ESKOM JUNO-GROMIS POWERLINE DEVIATION

ECOLOGICAL IMPACT ASSESSMENT REPORT

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

PROPOSED 15KM 400KV JUNO-GROMIS POWERLINE DEVIATION NEAR NUWERUS, MATZIKAMA LOCAL MUNICIPALITY, WESTERN CAPE PROVINCE

ECOLOGICAL IMPACT ASSESSMENT REPORT

Prepared for:

Eskom

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REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Draft Terrestrial Biodiversity Specialist Assessment for the proposed 15km 400kV Juno-Gromis Powerline Deviation near Nuwerus, Matzikama Local Municipality, Western Cape Province		
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SPECIALIST TEAM

Ms Tarryn Martin, Principal Environmental Consultant and Botanical Specialist *(400018/14)*

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C_3 and C_4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. She conducts vegetation assessments including vegetation and sensitivity mapping to guide developments and thereby minimise their impacts on sensitive vegetation. Tarryn has undertaken several vegetation and impact assessments in Mozambique (to IFC standards) which include the Lurio Forestry Project in Nampula, the Syrah Graphite Mine in Cabo Delgado and the Baobab Iron Ore Mine in Tete, Mozambique. She has undertaken critical habitat assessments, to IFC standards, for a solar farm in Cameroon and a graphite mine in Mozambique. She has co-designed and implemented the Terrestrial Monitoring Program for the Kenmare Namalope heavy minerals mine in Mozambique and has recently developed a Biodiversity Management Plan and monitoring plan for the Kenmare Pilivilli deposit. She has also worked on the Lesotho Highlands Development Authority botanical baseline survey for Phase 2 of the Lesotho Highlands Water Project.

Ms Amber Jackson, Principal Environmental Consultant and Faunal Specialist

Amber is a Principal Environmental Consultant and has been employed with CES since September 2011. She holds a Masters in Environmental Management and has a background in both Social and Ecological work. Her honours and undergraduate degree focused on Ecology, Conservation and Environment with reference to landscape effects on Herpetofauna, while her masters focused on the environmental management of social and ecological systems. With a dissertation in food security that investigated the complex food system of informal and formal distribution markets. During her time at CES Amber has worked extensively in Mozambique managing several Environmental and Social Impact Assessment. Amongst which she has conducted large scale faunal impact assessments in the both South Africa and northern of Mozambique to both national standards and international lenders standards (AfDB, EIB and IFC), alone and assisted by and to Prof Bill Branch. Her interests include, lenders requirements, range limitation, island biogeography, ecology as well as land use and natural resource management.

Ms Nicole Wienand, Botanical Specialist and Report Author

Ms Nicole Wienand is an Environmental Consultant based in the Port Elizabeth branch. Nicole obtained her BSc Honours in Botany (Environmental Management) from Nelson Mandela University (NMU) in December 2018. She also holds a BSc Degree in Environmental Management (Cum Laude) from NMU. Nicole's honours project focused on the composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth and for her undergraduate project she investigated dune movement in Sardinia Bay. Nicole's key interests include marine ecology, botanical specialist assessments, GIS Mapping, the general EIA process, Public Participation Process (PPP) and Ecological Impact Assessments.

Dr A.M (Ted) Avis Internal Reviewer

Ted Avis is a leading expert in the field of Environmental Impact Assessments and environmental management, having project-managed numerous large-scale ESIAs and ESMPs to International Finance Corporation Performance Standards. Ted has been EIA study leader on numerous large scale ESIA's and ESHIA's for projects with capital investments ranging from US$200m to over US$1billion. He has been study leader for ESIA and related environmental studies completed to international in, Egypt, Kenya, Liberia, Mozambique, Madagascar, Malawi Sierra Leone, South Africa and Zambia,. Ted also has experience in large scale Strategic Environmental Assessments in southern Africa, and has been engaged by the International Finance Corporation (IFC) on a number of projects.

Most of the ESIA work Ted has been involved in has included the preparation of various Environmental & Social Management Plans, Resettlement Action Plans and Monitoring Plans. These ESIA's cover a range of sectors including infrastructure, mining (heavy minerals, graphite, tin, copper, iron), agri-industrial, forestry, resorts and housing development, energy, ports and coastal developments.

Ted holds a PhD in Botany, and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled "Coastal Dune Ecology and Management in the Eastern Cape"). He has delivered papers and published in the field of EIA, Strategic Environmental Assessment and Integrated Coastal Zone Management and has been a principal of CES since its inception in 1990, and Managing Director since 1998.

Ted was instrumental in establishing the Environmental Science Department at Rhodes University whilst a Senior lecturer in Botany, based on his experience running honours modules in EIA practice and environmental management. He was one of the first certified Environmental Assessment Practitioner in South Africa, gaining certification in April 2004. He has been a professional member of the South African Council for Natural Scientific Professionals since 1993.

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DECLARATION

Role on Study Team	Declaration of independence
Report production	• I, Tarryn Martin, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017; • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this report are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act. …….. ……. SIGNED DATE
Report production and Field Survey	• I, Nicole Wienand, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017; • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this report are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

	…….. ……. SIGNED DATE
Faunal Assessment	• I, Amber Jackson, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017; • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this report are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act. …….. ……. SIGNED DATE

ACRONYM LIST

AOO	Area of Occupancy
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services
CR	Critically Endangered
ECO	Environmental Control Officer
EDGE	Evolutionarily Distinct and Globally Endangered
EN	Endangered
ESIA	Environmental and Social Impact Assessment
EOO	Extent of Occupancy
GBIF	Global Biodiversity Information Facility
GIS	Geographical Information System
IBA	Important Birding Areas
IUCN	International Union for Conservation of Nature
KBA	Key Birding Areas
LC	Least Concern
NBSAP	National Biodiversity and Strategy Action Plan
NEMBA	National Environmental Management Biodiversity Act
NGO	Non-Government Organisation
PNCO	Provincial Nature Conservation Ordinance
SCC	Species of Conservation Concern
QDS	Quarter Degree Square
SA	South Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
TOPS	Threatened and Protected Species

DEFINITIONS

Alien Invasive Species refers to an exotic species that can spread rapidly and displace native species causing damage to the environment

Biodiversity is the term that is used to describe the variety of life on Earth and is defined as "*the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems*" (Secretariat of the Convention on Biological Diversity, 2005).

