, which could be destroyed during site preparation.
Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
Ecological Processes	Disturbances or disruptions to ecological processes: Activity may result in disturbances to ecological processes.
Aquatic and Riparian habitat & processes	Disturbances to Aquatic and Riparian habitat & processes associated with terrestrial vegetation associated with aquatic features.
Faunal Habitat	Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
Faunal Processes	Impacts to faunal processes because of the activity
Faunal Species	Loss of faunal SCC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

7.8.1 CONSTRUCTION PHASE

PERMANENT OR TEMPORARY LOSS OF INDIGENOUS VEGETATION COVER

The impact of the construction phase on the impact on loss of indigenous vegetation cover is shown in **Table 7-21** below.

Table 7-21: Assessment of significance of potential impacts on loss of indigenous vegetation cover associated with the construction phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
LOSS OF INDIGENOUS VEGETATION									
Without Mitigation	3	2	3	4	5	60	Moderate	(-)	High
With Mitigation	1	2	3	4	5	50	Moderate	(-)	High
Mitigation and Management Measures	— Blanket clearing of vegetation must be to pylons, 4x4 access tracks (were need) and substations footprints. No clearing outside of footprint to take place. Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place.								

LOSS OF FLORA SPECIES OF CONSERVATION CONCERN

The impact of the construction phase on the impact on flora SCC is shown in **Table 7-22** below.

Table 7-22: Assessment of significance of potential impacts on flora SCC associated with the construction phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
FLORA SCC									
Without Mitigation	2	1	3	1	5	35	Moderate	(-)	High
With Mitigation	1	1	3	1	5	30	Low	(-)	High
Mitigation and Management Measures	— A flora search and rescue is likely to be required within pylon and substation footprints as per: — Northern Cape Nature Conservation Act (Act no. 9 of 2009) — Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000): — NEMBA Threatened or Protected Species (TOPS). — With particular reference to the large population of Sensitive Species 142 situated within the alignment of OHP Options 1A and 1C, and inasmuch that Sensitive Species 142 is a subterrain geophyte: — The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible. — Vegetation and any Sensitive Species 142 should not be removed/relocated to create the 4x4 track but rather left in situ (i.e., create the track by simply driving repeatedly over the same route). If any Sensitive Species 142 clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. — Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of Sensitive Species 142 and any other protected species. — All protected species within any pylon footprint must be rescued and relocated.								

SUSCEPTIBILITY OF POST CONSTRUCTION DISTURBED AREAS TO INVASION

The impact of the construction phase on the impact on susceptibility of post construction disturbed areas to invasion is shown in **Table 7-23** below.

Table 7-23: Assessment of significance of potential impacts on the susceptibility of post construction disturbed areas to invasion associated with the construction phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
ALIEN INVASIVE SPECIES									
Without Mitigation	3	1	3	2	4	**36**	**Moderate**	(-)	High
With Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
Mitigation and Management Measures	— A suitable weed management strategy to be implemented in construction and operation phases. —								

SUSCEPTIBILITY OF SOME AREAS TO EROSION

The impact of the construction phase on the impact on erosion is shown in **Table 7-24** below.

Table 7-24: Assessment of significance of potential impacts on erosion associated with the construction phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
EROSION									
Without Mitigation	3	2	3	3	3	**33**	**Moderate**	(-)	High
With Mitigation	1	2	3	3	3	**27**	**Low**	(-)	High
Mitigation and Management Measures	— Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed. — Topsoil must be stripped and stockpiled separately and replaced on completion. — If natural vegetation re-establishment does not occur, a suitable grass must be applied.								

DISTURBANCES OR DISRUPTIONS TO ECOLOGICAL PROCESSES

The impact of the construction phase on the impact on ecological processes is shown in **Table 7-25** below.

Table 7-25: Assessment of significance of potential impacts on ecological processes associated with the construction phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
ECOLOGICAL PROCESSES									
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)	High
With Mitigation	1	2	3	1	4	**28**	**Low**	(-)	High

Potential Impact: ECOLOGICAL PROCESSES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Mitigation and Management Measures	— Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.								

DISTURBANCES TO AQUATIC AND RIPARIAN HABITAT AND PROCESSES

The impact of the construction phase on the impact on aquatic processes is shown in **Table 7-26** below.

Table 7-26: Assessment of significance of potential impacts on aquatic processes associated with the construction phase of the project.

Potential Impact: AQUATIC PROCESSES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	4	4	48	Moderate	(-)	High
With Mitigation	1	2	3	1	4	28	Low	(-)	High
Mitigation and Management Measures	— Pylon placement should span any aquatic and riparian features, rivers, non-perennial watercourses and any wetlands/pans.								

LOSS OF FAUNAL HABITAT

The impact of the construction phase on the impact on loss of faunal habitat is shown in **Table 7-27** below.

Table 7-27: Assessment of significance of potential impacts on loss of faunal habitat associated with the construction phase of the project.

Potential Impact: FAUNAL HABITAT	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	4	4	48	Moderate	(-)	High
With Mitigation	1	2	3	1	4	28	Low	(-)	High
Mitigation and Management Measures	— Blanket clearing of vegetation must be limited to the footprint. It is important that clearing activities are kept to the minimum and take place in a phased manner, where applicable. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.								

IMPACTS TO FAUNAL PROCESSES

The impact of the construction phase on the impact on faunal processes is shown in **Table 7-28** below.

Table 7-28: Assessment of significance of potential impacts on faunal processes associated with the construction phase of the project.

Potential Impact: FAUNAL PROCESSES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)	High
With Mitigation	1	2	3	1	4	**28**	**Low**	(-)	High
Mitigation and Management Measures	— It is recommended that a faunal search and rescue be conducted before construction commences (i.e. clearing of vegetation), although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on call for such circumstances .								

LOSS OF FAUNAL SCC

The impact of the construction phase on the impact on loss of faunal SCC is shown in **Table 7-29** below.

Table 7-29: Assessment of significance of potential impacts on faunal SCC associated with the construction phase of the project.

Potential Impact: FAUNAL SPECIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	1	3	**21**	**Low**	(-)	High
With Mitigation	1	1	3	1	3	**18**	**Low**	(-)	High
Mitigation and Management Measures	— A faunal search and rescue is likely to be required prior to site clearing including particularly reptile species. — No animals are to be harmed or killed during the course of operations. — Workers are NOT allowed to snare any faunal species.								

7.8.2 OPERATIONAL PHASE

PERMANENT OR TEMPORARY LOSS OF INDIGENOUS VEGETATION COVER

The impact of the operational phase on the impact on loss of indigenous vegetation is shown in **Table 7-30** below.

Table 7-30: Assessment of significance of potential impacts on loss of indigenous vegetation associated with the operational phase of the project.

Potential Impact: VEGETATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	4	5	**60**	**Moderate**	(-)	High

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
VEGETATION									
With Mitigation	1	2	3	4	5	50	Moderate	(-)	High
Mitigation and Management Measures	— Ensure that only designated access roads are utilised to eliminate permanent or temporary loss of vegetation cover.								

LOSS OF FLORA SPECIES OF CONSERVATION CONCERN

The impact of the operational phase on the impact on loss of flora SCC is shown in **Table 7-31** below.

Table 7-31: Assessment of significance of potential impacts on loss of flora SCC associated with the operational phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
FLORA SPECIES									
Without Mitigation	1	1	3	1	5	30	Low	(-)	High
With Mitigation	1	1	3	1	5	30	Low	(-)	High
Mitigation and Management Measures	— Ensure that only designated access roads are utilised to eliminate loss of Flora SCC..								

SUSCEPTIBILITY OF POST CONSTRUCTION DISTURBED AREAS TO INVASION

The impact of the operational phase on the impact on invasion is shown in **Table 7-32** below.

Table 7-32: Assessment of significance of potential impacts on alien invasive species associated with the operational phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
ALIEN INVASIVE SPECIES									
Without Mitigation	1	1	3	2	4	28	Low	(-)	High
With Mitigation	1	1	3	2	4	28	Low	(-)	High
Mitigation and Management Measures	— Alien trees must be removed from the site as per CARA/NEMBA requirements. — A suitable weed management strategy to be implemented in operation phases. — After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust.								

SUSCEPTIBILITY OF SOME AREAS TO EROSION

The impact of the operational phase on the impact on erosion is shown in **Table 7-33** below.

Table 7-33: Assessment of significance of potential impacts on erosion associated with the operational phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
EROSION									
Without Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
With Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
Mitigation and Management Measures	— Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed. — If natural vegetation re-establishment does not occur, a suitable grass must be applied.								

DISTURBANCES OR DISRUPTIONS TO ECOLOGICAL PROCESSES

The impact of the operational phase on the impact on ecological processes is shown in **Table 7-34** below.

Table 7-34: Assessment of significance of potential impacts on ecological processes associated with the operational phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
ECOLOGICAL PROCESSES									
Without Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
With Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
Mitigation and Management Measures	— Ensure that only designated access roads are utilised to eliminate disturbance or distruption to ecological processes.								

DISTURBANCES TO AQUATIC AND RIPARIAN HABITAT AND PROCESSES

The impact of the operational phase on the impact on aquatic and riparian habitat and processes is shown in **Table 7-35** below.

Table 7-35: Assessment of significance of potential impacts on aquatic and riparian habitat and processes associated with the operational phase of the project.

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
AQUATIC PROCESSES									
Without Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
With Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
Mitigation and Management Measures	— Mitigation measures are included in Section 7.7.2 above..								

LOSS OF FAUNAL HABITAT

The impact of the operational phase on the impact on loss of faunal habitat is shown in **Table 7-36** below.

Table 7-36: Assessment of significance of potential impacts on loss of faunal habitat associated with the operational phase of the project.

Potential Impact: FAUNAL HABITAT	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	2	4	28	Low	(-)	High
With Mitigation	1	1	3	2	4	28	Low	(-)	High
Mitigation and Management Measures	— Ensure that only designated access roads are utilised to eliminate loss of faunal habitat.								

IMPACTS TO FAUNAL PROCESSES

The impact of the operational phase on the impact on faunal processes is shown in **Table 7-37** below.

Table 7-37: Assessment of significance of potential impacts on faunal processes associated with the operational phase of the project.

Potential Impact: FAUNAL PROCESSES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	2	4	28	Low	(-)	High
With Mitigation	1	1	3	2	4	28	Low	(-)	High
Mitigation and Management Measures	— Ensure that only designated access roads are utilised to eliminate impacts to faunal processes. .								

LOSS OF FAUNAL SCC

The impact of the operational phase on the impact on loss of faunal SCC is shown in **Table 7-38** below.

Table 7-38: Assessment of significance of potential impacts on loss of faunal SCC associated with the operational phase of the project.

Potential Impact: FAUNAL SPECIES	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	1	4	24	Low	(-)	High
With Mitigation	1	1	3	1	4	24	Low	(-)	High
Mitigation and Management Measures	— No animals are to be harmed or killed during the course of operations. — Workers are NOT allowed to snare any faunal species.								

7.8.3 DECOMMISSIONING PHASE

The impacts associated with terrestrial biodiversity during the decommissioning phase are anticipated to be similar to the construction phase.

7.9 AVIFAUNA

Negative impacts on avifauna by electricity infrastructure generally take two main forms namely electrocution and collisions. Displacement due to habitat destruction and disturbance associated with the construction of the electricity infrastructure is another impact that could potentially impact on avifauna.

7.9.1 CONSTRUCTION PHASE

During the construction of power lines, service roads (jeep tracks) and substations, habitat destruction/transformation inevitably takes place. The construction activities will constitute the following:

- Site clearance and preparation;
- Construction of the infrastructure (i.e. the on-site substation and OHPL);
- Transportation of personnel, construction material and equipment to the site, and personnel away from the site;
- Removal of vegetation for the proposed on-site substation and OHPL, stockpiling of topsoil and cleared vegetation;
- Excavations for infrastructure;

These activities could impact on birds breeding, foraging and roosting in or in close proximity of the proposed substation through transformation of habitat, which could result in temporary or permanent displacement. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the on-site substation yard is unavoidable. The habitat in the study area is relatively uniform from a bird impact perspective, with fairly large expanses of karoo/renosterveld. The loss of habitat for priority species due to direct habitat transformation associated with the construction of the proposed on-site substation and 132kV OHPL is likely to be minimal.

Apart from direct habitat destruction, the above-mentioned activities also impact on birds through disturbance; this could lead to breeding failure if the disturbance happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. A potential mitigation measure is the timeous identification of nests and the timing of the construction activities to avoid disturbance during a critical phase of the breeding cycle, although in practice that can admittedly be very challenging to implement. Terrestrial species and raptors are most likely to be affected by displacement due to disturbance in the study area.

The study area contains one Verreaux's Eagle territory, with the nest situated at 32°51'59.27"S 20°30'12.02"E (Beacon Hill). While indications are that the territory is not currently active, it cannot be conclusively assumed, and the territory might become active again anytime in the future. It would therefore be prudent to implement a 1.5km no disturbance buffer[20] around the nest during the construction phase to ensure the birds will not be disturbed by the construction activities, should the territory be active, or in the process of becoming active, when the construction commences.

The priority species which are potentially vulnerable to this impact are listed below:

- Ludwig's Bustard

[20] This is the recommended no-disturbance buffer for Verreaux's Eagles in the current BirdLife South Africa Verreaux's Eagle guidelines (Ralston 2017)

— Helmeted Guineafowl
— Karoo Korhaan
— Southern Black Korhaan
— Verreaux's Eagle

DISPLACEMENT OF SENSITIVE SPECIES DUE TO DISTURBANCE

The construction impact on displacement of sensitive species due to disturbance is shown in **Table 7-39** below.

Table 7-39: Displacement of priority species due to disturbance

Potential Impacts: DISPLACEMENT FROM DISTURBANCE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
Mitigation and Management Measures	— Construction activity should be restricted to the immediate footprint of the infrastructure as much as possible. — Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of powerline sensitive species as much a practically possible. — Measures to control noise and dust should be applied according to current best practice in the industry. — A 1.5km No Go buffer should be implemented around the Verreaux's Eagle nest at 32°51'59.27"S 20°30'12.02"E (Beacon Hill).								

DISPLACEMENT OF SENSITIVE SPECIES DUE TO HABITAT TRANSFORMATION

The construction impact on displacement of sensitive species due to habitat transformation is shown in **Table 7-40** below.

Table 7-40: Displacement of priority species due to habitat transformation

Potential Impacts: DISPLACEMENT FROM HABITAT TRANSFORMATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
Mitigation and Management Measures	— Construction activity should be restricted to the immediate footprint of the infrastructure as much as possible. — Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum. — Vegetation clearance should be limited to what is absolutely necessary. — The mitigation measures proposed by the vegetation and terrestrial biology specialists must be strictly enforced								

7.9.2 OPERATIONAL PHASE

ELECTROCUTIONS

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). The electrocution risk is largely determined by the pole/tower design. In the case of the proposed Karreebosch OHPL, the electrocution risk is envisaged to be low because the proposed design of the 132kV line, namely the steel monopole and the clearance distances between the live and earthed components. The Karreebosch OHPL should not pose an electrocution threat to the powerline sensitive species which are likely to occur in the study area and immediate surrounding environment. Electrocutions within the proposed on-site substation yard are possible but should not affect the more sensitive Red List bird species, as these species are unlikely to use the infrastructure within the substation yard for perching or roosting. Species that are more vulnerable to this impact are corvids, owls and certain species of waterbirds. The powerline sensitive species which are potentially vulnerable to this impact are listed below:

- Common Buzzard
- Jackal Buzzard
- Cape Crow
- Pied Crow
- Black-chested Snake-Eagle
- Booted Eagle
- Martial Eagle
- Verreaux’s Eagle
- Spotted eagle-Owl
- Egyptian Goose
- Pale Chanting Goshawk
- Helmeted Guineafowl
- Black Harrier
- Black-headed Heron
- Hadeda Ibis
- Lesser Kestrel
- Rock Kestrel
- Black-winged Kite
- White-necked Raven
- Rufous-breasted Sparrowhawk
- Hamerkop

The operational impact of electrocution is shown in **Table 7-41** below.

Table 7-41: Electrocution Impact on Avifauna

Potential Impacts: ELECTROCUTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	5	3	3	4	2	**30**	**Low**	(-)	High
With Mitigation	1	2	3	4	2	**20**	**Low**	(-)	High
Mitigation and Management Measures	— The hardware within the proposed substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are								

Potential Impacts: ELECTROCUTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	recorded once operational, site specific mitigation (insulation) be applied reactively. This is an acceptable approach because Red List priority species are unlikely to frequent the substation.							

COLLISIONS

Collisions are the biggest threat posed by transmission lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Anderson 2001). In a PhD study, Shaw (2013) provides a concise summary of the phenomenon of avian collisions with transmission lines:

"The collision risk posed by power lines is complex and problems are often localised. While any bird flying near a power line is at risk of collision, this risk varies greatly between different groups of birds, and depends on the interplay of a wide range of factors (APLIC 1994). Bevanger (1994) described these factors in four main groups – biological, topographical, meteorological and technical. Birds at highest risk are those that are both susceptible to collisions and frequently exposed to power lines, with waterbirds, gamebirds, rails, cranes and bustards usually the most numerous reported victims (Bevanger 1998, Rubolini et al. 2005, Jenkins et al. 2010).

The proliferation of man-made structures in the landscape is relatively recent, and birds are not evolved to avoid them. Body size and morphology are key predictive factors of collision risk, with large-bodied birds with high wing loadings (the ratio of body weight to wing area) most at risk (Bevanger 1998, Janss 2000). These birds must fly fast to remain airborne, and do not have sufficient manoeuvrability to avoid unexpected obstacles. Vision is another key biological factor, with many collision-prone birds principally using lateral vision to navigate in flight, when it is the lower-resolution, and often restricted, forward vision that is useful to detect obstacles (Martin & Shaw 2010, Martin 2011, Martin et al. 2012). Behaviour is important, with birds flying in flocks, at low levels and in crepuscular or nocturnal conditions at higher risk of collision (Bevanger 1994). Experience affects risk, with migratory and nomadic species that spend much of their time in unfamiliar locations also expected to collide more often (Anderson 1978, Anderson 2002). Juvenile birds have often been reported as being more collision-prone than adults (e.g. Brown et al. 1987, Henderson et al. 1996).

Topography and weather conditions affect how birds use the landscape. Power lines in sensitive bird areas (e.g. those that separate feeding and roosting areas, or cross flyways) can be very dangerous (APLIC 1994, Bevanger 1994). Lines crossing the prevailing wind conditions can pose a problem for large birds that use the wind to aid take-off and landing (Bevanger 1994). Inclement weather can disorient birds and reduce their flight altitude, and strong winds can result in birds colliding with power lines that they can see but do not have enough flight control to avoid (Brown et al. 1987, APLIC 2012).

The technical aspects of power line design and siting also play a big part in collision risk. Grouping similar power lines on a common servitude, or locating them along other features such as tree lines, are both approaches thought to reduce risk (Bevanger 1994). In general, low lines with short span lengths (i.e. the distance between two adjacent pylons) and flat conductor configurations are thought to be the least dangerous (Bevanger 1994, Jenkins et al. 2010). On many higher voltage lines, there is a thin earth (or ground) wire above the conductors, protecting the system from lightning strikes. Earth wires are widely accepted to cause the majority of collisions on power lines with this configuration because they are difficult to see, and birds flaring to avoid hitting the conductors often put themselves directly in the path of these wires (Brown et al. 1987, Faanes 1987, Alonso et al. 1994a, Bevanger 1994)."

From incidental record keeping by the Endangered Wildlife Trust, it is possible to give a measure of what species are generally susceptible to power line collisions in South Africa (**Figure 7-1**).

Power line collisions are generally accepted as a key threat to bustards (Raab *et al*. 2009; Raab *et al*. 2010; Jenkins & Smallie 2009; Barrientos *et al*. 2012, Shaw 2013). In a recent study, carcass surveys were performed under high voltage transmission lines in the Karoo for two years, and low voltage distribution lines for one year (Shaw 2013). Ludwig's Bustard was the most common collision victim (69% of carcasses), with bustards generally comprising 87% of mortalities recovered. Total annual mortality was estimated at 41% of the Ludwig's Bustard population, with Kori Bustards also dying in large numbers (at least 14% of the South African population killed in the Karoo alone). Karoo Korhaan was also recorded, but to a much lesser extent than Ludwig's Bustard. The reasons for the relatively low collision risk of this species probably include their smaller size (and hence greater agility in flight) as well as their more sedentary lifestyles, as local birds are familiar with their territory and are less likely to collide with power lines (Shaw 2013).

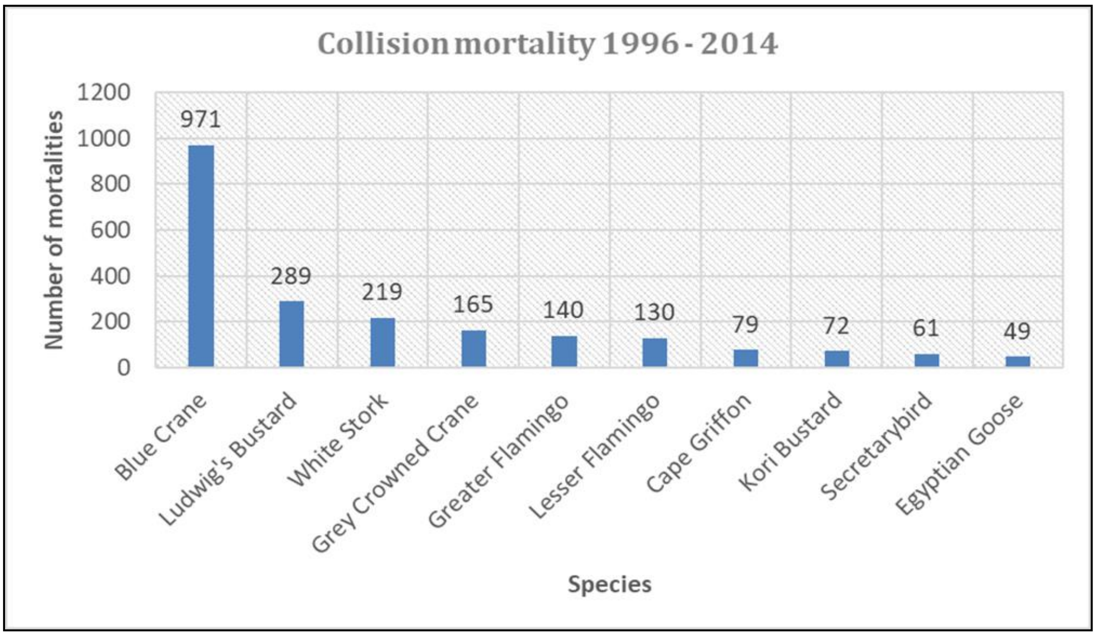


Figure 7-1: The top 10 collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom/Endangered Wildlife Trust Strategic Partnership central incident register 1996 - 2014 (EWT unpublished data)

Several factors are thought to influence avian collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. An important additional factor that previously has received little attention is the visual capacity of birds; i.e. whether they are able to see obstacles such as power lines, and whether they are looking ahead to see obstacles with enough time to avoid a collision. In addition to helping explain the susceptibility of some species to collision, this factor is key to planning effective mitigation measures. Recent research provides the first evidence that birds can render themselves blind in the direction of travel during flight through voluntary head movements (Martin & Shaw 2010). Visual fields were determined in three bird species representative of families known to be subject to high levels of mortality associated with power lines i.e. Kori Bustards *Ardeotis kori*, Blue Cranes and White Storks. In all species the frontal visual fields showed narrow and vertically long binocular fields typical of birds that take food items directly in the bill under visual guidance. However, these species differed markedly in the vertical extent of their binocular fields and in the extent of the blind areas which project above and below the binocular fields in the forward-facing hemisphere. The importance of these blind areas is that when in flight, head movements in the vertical plane (pitching the head to look downwards) will render the bird blind in the direction of travel. Such movements may frequently occur when birds are scanning below them (for foraging or roost sites, or for conspecifics). In bustards and cranes pitch movements of only 25° and 35°, respectively, are sufficient to render the birds blind in the direction of travel; in storks, head movements of 55° are necessary. That flying birds can render themselves blind in the direction of travel has not been previously recognised and has important implications for the effective mitigation of collisions with human artefacts including wind turbines and power lines. These findings have applicability to species outside of these families especially raptors

(A*ccipitridae*) which are known to have small binocular fields and large blind areas similar to those of bustards and cranes, and are also known to be vulnerable to power line collisions.