Habitat Fragmentation occurs when large expanses of habitat are transformed into smaller patches of discontinuous habitat units isolated from each other by transformed habitats such as farmland.

Key Biodiversity Area are globally recognised sites that contain significant concentrations of biodiversity.

Natural Habitat refers to habitats composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area's primary ecological function and species composition.

Protected Area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values**.** *(IUCN Definition 2008)*

SPECIALIST CHECK LIST

The contents of this specialist report complies with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page iv
	3.1.2	A signed statement of independence by the specialist;	Page v
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.1
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Chapter 4 and Chapter 6
	3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 5
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Chapter 5
	3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 5
	3.1.10	The degree to which the impacts and risks can be reversed;	
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 5 and Section 6.2
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Chapter 6
	3.1.15	Any conditions to which this statement is subjected.	Section 6.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.		✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		

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1 INTRODUCTION AND PROJECT DESCRIPTION

1.1 PROJECT DESCRIPTION AND LOCALITY

The power supply to the greater Cape area is mostly provided by the coal-fired power stations on the Highveld, mainly in Mpumalanga. As a result, a Transmission network from Mpumalanga to the Cape has grown over the years as demand has increased. Much of this network is now over two decades old and is approaching its peak operational capacity. In order to meet the increasing demand for electricity, Eskom proposes to import power from the 800MW Kudu CCGT power station at Uubvlei, 15km north of Oranjemond in Namibia. The 800MW Kudu CCGT power station will supply 200MW to Namibia and the balance will be available for integration into the South African grid.

Eskom proposes to integrate the power from the Kudu CCGT power station into the South African grid via Transmission lines from the Namibian border. A number of alternative integration options and routes have been proposed to connect to Eskom's Western Grid and supply the increasing demand in the Cape. This specific project forms part of the Kudu Integration project and relates specifically to the proposed 230km 400kV Juno-Gromis Transmission line which aims to enhance the supply to the Western Cape, which has been plagued by outages.

An Environmental Impact Assessment (EIA) was commissioned for the proposed construction of the Eskom 400kV transmission power line and Kudu integration project in terms of the Environment Conservation Act 1989 (Act No. 73 of 1989). The study presented various alternatives and included a number of specialist studies, and as a result a Record of Decision (RoD) now known as an Environmental Authorisation (EA) was issued on 6 November 2007 (Ref: 12/12/20/720). An extension for the EA issued was applied for and granted on 20 March 2014.

Subsequent to the EA issued in 2007, the negotiation process with the affected landowners resulted in the need for amendments to the proposed alignment. In 2017, a Basic Assessment Process in terms of the current legal instrument, the National Environmental Management Act, was undertaken to apply for these amendments which received an EA in 2017 (Ref: 14/12/16/3/3/1/1679). The approved deviations included:

- 4.1 km deviation around the landing strip in Lutzville;
- 3km deviation within the Tronox Mine Namakwa Sands; and
- 7.2km deviation around a mine in Kamiesberg.

There is now a need to apply for an additional deviation to the 400kV transmission powerline route which traverses Tronox Mine Namakwa Sands, which is located near Nuwerus within the Matzikama Local Municipality, West Coast District in the Western Cape. After the receipt of favourable prospecting rights, Eskom are required to deviate around the Tronox Mine area, which will result in a proposed 15km deviation to the east of the 2017 approved deviation. The proposed 15km deviation falls outside of the 2017 EA authorised corridor, resulting in an increase in the length of the powerline. The 15km deviation will therefore require a Basic Assessment Process to be undertaken as per the NEMA EIA Regulations (2014, as amended).

The proposed 15km 400Kv Juno-Gromis Powerline Deviation is located near Nuwerus within the Matzikama Local Municipality, West Coast District in the Western Cape.

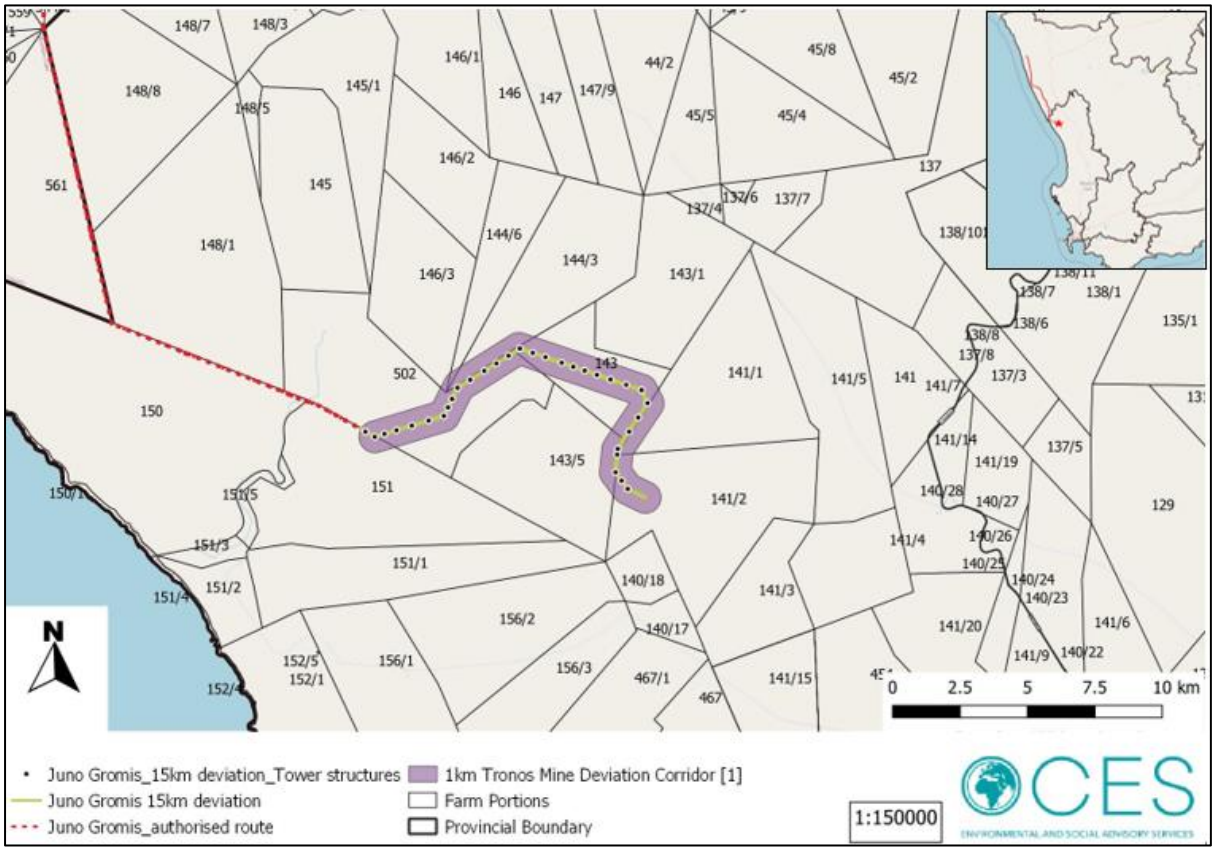


Figure 1-1: Locality Map of the proposed 15km 400Kv Juno-Gromis Powerline Deviation.

CES has been appointed by Eskom Holdings SOC Ltd (Eskom) to apply for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998 and subsequent amendments) Environmental Impact Assessment (EIA) Regulations (2014 and subsequent amendments) by means of conducting a Basic Assessment (BA) Process, inclusive of the relevant specialist studies. This Terrestrial Biodiversity Specialist Assessment forms part of the BA Process for the proposed 15km 400Kv Juno-Gromis Powerline Deviation.

1.2 Site Sensitivity Verification and Minimum Report Content Requirements

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements.

According to the results of the Screening Report generated for the proposed 15km 400Kv Juno-Gromis Powerline Deviation, the relative terrestrial biodiversity theme sensitivity is

classified as VERY HIGH due to portions of the site occurring within a Critical Biodiversity Area (CBA) 1, and an Ecological Support Area (ESA) 1 and 2. According to Section 3 (1) of GN R. 320, '*an applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment'*.

Due to the very high sensitivity rating of the site, a full **Terrestrial Biodiversity Specialist Assessment** (this report) has been undertaken as part of the BA Process for the proposed 15km 400Kv Juno-Gromis Powerline Deviation.

1.3 Objectives and Terms of Reference

The objectives for the ecological assessment are as follows:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Establish and map sensitive vegetation areas showing the suitability for development and no-go areas.
- Identify plant and animal species of conservation concern (Red Data List, PNCO and TOPS lists). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation and degradation of key ecosystems and, where feasible, provide mitigation measures to reduce these impacts.

1.4 Limitations and Assumptions

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- The report is based on a project description received from the client.
- A detailed faunal survey was not conducted. Although a site visit was undertaken, the faunal survey was mainly a desktop study, using information from previous ecological surveys conducted in the area. This data was supplemented by recording animal species that were observed during the site survey.
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs will be found during construction and operation of the development.
- Sampling could only be carried out at one stage in the annual or seasonal cycle. The survey was conducted in late spring when most plants were at the end of the flowering stage. Early flowering species, specifically geophytes could therefore not be identified. However, the time available in the field, and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area.
- Portions of the site (SE and SW sample points) could not be accessed in the time given due to private land restrictions, lack of road networks and some areas could not be crossed on foot.
- No alternative corridors were provided by ESKOM although a 1km corridor was provided and it was requested that the powerline be microsited within this corridor.

2 METHODOLOGY

2.1 THE ASSESSMENT

A site visit was undertaken on the 23-25 November to assess the site-specific ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visits also served to identify potential impacts of the proposed development, and its impact on the surrounding ecological environment. The findings from this site visit were supplemented with data from a previous site assessment that was undertaken for the powerline. This assessment was undertaken in October 2014 by Simon Todd Consulting.

In addition to the site visit, key resources that were consulted include the following:

- The South African Vegetation Map (Mucina and Rutherford, 2018);
- The Western Cape Biodiversity Spatial Plan (2017);
- The Western Cape Landcover Project, 2014
- The National Environmental Management: Biodiversity Act (NEMBA), 2004: List of Threatened Ecosystems (2011);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species;
- The National Protected Areas Expansion Strategy (NPAES,2010);
- The National Biodiversity Assessment (SANBI, 2018);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Alien Invasive Vegetation; and
- Available published scientific literature.

2.2 SPECIES OF CONSERVATION CONCERN

Data on the known distribution and conservation status for each potential species of conservation concern must be obtained to develop a list of 'Species of Concern'. These species are those that may be impacted significantly by the proposed activity. In general, these will be species that are already known to be threatened or at risk, or those that have restricted distributions (endemics) with a portion (at least 50%) of their known range falling within the study area i.e. strict endemic and near endemic species. Species that are afforded special protection, notably those that are protected by NEMBA (No. 10 of 2004), PNCO (1975), the National Forest Act or which occur on the South African Red Data List as species of conservation concern fall within this category.

2.3 SAMPLE SITE SELECTION

A sampling protocol was developed that would enable us to evaluate the existing desktop interpretations of the vegetation of the study area, to improve on them if necessary, and to add detailed information on the plant communities present. The protocol considered the amount of time available for the study, the accessibility of different parts of the area, and limitations such as the seasonality of the vegetation.