Despite doubts about the efficacy of line marking to reduce the collision risk for bustards (Jenkins *et al*. 2010; Martin *et al.* 2010), there are numerous studies which prove that marking a line with PVC spiral type Bird Flight Diverters (BFDs) generally reduce mortality rates (e.g. Bernardino *et al.* 2018; Sporer *et al.* 2013, Barrientos *et al*. 2011; Jenkins *et al*. 2010; Alonso & Alonso 1999; Koops & De Jong 1982), including to some extent for bustards (Barrientos *et al*. 2012; Hoogstad 2015 pers.comm). Beaulaurier (1981) summarised the results of 17 studies that involved the marking of earth wires and found an average reduction in mortality of 45%. Barrientos *et al.* (2011) reviewed the results of 15 wire marking experiments in which transmission or distribution wires were marked to examine the effectiveness of flight diverters in reducing bird mortality. The presence of flight diverters was associated with a decrease of 55–94% in bird mortalities. Koops and De Jong (1982) found that the spacing of the BFDs was critical in reducing the mortality rates - mortality rates are reduced up to 86% with a spacing of 5m, whereas using the same devices at 10m intervals only reduces the mortality by 57%. Barrientos *et al*. (2012) found that larger BFDs were more effective in reducing Great Bustard collisions than smaller ones. Line markers should be as large as possible, and highly contrasting with the background. Colour is probably less important as during the day the background will be brighter than the obstacle with the reverse true at lower light levels (e.g. at twilight, or during overcast conditions). Black and white interspersed patterns are likely to maximise the probability of detection (Martin *et al*. 2010).

Using a controlled experiment spanning a period of nearly eight years (2008 to 2016), the Endangered Wildlife Trust (EWT) and Eskom tested the effectiveness of two types of line markers in reducing power line collision mortalities of large birds on three 400kV transmission lines near Hydra substation in the Karoo. Marking was highly effective for Blue Cranes, with a 92% reduction in mortality, and large birds in general with a 56% reduction in mortality, but not for bustards, including the endangered Ludwig's Bustard. The two different marking devices were approximately equally effective, namely spirals and bird flappers, they found no evidence supporting the preferential use of one type of marker over the other (Shaw *et al*. 2017).

The priority species which are potentially vulnerable to this impact are listed below:

- Ludwig's Bustard
- Red-knobbed Coot
- Reed Cormorant
- White-breasted Cormorant
- African Black Duck
- Maccoa Duck
- Yellow-billed Duck
- Verreaux's Eagle
- Greater Flamingo
- Egyptian Goose
- Spur-winged Goose
- Black-necked Grebe
- Great Crested Grebe
- Little Grebe
- Helmeted Guineafowl
- Black-headed Heron
- Grey Heron
- African Sacred Ibis
- Hadeda Ibis
- Karoo Korhaan
- Southern Black Korhaan
- Common Moorhen

— Southern Pochard
— South African Shelduck
— Cape Shoveler
— African Spoonbill
— Black Stork
— Cape Teal
— Red-billed Teal
— Secretarybird

The collision impact on avifauna is shown in **Table 7-42** below.

Table 7-42: Operation Impact on Avifauna

Potential Impacts: COLLISION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	5	3	3	4	4	**60**	**Moderate**	(-)	High
With Mitigation	3	3	3	4	3	**39**	**Moderate**	(-)	High
Mitigation and Management Measures	— Bird Flight Diverters must be fitted to the entire powerline according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines). These devices must be installed as soon as the conductors are strung.								

7.9.3 DECOMMISSIONING PHASE

DISPLACEMENT OF SENSITIVE SPECIES DUE TO DISTURBANCE

The decommissioning impact on displacement of sensitive species due to disturbance is shown in **Table 7-43** below.

Table 7-43: Displacement of priority species due to disturbance

Potential Impacts: DISPLACEMENT FROM DISTURBANCE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
Mitigation and Management Measures	— Decommissioning activity should be restricted to the immediate footprint of the infrastructure as much as possible. — Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of powerline sensitive species. — Measures to control noise and dust should be applied according to current best practice in the industry. — Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.								

7.10 BATS

No construction or operational impacts to bats are expected. Refer to **Appendix F-3** for the Bat Verification Letter.

7.11 VISUAL

Power line towers and substations are very large objects and thus highly visible. According to the project description provided by Karreebosch, the maximum tower height envisaged for the proposed power line is 40m (approximately equivalent in height to a six storey building). Although a tower structure would be less visible than a building, the height of the structure means that the tower would still typically be visible from a considerable distance. Visibility would be increased by the fact that the power line comprises a series of towers typically spaced approximately 200m to 250m apart in a linear alignment.

The degree of visibility of an object informs the level and intensity of the visual impact, but other factors also influence the nature of the visual impact. The landscape and aesthetic context of the environment in which the object is placed, as well as the perception of the viewer are also important factors. In the context of a power line, the type of tower used as well as the degree to which the towers would impinge upon or obscure a view is also a factor that will influence the experience of the visual impacts.

As described above, a power line or substation could be perceived to be highly incongruous in the context of a largely natural landscape. The height and linear nature of the power line will exacerbate this incongruity, as the towers may impinge on views within the landscape. In addition, the practice of clearing any taller vegetation from areas within the power line servitude can increase the visibility and incongruity of the power line. In a largely natural, bushier setting, vegetation clearance will cause fragmentation of the natural vegetation cover, thus making the power line more visible and drawing the viewer's attention to the power line servitude.

Sensitivity to visual impacts is typically most pronounced in areas set aside for conservation of the natural environment (such as protected natural areas or conservancies), or in areas in where the natural character or scenic beauty of the area attracts visitors (tourists). In this instance however, the area is not typically valued for its tourism significance and no formal protected areas, leisure-based tourism activities were identified in the area. Although a recognised tourism route (R354) traverses the study area, visual impacts affecting this route are expected to be reduced by the hilly nature of the terrain.

Conversely, the presence of other anthropogenic objects associated with the built environment may "degrade" the visual environment and thus the introduction of a new power line and substation into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible. In this context therefore, the presence of the Komsberg substation and the existing high voltage power lines traversing the study area, in conjunction with the Roggeveld WEF and the associated Bon Espirange substation, is expected to lessen the visual contrast associated with the introduction of a new power line and substation.

Other factors, as listed below, can also affect the nature and intensity of a potential visual impact associated with a power line and substation:

- The location of the development in the landform setting – i.e. in a valley bottom or on a ridge top. In the latter example the development would be much more visible and would "break" the horizon;
- The presence of macro- or micro-topographical features, built form or vegetation that would screen views of the development from a receptor location;
- The presence of existing, similar features in the area and their alignment in relation to the proposed new development; and
- Temporary factors such as weather conditions (presence of haze, rainfall or heavy mist) which would affect visibility.

In this instance, the proposed power line and substation are intended to serve the proposed Karreebosch WEF and as such, the power line and substation will only be built if this WEF is developed. The proposed power line and substation are therefore likely to be perceived to be part of the greater WEF development and the visual impact will be relatively minor when compared to the visual impact associated with the WEF as a whole.

7.11.1 CONSTRUCTION PHASE

The following impacts are expected during the construction phase:

- Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction.
- Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers.
- Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment.
- Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.
- Litter on the construction site may result in visual pollution.

The construction impact on the visual landscape is indicated in **Table 7-44** below.

Table 7-44: Construction Impact on Visual Landscape

Potential Impact: **VISUAL DISTURBANCE DURING CONSTRUCTION**	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**	**Confidence**
Without Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
With Mitigation	2	2	3	2	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— Carefully plan to minimise the construction period and avoid construction delays as much as possible. — Inform receptors within 500m of the proposed power line and / or substation of the construction programme and schedules. — Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. — Vegetation clearing should take place in a phased manner. — Maintain a neat construction site by removing rubble and waste materials regularly. — Make use of existing gravel access roads where possible. — Limit the number of vehicles and trucks travelling to and from the construction site, where possible. — Ensure that dust suppression techniques are implemented: — on all access roads; — in all areas where vegetation clearing has taken place; — on all soil stockpiles								

7.11.2 OPERATIONAL PHASE

The following impacts are expected during the operational phase:

- The power line and substation may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- The proposed power line and substation will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts.

— Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers.
— The night-time visual environment will be altered as a result of operational and security lighting at the proposed substation.

The operational impact on the visual landscape is indicated in **Table 7-45** below.

Table 7-45: Operational Impact on Visual Landscape

Potential Impact: VISUAL DISTURBANCE DURING OPERATION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	2	3	4	3	**30**	**Low**	(-)	High
With Mitigation	2	2	3	4	2	**22**	**Low**	(-)	High
Mitigation and Management Measures	— As far as possible, limit the number of maintenance vehicles using access roads. — As far as possible, limit the amount of security and operational lighting at the proposed substation. — Light fittings for security at night should reflect the light toward the ground and prevent light spill. — Lighting fixtures should make use of minimum lumen or wattage. — Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used. — If possible, make use of motion detectors on security lighting. — Buildings on the substation site should be painted with natural tones that fit with the surrounding environment. — Non-reflective surfaces should be utilised where possible.									

7.11.3 DECOMMISSIONING PHASE

The following impacts are expected during the decommissioning phase:

— Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process;
— Potential visual impacts of increased dust emissions from decommissioning activities and related traffic; and
— Potential visual intrusion of any remaining infrastructure on the site.

The decommissioning impact on the visual landscape is indicated in **Table 7-46** below.

Table 7-46: Decommissioning Impact on Visual Landscape

Potential Impact: VISUAL DISTURBANCE DURING DECOMMISSIONING	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	**30**	**Low**	(-)	High
With Mitigation	2	2	3	2	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— All infrastructure that is not required for post-decommissioning use should be removed. — Carefully plan to minimize the decommissioning period and avoid delays as much as possible. — Maintain a neat decommissioning site by removing rubble and waste materials regularly.									

	— Make use of existing gravel access roads where possible. — Limit the number of vehicles and trucks travelling to and from the decommissioning site, where possible. — Ensure that dust suppression techniques are implemented as needed: — on all access roads; — in all areas where vegetation clearing has taken place; — on all soil stockpiles. — All cleared areas should be rehabilitated as soon as possible.

7.12 WASTE MANAGEMENT

7.12.1 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 site specific and generic EMPrs to consider the correct disposal of general and hazardous waste generated on the Project. **Table 7-47** 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 7-47: 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).
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 conatiners in hazardous waste 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).

WASTE	TYPE OF WASTE	MANAGEMENT OPTIONS
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 general 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; — Co-ordinate waste removal from the site.

The construction impact on improper waste management and littering is indicated in **Table 7-48** below.

Table 7-48: 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 or as needed to prevent rodents and pests entering the site; — The number of toilets must be provided as per the OHSA requirements for number of personnel on site. — 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; — 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 — Storage of domestic waste shall be in covered waste skips.								

7.12.2 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.

7.12.3 DECOMMISSIONING PHASE

The impacts associated with waste management during the decommissioning phase are anticipated to be similar to the construction phase, therefore the same mitigation measures will apply.

7.13 TRAFFIC

7.13.1 CONSTRUCTION PHASE

Construction traffic will include vehicles for deliveries, removal of materials and construction staff.

- Material and component delivery: Vehicle trips from material and component delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Not enough detail about the powerline is known at this stage to provide an estimated trip generation volume for material and component traffic. The materials and components expected for the powerline construction can generally be transported by normal heavy load vehicles. Project planning can be used to reduce delivery trips during peak hours. In addition to this, using a temporary construction material stockpile yards near the proposed site can also reduce peak hour trips.
- Construction machinery: Cranes for pylon/tower assembly, heavy vehicles required for earthworks etc. These vehicles are expected to have negligible traffic impact as they will arrive on site in preparation for construction. Once on site, these vehicles will produce internal site traffic with minimal effect on the external road network.
- Site personnel and workers: Based on information obtained from similar projects the following trip generation assumptions are made for construction personnel (**Figure 7-2**):

	Activity	traffic comments	Approx. team size	Approx. duration at a point (i.e., tower location)
1	Centre line pegging and identification of new gates	(light vehicle access)	3	1 day
2	Access Negotiations	(light vehicle access)	1	1 day
3	Tower Pegging	(light vehicle access)	5	1 days
4	New gate installation	(light vehicle access)	5	1 days
5	Foundation nominations (for main structure and anchors)	(heavy vehicle access)	5	2 days
6	Excavation of foundation	(heavy vehicle access)	10	2 days
7	Foundation steelwork (reinforcing)	(heavy vehicle access)	10	2 days
8	Foundation (concrete) pouring	(heavy vehicle access)	20	2 days
9	Delivery of tower steelwork	(heavy vehicle access)	5	1 day
10	Assembly team / Punching and painting	(light vehicle access)	10	3 days
11	Erection	(abnormal load vehicle access)	20	2 days
12	Stringing	(abnormal load vehicle access) (intensive vehicle activity likely within the working area)	50	7 days
13	Sag and tension	(heavy vehicle access)	10	3 days
14	Rehabilitation	(heavy and light vehicle access)	5 to 15	2 – 10 days

Figure 7-2: Trip generation assumptions for the construction of the Karreebosch OHPL

It is assumed that the same team will move together from one construction location to the next. Based on this assumption a maximum of 50 to 70 workers can be expected on site per workday.

Based on traffic station data sourced from the Western Cape Government Road Network Information System, there are no taxis or busses operating along the R354. It is recommended that the majority of construction personnel be transported to and from site by means of busses or minibus taxis.

Busses have an average of 65 passenger capacity while minibus taxis have an average passenger

capacity of 15. Assuming approximately 20% highly skilled personnel will travel by means of passenger vehicles the following trips are assumed:

- for the skilled personnel a maximum of 14 trips are expected.
- The remaining 56 workers can travel by bus (i.e., 1 bus trip) or 4 (four) minibus taxi trips.

Depending on the construction schedule, a maximum of 18 peak hour site personnel trips is assumed for the purposes of this assessment. This volume is deemed to generate an insignificant traffic impact.

The potential transport impacts imposed by the construction traffic are temporary, short term in nature, and can be mitigated to an acceptable level.

The construction impact on traffic is indicated in **Table 7-49** below.

Table 7-49: Construction Impact on Increased Local Traffic

Potential Impact: DUST AND NOISE POLLUTION AND TRAFFIC CONGESTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	1	3	2	5	**45**	**Moderate**	(-)	High
With Mitigation	2	1	3	2	3	**24**	**Low**	(-)	High
Mitigation and Management Measures	— The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods. — Dust suppression of gravel roads during the construction phase, as required. — Regular maintenance of gravel roads is required by the Contractor during the construction phase. — The use of quarries near the site would decrease traffic on the surrounding road network. — Staff and general trips should occur outside of peak traffic periods as far as possible.								

7.13.2 OPERATION PHASE

Traffic during the operational phase will consist of maintenance staff maintaining the proposed facility. The trips generated during this phase are deemed low. as the operational trips will only be for occasional maintenance requirements. To take into account a worst-case scenario, between 5 to15 peak hour staff trips are assumed at this stage.

The construction impact on traffic is indicated in **Table 7-50** below.

Table 7-50: Operational Impact on Increased Local Traffic

Potential Impact: DUST AND NOISE POLLUTION AND TRAFFIC CONGESTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	4	3	**30**	**Low**	(-)	High
With Mitigation	1	1	3	4	2	**18**	**Low**	(-)	High
Mitigation and Management Measures	— Consider scheduling shift changes to occur during off peak hours. — Regular maintenance of gravel roads by the Owner/Facility Manager during the operational phase.								

7.13.3 DECOMMISSIONING PHASE

The impacts associated with traffic during the decommissioning phase are anticipated to be similar to the construction phase, therefore the same mitigation measures will be applicable.

7.14 HERITAGE

7.14.1 CONSTRUCTION PHASE

ARCHAEOLOGY

The findings of the field assessment undertaken by CTS Heritage (August, 2022) largely correlate with the findings of the Karreebosch HIA (2015) which "*revealed that the study area is relatively austere in terms of pre-colonial heritage, however valley bottoms contain evidence of early trekboer cultural landscapes – ruins, graves and occasional middens. These consist of collections of ruined stone and mud buildings, threshing floors and kraals located exclusively in the valley areas between the high longitudinal ridges that characterise the study area*."

No significant heritage resources were identified in any of the proposed alignment alternatives, with only one LSA chert flake (KRB022) identified within the alignment for Alternative Option 2C. This is likely due to the placement of the proposed powerline alternatives on ridgelines or slopes. It has been previously noted that in this area, it is the valley bottoms that are sensitive in terms of archaeology and heritage resources.

As such, no negative impact to significant archaeological heritage is anticipated and there is no preferred alternative alignment in terms of impacts to archaeological resources.

The potential for any heritage impacts is indicated in **Table 7-51** below.

Table 7-51: Construction Impact on Damage to Archaeological Resources

Potential Impact: ARCHAEOLOGY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	5	5	1	**12**	**Very Low**	(-)	High
With Mitigation	1	1	5	5	1	**12**	**Very Low**	(-)	High
Mitigation and Management Measures	N/A								

PALAEONTOLOGY

Dr Almond notes (2015) that "*No fossils were recorded within the Late Caenozoic superficial deposits in the region (colluvium, alluvium etc). The overall palaeosensitivity of the grid connection project area is inferred to be Low.*

However, the potential for isolated vertebrate and other fossil finds of high scientific interest – as recorded elsewhere in the Klein-Roggeveldberge region - cannot be completely discounted.

There are no objections on palaeontological grounds to authorisation of the proposed 132 kV powerline and there is no preference on palaeontological heritage grounds for any particular on-site substation site or powerline route option among those currently under consideration. If powerline Option 1B is selected for construction, vertebrate fossil material at or in the vicinity of Locs. 454-456 on Rietfontein RE/197 must be collected by a professional palaeontologist before construction of the powerline. No further specialist palaeontological studies or mitigation are recommended for this electrical infrastructure project. These recommendations and the Chance Fossil Finds Protocol appended to this report should be included in the EMPr for the development."

Dr Almond concludes that "*Based on combined desktop and field-based palaeontological data an overall LOW palaeosensitivity for the Karreebosch WEF and grid connection project areas is inferred here. However, the potential for isolated vertebrate and other fossil finds of high scientific interest - as occasionally recorded elsewhere in the Klein-Roggeveldberge region - cannot be completely discounted*."

The potential for any palaeontological impacts is indicated in **Table 7-52** below.

Table 7-52: Construction Impact on Damage to Palaeontological Resources

Potential Impact: PALAEONTOLOGY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	1	5	5	3	**45**	**Moderate**	(-)	High
With Mitigation	1	1	5	5	1	**12**	**Very Low**	(-)	High
Mitigation and Management Measures	— Should OHL Alternative 1B be developed, a walkdown of final alignment must be conducted by a palaeontologist with an approved workplan for the collection of sensitive fossil resources that are at risk. — Chance Fossil Finds Procedure must be implemented throughout the construction phase of the development								

7.14.2 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.

7.14.3 DECOMMISSIONING PHASE

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

7.15 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 power line can be effectively mitigated if the recommended mitigation measures are implemented.

7.15.1 CONSTRUCTION PHASE

CREATION OF LOCAL EMPLOYMENT, TRAINING AND BUSINESS OPPORTUNITIES

Based on similar projects the construction phase of for the grid connection will extend over a period of approximately 12-24 months and create in the region of 20-30 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 Laingsburg, Matjiesfontein and Sutherland. A percentage of the high skilled positions may also benefit the local community. Most of the employment opportunities are also likely to accrue to 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 will be in the region of R 1.8 million (2022 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 12 months. A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in LM. The capital expenditure associated with the construction of grid infrastructure will be ~ R 18 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, skills development and business opportunities is shown in **Table 7-53**.

Table 7-53: 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	4	3	0	2	4	36	Moderate	(+)	High
Mitigation and Management Measures	Employment — 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 LM and KH to establish the existence of a skills database for the area. If such as 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. Business — The proponent should liaise with the LM 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.									

	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.

PRESENCE OF CONSTRUCTION WORKERS AND POTENTIAL IMPACTS ON FAMILY STRUCTURES AND SOCIAL NETWORKS

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 unplanned / unwanted pregnancies.
— An increase in prostitution.
— An increase in sexually transmitted diseases (STDs), including HIV.

Given the relatively small number of construction workers, the potential impact on the local community is likely to be negligible. The impact of the presence of construction workers on family structures and social networks is show in **Table 7-54**.

Table 7-54: Construction Impact on Family Structures and Social Networks

Potential Impact: PRESENCE OF CONSTRUCTION WORKERS AND POTENTIAL IMPACTS ON FAMILY STRUCTURES AND SOCIAL NETWORKS	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**	**Very 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 HIV/AIDS awareness programme 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 for 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.

RISK TO SAFETY, LIVESTOCK AND FARM INFRASTRUCTURE

The presence of and movement of construction workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open. The presence of construction workers on the site also increases the exposure to local farming operations to the outside world, which, in turn, increases the potential risk of stock theft.

The majority of farmers in the area have been exposed to the construction of the Roggeveld, Karusa and Soetwater WEFs, and therefore have first-hand experience of the impacts associated with the construction of WEFs and the associated infrastructure, such as grid connections. The key issues raised included:

- Impact of construction related activities and movement of construction vehicles on the veld. Due to the sensitivity of the vegetation, disturbances take many years to recover.
- Farm gates left open by contractors and Eskom employees. This was raised as key concern by all the affected landowners interviewed. This has resulted in stock losses and increased vulnerability to stock theft. Mixing of flocks of different breeds (e.g., meat and wool sheep) also impacts on farming operations. Time and resources are also spent on recovering stock that has escaped due to gates being left open.
- Damage to farm fences. The damage to farm fences poses the same risks to farming operations as leaving farm gates open. In many instances damage to fences caused by contractors occurs in remote areas and is not reported to the farmer.
- Lack of awareness amongst contractors of the impacts that their activities can have on farming operations.

The owners of the most directly impacted landowners, namely Bon Espirange 73/RE and Bon Espirange 73/1, indicated that the proposed alignments would be acceptable given that they largely follow alignment of the new Roggeveld WEF line and are confined to the southern margin of their viewshed and do not traverse cropped areas (current or future) on the relevant properties (Conradie, Mr Piet; Calldo – pers. comm).

The only proposed option that was regarded as unsuitable by the relevant landowners was the section of Option 2C that traverses comparatively lower-lying terrain located to the west of the narrow north-south running valley of Tankwa River (near its source). The alignment is located particularly close to the river on Ek Kraal 199/1 and Ek Kraal 199/RE and traverses cropped areas on the latter. The concerns are linked to potential impacts on productive areas located adjacent to the Tankwa River on portions of Ek Kraal 199/RE. The owner of Ek Kraal 199/RE indicated that the alignment of Option 2C would affect historically cropped areas that had the potential for future cultivation. The concern is that the powerline and associated servitude would hamper operations and fragment some of the best land on the property. The owner indicated that they would prefer an alignment located to the west that was located on mountainous, less productive sections of the property. All the other line segments are acceptable to the relevant owners. The associated substation options were also identified as being acceptable.

The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction workers on the site during the construction phase. However, as indicated by the comments from local farmers in the area, it would appear that these measures have not been effectively implemented during the construction of Roggeveld, Karusa and Soetwater WEFs. The mitigation measures to address these risks are outlined below.

The impact safety, stock theft and damage to infrastructure is shown in **Table 7-55**.

Table 7-55: Construction Impact on Safety, Livestock and Damage to Farm Infrastructure

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	3	2	3	2	4	**40**	**Moderate**	(-)	High
With Mitigation	2	1	3	2	2	**16**	**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 should provide daily transport for low and semi-skilled workers to and from the site. — The proponent should consider the option of establishing a Monitoring Forum (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. — 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 (see below). — 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.									

CONSTRUCTION ACTIVITIES AND VEHICLES

The construction activities on site and movement of heavy construction vehicles during the construction phase has the potential to create noise and dust impacts, damage local roads and create safety impacts for other road users. 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 traffic related impacts associated with the transport of materials to the site are also likely to be limited. However, the construction of renewable energy facilities and the associated grid infrastructure has resulted in increased traffic and damage to local roads in the area. The transport of workers to site and speed at which taxis travelled was raised as a concern. Given the relatively small number of construction workers and the short construction period the traffic related impacts associated with transporting workers to and from the site are likely to be limited. As indicated above, the construction phase also poses a risk to farming operations.

The impact of construction vehicles and activities is shown in **Table 7-56**.