A stratified random sampling approach was adopted, whereby initial assumptions were made about the diversity of vegetation, based on Google Earth, spatial planning tools and available literature and the area stratified into these basic types. In this way the time available was used

much more efficiently than in random sampling, but there is a risk of bias and the eventual results may simply 'prove' the assumptions.

In general, the stratification of the site was influenced by obvious features of the vegetation, such as the presence of conspicuous species or vegetation structure. These factors may be largely independent of the floristic make-up of the vegetation, and by definition the biological communities present. Sample (Figure 2-1) plots were analysed by determining the dominant species in each plot, as well as any alien invasive species and potential SCC occurring within the plots. Each sample plot was sampled until no new species were recorded. Vegetation communities were then described according to the dominant species recorded from each type, and these were mapped and assigned a sensitivity score.

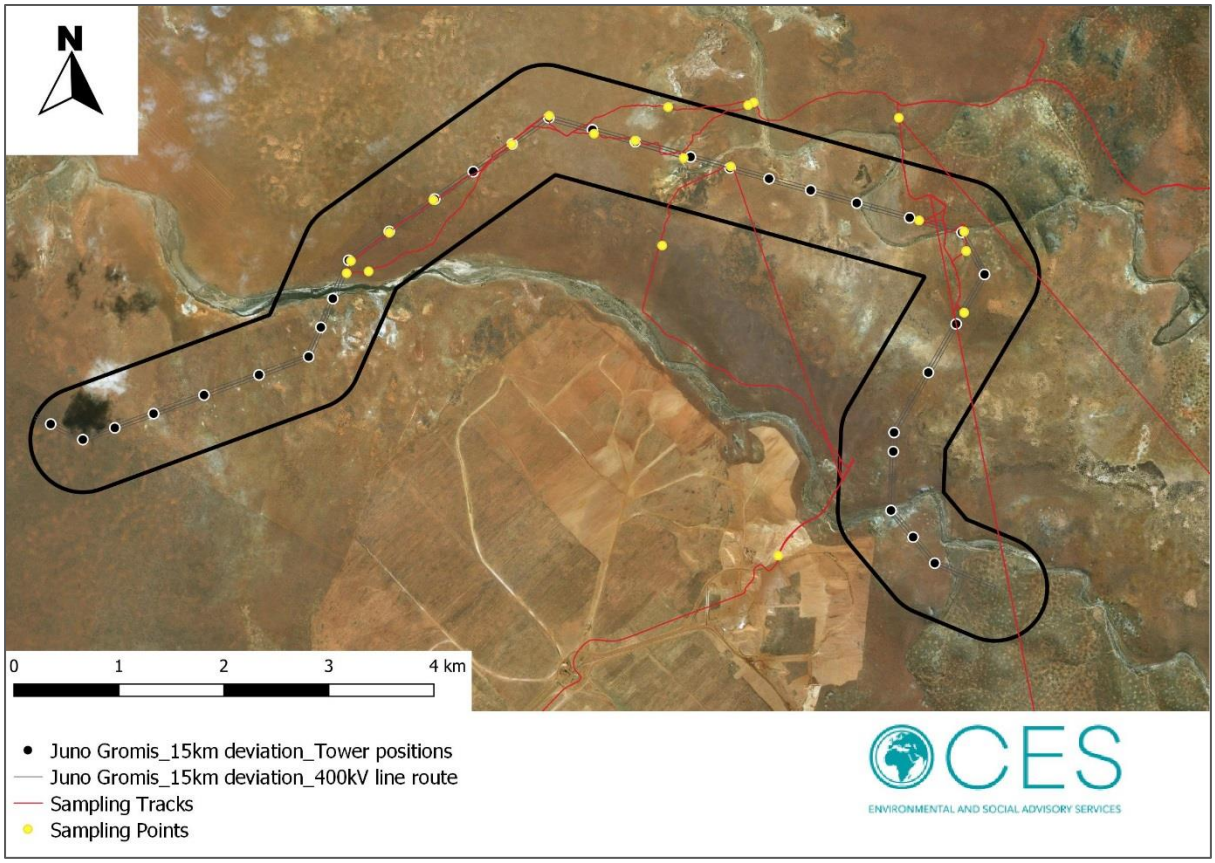


Figure 2-1: Sample sites and tracks

2.4 VEGETATION MAPPING

The revised SA VEGMAP (2018) maps "floristically-based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before." The map was developed using a wealth of data provided by a network of ecologists, biologists and conservation planners that make periodic contributions to the project. These contributions have allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. The SA VEGMAP informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012.

The SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from satellite images, literature descriptions and related data gathered on the ground.

2.5 SENSITIVITY ASSESSMENT

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (Table 2.1). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings (refer to Appendix 6 for a summary of rating system).

The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 2-1: Criteria for establishing Site Ecological importance and description of criteria

Criteria	Description
Conservation Importance (CI)	*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 & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*
Functional Integrity (FI)	*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.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*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.*
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

2.6 ECOLOGICAL IMPACT ASSESSMENT

2.6.1 Impact rating methodology

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardized rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements outlined in Appendix 1 of the NEMA EIA Regulations (2014 and subsequent 2017 amendments). The details of this rating scale are included in Appendix 5.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

3.1.1 Climate

The information provide herewith is based on the climate data for Nuwerus, Western Cape Province, the nearest urban area in proximity to the project area. The Western Cape has a Mediterranean climate with moderately hot summers and mild to cold winters. Average maximum daily temperatures in Nuwerus reach a high of 30°C in February and a low of 5°C in July (Figure 3.1). Rainfall occurs throughout the year with the greatest rainfall occurring during the winter months, but total annual rainfall is less than 280mm, resulting in a Koppen classification of BWk and BSk. July receives the greatest rainfall (15 mm) while February receives the lowest rainfall (4 mm). The prevailing wind direction is from the south-west (Meteoblue, 2020).

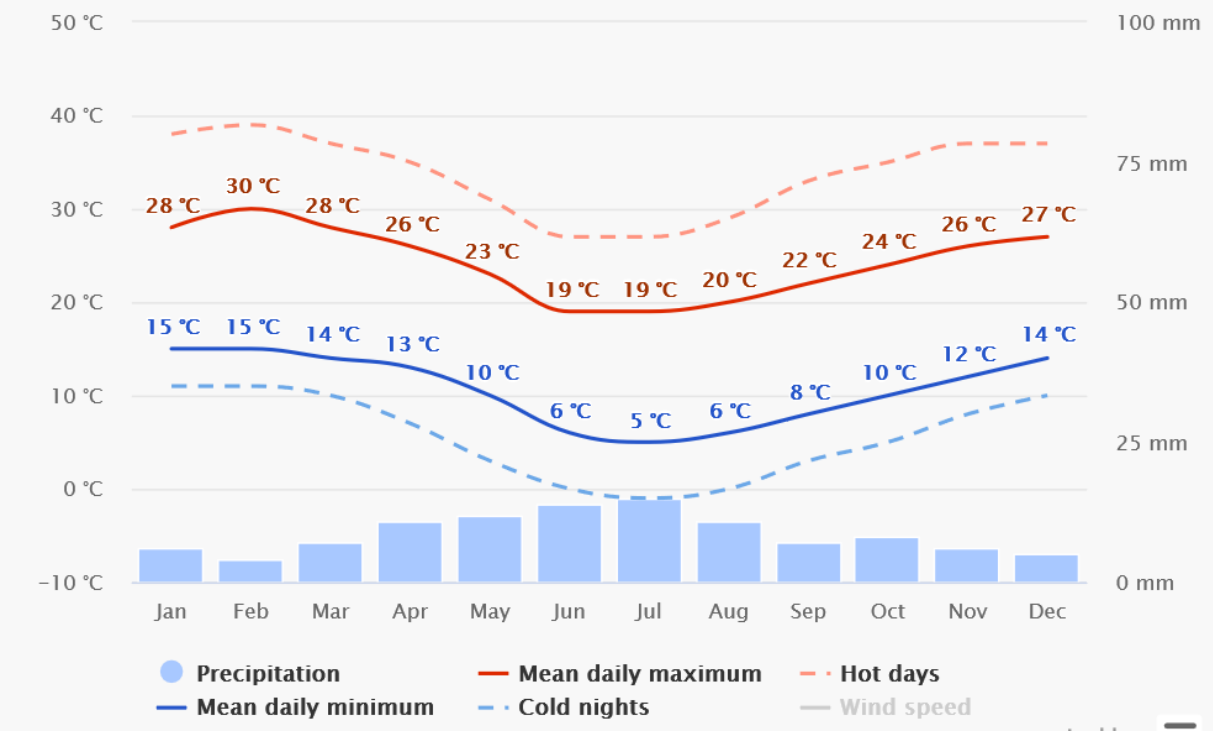


Figure 3-1: Climate data for Nuwerus, Western Cape Province (source: https://www.meteoblue.com).

3.1.2 Topography, Soils and Geology

Vegetation types are influenced by a range of biotic and/or abiotic factors at different spatial and temporal scales, which together influence the distribution, composition, structure and diversity of plant communities (Rodrigues *et al.*, 2016). Among the abiotic factors influencing vegetation types, topography (landform), geology, and soils are considered three of the major factors determining habitat heterogeneity and species diversity.

Topography

The topography of the project area decreases in elevation towards the Groot Goerap River. The elevation of the project area on either side of the river is relatively flat, ranging between 120 m and 80 m above sea-level and decreasing to 40 m as a result of the incision by the Groot Goerap River (Figure 3.2 and 3.3).