Table 7-56: 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**	**Very 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 land owners and road users during construction period. — Establishment of a Grievance Mechanism 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. — Implementation of a road maintenance programme throughout the construction phase to ensure that the affected roads maintained in a good condition and repaired once the construction phase is completed. — 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 on a regular basis and ensuring that vehicles used to transport 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 OF VELD FIRES

The presence on and movement of construction workers on and off the site and construction related activities such as welding etc., increases the risk of veld fires which pose a risk to livestock, farm infrastructure and game. The loss of grazing also poses a threat to local livelihoods that are dependent on livestock farming. The risk of veld fires is higher during the dry, windy summer months of December through to March. The local landowners indicated that although the risk of veld fires was low, they do pose a threat to farming operations.

The impact of veld fires is shown in **Table 7-57**.

Table 7-57: Construction Impact of Veld Fires

Potential Impact: VELD FIRES	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**	**Confidence**
Without Mitigation	3	2	3	2	3	**30**	**Moderate**	(-)	High
With Mitigation	2	1	3	2	2	**16**	**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. — Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. — Smoking on site should be confined to designated areas. — Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months. — Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle. — Contractor should provide fire-fighting training to selected construction staff. — No construction staff, with the exception of security staff, to be accommodated on site overnight. — As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.									

7.15.2 OPERATIONAL PHASE

IMPROVED ENERGY SECURITY AND ESTABLISHMENT OF ENERGY INFRASTRUCTURE

The proposed power line is essential to enable the development and operation of Karreebosch WEF. The primary goal of the proposed Karreebosch WEF 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[21]. 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[22].

The operational impact on energy security is shown in **Table 7-58**.

Table 7-58: 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, where feasible. — 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, skills development and business-related opportunities associated with the power line and substation will be limited and largely confined to periodic maintenance and repairs. The potential socio-economic benefits are therefore likely to be limited. The potential opportunities can however be enhanced if a local service provider is appointed to undertake the work required. This may involve providing training and skills development to enable a locally based service provider to provide the required services.

The impact on employment opportunities is shown in **Table 7-59**.

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[21] 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
[22] "How does load shedding affect small business in SA?". *The Yoco Small Business Pulse (3: Q1 2019):*

Table 7-59: 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**	**Very Low**	(+)	High
With Mitigation	2	2	0	4	3	**24**	**Low**	(+)	High
Mitigation and Management Measures	— The enhancement measures in table 7-57 also apply to the operational phase. — In addition, the proponent should investigate providing training and skills development to enable locally based service providers to provide the required services for the maintenance of the powerline and other aspects for the proposed wind energy facility.								

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.

INCOME GENERATION FOR FARMERS

The proponent will be required to either purchase the land or enter into a lease/servitude agreement with the affected landowners for the use of the land for the establishment of the proposed transmission line and substation. Based on the findings of the SIA, the area is prone to droughts and farming operations can be challenging. Any additional source of income therefore represents a significant benefit for the affected landowner(s). The additional income would assist to reduce the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc. The additional income would improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

The operational impact on income generation for farmers is shown in **Table 7-60**.

Table 7-60: Operational Impact of Income Generation for Farmers

Potential Impact: INCOME GENERATION FOR FARMERS	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	0	4	3	**21**	**Low**	(+)	High
With Mitigation	3	2	0	4	5	**45**	**Moderate**	(+)	High
Mitigation and Management Measures	— Implement agreements with affected landowners.								

Residual impacts include Support for local agricultural sector and farming.

IMPACT ON SENSE OF PLACE

The area's existing sense of place has been altered by existing transmission lines associated with the Komsberg substation and the establishment of a number of WEFs. The proposed power line is also located within the Komsberg REDZ and Central Transmission Corridor. The area has therefore been identified as suitable for the establishment of the grid infrastructure. The potential impact on the broader areas sense of place associated with the proposed grid connection will therefore be low.

As indicated above, the owners of the most directly impacted landowners, namely Bon Espirange and Swartland, both indicated that all of the proposed alignments were acceptable as the alignments largely follow the new Roggeveld WEF line and remain confined to the southern margin of their viewshed

(Conradie, Mr Piet; Calldo – pers. comm). None of the other affected landowners interviewed raised concerns regarding the potential visual impact on the areas sense of place.

The operational impact on sense of place is shown in **Table 7-61**.

Table 7-61: Operational Impact on Sense of Place

Potential Impact: SENSE OF PLACE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	1	4	3	**27**	**Low**	(-)	High
With Mitigation	2	2	1	4	3	**27**	**Low**	(-)	High
Mitigation and Management Measures	— N/A								

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.

As indicated above, the majority of farmers in the area have been exposed to the construction of the Roggeveld, Karusa and Soetwater WEFs, and therefore have first-hand experience of the impacts associated with the construction of WEFs and the associated infrastructure, such as grid connections. The key issues raised are linked to the construction phase but are also valid for the maintenance phase. These include:

- Impact of maintenance related activities and movement of maintenance vehicles on the veld. Due to the sensitivity of the vegetation disturbances take many years to recover.
- Farm gates left open by maintenance contractors and Eskom employees. This was raised as key concern by all the affected landowners interviewed. This has resulted in stock losses and increased vulnerability to stock theft. Mixing of flocks of different breeds (e.g., meat and wool sheep) also impacts on farming operations. Time and resources are also spent on recovering stock that has escaped due to gates being left open.
- Damage to farm fences. The damage to farm fences poses the same risks to farming operations as leaving farm gates open. In many instances damage to fences caused by contractors occurs in remote areas and is not reported to the farmer.
- Lack of awareness amongst contractors of the impacts that their activities can have on farming operations.

Based on experience with maintenance of the existing Eskom power lines this is an issue that will need to be addressed. 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. Mitigation measures to address these risks are outlined below. However, the findings of the SIA indicate that despite measures being in place, these measures are not being implemented affectively by the contractors working in the area.

The impact on farming activities is shown in **Table 7-62**.

Table 7-62: 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	2	4	**40**	**Moderate**	(-)	High
With Mitigation	2	2	3	2	3	**27**	**Low**	(-)	High
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.								

IMPACT ON PROPERTY VALUES

A literature review of the impact of wind farms on property values was undertaken as part of the SIA. It is assumed that the findings can also be applied to transmission lines. It should be noted that the review does not constitute a property evaluation study and merely seeks to comment on the potential impact of wind farms (transmission lines) on property values based on the findings of studies undertaken overseas. The assessment rating is based on the findings of the review. In total five articles were identified and reviewed namely:

— Stephen Gibbons (April 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159.

— Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia.

— Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012.

— Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University.

— Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

Based on the findings of the literature review the potential impact of WEFs on rural property values is likely to be low, specifically for farms that are farmed as productive farms, most of these being small stock livestock farming. The same would apply to transmission lines. As indicated above, the potential loss of productive land and the associated potential impact on property values can also be minimised by careful planning and siting of the pylons and access roads. The potential impact on property values was not raised as a concern by local landowners

The impact on property values is shown in **Table 7-63**.

Table 7-63: Operational Impact on Property Values

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
RISKS POSED TO FARMING ACTIVITIES BY MAINTENANCE WORKERS									
Without Mitigation	2	2	0	4	2	**16**	**Low**	(-)	High
With Mitigation	2	1	0	4	2	**14**	**Low**	(-)	High
Mitigation and Management Measures	— The recommendations contained in the VIA should be implemented								

IMPACT ON TOURISM

A review of international literature in the impact of wind farms was undertaken as part of the SIA. The findings are also likely to be relevant to transmission lines, specifically transmission lines associated with WEFs. Three articles were reviewed, namely:

— Atchison, (April 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh.

— Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government.

— Regeneris Consulting (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector.

Based on the findings of the review there is limited evidence to suggest that WEFs impact on the tourism in the area. The same would apply to transmission lines. The potential impact on tourism was not raised as a concern by local landowners

The impact on property values is shown in **Table 7-64**.

Table 7-64: Operational Impact on Property Values

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
RISKS POSED TO FARMING ACTIVITIES BY MAINTENANCE WORKERS									
Without Mitigation	1	2	0	4	2	**14**	**Low**	(-)	High
With Mitigation	1	2	0	4	2	**14**	**Low**	(-)	High
Mitigation and Management Measures	— The recommendations contained in the VIA should be implemented								

7.15.3 DECOMMISSIONING PHASE

The impacts associated with social during the decommissioning phase are anticipated to be similar to the construction phase, therefore the same mitigation measures will be applicable.

7.16 HEALTH AND SAFETY

7.16.1 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 7-65** below.

Table 7-65: 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; — 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.								

7.16.2 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 7-66** below.

Table 7-66: Operation Impact on Employee Health and Safety

Potential Impact: EMPLOYEE HEALTH AND SAFETY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	3	3	**33**	**Moderate**	(-)	High

Potential Impact: EMPLOYEE HEALTH AND SAFETY	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
With Mitigation	2	1	3	4	2	**20**	**Low**	(-)	High
Mitigation and Management Measures	— The following mitigation measures will be the responsibility of Eskom once the 132kv component of the substation and powerline are handed over before operation. — 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; — Provide MSDSs for all hazardous substances kept onsite; and — All visitors should undergo site induction and be made aware of the risks associated with the site.									

7.16.3 DECOMMISSIONING PHASE

The impacts associated with health and safety during the decommissioning phase are anticipated to be similar to the construction phase, therefore the same mitigation measures will be applicable.

7.17 NO-GO ALTERNATIVE

The no-go alternative is essentially the option of not developing powerlines or substations in this area in which case none of the negative and positive impacts described above will come into effect.

The area would thus retain its visual character and sense of place and no visual impacts would be experienced by any locally occurring receptors.

The no-go alternative considers impacts that will occur to the project area in the absence of the proposed development. There is no agricultural impact of the no-go option. Therefore, the extent to which the development (insignificant impact) and the no-go alternative will impact the current land use is more or less equal, which results in there being, from an agricultural impact perspective only, no preferred alternative between the development and the no-go. However, the no-go option would prevent the authorised Karreebosch WEF from contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa.

The no-go alternative will result in the current status quo being maintained at the proposed development site as far as all the specialist studies concerned. The study area itself consists mostly of renosterveld, ephemeral drainage lines and ridge lines. The no-go option would maintain the natural habitat which would be beneficial to the avifauna currently occurring there.

The proposed power line and substation are essential to enable the authorised Karreebosch WEF to connect to the national electricity grid to address the current energy supply constraints and reduce South Africa’s reliance on coal generated energy. As indicated above, energy supply constraints and associated load shedding have had a significant impact on the economic development of the South African economy. South Africa also relies on coal-powered energy to meet more than 90% of its energy needs. South Africa is therefore one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world’s second largest producer of carbon emissions.

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.

8 CUMULATIVE IMPACT ASSESSMENT

Although the objective of the NEMA Basic Assessment process is to undertake an impact and risk assessment process, inclusive of cumulative impacts, which is essential to assessing and managing the environmental and social impacts of projects, it may be insufficient for identifying and managing the 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 and substation. 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.

Therefore, a number of renewable energy developments within the surrounding area which have submitted applications for environmental authorisation (some of which have been approved and others now operational). It is important to note that the existence of an approved EA does not directly equate to actual development of the project.

The surrounding projects that have not already been awarded Preferred Bidder (PB) status under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) Bid window 5 or the Risk Mitigation IPP procurement programme (RMIPPPP), are still subject to the REIPPPP bidding process or subject to securing an off taker of electricity through an alternative process. Some of the surrounding proposed WEFs secured EAs several years ago but have not obtained PB status (or a private off taker agreement) and as such have not been developed.

These existing surrounding projects of varying approval status have been detailed in **Table 8-1** and **Figure 8-1**. Given the site's location within the Komsberg REDZ, it is considered to be located within the renewable energy hub that is developing in this focus area.

Table 8-1: Existing surrounding projects within a 30km radius of the Karreebosch WEF and Karreebosch OHPL

LABEL	DFFE REFERENCE	PROJECT TITLE	STATUS
1	12/12/20/1782/1/AM5	140MW Rietrug Wind Energy Facility near Sutherland, Northern Cape Province.	Preferred Bidder Round 5
2	12/12/20/1782/2/AM6	140MW Sutherland 1 Wind Energy Facility near Sutherland, Northern Cape and Western Cape Provinces.	Preferred Bidder Round 5
3	12/12/20/1782/3/AM3	140MW Sutherland 2 Wind Energy Facility near Sutherland, Northern Cape Provinces.	Preferred Bidder Round 5
4	12/12/20/1783/1/AM5	150MW Perdekraal West Site 1 Wind Energy Facility, Western Cape Province.	Approved
5	12/12/20/1783/2/AM5	147MW Perdekraal East Site 2 Wind Energy Facility, Western Cape Province.	Preferred Bidder Round 4, Operational
6	12/12/20/1988/1/AM6	140MW Roggeveld Phase 1 Wind Farm, North of Matjiesfontein, Northern Cape and Western Cape Provinces.	Preferred Bidder Round 4, Operational
7	12/12/20/2370/1/AM6	140MW Karusa Wind Energy Facility,Phase 1, Karoo Hoogland Municipality, Northern Cape Province.	Preferred Bidder Round 4, Operational
8	12/12/20/2370/2/AM6	140MW Soetwater Wind Farm Phase 2, Karoo Hoogland Municipality, Northern Cape Province.	Preferred Bidder Round 4, Operational
9	12/12/20/2370/3/AM5	140MW Great Karoo Wind Energy Facility Phase 3, Karoo Hoogland Municipality, Northern Cape Province.	Approved
10	14/1/1/16/3/3/1/2318	310MW Pienaarspoort Wind Energy Facility Phase 1, Witzenberg local Municipality, Western Cape Province.	Approved
11	14/12/16/3/3/1/2441	360MW Pienaarspoort Wind Energy Facility Phase 1, Witzenberg local Municipality, Western Cape Province.	Approved
12	14/12/16/3/3/1/1976/1/AM3	226MW Kudusberg Wind Energy Facility between Matjiesfontein and Sutherland in Western and Northern Cape Provinces.	Approved
13	14/12/16/3/3/1115	325WM Rondekop Wind Energy Facility between Matjiesfontein and Sutherland in Western and Northern Cape Provinces	Approved

14	14/12/16/3/3/1/1977/AM3	183MW Rietkloof Wind Energy Facility near Matjiesfontein in the Western Cape Province.	Preferred Bidder Round 5
15	14/12/16/3/3/1/2542	200MW Esizayo Wind Energy Facility Expansion near Laingsburg, Western Cape.	In Process
16	14/12/16/3/3/2/2009/AM1	Oya Energy Facility between Matjiesfontein and Sutherland in Western and Northern Cape Provinces.	Preferred Bidder Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP)
17	14/12/16/3/3/2/826	140MW Gunsfontein Wind Energy Facility Karoo Hoogland Municipality, Northern Cape Province.	Approved
18	14/12/16/3/3/2/856 /AM4	275MW Komsberg West near Laingsburg, Western Cape Provinces	Approved
19	14/12/16/3/3/2/857/AM4	275 Komsberg East near Laingsburg, Western Cape Provinces.	Approved
20	14/12/16/3/3/2/900/AM2	140MW Brandvalley Wind Energy Facility, WITHIN THE Laingsburg and Witzenberg Local Municipalities in the Western and Northern Cape Province.	Preferred Bidder Round 5
21	14/12/16/3/3/2/962/AM1	140MW Maralla East Wind Energy Facility, Namakwa and Central Karoo District Municipalities, Western and Northern Cape Provinces.	Approved
22	14/12/16/3/3/2/963/AM1	140Maralla West Wind Energy Facility, Karoo Hoogland local Municipality, Northern Cape Province.	Approved
23	14/12/16/3/3/2/967/AM3	140MW Esizayo Wind Farm, Laingsburg Local Municipality Western Cape Province.	Approved
24	12/12/20/2235	10MW Inca Photovoltaic Facility near Sutherland, Northern Cape Province.	Approved

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.

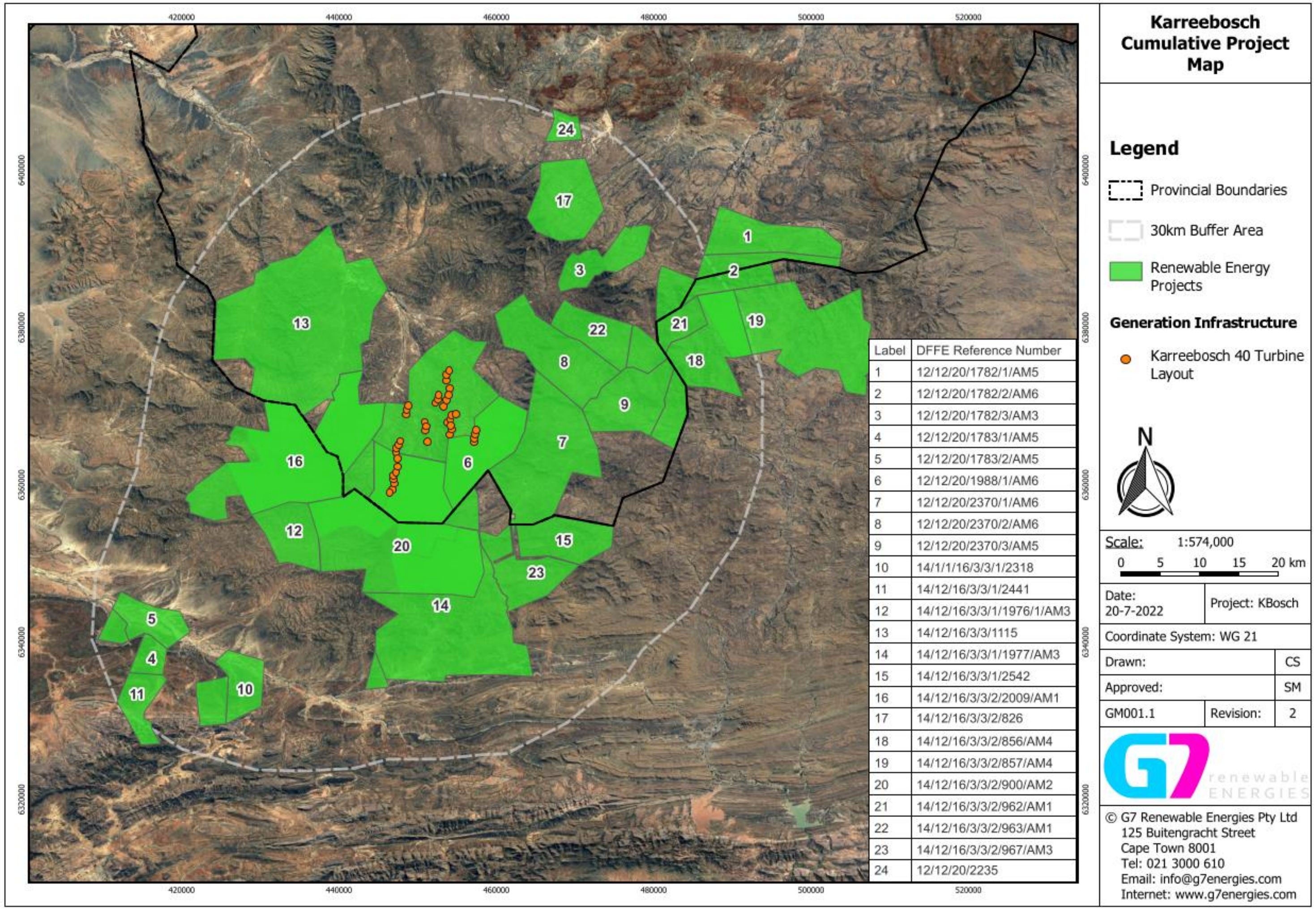

Figure 8-1: Existing surrounding projects (by approval status) within a 30km radius of the Karreebosch WEF and proposed OHPL and substation

SENSE OF PLACE

The Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. These issues raised in these guidelines as to what defines a cumulative impact are also regarded as pertinent to transmission lines. The relevant issues identified by Scottish Natural Heritage study include:

- Combined visibility (whether two or more transmission lines) will be visible from one location.
- Sequential visibility (e.g. the effect of seeing two or more two or more transmission lines) along a single journey, e.g. road or walking trail).
- The visual compatibility of different two or more transmission lines in the same vicinity.
- Perceived or actual change in land use across a character type or region.
- Loss of a characteristic element (e.g. viewing type or feature) across a character type caused by developments across that character type.

There are existing transmission lines associated with the existing Komsberg substation. Several WEFs are also operational or are proposed in the area. The potential for cumulative impacts associated with combined visibility (whether two or more power lines will be visible from one location) and sequential visibility (e.g., the effect of seeing two or more power lines along a single journey, e.g., road or walking trail) does therefore exist. However, the cumulative impact on the areas sense of place is likely to be low. The area also falls within the Komsberg REDZ and Central Transmission Corridor. The area has therefore been identified as suitable for the establishment of the grid infrastructure.

The cumulative impact on sense of place is outlined in **Table 8-2**.

Table 8-2: Cumulative Impact on Sense of Place

Potential Impact: Sense of Place	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Project in isolation	2	2	1	4	3	**27**	**Low**	(-)	High
Project and other projects in the area	3	2	1	4	4	**40**	**Moderate**	(-)	High

GEOTECHNICAL

The cumulative geotechnical impact pertain to the impact of increase soil erosion due to the removal of subsoil. The significance of the impact is indicated in **Table 8-3**.

Table 8-3: Cumulative Geotechnical Impact

Potential Impact: SOIL EROSION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	1	3	4	5	**55**	**Moderate**	(-)	High
With Mitigation	1	1	1	4	2	**14**	**Very Low**	(-)	High

BIODIVERSITY

Development of the entire site will result in some cumulative impacts. However, the vegetation unit, habitat and species are generally widespread.

The proposed powerline will result in the limited transformation and loss of some natural habitat, limited to the footprints for pylons and substations and access roads along the preferred route(s). This loss will be highly localised but will result in a cumulative loss of the vegetation type and species. This cumulative loss is negligible.

Cumulative impacts because of the development of the site, are regarded as being low due to the widespread nature of the vegetation unit and the low impact of the proposed activity which is unlikely to pose significant risk to potential localised populations of species of conservation concern.

The cumulative biodiversity impacts are indicated in **Table 8-4** below.

Table 8-4: Cumulative Biodiversity Impacts

Potential Impact:	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**	**Confidence**
Permanent or temporary loss of indigenous vegetation cover									
Without Mitigation	3	2	3	4	5	**60**	**Moderate**	(-)	High
With Mitigation	1	2	3	4	5	**50**	**Moderate**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Loss of flora Species of Conservation Concern									
Without Mitigation	2	1	3	1	5	**35**	**Moderate**	(-)	High
With Mitigation	1	1	3	1	5	**30**	**Low**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Susceptibility of post construction disturbed areas to invasion									
Without Mitigation	3	1	3	2	4	**36**	**Moderate**	(-)	High
With Mitigation	1	1	3	2	4	**28**	**Low**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Susceptibility of some areas to erosion									
Without Mitigation	3	2	3	3	3	**33**	**Moderate**	(-)	High
With Mitigation	1	2	3	3	3	**27**	**Low**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Disturbances or disruptions to ecological processes									
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)	High
With Mitigation	1	2	3	1	4	**28**	**Low**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Disturbances to Aquatic and Riparian habitat & processes									
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)	High
With Mitigation	1	2	3	1	4	**28**	**Low**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Loss of Faunal Habitat									
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)	High
With Mitigation	1	2	3	1	4	**28**	**Low**	(-)	High
Potential Impact:	Magni	Exten	Rever	Durati	Proba	Signifi cance		Chara cter	Confi dence

Impacts to Faunal Processes									
Without Mitigation	3	2	3	4	4	**48**	**Moderate**	(-)	High
With Mitigation	1	2	3	1	4	**28**	**Low**	(-)	High
Potential Impact: Loss of Faunal Species of Special Concern	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	1	3	**21**	**Low**	(-)	High
With Mitigation	1	1	3	1	3	**18**	**Low**	(-)	High

FRESHWATER

Watercourses within the region are under continued threat due to rapid land use transformation in the surrounding landscape, with specific mention of renewable energy facilities (REF) and associated powerline infrastructure.

Direct and indirect impacts identified within the assessed watercourses can predominantly be attributed to informal road crossings leading to limited alien and invasive species establishment. Considering that the proposed powerline support structures and substation will be located outside the assessed watercourses (thus avoiding direct negative impacts), increased vehicular movement and infrastructure in the surrounding landscape may result in indirect edge effects. Considering the proposed development of other REFs and associated electrical infrastructure, such edge effects may cause cumulative impacts to the watercourses, with specific mention of alien and invasive species establishment and increased sediment loads. With management and mitigation measures implemented during the construction phase and monitoring of support structures and substation for any erosion during the operational phase, the direct and indirect negative impacts can be reduced, thus no significant contribution to the above-mentioned impacts is considered likely.