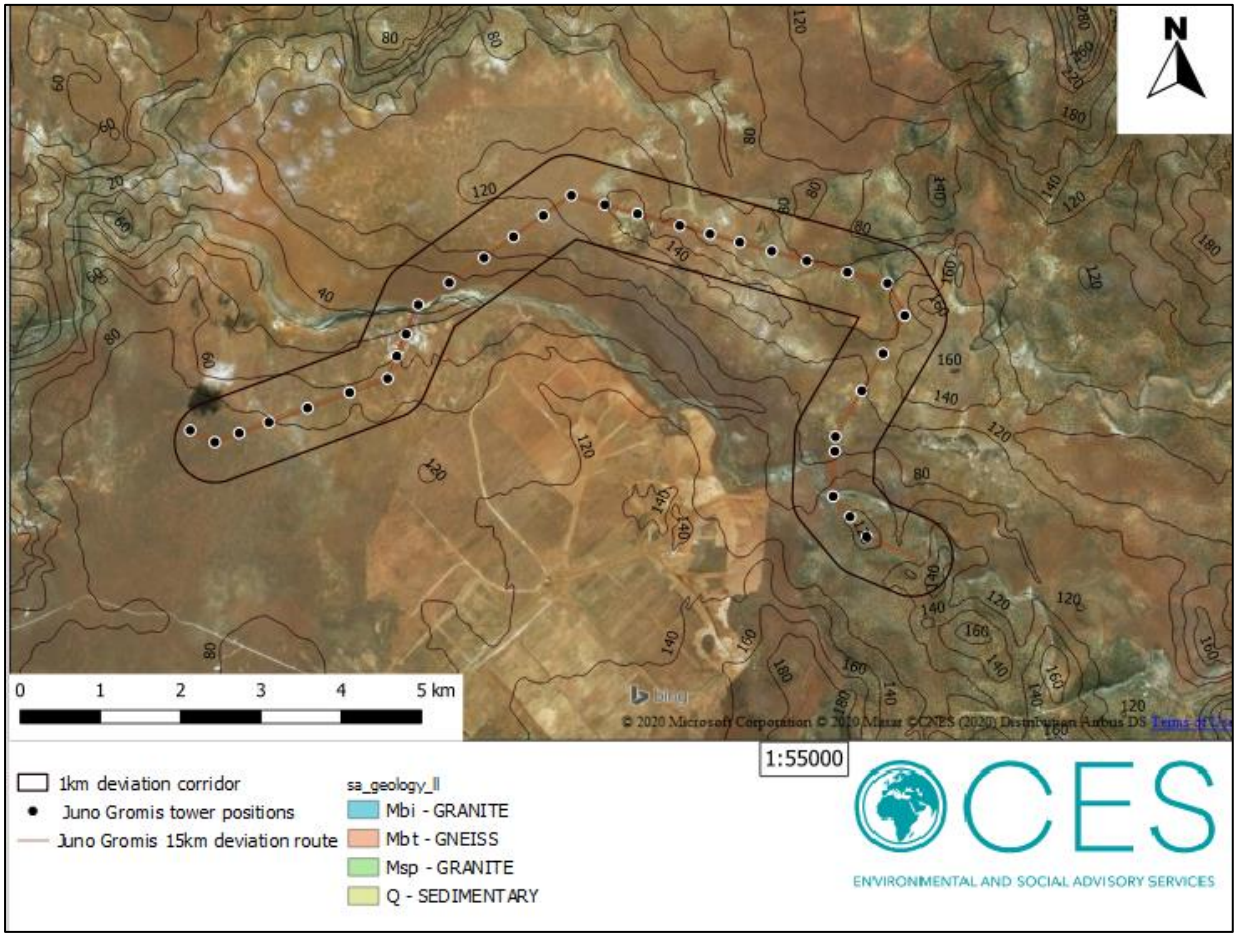


Figure 3-2:Contour Map of the study area.

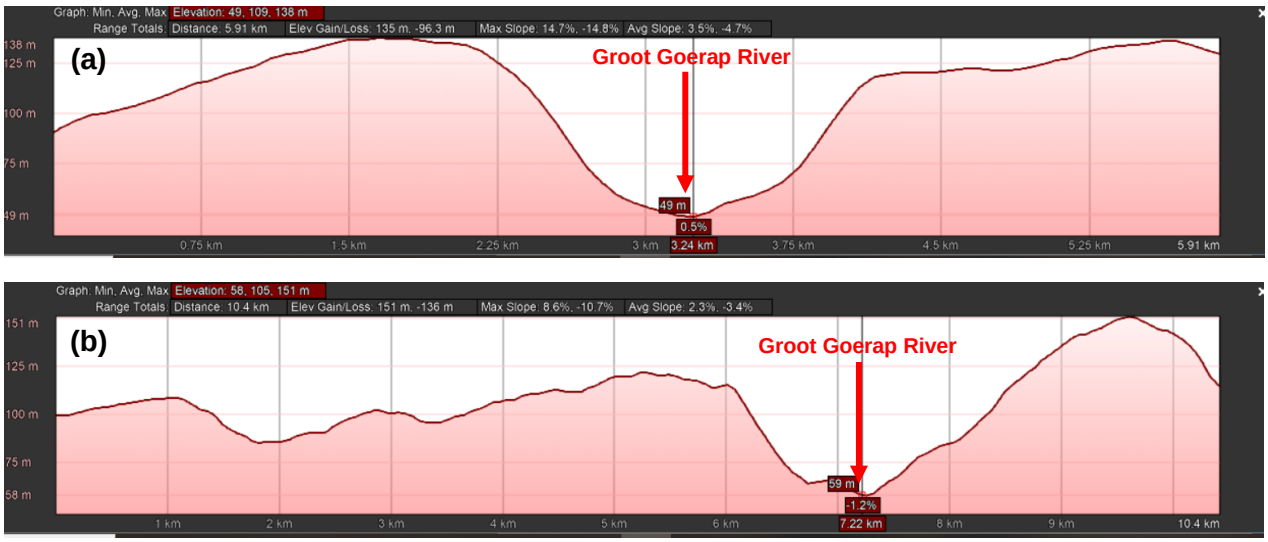


Figure 3-3: Elevation profile of the study site from (a) north to south and (b) east to west.

3.1.3 Geology and Soils

The underlying geology for the majority of the project area consists of Quaternary sedimentary deposits (calcrete and sand) that give rise to sandy soils. The eastern portion of the project area consists of igneous (granite) and metamorphic (gneiss) belonging to the Spektakel Suite (Figure 3.4). The soils underlying the study site are classified as Ferralic Arenosols. Arenosols are sandy soils derived from the weathering of old, usually quartz-rich parent material or rock, and/or soils derived from recently deposited desert or beach sands. They are typically characterised by a loamy sand or coarser texture that extends to a depth of approximately 100 cm from the soil surface, less than 35% rock fragments, and the absence of diagnostic horizons below 50 cm from the soil surface (ISRIC, n.d).

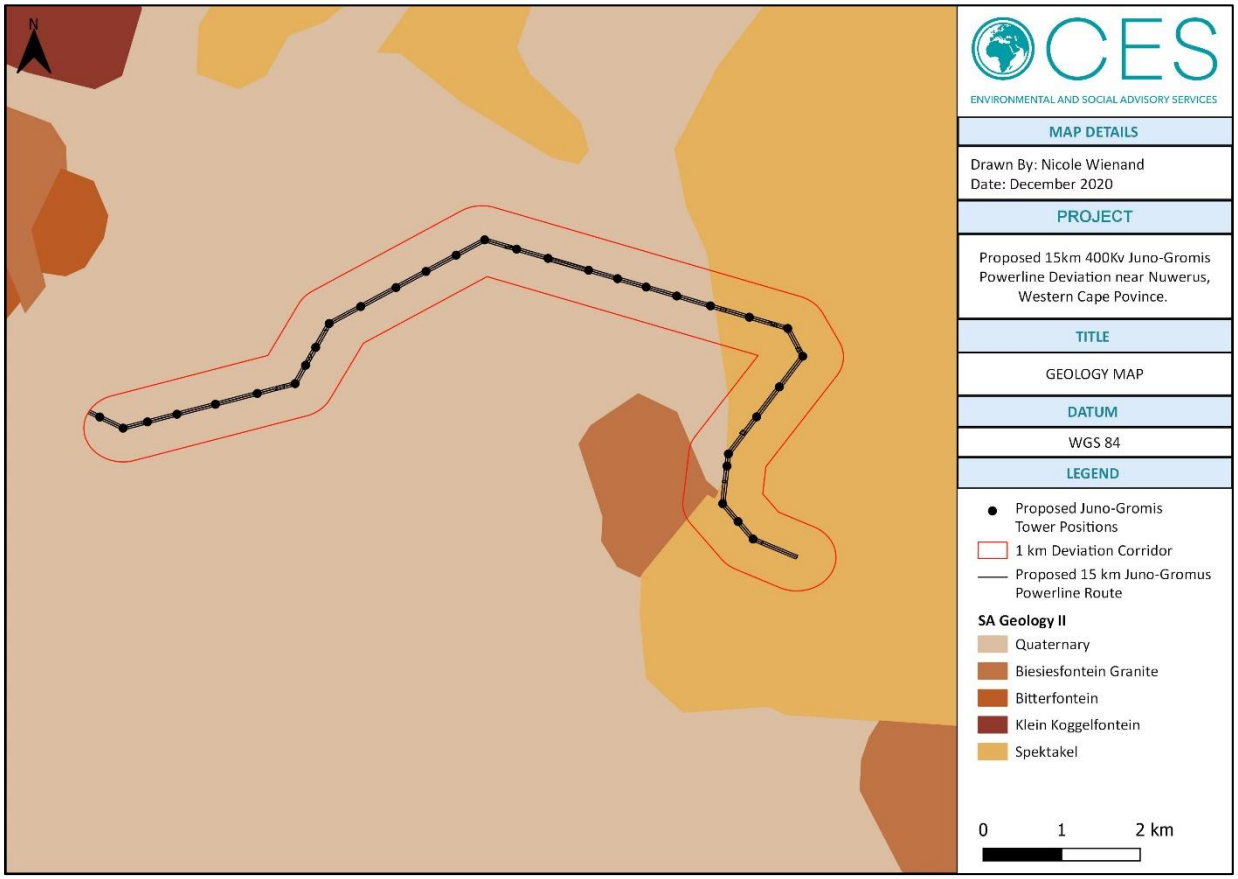


Figure 3-4: Geology Map of the study site.

3.2 Land Cover

According to the South African National Land-Cover (2018) spatial dataset, the majority of the project area occurs within Low Shrubland (Succulent Karoo) (Figure 3.5). Other land uses scattered throughout the site include *Fallow Lands* and *Old Fields, Open Woodlands (restricted to drainage areas), Natural Grassland, Eroded Land* and *Bare Riverbed Material*.

3.3 The current land use

The current land use within the surrounding landscape includes the Namakwa Sands Heavy Minerals Mine to the south surrounded by livestock farming to the north, east and west. The proposed route will pass through land owned by the mine (east and western sections of the proposed powerline) as well as some private farmland (northern sections).

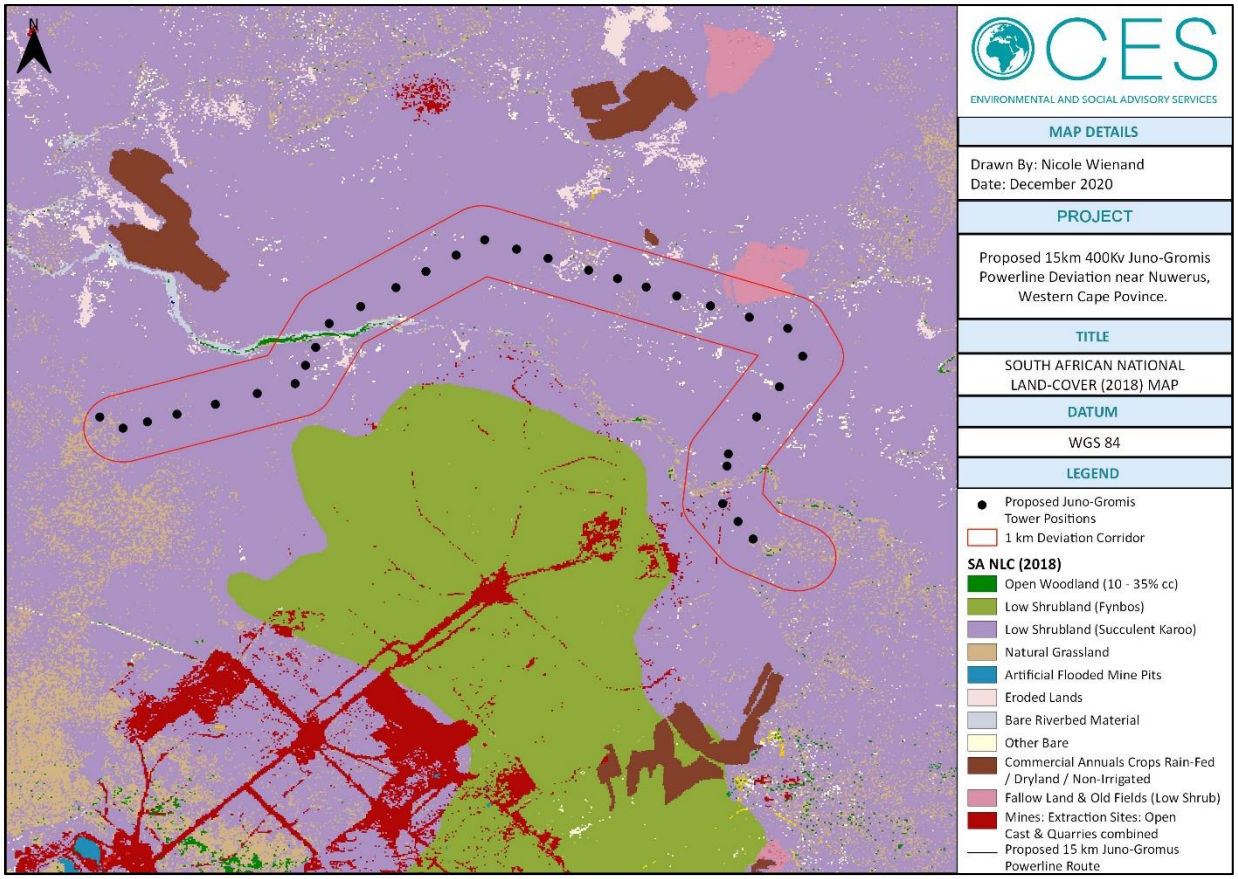


Figure 3-5:South African National Land-Cover (SANLC, 2018) Map of the project area.