AVIFAUNA

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed project. 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.

The proposed Karreebosch OHPL will have a maximum length of approximately 20.5km. There are approximately 140km of existing high voltage lines within the 30km radius around the Karreebosch project (counting parallel lines as one). In addition, at least around 250+km of new grid connections is planned to connect to the Komsberg Main Transmission Substation (MTS), based on information that is available in the public domain. The Karreebosch grid connection project will thus increase the total number of existing and planned high voltage lines by approximately 5.2% or less. The contribution of the proposed Karreebosch grid connection to the cumulative impact of all the high voltage lines is thus Low. However, the combined cumulative impact of the existing and proposed high voltage power lines on avifauna within a 30km radius is considered to be High as far as potential collision mortality is concerned, but if mitigated as prescribed with the appropriate bird flappers throughout the powerline, then can be reduced to Moderate.

The cumulative impact of displacement due to disturbance and habitat transformation in the Karreebosch substation is considered to be Low, due to the small size of the footprint, and the availability of similar habitat within the 30km radius area. The cumulative impact of potential electrocutions within the substation yard is also likely to be Low as it is expected to be a very rare event. The cumulative impact of all the proposed substations linked to the planned renewable energy projects is considered to be Moderate as far as displacement is concerned, but if mitigated can be reduced to Low. In the case of potential electrocution in substations, the cumulative impact of all the renewable energy substations is likely to be Low both pre- and post-mitigation.

The cumulative impact of displacement due to disturbance and habitat transformation in the Karreebosch substation is considered to be low, due to the small size of the footprint, and the availability of similar habitat within the 30km radius area. The cumulative impact of potential electrocutions within the substation yard is also likely to be low as it is expected to be a rare event.

The cumulative avifauna impacts are outlined in **Table 8-5**.

Table 8-5: Cumulative Avifauna Impacts

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
DISPLACEMENT OF POWERLINE SENSITIVE SPECIES DUE TO DISTURBANCE AND HABITAT TRANSFORMATION									
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	2	3	2	2	**20**	**Low**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
MORTALITY OF POWERLINE SENSITIVE SPECIES DUE TO COLLISIONS WITH OVERHEAD POWER LINE									
Without Mitigation	5	3	4	4	4	**64**	**High**	(-)	High
With Mitigation	5	3	3	4	3	**45**	**Moderate**	(-)	High
Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
MORTALITY OF POWERLINE SENSITIVE SPECIES DUE TO ELECTROCUTION IN THE ON-SITE SUBSTATION INFRASTRUCTURE									
Without Mitigation	5	3	3	4	2	**30**	**Low**	(-)	High
With Mitigation	1	2	3	4	2	**20**	**Low**	(-)	High

AGRICULTURAL POTENTIAL AND SOILS

The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project, but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact. But it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable.

level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

The potential cumulative agricultural impact of importance is a regional loss of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

— What level of loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

Power lines have an insignificant agricultural impact and an insignificant cumulative agricultural impact. Due to the relatively small footprint of the associated substation alternatives and access tracks required for construction and maintenance of the powerline, their impact on agriculture is also considered to be insignificant. Many times more electricity grid infrastructure than currently exists, or is currently proposed, can be accommodated before acceptable levels of change in terms of loss of production potential are exceeded. In reality, the landscape in this environment could be covered with power lines and agricultural production potential would not be affected. It therefore does not make sense to conduct a more formal assessment of the development's cumulative impacts as per DFFE requirements for cumulative impacts.

Due to the considerations discussed above, the cumulative impact of loss of future agricultural production potential can confidently be assessed as not having an unacceptable negative impact on the area. In terms of cumulative impact, the proposed development is therefore acceptable and it is therefore recommended that it be approved.

HERITAGE

The proposed grid connection will form part of the infrastructure required for the approved Karreeboosch WEF development. Furthermore, the proposed grid connection corridor is located within a belt of approved renewable energy facilities. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed grid connection is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact.

VISUAL

Renewable energy facilities have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. Although power lines and substations are relatively small developments when compared to renewable energy facilities, they may still introduce a more industrial character into the landscape, thus altering the sense of place.

It is assumed that all of these renewable energy developments include grid connection infrastructure, although few details of this infrastructure were available at the time of writing this report. It should be noted that this list is based on information available at the time of writing this report and as such there may be several other renewable energy projects proposed within the study area.

The relatively large number of renewable energy facilities within the surrounding area and their potential for large-scale visual impacts could significantly alter the sense of place and visual character in the broader region, as well as exacerbate the visual impacts on surrounding visual receptors, once constructed.

These renewable energy projects include 22 WEFs and one (1) Hybrid Facility. Although the different technologies are expected to have different impacts, all renewable energy developments and associated grid connection infrastructure are relevant as they contribute to the alteration of the visual character of the broader area.

The study area is however directly affected by two (2) renewable energy projects, namely the proposed Karreebosch WEF and operational Roggeveld WEF. These projects and associated infrastructure will inevitably introduce an increasingly industrial character into a largely natural, pastoral landscape in this sector of the study area, thus giving rise to significant cumulative impacts. Construction of the Roggeveld WEF and the associated grid connection infrastructure is complete and the landscape has already undergone noticeable change, which will be exacerbated with further WEF development in the area. Impacts of this transformation will however be reduced by the fact the landscape in the vicinity of these proposed WEF developments has already been disturbed by Komsberg substation and the existing power lines.

An examination of the literature available for the environmental assessments undertaken for many of these renewable energy applications showed that the visual impacts identified and the recommendations and mitigation measures provided are largely consistent with those identified in this report. Where additional mitigation measures were provided in respect of the other renewable energy applications, these have been incorporated into this report where relevant.

From a visual perspective, the further concentration of renewable energy facilities with associated grid connection infrastructure as proposed will inevitably change the visual character of the area and alter the inherent sense of place, introducing an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures put forward by the visual specialists in their respective reports.

It is important to note however that the study area is located within the Komsberg REDZ and also within a Strategic Transmission Corridor and thus the relevant authorities support the concentration of renewable energy developments and associated power line infrastructure in this area. In addition, it is possible that the renewable energy facilities located in close proximity to each other could be seen as one large facility rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

The cumulative visual impact is indicated in **Table 8-6** below.

Table 8-6: Cumulative Visual Impact

Potential Impact: Visual Impact	Magnitude	Extent	Reversibilit	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	3	3	4	3	**42**	**Moderate**	(-)	High
With Mitigation	3	3	3	4	3	**39**	**Moderate**	(-)	High

The following mitigation measures are recommended to manage potential cumulative impacts:

— Where possible, limit the number of maintenance vehicles using access roads.
— Non-reflective surfaces should be utilised where possible.
— Where possible, limit the amount of security and operational lighting present at the on-site substation
— Light fittings for security at night should reflect the light toward the ground and prevent light spill.

TRAFFIC

The cumulative impact of increased dust and noise pollution due to increased traffic, assumes that all wind farms within 30km currently proposed and/or approved would be constructed at the same time. It must be noted that this is a conservative approach. The cumulative traffic impact is outlined in **Table 8-7**.

Table 8-7: Cumulative Traffic Impact

Potential Impact: Dust and Noise	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	5	3	3	2	5	**65**	**High**	(-)	High
With Mitigation	3	2	3	2	4	**40**	**Moderate**	(-)	High

Proposed mitigation measures

— The delivery of components to the site can be staggered, and trips can be scheduled to occur outside of peak traffic periods.
— Dust suppression of gravel roads during the construction phase, as required.
— Regular maintenance of gravel roads is required by the Contractor during the construction and decommissioning phase and by the Owner/Facility Manager during the operational phase.
— Staff and general trips should occur outside of peak traffic periods as far as possible.

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 proposed Project, 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 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 very high and high 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:**
  - Wetland areas in vicinity of Bon Espirange substation.
  - Rocky Garden on mountain slightly to the north of route for OHPL route alternatives 1 A, B & C.
  - Buffer along Tankwa River including aggregating, ground-nesting bee population on western side of OHPL route alternative 2 C.
  - Sub-population of Sensitive Species 142 and scattered but localised individuals of *Indigophora hantamensis* in the vicinity of a portion of OHPL route alternatives 1 A & B and slightly to the west of OHPL route alternative 1 C & 2 A.
- **Freshwater:**
  - NEMA 32m zone of regulation
  - 1:100yr floodline and/or 100m zone of regulation
- **Visual:**
  - NEMA zone of regulation.
- **Avifauna:**
  - Verreaux's Eagle Nest (32°51'59.27"S 20°30'12.02"E) -Beacon Hill
- **Heritage**
  - Heritage resources in study area

The above sensitivities are discussed in the following sub-sections. The combined environmental sensitivities of the proposed Project footprint are shown in **Figure 9-1** below.

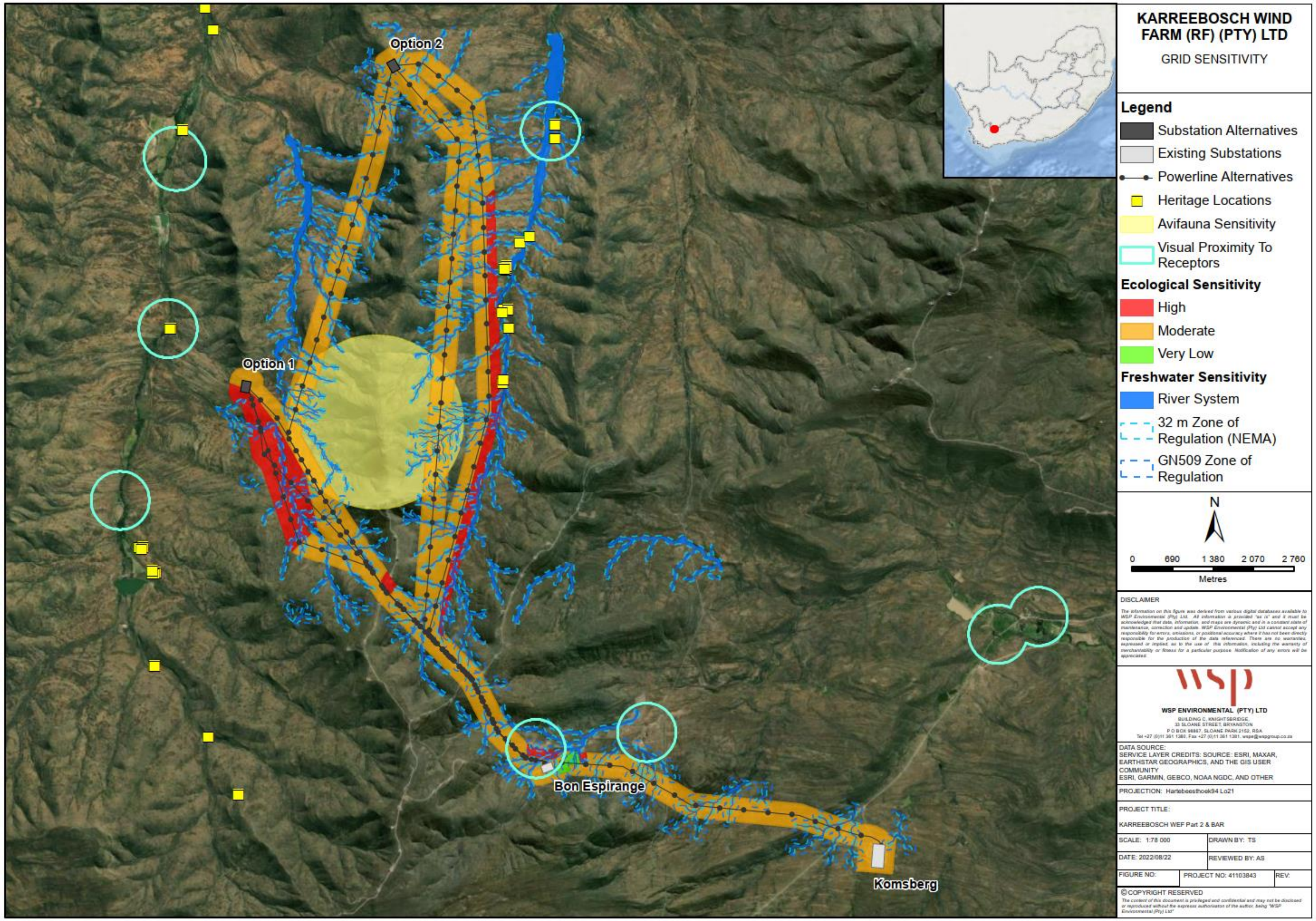

Figure 9-1: Combined Sensitivity map for the Karreebosch 132kV OHPL and substation Project

9.1.1 AGRICULTURAL POTENTIAL AND SOILS

The screening tool classifies agricultural sensitivity according to only two independent criteria – the land capability rating and whether the land is cultivated or not. All cultivated land is classified as at least high sensitivity, based on the logic that if it is under cultivation, it is indeed suitable for cultivation, irrespective of its land capability rating.

The screening tool sensitivity categories in terms of land capability are based upon the Department of Agriculture's updated and refined, country-wide land capability mapping, released in 2016. Land capability is defined as the combination of soil, climate and terrain suitability factors for supporting rain fed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land. The higher land capability values (≥8 to 15) are likely to be suitable as arable land for the production of cultivated crops, while lower values are only likely to be suitable as non-arable, grazing land, or at the lowest extreme, not even suitable for grazing.

A map of the proposed corridor alternatives overlaid on the screening tool sensitivity is given in **Figure 9-2**. The agricultural sensitivity of the entire corridor is almost entirely low and it is low for both alternative substation sites. The small area of classified medium sensitivity within the OHPL corridor is actually no different to the rest and so all land affected by the development can be considered to be of low agricultural sensitivity.

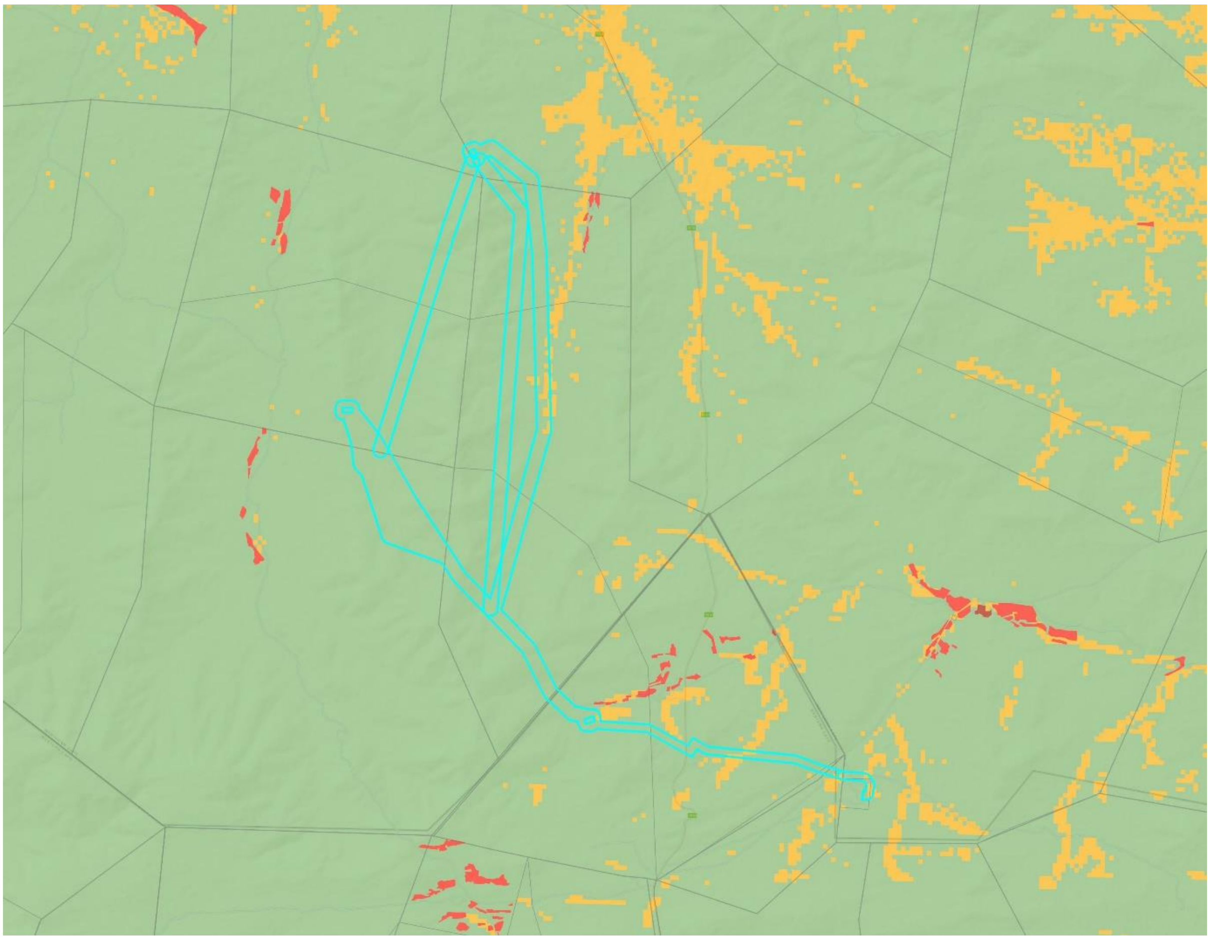

Figure 9-2: The proposed corridor alternatives (blue outlines) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high).

9.1.2 BIODIVERSITY

An overall Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators (summarised in **Table 6-6**) was undertaken and includes the following key criteria:

- Relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.

- Presence, diversity and abundance of *Species of Conservation Concern* (weighted in favour of local endemic species).
- Extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- Overall degradation incorporating above factors.
- Relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

INTACTNESS

Three basic classes are differentiated as follows:

- **Very Low:** original vegetation is removed, secondary (indigenous) or non-indigenous vegetation is present.
- **Low**: > 75% of original vegetation has been removed or lost; and/or no Species of Conservation Concern present that are critically endangered, endangered or endemic with highly localised distribution.
- **Moderate**: 25 - 75% of original vegetation has been removed/lost; and or presence of Species of Conservation Concern but not having high conservation status or high levels of endemicity or highly localised distributions.
- **High**: < 25% of original vegetation has been removed or lost; and/or presence of species with a highly endemicity and or high conservation status (endangered or critically endangered).

Intactness for the site is generally High.

ALIEN INVASION

Three classes are differentiated as follows:

- **Low**: no or few scattered individuals.
- **Moderate**: individual clumps of invasives present but cover less than 25% or original area.
- **High**: dense, stands of invasives present, or cover 25 - 80% of area with notable loss of ecological functioning. Rehabilitation will most likely require specialised techniques over an extended period (5 – 10 years).
- **Very High**: dense, impenetrable stands of invasives present stands of invasive present, or cover > 80%, with significant loss of ecological functioning and associated biophysical changes that are likely to thwart rehabilitation without assisted techniques, over 10 years or unlikely to rehabilitate to natural state.

Alien invasion for the site is generally Low in intact areas but high to very high in densely invaded stands of wattle. These densely invaded areas have undergone significant biophysical changes as is evident on site.

DEGRADATION

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

Table 9-1: Matrix for Degradation

	INVASION			
INTACTNESS	**LOW**	**MODERATE**	**HIGH**	**VERY HIGH**
High	Pristine	Near Pristine	Degraded	-
Moderate	Near Pristine	Degraded	Severely Degraded	Severely Degraded
Low	Degraded	Severely Degraded	Transformed	Transformed
Very Low	Highly Degraded	Transformed	Transformed	Transformed

Degradation for the site is Low to Moderate (Natural/Intact to Degraded).

OVERALL SENSITIVITY SCORE

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix[23] which combines degradation and overall conservation status of the vegetation units of the site.

Table 9-2: Matrix for Overall Sensitivity

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Transformed	Very Low	Low	Low	Low
Severely degraded	Low	Low	Moderate	Moderate-High
Degraded	Low	Moderate	Moderate - High	Very High
Ecologically Near Pristine or near Pristine (intact/semi-intact)	Moderate	Moderate - High	High	Critical

Refer to **Figure 9-3** and **Figure 9-4** for overall sensitivity map and **Table 9-3** for summary of the sensitivity of the respective vegetation units and habitats. In general, both vegetation units (Central Mountain Shale Renosterveld on mountains and Koedoesberge-Moordenaars Karoo ion the lowlands) have a low sensitivity. However, where communities or habitats are identified that differ from the normal vegetation matrix, or have other sensitivities, including low resilience to disturbance, a concentration of species of conservation concern and/or protected species, the status has been raised to moderate or high, as the specific communities are deemed to be more sensitive than the surrounding vegetation. These communities generally have localised distributions, and it should be feasible to minimise impacts by careful placement of pylons and associated infrastructure (such as the access roads) to span or avoid such areas, or to minimise the footprints, as far as is technically possible.

Table 9-3: Sensitivity Summary for the site

SPECIES/HABITAT		SITE ECOLOGICAL IMPORTANCE			
	INTACTNESS	ALIEN INVASION	DEGRADATION	STATUS	OVERALL SENSITIVITY*
Central Mountain Shale Renosterveld	Moderate	Low	Near Pristine/ Degraded	LC	Moderate/ Low
Koedoesberge-Moordenaars Karoo	Moderate	Low	Near Pristine/ Degraded	LC	Moderate/ Low
Rocky outcrops	High	Low	Pristine	LC	High*
Sensitive Species sub-populations	High	Low	Pristine	LC	High*
Alluvial Vegetation (faunal habitat)	Moderate	Low	Pristine	LC	High*
Transformed Areas	Very Low	Low	Transformed	LC	Very Low

* Vegetation communities and niches that have a higher sensitivity than typical surrounding vegetation.

[23] Based on the Terrestrial Biodiversity Assessment protocol.

- Areas scoring an overall Very Low or Low Terrestrial Biodiversity Sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. VERY LOW Terrestrial Biodiversity Sensitivity areas are limited to the transformed areas such as cultivated lands or having secondary vegetation. No LOW Terrestrial Biodiversity Sensitivity areas are differentiated.
- Areas scoring an overall Moderate Terrestrial Biodiversity Sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. Moderate Sensitivity areas include the intact Central Mountain Shale Renosterveld and Koedoesberge-Moordenaars Karoo, which are more resilient than more specialised habitat, but are none the less having a moderate to high species diversity as well as sporadic species of conservation concern.
- Areas scoring an overall High Terrestrial Biodiversity Sensitivity include those areas deemed to have an elevated sensitivity, including areas deemed to be sensitive areas or habitat such as rocky outcrops and or areas having sub-populations of species of conservation concern that are considered to be vulnerable. High Sensitivity terrestrial areas on site includes Rocky outcrops, riparian areas and various sensitive areas as demarcated in **Figure 6-27** to **Figure 6-29**. These areas tend to offer more specialised niche habitats and often have a slightly different species composition to the surrounding Renosterveld or Karoid matrix. Pylons and access roads should avoid these areas where possible, and if not, then the footprint within must be kept to the smallest technically possible.
- Areas scoring an overall VERY HIGH Terrestrial Biodiversity Sensitivity (No-Go Areas) include natural/intact areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat for any faunal species that is endangered or critically endangered. No Very High sensitivity terrestrial areas have been identified.

The vegetation type and overall site is considered to have a Low Sensitivity, due to the status of the vegetation type. Taking into consideration niche habitats, several localised areas are considered to have an elevated sensitivity and should be avoided, or footprints minimised as far as is technically possible.

High Sensitivity areas identified include Sub-population of Sensitive Species 142 and scattered but localised individuals of Indigophora hantamensis in the vicinity of a portion of alternatives 1A and 1B and slightly to the west of alternative 1C & 2A. These specific sensitive areas are indicated as High Sensitivity in **Figure 9-3** & **Figure 9-4**.

No Moderate or Very High sensitivity areas were identified.

NO-GO AREAS

Specific No-Go areas deemed to be *Sensitive Areas* that have been identified (**Figure 6-27** to **Figure 6-29**) include:

- Wetland areas in vicinity of Bon Espirange substation.
- Rocky Garden on mountain slightly to the north of route for alternatives 1A; within 100 meters of the proposed OHP
- Buffer along Tankwa River including aggregating, ground-nesting bee population on western side of alternative 2 C.

9.1.3 PLANTS AND ANIMALS

SITE ECOLOGICAL IMPORTANCE CRITERIA

Site Ecological Importance (SEI) is considered to be a function of the Biodiversity Importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (Receptor Resilience [RR]) as follows:

SEI = BI + RR where BI = CI + FI

Table 9-4: Site Ecological Importance

SEI	INTERPRETATION IN RELATION TO PROPOSED DEVELOPMENT ACTIVITIES
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
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.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

CONSERVATION IMPORTANCE

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as 'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'

Table 9-5: Conservation Importance

CI	FULFILLING CRITERIA
Very high	— Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[23] or Critically Rare[24] species that have a global EOO of < 10 km^2. — Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type. — Globally significant populations of congregatory species (> 10% of global population).
High	— Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. — Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. — Presence of Rare species. — Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	— Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. — Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species.

	— > 50% of receptor contains natural habitat with potential to support SCC.
Low	— No confirmed or highly likely populations of SCC. — No confirmed or highly likely populations of range-restricted species. — < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	— No confirmed and highly unlikely populations of SCC. — No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

FUNCTIONAL INTEGRITY

Functional integrity (FI) of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predict- ed state under ideal conditions. Simply stated, FI is *'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'*

Table 9-6: Functional Integrity

FI	FULFILLING CRITERIA
Very high	— Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. — High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. — No or minimal current negative ecological impacts with no signs of major past disturbance (e.g., ploughing).
High	— Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. — Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. — Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	— Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. — Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. — Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	— Small (> 1 ha but < 5 ha) area. — Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. — Several minor and major current negative ecological impacts.
Very Low	— Very small (< 1 ha) area. — No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

Table 9-7: Functional Integrity Matrix

FUNCTIONAL INTEGRITY	CONSERVATION IMPORTANCE				
	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Very High	Very High	Very High	High	Medium	Low
High	Very High	High	Medium	Medium	Low
Medium	High	Medium	Medium	Low	Very Low
Low	Medium	Medium	Low	Low	Very Low
Very Low	Medium	Low	Very Low	Very Low	Very Low

RECEPTOR RESILIENCE

Receptor resilience (RR) is defined here as 'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.'

Table 9-8: Receptor Resilience

RR	FULFILLING CRITERIA
Very high (Intact)	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%28 of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Moderate (Degraded)	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low (Invaded)	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low (Transformed)	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Table 9-9: Matrix for Receptor Resilience

RECEPTOR RESILIENCE	BIODIVERSITY IMPORTANCE				
	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Very High	Very High	Very High	High	Medium	Low
High	Very High	Very High	High	Medium	Very Low
Medium	Very High	High	Medium	Low	Very Low
Low	High	Medium	Low	Very Low	Very Low
Very Low	Medium	Low	Very Low	Very Low	Very Low

SITE ECOLOGICAL IMPORTANCE

Based on the intactness, conservation status and presence of Sensitive Species, the relative species-based sensitivity varies across the site, with transformed areas having a Very Low sensitivity, intact and semi-intact areas having a Moderate Sensitivity, and specialised localised habitats having a High Sensitivity (**Table 9-10**). The overall Terrestrial Biodiversity Sensitivity map aligns with the species of conservation concern map.

Table 9-10: Overall Species Ecological Importance

SPECIES/HABITAT	SITE ECOLOGICAL IMPORTANCE				
	INTACTNESS	ALIEN INVASION	DEGRADATION	STATUS	OVERALL SENSITIVITY*
Central Mountain Shale Renosterveld	Moderate	Low	Near Pristine/ Degraded	LC	Moderate/ Low
Koedoesberge-Moordenaars Karoo	Moderate	Low	Near Pristine/ Degraded	LC	Moderate/ Low
Rocky outcrops	High	Low	Pristine	LC	High*
Sensitive Species sub-populations	High	Low	Pristine	LC	High*
Alluvial Vegetation (faunal habitat)	Moderate	Low	Pristine	LC	High*
Transformed Areas	Very Low	Low	Transformed	LC	Very Low

The site is considered to have an overall Moderate Sensitivity due to the low (Least Concern) conservation status of the vegetation units represented. The general intactness and diversity of species of conservation concern (including numerous Crassulaceae and Aizoaceae) does elevate the overall sensitivity to be above low for near-natural vegetation. Specific Sensitive Areas (**Figure 6-23** to **Figure 6-26**) having an elevated sensitivity, are present and are reflected in the overall sensitivity maps (**Figure 9-3** and **Figure 9-4**).

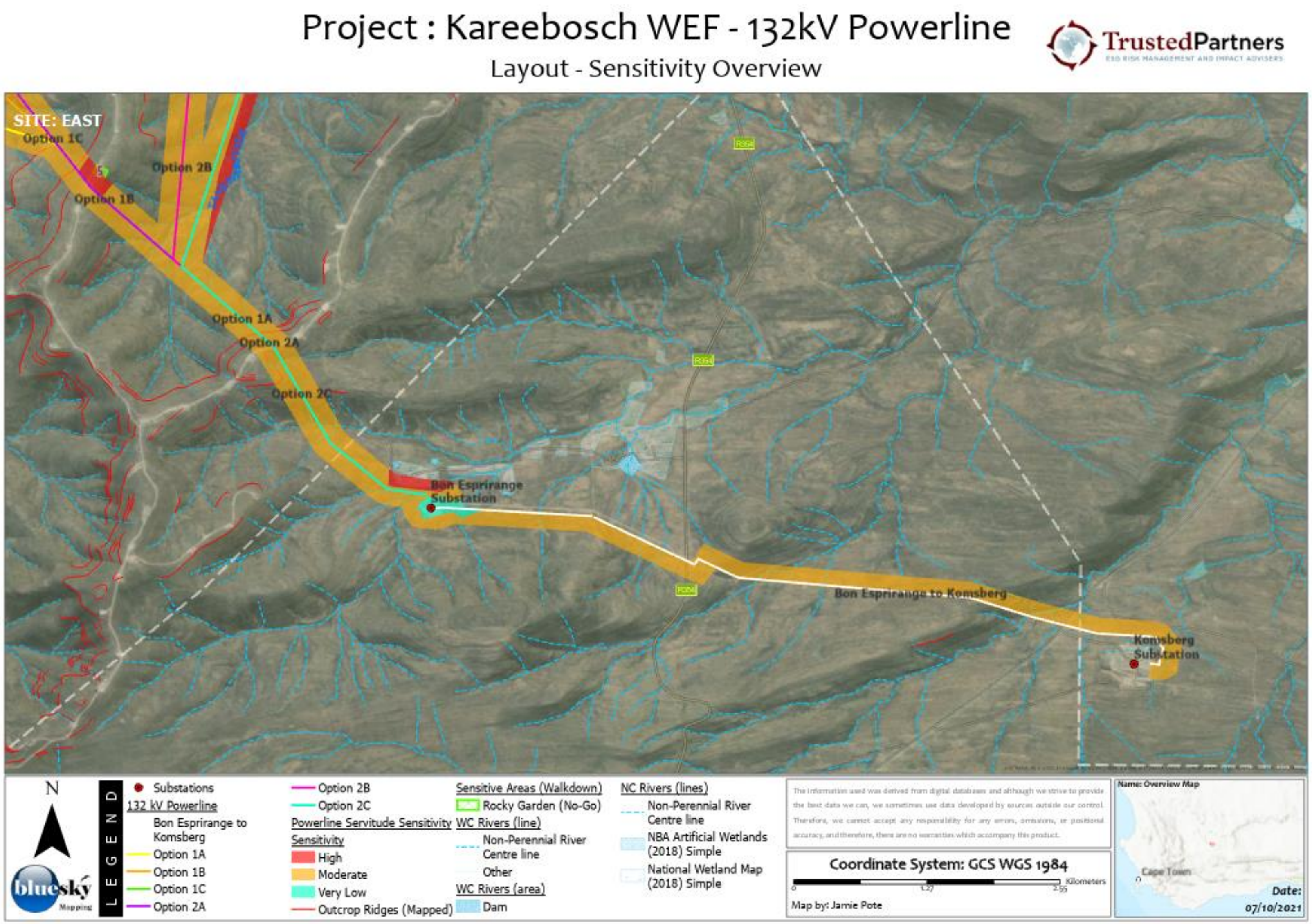

Figure 9-3: Overall Species Sensitivity (East).

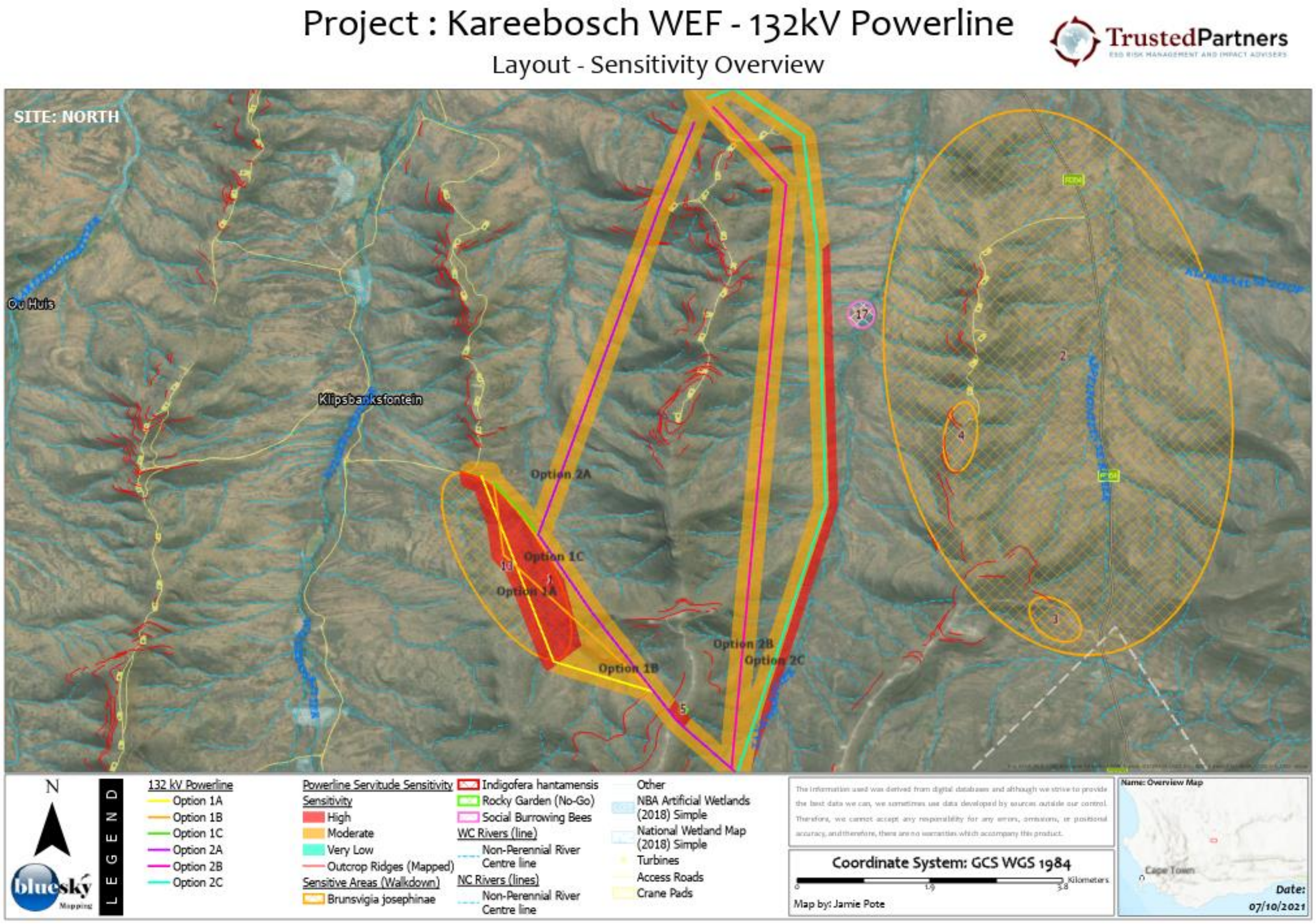

Figure 9-4: Overall Species Sensitivity (North).

9.1.4 FRESHWATER

A 32 m Zone of Regulation (ZoR) in accordance with NEMA was applied to all identified watercourses. A 100 m Zone of Regulation in accordance with Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (in the absence of a defined 1 in 100 year floodline) were applied to the ephemeral river and tributaries with riparian vegetation and the episodic drainage lines with no riparian vegetation associated with the proposed development (**Figure 9-5** to **Figure 9-7**). The proposed development will encroach into the 100 m GN509 regulated area, thus Water Use Authorisation (WUA) from the DWS is required prior to commencement of any construction. Based on the outcome of the DWS Risk Assessment, Water Use Authorisation by means of General Authorisation in terms of Section 21(c) and (i) water uses are required to be obtained in consultation with the DWS.

NatureStamp (2022) concluded through the flood analysis that the proposed OHPL infrastructure and associated access roads will not be at risk of damage through flooding from the channels. This is largely due to the general low rainfall in the area and the small catchments on the site, resulting in less accumulated surface runoff (**Figure 9-8**).

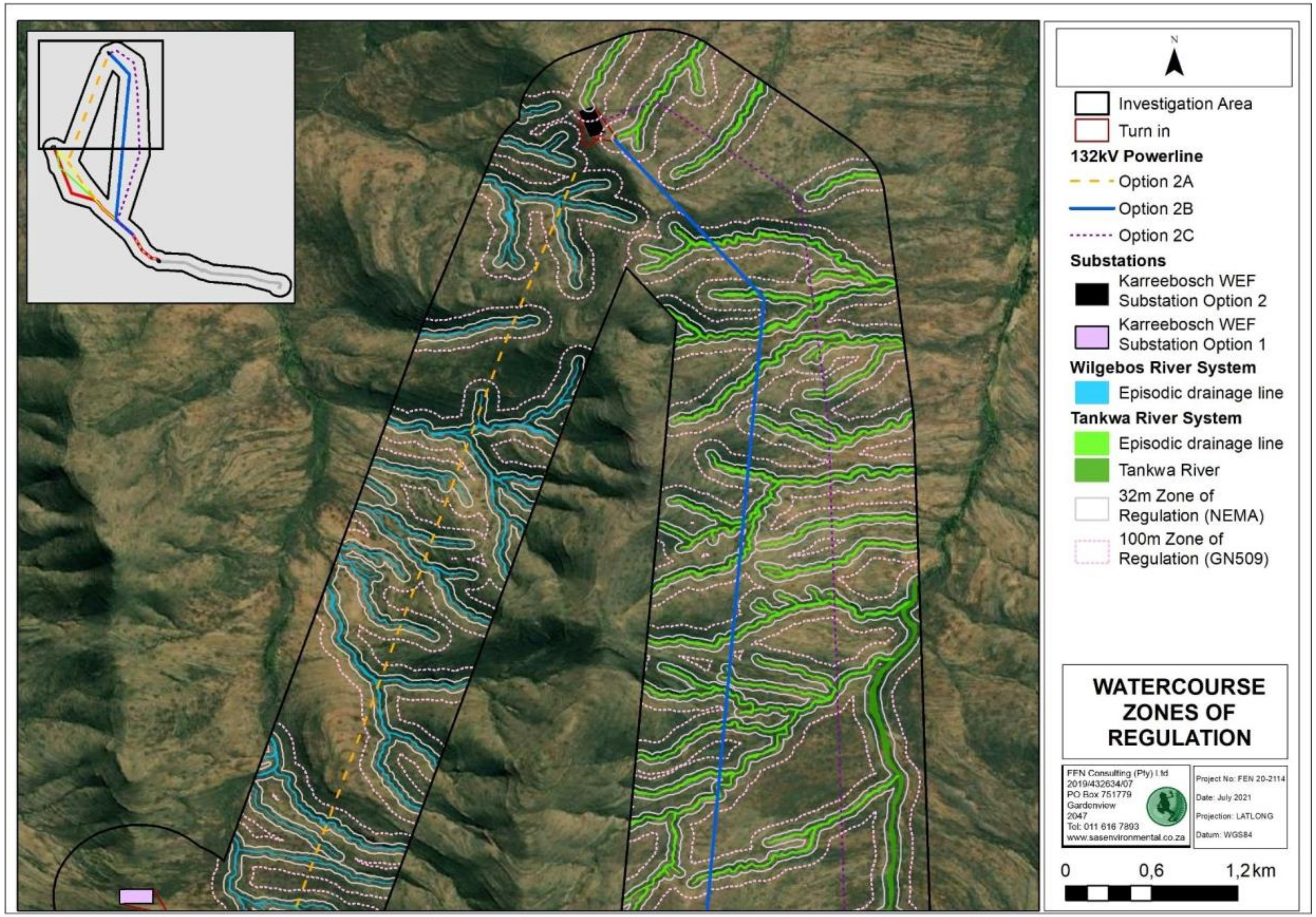

Figure 9-5: The conceptual presentation of the zones of regulation relation to the delineated watercourses that form part of the Tankwa and Wilgebos River system within the northern portion of the investigation area. (Take note due to the scale of the map: Substation Option 2 is located approximately 20m from the delineated extent of an episodic drainage line)

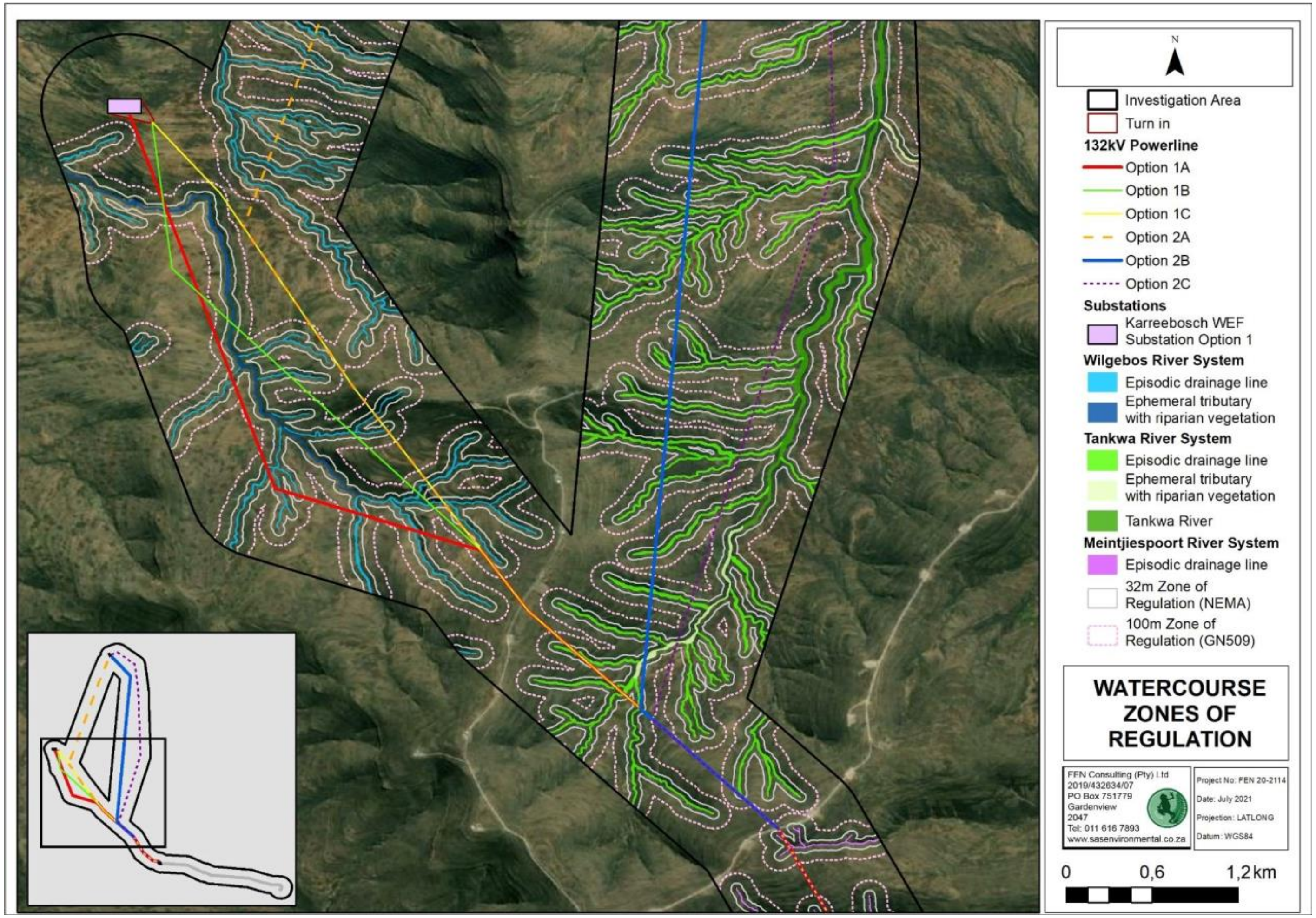

Figure 9-6: The conceptual presentation of the zones of regulation in relation to the delineated watercourses that form part of the Tankwa and Wilgebos River system within the central portion of the investigation area.

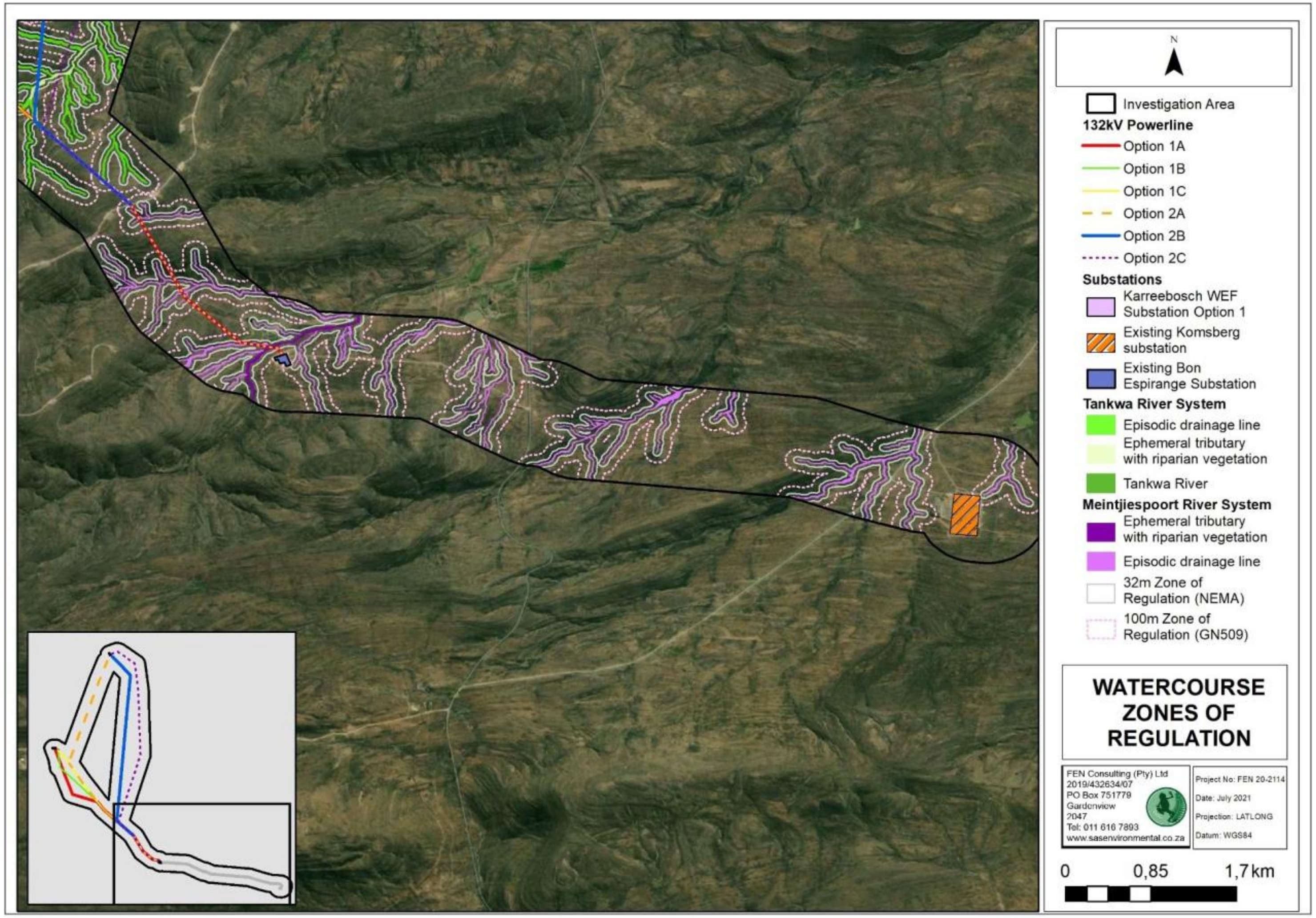

Figure 9-7: The conceptual presentation of the zones of regulation in relation to the delineated watercourses that form part of the Wilgebos and Meintjiesplaas River system within the southern portion of the investigation area.

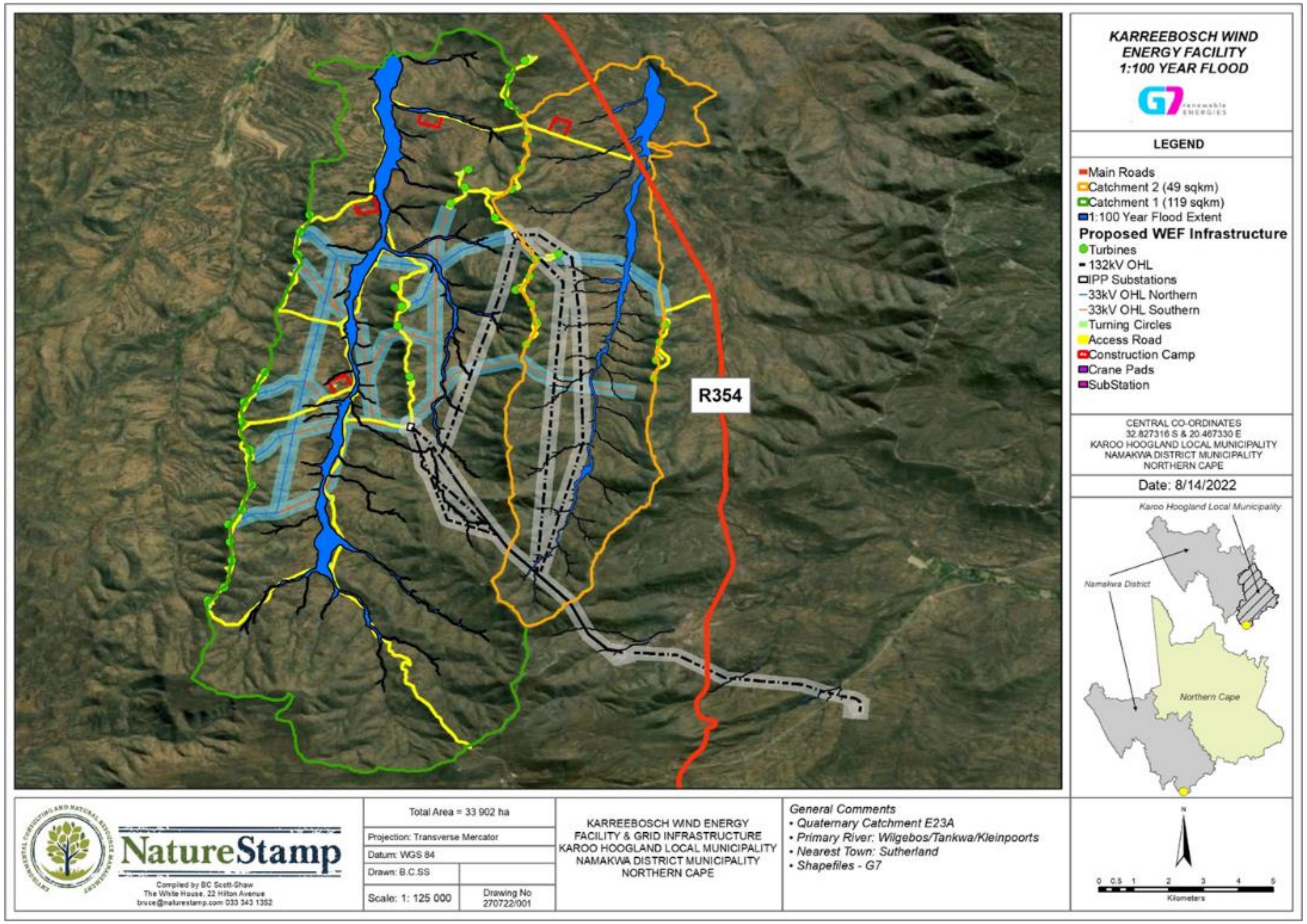

Figure 9-8: Steady state analysis of the 1:100 year flood event for the proposed Karreebosch WEF and Grid infrastructure

9.1.5 VISUAL

SENSITIVE VISUAL RECEPTORS

A sensitive visual receptor location is defined as a location from where receptors would potentially be impacted by a proposed development. Adverse impacts often arise where a new development is seen as an intrusion which alters the visual character of the area and affects the 'sense of place'. The degree of visual impact experienced will however vary from one receptor to another, as it is largely based on the viewer's perception.

A distinction must be made between a receptor location and a sensitive receptor location. A receptor location is a site from where the proposed development may be visible, but the receptor may not necessarily be adversely affected by any visual intrusion associated with the development. Less sensitive receptor locations include locations of commercial activities and certain movement corridors, such as roads that are not tourism routes. More sensitive receptor locations typically include sites that are likely to be adversely affected by the visual intrusion of the proposed development. They include tourism facilities, scenic sites and residential dwellings in natural settings.

The identification of sensitive receptors is typically based on a number of factors which include:

— the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity;
— the presence of leisure-based (especially nature-based) tourism in an area;
— the presence of sites or routes that are valued for their scenic quality and sense of place;
— the presence of homesteads / farmsteads in a largely natural setting where the development may influence the typical character of their views; and
— feedback from interested and affected parties, as raised during the public participation process conducted as part of the BA study.

Viewing distance is also a critical factor in the experiencing of visual impacts. As the visibility of the development would diminish exponentially over distance, receptor locations which are closer to the proposed development would experience greater adverse visual impacts than those located further away.

The degree of visual impact experienced will however vary from one inhabitant to another, as it is largely based on the viewer's perception. Factors influencing the degree of visual impact experienced by the viewer include the following:

— Value placed by the viewer on the natural scenic characteristics of the area.
— The viewer's sentiments toward the proposed structures. These may be positive (a symbol of progression toward a less polluted future) or negative (foreign objects degrading the natural landscape).
— Degree to which the viewer will accept a change in the typical Karoo character of the surrounding area.

In assessing visual sensitivity, the proposed development was examined in relation to the Landscape Theme of the National Environmental Screening Tool to determine the relative landscape sensitivity for the development of grid connection infrastructure. The tool does not however identify any landscape sensitivities in respect of the proposed powerline or substation.

RECEPTOR IDENTIFICATION

Preliminary desktop assessment of the study area identified twelve (12) potentially sensitive visual receptor locations within the study area, most of which appear to be existing farmsteads (**Figure 9-9**). These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown.

The findings of the desktop assessment were largely confirmed by field assessment conducted in late August / early September 2021, although it was not possible to confirm the presence of farmsteads at all the identified locations due to access restrictions. Notwithstanding this limitation, all the identified receptor locations were assessed as part of this VIA as they are still regarded as being potentially sensitive to the visual impacts associated with the proposed Project.

One (1) of the identified receptor locations was confirmed to be a sensitive receptor, this being tourism / accommodation facilities at the Saaiplaas Guest Farm (SR1). Although this Guest Farm does not appear to be operating at present, for the purposes of this VIA, it has been assumed that this is a temporary state of affairs and this receptor has been included in the assessment as a “sensitive receptor”.

Five (5) identified receptors were found to be outside the viewshed for the combined grid infrastructure proposals and as such, no further assessment of these receptors was undertaken.

In many cases, roads along which people travel, are regarded as sensitive receptors. The primary thoroughfare in the broader region is the R354 main road which connects the N1 National Route at Matjiesfontein with Sutherland to the north. This road is considered to have high scenic and rural value and is recognised as an important tourist route to the Sutherland Observatory. As travellers using this route may experience adverse visual impacts as a result of the proposed power line development, the road has been classified as a “receptor road”.

The degree of impact experienced by travellers using this route will however depend on the relative visibility of the power line from different sections of the road. Other roads in the study area are primarily farm access roads and do not form part of any scenic tourist routes and are therefore not regarded as visually sensitive.

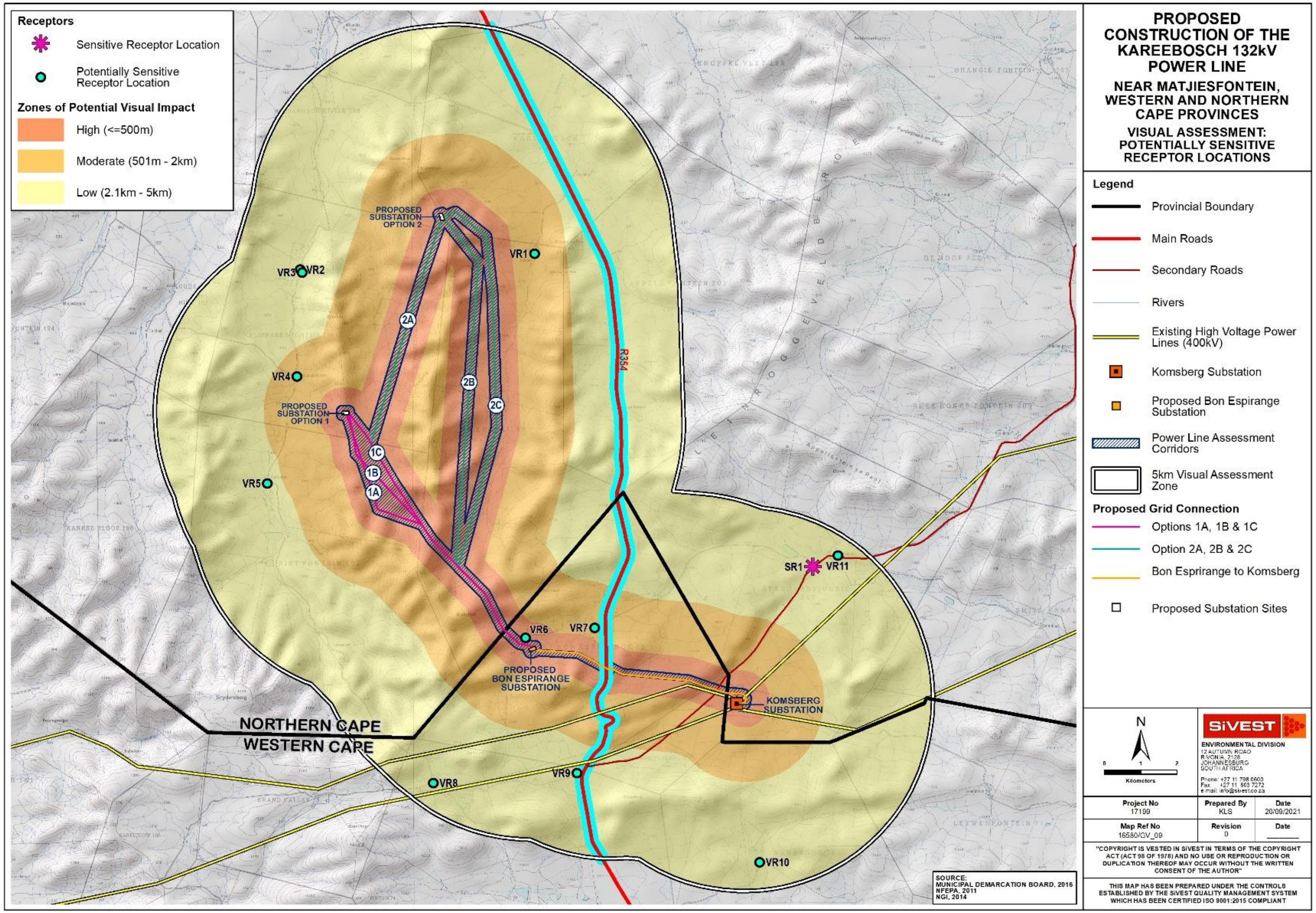

Figure 9-9: Potentially sensitive receptor locations within 5kms of the proposed Karreebosch OHPL.

RECEPTOR IMPACT RATING

In order to assess the impact of the proposed grid infrastructure development on the identified potentially sensitive receptor locations, a matrix that takes into account a number of factors has been developed and is applied to each receptor location.

The matrix is based on a number of factors as listed below:

— Distance of a receptor location away from the proposed development (zones of visual impact)
— Presence of screening elements (topography, vegetation etc.)
— Visual contrast of the development with the landscape pattern and form

These factors are considered to be the most important factors when assessing the visual impact of a proposed development on a potentially sensitive receptor location in this context. It should be noted that this rating matrix is a relatively simplified way of assigning a likely representative visual impact, which allows a number of factors to be considered. Experiencing visual impacts is however a complex and qualitative phenomenon and is thus difficult to quantify accurately. The matrix should therefore be seen as a representation of the likely visual impact at a receptor location. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

As described above, the distance of the viewer / receptor location from the development is an important factor in the context of experiencing visual impacts which will have a strong bearing on mitigating the potential visual impact. A high impact rating has been assigned to receptor locations that are located within 500m of the proposed development. Beyond 5km, the visual impact of a power line and/or substation diminishes considerably, as the development would appear to merge with the elements on the horizon. Any visual receptor locations beyond this distance have therefore not been assessed as they fall outside the study area and would not be visually influenced by the proposed development.

Zones of visual impact for the proposed development were therefore delineated according to distance from the proposed power line assessment corridors. Based on the height and scale of the project, the distance intervals chosen for the zones of visual impact are as follows:

— 0 - 500m (high impact zone)
— 500m – 2km (moderate impact zone)
— 2km - 5km (low impact zone)

The presence of screening elements is an equally important factor in this context. Screening elements can be vegetation, buildings and topographic features. For example, a grove of trees or a series of low hills located between a receptor location and an object could completely shield the object from the receptor. As such, where views of the proposed development are completely screened, or where the receptor is outside the viewshed for the proposed development, the receptor has been assigned an overriding nil impact rating, as the development would not impose any impact on the receptor.

The visual contrast of a development refers to the degree to which the development would be congruent with the surrounding environment. This is based on whether or not the development would conform to the land use, settlement density, structural scale, form and pattern of natural elements that define the structure of the surrounding landscape. Visual compatibility is an important factor to be considered when assessing the impact of the development on receptors within a specific context. A development that is incongruent with the surrounding area could have a significant visual impact on sensitive receptors as it may change the visual character of the landscape.

In light of the fact that the study area is located within the Central Strategic Transmission Corridor, and also within Renewable Energy Development Zone (Komsberg REDZ[24]), the concentration of renewable energy developments and associated grid connection infrastructure is supported in this area. This could result in an incremental change in the visual character of the area and in the typical land use patterns towards a less rural environment within which power lines and substations would be less incongruous.

[24] formally gazetted (Gazette Number 41445) on 16 February 2018 by the Minister of Environmental Affairs (GN 114)

The matrix returns a score which in turn determines the visual impact rating assigned to each receptor location (**Table 9-11**) below.

Table 9-11: Rating scores

Rating	Overall Score
High Visual Impact	8-9
Moderate Visual Impact	5-7
Low Visual Impact	3-4
Negligible Visual Impact	(overriding factor)

An explanation of the matrix is provided in **Table 9-12** below.

Table 9-12: Visual assessment matrix used to rate the impact of the proposed development on potentially sensitive receptors

VISUAL IMPACT RATING

Visual FACTOR	**High**	**MODERATE**	**Low**	**Overriding Factor: NEGLIGIBLE**
Distance of receptor away from proposed development	<= 500m **Score 3**	500m < 2km **Score 2**	2km < 5km **Score 1**	>5km
Presence of screening factors	No / almost no screening factors – development highly visible **Score 3**	Screening factors partially obscure the development **Score 2**	Screening factors obscure most of the development **Score 1**	Screening factors completely block any views towards the development, i.e. the development is not within the viewshed
Visual Contrast	**High contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 3**	**Moderate contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 2**	**Corresponds** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 1**	

Table 9-13 below presents a summary of the overall visual impact of the proposed 132kV OHPL and substation on each of the potentially sensitive visual receptor locations identified within 5kms of the proposed development.

Table 9-13: Summary Receptor Impact Rating

Receptor Location	Distance to nearest Corridor Alternative			Screening		Contrast		OVERALL IMPACT RATING	
	KMs	Rating		Rating		Rating		Rating	
SR1 - Saaiplaas Guest Farm	3.8	Low	1	Low	1	Mod	2	LOW	3
VR1 - Farmstead	1.1	Mod	2	Low	1	Mod	2	MODERATE	5
VR2 - Farmstead*	*NIL*								
VR3 - Farmstead*	*NIL*								
VR4 - Farmstead	1.4	Mod	2	Low	1	High	3	MODERATE	6
VR5 - Farmstead	2.4	Low	1	Mod	2	Mod	2	MODERATE	5
VR6 - Farmstead	0.03	High	3	Mod	2	Mod	2	MODERATE	7
VR7 - Farmstead	0.8	Mod	2	Mod	2	Mod	2	MODERATE	6
VR8 – Farmstead*	*NIL*								
VR9 – Farmstead*	*NIL*								
VR10 – Farmstead*	*NIL*								
VR11 - Farmstead	4.5	Low	1	Low	1	Mod	2	LOW	4

Receptor is outside the preliminary viewshed and as such the overall impact rating is "NIL**"*

The table above shows that the only sensitive receptor within the study area would experience low levels of visual impact as a result of the proposed development, this being the Saaiplaas Guest Farm. Five (5) potentially sensitive receptors will be subjected to moderate levels of visual impact as a result of the proposed power line development, while one receptor will be subjected to low levels of visual impact. It should be noted however, that most of these receptors are located on farms which are within the project areas for other approved renewable energy projects. As such the owners / occupants are not expected to perceive the proposed power line and substation in a negative light.

The remaining five (5) receptors are outside the viewshed of the proposed development and are therefore not expected to be subjected to any visual impacts as a result of the power line development.

As stated above, the R345 main road could be considered as a potentially sensitive receptor road and sections of the proposed power line are likely to be visible to motorists travelling along this route. The degree of visibility is restricted to some extent by the topography and the likely visual impacts of the power line and substation would be reduced where sections of the road are some distance from the power line or substation. The southern section of this road is traversed by the proposed power line and is therefore likely to experience the most visual impact, although this would be reduced to some degree by the presence of existing high voltage power lines. In light of this, visual impacts affecting the R354 are rated as **moderate**.

NIGHT-TIME IMPACTS

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed development at night.

Much of the study area is characterised by natural areas with pastoral elements and low densities of human settlement. As a result, relatively few light sources are present in the broader area surrounding the proposed development site. The closest built-up area is the town of Matjiesfontein which is situated approximately 34km south of Komsberg Substation and is thus too far away to have significant impacts on the night scene in the study area. At night, the general study area is characterised by a picturesque dark starry sky and the visual character of the night environment is largely ‘unpolluted’ and pristine. Sources of light in the area are largely limited to isolated lighting from surrounding farmsteads and transient light from the passing cars travelling along the R354 main road and gravel access roads. Some light pollution is however likely to emanate from the security lighting at Komsberg substation and at the operational Roggeveld WEF and this would reduce the impacts of additional lighting in the area.

Power lines and associated towers or pylons are not lit up at night and, thus light spill associated with the proposed electrical infrastructure project is only likely to emanate from the proposed substation. Although the lighting required at the substation site would normally be expected to intrude on the nightscape, night-time impacts of this lighting will be reduced by the existing light spill emanating from Komsberg substation and Roggeveld WEF. It should also be noted that the power line and substation will only be constructed if the proposed Karreebosch WEF is also developed. Light sources for this facility will include operational and security lighting and thus the lighting impacts from the proposed substation would be subsumed by the glare and contrast of the lighting associated with the WEF. As such, the substation alone is not expected to result in significant lighting impacts.

9.1.6 AVIFAUNA

The entire study area is regarded as highly sensitive due to the regular occurrence of Red List powerline priority species. Areas that are particularly risky from a potential bird collision perspective are the following:

- Natural flight paths: Topographical features e.g. ridges and areas where the line crosses a valley, or drainage lines.
- Waterbodies: Several priority species are attracted open water. If a line skirts a waterbody, or run between two waterbodies, it can pose a collision risk to birds which are attracted to the water.

Areas that are particularly sensitive from a disturbance perspective are the following:

- Nests: Verreaux’s Eagle nest at 32°51'59.27"S; 20°30'12.02"E (Beacon Hill).

A 1.5km No Go buffer should be implemented around the Verreaux’s Eagle nest at 32°51'59.27"S 20°30'12.02"E (Beacon Hill) (**Figure 9-10**).

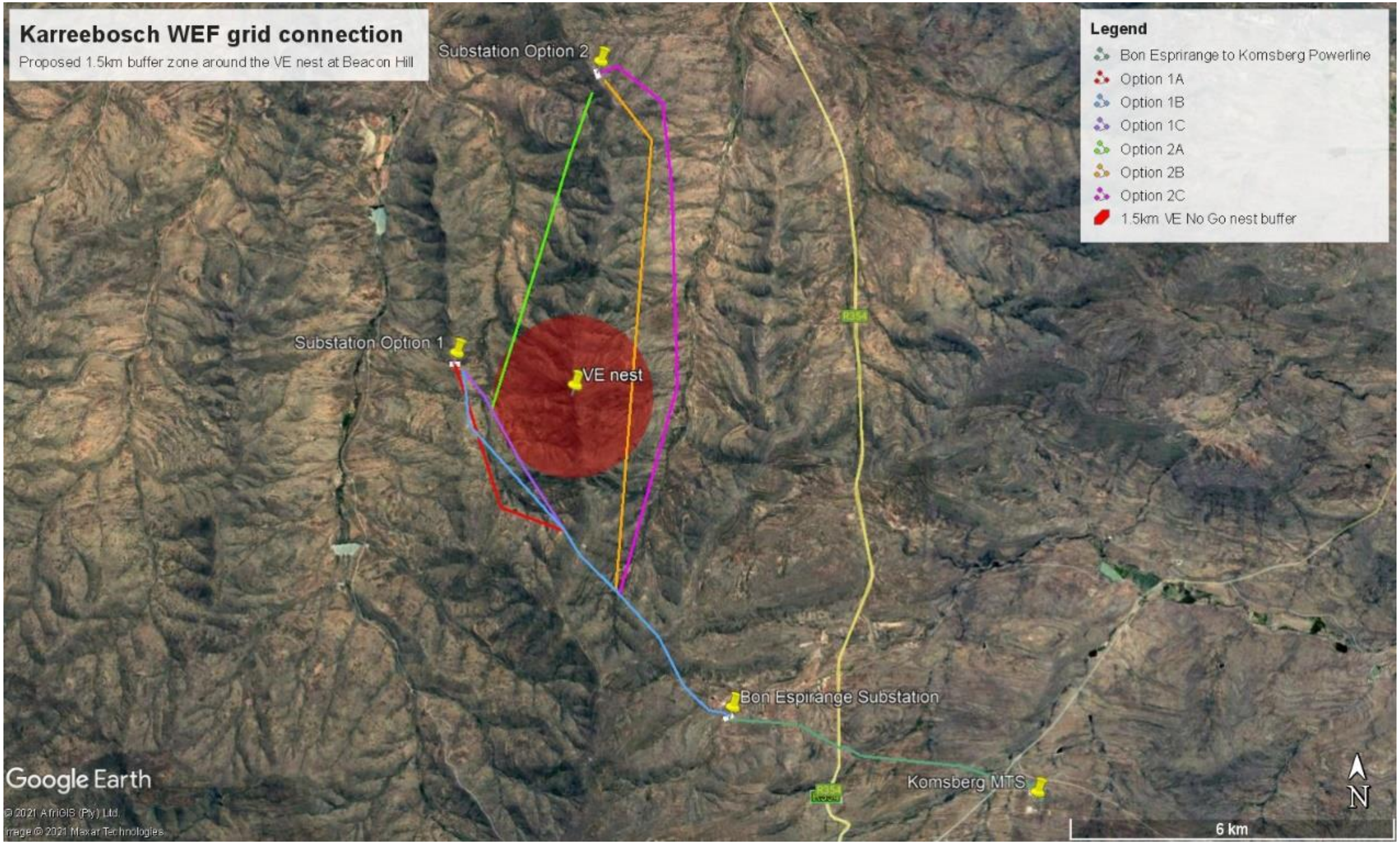

Figure 9-10: A 1.5km No Go buffer should be implemented around the Verreaux's Eagle nest at 32°51'59.27"S 20°30'12.02"E (Beacon Hill).

9.1.7 HERITAGE

Very few archaeological resources were identified during the archaeological field assessment completed for the proposed Karreebosch OHL and substation development (**Figure 9-11**). The resources that were identified were all single artefact occurrences or low density artefact scatters, none of which were determined to have any scientific cultural value.

While the survey of the Karreebosch OHL and substation must be taken in context with the broader assessments of the wind farms that have necessitated the development of the OHL, the findings were particularly limited due to the route taken for the OHL. 132kV lines typically have a very small development footprint and can be constructed without the large roads needed to build the WEFs. The routes chosen by the engineers for the various alternatives follow very rugged, mid-slope paths where almost no archaeological material or ruins were found.

Where archaeological material was found, lithics consisted of local quartzites used to manufacture Middle and Later Stone Age flakes as well as cherts that were sourced in the more general region such as the Tanqua and Ceres Karoo by people in the Later Stone Age.

The palaeosensitivity of the project area is provisionally rated as High, based on the Lower Beaufort Group bedrocks (SAHRIS website / DFFE screening tool). However, previous field-based palaeontological surveys in the Roggeveld WEF project area have only yielded scrappy plant remains as well as low-diversity trace fossils. With the exception of fragmentary fossil remains of very rare temnospondyl amphibians found on Rietfontein RE/197, close to the powerline Option 1B, additional fossil sites recorded during a recent 2-day palaeontological site visit to the Roggeveld WEF grid connection project area are mostly of low scientific / conservation value and lie outside or on the margins of the grid corridors under investigation.

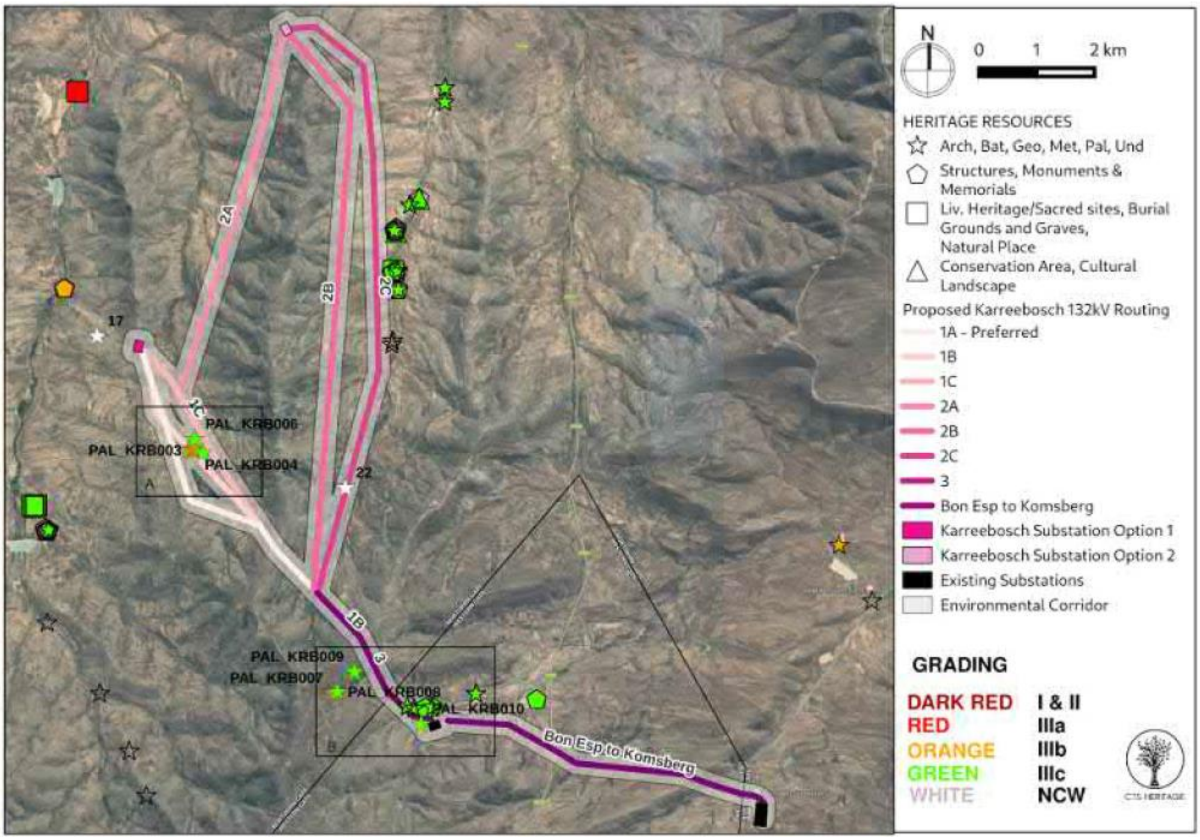

Figure 9-11: Map of heritage resources identified during the field assessment, relative to the broader study area

9.2 SPECIALIST CONCLUSIONS

9.2.1 AGRICULTURAL POTENTIAL

The assessed corridor alternatives are entirely on land that has only ever had grazing as an agricultural land use. For the purposes of this impact assessment, the agricultural sensitivity of all proposed corridor alternatives is assessed as low.

The conclusion of this assessment is that the proposed development will have negligible agricultural impact and will be acceptable in terms of its impact on the agricultural production capability of the site. This is substantiated by the facts that the amount of agricultural land loss resulting from the development is totally insignificant, and that the land is of very low agricultural potential.

The only potential source of impact is minimal disturbance to the land during construction and decommissioning. This impact can be completely mitigated.

In addition, there is likely to be some nuisance disturbance to agricultural activities during construction. However, nuisance disturbances are highly unlikely to translate into a real change in agricultural production and therefore do not constitute an actual agricultural impact.

From an agricultural impact point of view, it is recommended that the development be approved.

Because of the negligible agricultural impact, there is no material difference between the agricultural impacts of any substation alternative or OHPL route alternatives, alternative layouts within the corridor, or any technology alternatives. All possible alternatives are considered acceptable in terms of agricultural impact.

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. It must provide a substantiated statement on the acceptability of the proposed development and a recommendation on the approval of the proposed development.

Nevertheless, it is hereby confirmed that the agricultural impact of the proposed development is insignificant.

The conclusion of the assessment is that the proposed development will have an insignificant and therefore acceptable impact on the future agricultural production potential of the site. This is because:

— There is no loss of future agricultural production potential under transmission lines because all agricultural activities that are viable in this environment, can continue completely unhindered underneath transmission lines. The direct, permanent, physical footprint of the development, including the substation alternatives and access roads that has any potential to interfere with agriculture is insignificantly small.
— Furthermore, the land is of very low agricultural production potential.

Therefore, from an agricultural impact point of view, it is recommended that the development be approved. The conclusion of the agricultural assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions.

9.2.2 AVIFAUNA ASSESSMENT

Only one (1) OHPL route is technically feasible for the section of the proposed powerline directly preceding the existing Bon Espirange Substation (Route 3) and for the section connecting the Bon Espirange substation to the Komsberg substation (Bon Espirange to Komsberg Route), which is approximately 9.2 km in length. No alternatives can therefore be provided for these two sections of the OHPL (Route 3 and Bon Espirange to Komsberg Route).

Six (6) OHPL route alternatives (Options 1A, 1B, 1C, 2A, 2B and 2C) are proposed between the Karreebosch WEF onsite 33/132kV substation (with substation alternatives: Option 1 and Option 2) and Route 3 preceding the existing Bon Espirange Substation. As noted above, all of the six OHPL route alternatives follow the same routing from their point of convergence on Remainder of farm Ek Kraal No.199, approximately 3.1 km before the Bon Espirange Substation, to the Komsberg Substation situated on Portion 2 of Farm Standvastigheid No. 210.

The preferred option from an avifaunal perspective would be any one of the Option 1 permutations. They are the shortest and they all avoid the proposed 1.5km No Go buffer around the Verreaux’s Eagle nest at Beacon Hill, except Option 1C, which marginally intrudes on the buffer by about 50m, which is not considered significant. Options 2A and 2B are not preferred, due to their length and they both intrude on the proposed 1.5km No Go buffer around the Verreaux’s Eagle nest at Beacon Hill. Option 2C is acceptable but not preferred due to its length, compared to the Option 1 permutations.

The expected impacts of the on-site substation and 132kV OHPL were rated to be of Moderate significance and negative status pre-mitigation. However, with appropriate mitigation, the post-mitigation significance of the identified impacts should be reduced to Low negative. No fatal flaws were discovered in the course of the investigation. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures as detailed in the site specific and generic EMPrs are strictly implemented.

9.2.3 BIODIVERSITY ASSESSMENT

Within the site, levels of transformation are generally low and alien infestation is generally also very low. Some degradation from historical grazing is evident in the landscape. Vegetation is primarily Koedoesberge-Moordenaars Karoo in the lowlands and Central Mountain Shale Renosterveld in the mountains, with several communities being differentiated, having slight differences in biophysical conditions (underlying substrate, soils and aspects) and flora composition. The vegetation units are widespread and have a low overall conservation status.

Several species of conservation concern are found in the broader area and could be present most likely as scattered individuals or small clumps or sub-populations. Several range-restricted species of conservation concern are also known to occur in the surrounding area and the vegetation types, with some found in proximity to the powerline at the time of the site assessment. The site assessment has physically screened for the presence of these, and other possible species not identified in the screening tool and is addressed in the respective species assessment.

The proposed powerline will result in the limited transformation and loss of some natural habitat, limited to the footprints for pylons and substations and access roads along the route. This loss will be highly localised but will result in a cumulative loss of the vegetation type and species. This cumulative loss is negligible.

Numerous flora and fauna species protected in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) are present or likely to be present and will require the appropriate permits before commencement. Flora and fauna search and rescue is recommended before commencement. It may be most feasible to undertake the search and rescue, in particular of fauna, in a phased manner slightly ahead of the clearing and construction phase. This will increase the likelihood of finding and relocating various species.

Due to the small size of the overall footprint, risks to faunal species are likely to be low. It is likely that the mammal species identified to be of conservation concern would likely be transient visitors. A search and rescue should be conducted before commencement to relocate any small mammals into a nearby area of similar suitable habitat. Several reptile species are present but are also likely transient. A search and rescue must be conducted before commencement to relocate any reptiles into a nearby area of similar suitable habitat. Amphibians are likely less common, being an arid area, with limited or no perennial wetlands noted.

The route does cross mountainous areas, with more sensitive outcrop areas. The powerline route should span outcrops as far as possible. Several more sensitive areas, generally confined to small areas, within the broader homogenous landscape were noted and have been mapped and designated a higher sensitivity. This is due to the prevalence of various protected species that are not common to the surrounding Renosterveld/Karoid mozaic. These habitats are also somewhat less resilient to disturbance, and it is recommended that these patches be avoided as far as is technically possible.

The following pertinent findings were made in respect of biodiversity:

- Very Low sensitivity areas include transformed areas such as cultivated areas.
- Low sensitivity areas include most of the route within natural Shale Renosterveld and Moordenaars Karoo.
- No Moderate Sensitivity areas were identified.
- High sensitivity areas were identified including:

- Sub-population of Sensitive Species 142 and scattered but localised individuals of Indigophora hantamensis in the vicinity of a portion of alternatives 1A and 1B and slightly to the west of alternative 1C & 2A.

— Specific No-Go areas:
  - Wetland areas in vicinity of Bon Espirange substation.
  - Rocky Garden on mountain slightly to the north of route for alternatives 1A; within 100 meters of the proposed OHP;
  - Buffer along Tankwa River including aggregating, ground-nesting bee population on western side of alternative 2C.

— No Very High sensitivity areas were identified.

— Cumulative impacts because of the development of the site, are regarded as being low due to the widespread nature of the vegetation unit and the low impact of the proposed activity which is unlikely to pose significant risk to potential localised populations of species of conservation concern.

The following recommendations are made in respect of biodiversity:

— The habitats that are designated as having an elevated sensitivity should be avoided as far as is technically possible.

— A flora and fauna search and rescue should be undertaken prior to site clearance activities.

— With particular reference to the large population of species 142 situated within the alignment of OHP Options 1A and 1C, and inasmuch that Sensitive Species 142 is a subterrain geophyte:
  - The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible.
  - Vegetation and any Sensitive Species 142 should not be removed/relocated to create the 4x4 track but rather left in situ (i.e., create the track by simply driving repeatedly over the same route). If any Sensitive Species 142 clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
    - Improved survival of Sensitive Species 142 (and other geophytic plants) by leaving them in situ rather than relocating them;
    - Retention of topsoil and the seed bank in situ improves rehabilitation/regeneration of vegetation; and
    - Keeping a natural/endemic vegetative embedded into the soil decreases local erosion and topsoil loss from high wind.
  - Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of Sensitive Species 142 and any other protected species.
  - All protected species within any pylon footprint must be rescued and relocated.

Plants to be relocated should be dug out with as little damage to roots as possible and replanted in the adjacent landscape. A hand-spade should not be used but rather a small hand-pick (e.g., geologists pick) to minimise root damage. It is recommended that a small amount of water is provided to the disturbed roots after replanting, if undertaken outside of a rainy period.

9.2.4 FRESHWATER ASSESSMENT

During the site visit undertaken from the 25th to 28th of May 2021, several headwater EDLs without riparian vegetation which flow into larger ephemeral tributaries with riparian vegetation were identified. Although these episodic drainage lines cannot be classified as rivers or streams in the traditional sense, due to the lack of saturated soil and riparian vegetation, they do still function as waterways, through episodic conveyance of water. Based on the definition of a watercourse as per the NWA, water does flow regularly or intermittently within these drainage lines, conveying water from the upgradient catchment area into the downgradient tributaries and the larger river systems outside the investigation area. As such, they can be considered as watercourses due to their importance for hydrological functioning and therefore enjoy protection in terms of the NWA.

The results of the ecological assessment of the watercourses is summarised in the **Table 9-14** below:

Table 9-14: Summary of the results of the freshwater assessment

WATERCOURSE	PES	ECOSERVICES	EIS	REC
Episodic drainage lines associated with the Wilgebos, Tankwa and Meintjieplaas River systems	B (Largely natural with few modifications)	Intermediate (1,4)	High	REC: Category B (Largely natural with few modifications)
Ephemeral tributaries with riparian vegetation associated with the Wilgebos, Tankwa and Meintjieplaas River systems	B (Largely natural with few modifications)	Intermediate (1,5)	High	REC: Category B (Largely natural with few modifications)

The activities associated with the construction and operational phases of the proposed powerline and substation development based on the alignment and location provided respectively by the proponent, includes site preparation, excavation of foundation pits for installation of the support structures and construction activities. Direct negative impacts associated with the creation of new access roads (albeit informal jeep track style roads) to service the powerline development are expected to occur to the watercourse drivers and receptors during the construction phase. Should the recommended mitigation measures be implemented with specific mention of installing appropriate culverts or subsurface drainage within new and existing road watercourse crossings, is considered a positive long-term benefit for the maintenance and potential improvement of the hydrological functionality of the watercourses and associated downstream systems. Therefore, also with the condition that the construction and grading of the proposed access roads is undertaken during the dry periods when no surface water is present within the watercourse and the recommended mitigation measures are applied, the risk significance can be reduced to Low (with manual adjustment). Additionally, it is recommended that the support structures associated with the proposed powerline be positioned outside the delineated extent of the watercourses and its associated 32 m NEMA ZoR, and as such a Low risk significance is expected to occur.

Water Use Authorisation by means of a GA in terms of Section 21(c) and (i) water uses may, therefore, potentially be obtained in consultation with the DWS. However, the DWS, as the custodian of water resources in South Africa, must be consulted with regards to the outcome of this assessment. Preference is given to substation Option 1 and thus powerline route Option 1A/1B/1C and the access roads associated thereof, since the proposed substation is located outside the GN509 ZoR and no direct or indirect impacts from substation Option 1 are expected, and the access roads associated with these route options avoid the crossing of major rivers such as the Tankwa River. It must be noted that. due to the pollution risk associated with any potential transformer leakage such as substations, substation Option 2 is not preferred as it is located in close proximity to the delineated extent of the watercourses (at least 20 m of a watercourse). Therefore, substation Option 1 should be selected for development. If for any reason Option 2 must be developed, then it must be moved to be outside of the GN509 ZoR.

It is therefore recommended that the mitigation measures as provided in the specialist report (FEN, 2022) and the good housekeeping measures be implemented to prevent and direct/indirect impacts from occurring on the watercourses. None of the proposed development alternatives are considered fatally flawed.

9.2.5 GEOTECHNICAL ASSESSMENT

No fatal geotechnical constraints have been identified, which rendered a powerline alternative or substation site to be non-suitable

Construction activities on steeply inclined slopes will require additional earthworks, longer access routes in comparison to lower topographic areas.

Slope stability issues can arise in steeply inclined terrain which will require retention structures and advanced foundations. Mountainous terrain will require earthworks to create level platforms for structures. None of the alternatives are considered fatally flawed provided the recommendations presented in this report are adhered to.

The impact of the powerline was found to be "Negative moderate impact - The anticipated impact will have negative effects and will require mitigation."

In summary for powerline (PL) Option 1 which links substation 1 to the Komsberg Substation, incorporating options 1A, 1B & 1C. PL option 1A is preferred, with PL options 1B and 1C having no preference.

In summary for PL option 2 which links Substation 2 to the Komsberg Substation, incorporating options 2A, 2B, 2C. PL option 2C is preferred, with PL option 2B having no preference and PL option 2B considered favourable.

In summary the Bon Espirange to Komsberg substation and powerline option which is connected by an approximately 9.2km powerline has preference as there is only a single route. Additionally, there is not preference between Substation Option 1 and Substation Option 2.

No fatal geotechnical constraints, which rendered a powerline alternative or substation site to be non-suitable, have been identified during this desktop study. Conclusions presented in this report will have to be more accurately confirmed during the detailed geotechnical investigation phase.

9.2.6 HERITAGE, PALAEONTOLOGY AND ARCHAEOLOGY ASSESSMENT

The findings of field assessment (CTS, 2022) undertaken by the specialist largely correlate with the findings of the ACO in the HIA completed for the Karreebosch WEF (Kendrick, 2015, SAHRIS Ref 183350) and the Roggeveld WEF (Hart and Webley, 2013, SAHRIS Ref 152531). The archaeological resources identified were all ex-situ and are of limited scientific and heritage significance.

Based on the findings of the assessment undertaken by CTS (2022) and other assessments completed in the area, it is unlikely that the proposed development of the Karreebosch 132kV OHL, 33/132kV on site substation and associated infrastructure will negatively impact significant resources. This is due to the fact that 132kV lines typically have a very small development footprint and can be constructed without the large roads needed to build the WEFs. The routes chosen by the engineers for the various alternatives follow very rugged, mid-slope paths where almost no archaeological material or ruins were found. No significant heritage resources were identified within the areas proposed for the substation alternatives.

It is possible, although unlikely, that archaeological resources may be located beneath the ground surface which may be impacted during the course of development. Recommendations in this regard are included below.

In terms of impacts to palaeontological heritage, Almond (2021) concludes that "*There are no objections on palaeontological grounds to authorisation of the proposed 132 kV powerline and there is no preference on palaeontological heritage grounds for any particular on-site substation site or powerline route option among those currently under consideration. If powerline Option 1B is selected for construction, vertebrate fossil material at or in the vicinity of Locs. 454-456 on Rietfontein RE/197 must be collected by a professional palaeontologist before construction of the powerline. No further specialist palaeontological studies or mitigation are recommended for this electrical infrastructure project. These recommendations and the Chance Fossil Finds Protocol appended to this report should be included in the EMPr for the development*."

It is further recommended that the attached Chance Fossil Finds Procedure must be implemented throughout the construction phase of the development. The final layout for the Karreebosch WEF avoids impact to all known significant heritage resources present within the development area. The walkdown of the final layout revealed no new significant heritage resources that are likely to be impacted.

There is no objection to the proposed development of the Karreebosch OHL and onsite substation in terms of impacts to heritage resources and there is no preferred alternative for the OHL route or onsite substation on condition that:

- The Chance Fossil Finds Procedure must be implemented throughout the construction phase of the development
- It is therefore recommended that this report is accepted as satisfying the following conditions of the Environmental Authorisation issued for the Karreebosch WEF project:
- All buffers and no-go areas stipulated in this (HIA) report must be adhered to for both the facilities and all roads and power lines.
- No further heritage assessment is recommended for this development.

— Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The relevant heritage authority (the South African Heritage Resources Agency (SAHRA) in the Northern Cape and Heritage Western Cape (HWC) in the Western Cape) must be contacted immediately in order to determine an appropriate way forward.

9.2.7 SOCIO-ECONOMIC ASSESSMENT

The energy security benefits associated with the proposed Karreebosch WEF are dependent upon it being able to connect to the national grid via the establishment of 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 132 kV Karreebosch OHPL, substation and associated infrastructure are Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The power line is also located within the Komsberg REDZ and Central Transmission Corridor. The establishment of proposed 132 kV Karreebosch OHPL, 33/132kV Substation and associated infrastructure is therefore supported by the findings of the SIA.

All the Options were regarded as acceptable by the affected landowners except for the section of Alternative 2C located close to the headwaters of the Tankwa River on Ek Kraal 199/1 and traverses cropped areas on Ek Kraal 199/RE. The concerns are linked to potential impacts on the Tanqwa River and productive farmland. The options associated with substation Option 1 (Powerline Options 1A-1C) are preferred to the options associated with substation Option 2 (Powerline Options 2A-2C). This is due to the shorter distances involved with Option 1.

9.2.8 TRAFFIC ASSESSMENT

No capacity improvements are considered necessary based on the following:

— The site gains access of the R354, which is a Class 2 road designed to accommodate large traffic volumes.

— The only notable generated traffic would occur during the construction and decommissioning phases. The trips generated during these phases will only occur for short periods of time and the following mitigation measures are recommended for consideration:

  i. The delivery of materials and components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods,

  ii. The use of mobile batching plants and any material sources in close proximity to the site would decrease the impact on the surrounding road network,

  iii. Staff and general trips should can outside of peak traffic periods,

  iv. Staff can be shuttled on scheduled busses to minimise the number of trips; and

  v. Stagger the removal of towers, foundations, conductors etc during the decommissioning phase.

The aim of the study was to investigate all traffic and transportation related matters pertaining to 132 kV OHPL that will form part of the proposed Karreebosch WEF north of Matjiesfontein on the border between the Western Cape and Northern Cape.

With the proposed mitigation measures, the construction, operation and maintenance, as well as the decommissioning phase of the powerline is not envisaged to generate a significant traffic impact on the surrounding road network.

The development of this powerline and substation is supported from a traffic engineering point of view, provided that the recommendations in the specialist report are adhered to and are read in conjunction with the road design and environmental reports completed for this site.

It is envisaged that the majority of materials, will be sourced from Worcester approximately179km from the site or alternatively from Cape Town approximately 306 km from the site. The travel route from Worcester to the site travels through the N1 and the R354.

The workforce will most likely reside in Sutherland, Matjiesfontein, Touws River or Laingsburgas the closest communities. The travel routes form these towns to the site include the N1 and the R354. These are higher order routes as such geometric limitations are not envisaged..

9.2.9 VISUAL ASSESSMENT

A VIA has been conducted to assess the magnitude and significance of the potential visual impacts associated with the construction of a proposed 132 kV OHPL, 33/132kV substation and associated infrastructure to support the proposed Karreebosch WEF located near Matjiesfontein in the Western Cape Province. Overall, sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements. As such, the proposed powerline and substation development could potentially alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. The level of contrast is however reduced by the presence of the Roggeveld WEF, Komsberg substation and existing high voltage powerlines located in the central and southern sectors of the study area.

The area is not however typically valued for its tourism significance and there is limited human habitation resulting in relatively few potentially sensitive receptors in the area. A total of 12 potentially sensitive receptors were identified in the study area, one (1) of which is considered to be a sensitive receptor as it is linked to leisure/nature-based tourism activities in the area.

According to the receptor impact rating undertaken for this VIA, the only sensitive receptor identified within the study area would experience low levels of visual impact as a result of the proposed development, this being the Saaiplaas Guest Farm. Five potentially sensitive receptors will be subjected to moderate levels of visual impact as a result of the proposed powerline and substation development, while one receptor will be subjected to low levels of visual impact. It should be noted however, that most of these receptors are located on farms which are within the project areas for approved renewable energy projects. As such the owners / occupants are not expected to perceive the proposed powerline and substation in a negative light.

The remaining five (5) receptors are outside the viewshed of the proposed development and are therefore not expected to be subjected to any visual impacts as a result of the powerline development.

An overall impact rating was also conducted in order to allow the visual impact to be assessed alongside other environmental parameters. The assessment revealed that impacts associated with the proposed 132kV powerline and substation will be of low significance during construction, operation and decommissioning phases with a number of mitigation measures available.

Although other renewable energy developments and infrastructure projects, either proposed or in operation, were identified within a 30km radius of the proposed development, it was determined that only two (2) of these would have any significant impact on the landscape within the visual assessment zone. These facilities are the authorised Karreebosch WEF (14/12/16/3/3/2/807/AM3) and the operational Roggeveld WEF (12/12/20/1988/1). These facilities and the associated grid connection infrastructure will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. It is, however, anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists. In light of this and the relatively low level of human habitation in the study area however, cumulative impacts have been rated as medium.

It is important to note that the study area is located within the Komsberg REDZ, and also within the Central Strategic Transmission Corridor, and thus the relevant authorities support the concentration of renewable energy developments and associated grid connection infrastructure in this area. In addition, it is possible that the renewable energy facilities located in close proximity to each other could be seen as one large facility rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

A comparative assessment of alternatives was undertaken in order to determine which of the substation options and powerline corridor alternatives would be preferred from a visual perspective. No fatal flaws were identified for either of the substation site alternatives or any of the proposed powerline corridor alternatives and all alternatives were found to be favourable.

It is SLR's opinion that, overall, the visual impacts associated with the proposed Karreebosch 132kV OHPL and associated 33/132kV substation are of moderate significance. Given the low level of human habitation and the relative absence of sensitive receptors, the project is deemed acceptable from a visual impact perspective and the EA should be granted for the EA application. SLR is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

9.3 IMPACT SUMMARY

A summary of the identified impacts and corresponding significance ratings for the proposed powerline is provided in **Table 9-15** below.

Table 9-15: Impact Summary

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION SIGNIFICANCE	WITHOUT MITIGATION STATUS	WITH MITIGATION SIGNIFICANCE	WITH MITIGATION STATUS
Air Quality	Generation of Dust and PM	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
Noise	Noise Emissions	Construction Decommissioning	**Low**	(-)	**Very Low**	(-)
Geotechnical	Soil Erosion	Construction	**Moderate**	(-)	**Very Low**	(-)
	Soil Erosion	Operation	**Low**	(-)	**Very Low**	(-)
	Soil Erosion	Decommissioning	**Low**	(-)	**Very Low**	(-)
Soils	Soil Contamination	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Soil Contamination	Operation	**Low**	(-)	**Very Low**	(-)
Hydrology	Impact on Local Hydrology	Construction Decommissioning	**Low**	(-)	**Very Low**	(-)
	Deterioration of Groundwater Quality	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
Freshwater	Vehicular Movement	Construction Decommissioning	**Low**	(-)	**Low**	(-)
	Vegetation Removal	Construction Decommissioning	**Low**	(-)	**Low**	(-)
	Excavations	Construction Decommissioning	**Low**	(-)	**Low**	(-)
	Concrete Mixing and Casting	Construction Decommissioning	**Low**	(-)	**Low**	(-)
	Creation of new roads	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Upgrading existing roads	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Vehicular Movement along powerline	Operation	**Low**	(-)	**Very Low**	(-)

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION SIGNIFICANCE	STATUS	WITH MITIGATION SIGNIFICANCE	STATUS
	Vehicular movement along roads	Operation	**Low**	(-)	**Very Low**	(-)
Biodiversity	Loss of Indigenous Vegetation	Construction Decommissioning	**Moderate**	(-)	**Moderate**	(-)
	Loss of Flora SCC	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Susceptibility to Invasion	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Susceptibility to Erosion	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Disturbances to Ecological Processes	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Disturbances to Aquatic and Riparian Habitat and Processes	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Loss of Faunal Habitat	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Impacts to Faunal Processes	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Loss of Faunal SCC	Construction Decommissioning	**Low**	(-)	**Low**	(-)
	Loss of Indigenous Vegetation	Operation	**Moderate**	(-)	**Moderate**	(-)
	Loss of Flora SCC	Operation	**Low**	(-)	**Low**	(-)
	Susceptibility to Invasion	Operation	**Low**	(-)	**Low**	(-)
	Susceptibility to Erosion	Operation	**Low**	(-)	**Low**	(-)
	Disturbances to Ecological Processes	Operation	**Low**	(-)	**Low**	(-)
	Disturbances to Aquatic and Riparian Habitat and Processes	Operation	**Low**	(-)	**Low**	(-)

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
	Loss of Faunal Habitat	Operation	**Low**	(-)	**Low**	(-)
	Impacts to Faunal Processes	Operation	**Low**	(-)	**Low**	(-)
	Loss of Faunal SCC	Operation	**Low**	(-)	**Low**	(-)
Avifauna	Displacement of Priority Species (Disturbance)	Construction	**Moderate**	(-)	**Low**	(-)
	Displacement of Priority Species (Transformation)	Construction	**Moderate**	(-)	**Low**	(-)
	Electrocutions	Operation	**Low**	(-)	**Low**	(-)
	Collisions	Operation	**Moderate**	(-)	**Moderate**	(-)
	Displacement of Priority Species (Transformation)	Decommissioning	**Moderate**	(-)	**Low**	(-)
Visual	Visual Disturbance	Construction	**Low**	(-)	**Low**	(-)
	Visual Landscape	Operation	**Low**	(-)	**Low**	(-)
	Visual Disturbance	Decommissioning	**Low**	(-)	**Low**	(-)
Waste	Improper Waste Management	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
Traffic	Increased Local Traffic	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Increased Local Traffic	Operation	**Low**	(-)	**Low**	(-)
Heritage	Damage to Archaeological Resources	Construction Decommissioning	**Very Low**	(-)	**Very Low**	(-)
	Damage to Palaeontological Resources	Construction Decommissioning	**Moderate**	(-)	**Very Low**	(-)
Socio-economic	Creation of Employment, Training and Business Opportunities	Construction Decommissioning	**Low**	(+)	**Moderate**	(+)

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION SIGNIFICANCE	WITHOUT MITIGATION STATUS	WITH MITIGATION SIGNIFICANCE	WITH MITIGATION STATUS
	Presence of Construction Workers and Impact on Family Structures and Social Networks	Construction Decommissioning	**Low**	(-)	**Very Low**	(-)
	Risk to Safety, Livestock and Farm Infrastructure	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Construction Activities and Vehicles	Construction Decommissioning	**Low**	(-)	**Very Low**	(-)
	Veld Fires	Construction Decommissioning	**Moderate**	(-)	**Low**	(-)
	Improved Energy Security and Establishment of Infrastructure	Operation	**Moderate**	(+)	**Moderate**	(+)
	Creation of Employment Opportunities	Operation	**Very Low**	(+)	**Low**	(+)
	Income Generation for Farmers	Operation	**Low**	(+)	**Moderate**	(+)
	Sense of Place	Operation	**Low**	(-)	**Low**	(-)
	Impacts on Farming Operations During Maintenance	Operation	**Moderate**	(-)	**Low**	(-)
	Property Values	Operation	**Low**	(-)	**Low**	(-)
	Tourism	Operation	**Low**	(-)	**Low**	(-)
Health and Safety	Employee Health & Safety	Construction	**Moderate**	(-)	**Low**	(-)
	Employee Health & Safety	Operation	**Moderate**	(-)	**Low**	(-)
Cumulative Impacts						

REF.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION SIGNIFICANCE	STATUS	WITH MITIGATION SIGNIFICANCE	STATUS
Social	Sense of Place	Cumulative	**Low**	(-)	**Moderate**	(-)
Geotechnical	Soil Erosion	Cumulative	**Moderate**	(-)	**Very Low**	(-)
Biodiversity	Loss of Indigenous Vegetation	Cumulative	**Moderate**	(-)	**Moderate**	(-)
	Loss of Flora SCC	Cumulative	**Moderate**	(-)	**Low**	(-)
	Susceptibility to Invasion	Cumulative	**Moderate**	(-)	**Low**	(-)
	Susceptibility to Erosion	Cumulative	**Moderate**	(-)	**Low**	(-)
	Disturbances to Ecological Processes	Cumulative	**Moderate**	(-)	**Low**	(-)
	Disturbances to Aquatic and Riparian Habitat and Processes	Cumulative	**Moderate**	(-)	**Low**	(-)
	Loss of Faunal Habitat	Cumulative	**Moderate**	(-)	**Low**	(-)
	Impacts to Faunal Processes	Cumulative	**Moderate**	(-)	**Low**	(-)
	Loss of Faunal SCC	Cumulative	**Low**	(-)	**Low**	(-)
Avifauna	Displacement due to Disturbance	Cumulative	**Moderate**	(-)	**Low**	(-)
	Collisions	Cumulative	**High**	(-)	**Moderate**	(-)
	Electrocutions	Cumulative	**Low**	(-)	**Low**	(-)
Visual	Visual	Cumulative	**Moderate**	(-)	**Moderate**	(-)
Traffic	Dust and Noise	Cumulative	**High**	(-)	**Moderate**	(-)

9.4 ALTERNATIVES ASSESSMENT

Table 9-16 outlines the alternative preferences resulting from the various specialist studies.

Table 9-16: Specialist Alternative Preferences

SPECIALIST STUDY	COMMENT	PREFERENCE
Geotechnical	In summary for powerline (PL) Option 1 which links substation 1 to the Komsberg Substation, incorporating options 1A, 1B & 1C. PL option 1A is preferred, with PL options 1B and 1C having no preference. In summary for PL option 2 which links Substation 2 to the Komsberg Substation, incorporating options 2A, 2B, 2C. PL option 2C is preferred, with PL option 2B having no preference and PL option 2B considered favourable. In summary the Bon Espirange to Komsberg substation and powerline option which is connected by an approximately 9.2km powerline has preference as there is only a single route. Additionally, there is not preference between Substation Option 1 and Substation Option 2.	***Powerline:*** — Option 1A ***Substation:*** — No preference
Agriculture and Soils	Because of the negligible agricultural impact, there is no material difference between the agricultural impacts of any substation alternative or OHPL route alternatives, alternative layouts within the corridor, or any technology alternatives. All possible alternatives are considered acceptable in terms of agricultural impact.	***Powerline:*** — No preference ***Substation:*** — No preference
Freshwater	Preference is given to substation Option 1 and thus powerline route Option 1A/1B/1C and the access roads associated thereof, since the proposed substation is located outside the GN509 ZoR and no direct or indirect impacts from substation Option 1 are expected, and the access roads associated with these route options avoid the crossing of major rivers such as the Tankwa River. It must be noted that due to the pollution risk associated with any potential transformer leakage such as substations, substation Option 2 is not preferred as it is located in close proximity to the delineated extent of the watercourses (at least 20 m of a watercourse). Therefore, substation Option 1 should be selected for development. If for any reason Option 2 must be developed, then it must be moved to be outside of the GN509 ZoR.	***Powerline:*** — Option 1A,1 B or 1C ***Substation:*** — Option 1
Biodiversity	From a biodiversity and terrestrial ecology perspective, Substation 1 connecting via OHPL Route 1A and Route 3 to the Bon Espirange substation has marginally lower terrestrial biodiversity impact and is considered the preferred option. Where there are protected species located in the footprint of the required 4x4 tracks and pylon footprints, necessary permits for search and rescue of these species should be obtained. Placement of the OHPL on the Bon Espirange – Komsberg route on either the north or southern side of the existing OHPL has the same minimal impact to biodiversity and terrestrial ecology. Accordingly, the OHPL here can be established on either north or south of the existing 132kV OHPL as may be required from an engineering perspective. The existing service track should be used along this route where permissible under land rights.	***Powerline:*** — Option 1A ***Substation:*** — Option 1

SPECIALIST STUDY	COMMENT	PREFERENCE
	Option 2C intersects with a mapped sensitive area in terms of vegetation. There is also a ground-nesting bee population to the West of Option 2C. The bees are present in low lying alluvial areas, forming large, aggregated colonies covering area up to ± 100 m^2. Although their status is unknown, such colonies are rare within the site and deemed to be important ecologically as pollinators and relocation is not feasible due to dispersed nests.	
Avifauna	The preferred option from an avifaunal perspective would be any one of the Option 1 permutations. They are the shortest and they all avoid the proposed 1.5km No Go buffer around the Verreaux's Eagle nest at Beacon Hill, except Option 1C, which marginally intrudes on the buffer by about 50m, which is not considered significant. Options 2A and 2B are not preferred, due to their length and they both intrude on the proposed 1.5km No Go buffer around the Verreaux's Eagle nest at Beacon Hill. Option 2C is acceptable but not preferred due to its length, compared to the Option 1 permutations.	***Powerline:*** — Option 1A,1 B or 1C ***Substation:*** — Option 1
Visual	A comparative assessment of alternatives was undertaken in order to determine which of the substation options and powerline corridor alternatives would be preferred from a visual perspective. No fatal flaws were identified for either of the substation site alternatives or any of the proposed powerline corridor alternatives and all alternatives were found to be favourable	***Powerline:*** — No preference ***Substation:*** — No preference
Heritage	In terms of impacts to heritage resources, OHL Route Option 1B is NOT preferred from a heritage perspective due to the likely impacts to palaeontological heritage that are anticipated. There are no other OHL or substation alternative preferences from a heritage perspective on condition that the recommendations outlined below are implemented.	***Powerline:*** — No preference ***Substation:*** — No preference
Socio-economic	All the Options were regarded as acceptable by the affected landowners except for the section of Alternative 2C located close to the headwaters of the Tankwa River on Ek Kraal 199/1 and traverses cropped areas on Ek Kraal 199/RE. The concerns are linked to potential impacts on the Tanqwa River and productive farmland. The options associated with substation Option 1 (Powerline Options 1A-1C) are preferred to the options associated with substation Option 2 (Powerline Options 2A-2C). This is due to the shorter distances involved with Option 1	***Powerline:*** — Option 1A,1 B or 1C ***Substation:*** — Option 1

The preferred layout alternative for the transmission of generated power from the Karreebosch WEF onsite substation to the existing Komsberg substation via the Bon Espirange substation is Substation Option 1 and powerline route Option 1A, together with Route 3 and the route from Bon Espirange Substation to Komsberg SubstationFigure 1-1, which is approximately 14.5 km in length. The preferred route and substation is illustrated in **Figure 9-12** and the co-ordinates are included in **Table 9-17**.

Table 9-17: Co-ordinates of the Preferred Alternatives

POINT	CO-ORDINATES	
Preferred Route Alignment Option 1A		
15	20° 28' 47.71" E	32° 51' 39.6" S
17	20° 28' 55.42" E	32° 52' 0.84" S

POINT	CO-ORDINATES	
19	20° 29' 3.62" E	32° 52' 21.72" S
20	20° 29' 20.69" E	32° 53' 5.64" S
9	20° 30' 7.13" E	32° 53' 19.68" S
10	20° 30' 17.71" E	32° 53' 33.0" S
11	20° 30' 43.06" E	32° 53' 55.32" S
Route 3		
1	20° 31' 14.15" E	32° 54' 22.32" S
2	20° 31' 31.76" E	32° 54' 52.2" S
3	20° 31' 49.37" E	32° 55' 6.24" S
4	20° 32' 1.18" E	32° 55' 8.04" S
5	20° 32' 2.72" E	32° 55' 10.2" S
6	20° 30' 45.68" E	32° 53' 57.48" S
Bon Espirange to Komsberg Route		
26	20° 32' 12.8" E	32° 55' 9.12" S
27	20° 32' 53.52" E	32° 55' 11.28" S
28	20° 33' 38.27" E	32° 55' 32.88" S
29	20° 34' 49.87" E	32° 55' 39.0" S
30	20° 35' 10.07" E	32° 55' 45.12" S
31	20° 35' 29.47" E	32° 55' 50.16" S
32	20° 35' 39.3" E	32° 55' 51.6" S
33	20° 35' 43.3" E	32° 56' 3.84" S
Preferred Substation Option 1		
		

POINT	CO-ORDINATES	
S1-1	32°51'35.72"S	20°28'44.23"E
S1-2	32°51'36.70"S	20°28'49.99"E
S1-3	32°51'42.99"S	20°28'48.51"E
S1-4	32°51'42.22"S	20°28'42.93"E

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 Karreeboch WEF 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.

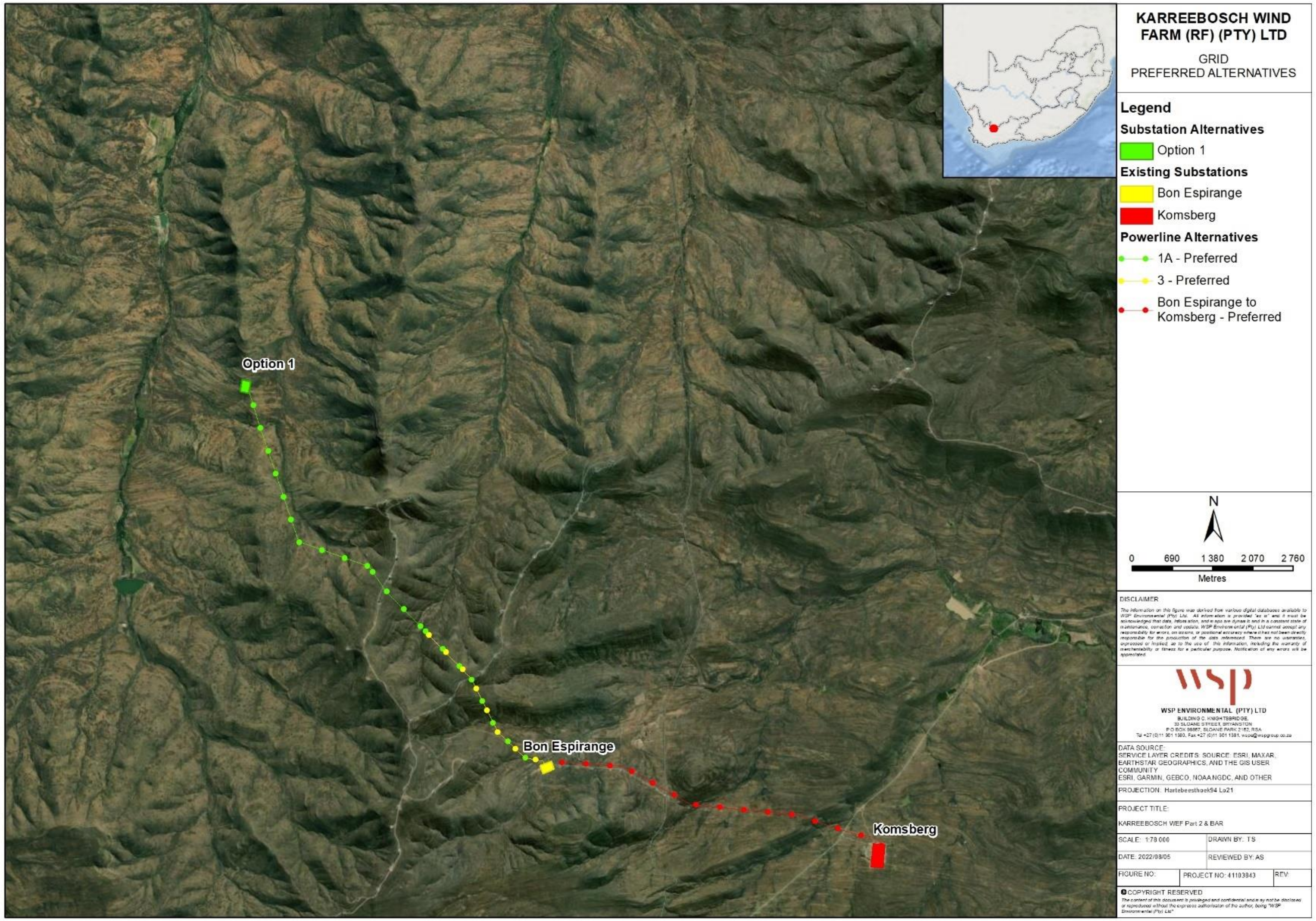

Figure 9-12: Map illustrating the Preferred Route alignment Option 1A (a 400m corridor was assessed along the preferred route)

9.5 RECOMMENDATIONS

The following recommendation are made in respect of the proposed Project:

- Based on the findings of the SIA, Option 1A, the preferred Option, is supported.
- Bird Flight Diverters must be fitted to the entire powerline according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines). These devices must be installed as soon as the conductors are strung;
- A 1.5km No Go buffer should be implemented around the Verreaux's Eagle nest at 32°51'59.27"S 20°30'12.02"E (Beacon Hill);
- Appropriate permits in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) must be obtained before commencement.
- The habitats that are designated as having an elevated sensitivity should be avoided as far as is technically possible.
- A flora and fauna search and rescue should be undertaken before any vegetation clearing
- High sensitivity areas should be demarcated as No-Go areas:
  - Wetland areas in vicinity of Bon Espirange substation (all alternatives).
  - Rocky Garden on mountain slightly to the north of route for alternatives 1A; within 100 meters of the proposed OHP;
  - Buffer along Tankwa River including aggregating, ground-nesting bee population on western side of alternative 2 C.
- With particular reference to the large population of Sensitive Species 142 situated within the alignment of OHP Options 1A and 1C, and inasmuch that Sensitive Species 142 is a subterrain geophyte:
  - The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible.
  - Vegetation and any Sensitive Species 142 should not be removed/relocated to create the 4x4 track but rather left in situ (i.e., create the track by simply driving repeatedly over the same route). If any Sensitive Species 142 clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
    - Improved survival of Sensitive Species 142 (and other geophytic plants) by leaving them in situ rather than relocating them;
    - Retention of topsoil and the seed bank in situ improves rehabilitation/regeneration of vegetation; and
    - Keeping a natural/endemic vegetative embedded into the soil decreases local erosion and topsoil loss from high wind.
  - Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of Sensitive Species 142 and any other protected species.
  - All protected species within any pylon footprint must be rescued and relocated
- Plants to be relocated should be dug out with as little damage to roots as possible and replanted in the adjacent landscape. A hand-spade should not be used but rather a small hand-pick (e.g., geologists pick) to minimise root damage. It is recommended that a small amount of water is provided to the disturbed roots after replanting, if undertaken outside of a rainy period.
- Powerline structures should only be installed outside the delineated extent of the watercourses and its associated 32 m NEMA ZoR.
- A detailed geotechnical investigation should be undertaken during the detailed design phase of the project. The detailed geotechnical investigation must entail the following:
  - Profiling and sampling of exploratory trial pits to determine founding conditions for the pylons.
  - Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements.

  - Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes.
- The Chance Fossil Finds Procedure must be implemented throughout the construction phase of the development
- Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The relevant heritage authority (the South African Heritage Resources Agency (SAHRA) in the Northern Cape and Heritage Western Cape (HWC) in the Western Cape) must be contacted immediately in order to determine an appropriate way forward.
- All proposed mitigation measures includes in this BA Report and in the Site specific and generic EMPRs (**Appendix G**) must be implemented in order to reduce possible impacts to an acceptable level.
- It is recommended that the respective haulage company conducts a dry-run to determine the restrictions relevant to the haulage vehicle to be utilised. With some route's road signs may need to be moved, overhead cables may need to be raised and bellmouths may need temporary widening to accommodate abnormal loads. A dry-run will help establish relevant changes specific to the abnormal load truck used to deliver the components and materials.

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 site specific and generic EMPRs (**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.

EA AUTHORISATION PERIOD

Appendix 1(3)(1)(q) of the NEMA EIA Regulations 2014, as amended requires "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 concluded, and the post construction monitoring requirements finalised" must be included in the BA Report.

The EA is required for a period of 10 years from the date of issuance of the EA to the end of the construction period (including rehabilitation), when the proposed activities applied for are completed. This is a reasonable period as it allows Eskom to conduct its internal processes which can only begin after issuance of the EA, when the proposed route is confirmed.

10 WAY FORWARD

Karreebosch proposes to construct a 132kV OHPL up to 20.5km in length to connect the proposed Karreebosch WEF onsite substation to the national grid via the existing Eskom Komsberg Substation. 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 moderate or major environmental 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 **23 August 2022 to 23 September 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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APPENDIX

A EAP CV

APPENDIX

B EAP DECLARATION

APPENDIX

C SPECIALIST DECLARATIONS

APPENDIX

D STAKEHOLDER ENGAGEMENT REPORT

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F-7 HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

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F-11 HYDROLOGICAL ASSESSMENT, STORMWATER & EROSION MANAGEMENT PLAN

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H HERITAGE NID

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I SCREENING TOOL REPORT