3.4 Screening Tool: Sensitive Species

The Department of Environmental Affairs Forestry and Fisheries (DEFF) preapplication screening tool recently included a category for species specific environmental assessment to ensure the inclusion of specific flora and fauna species in the environmental assessment process (SANBI, 2020).

The screening report illustrates that in terms of plant species sensitivity, the site is medium sensitivity with small areas of high sensitivity (Figure 3-6). Sensitiv plants species recorded by the screening tool include *Manuela cinereal, Sensitive species 703*[1]*, Antimimma komkansica, Sensitive species 91, Sensitive species 276, Ruschia bipapilata, Sensitive species 345, Helichrysum dunense, Leucoptera nodosa, Muraltia obovate, Aspalathus obtusata, Sensitive species 754, Otholobium incanum, Leucospermum praemorsum, Leucospermum rodolentum.*

The screening report illustrates that the proposed project area (EIA application area) in relation to animal species is of medium sensitivity due to the likely presence of the Endangered Species 4 (Table 3. 1 and Figure 3.7) (DEAFF, 2020).

Table 3.1: The terrestrial vertebrate faunal species that triggers sensitivity includes:

Scientific name	Common Name	Status	Sensitivity
Reptile			
Sensitive Species 4		Endangered	Medium

[1] These are species to sensitive for their locations to be revealed for fear of illegal harvesting.

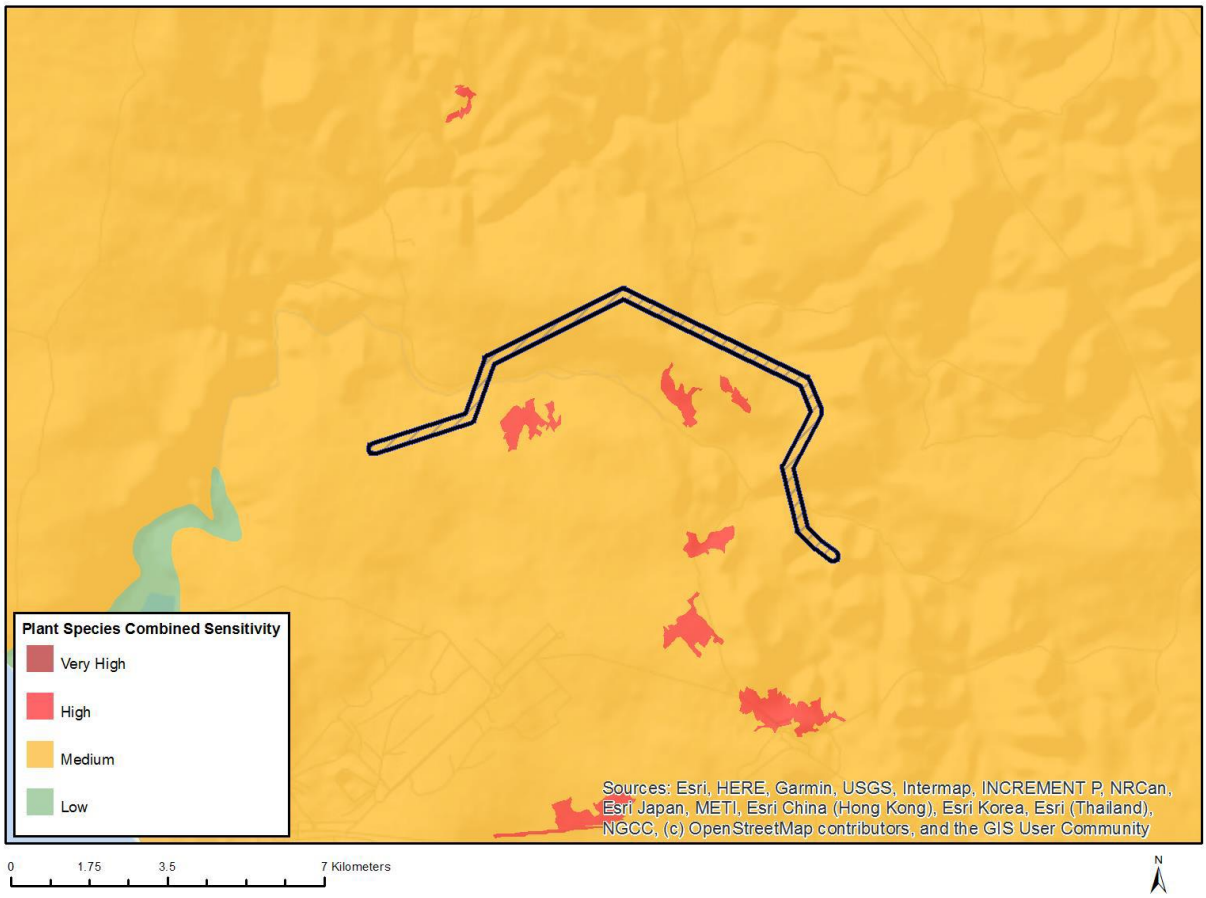


Figure 3.6: Plant species sensitivity for the proposed project area (DEAFF, 2020).

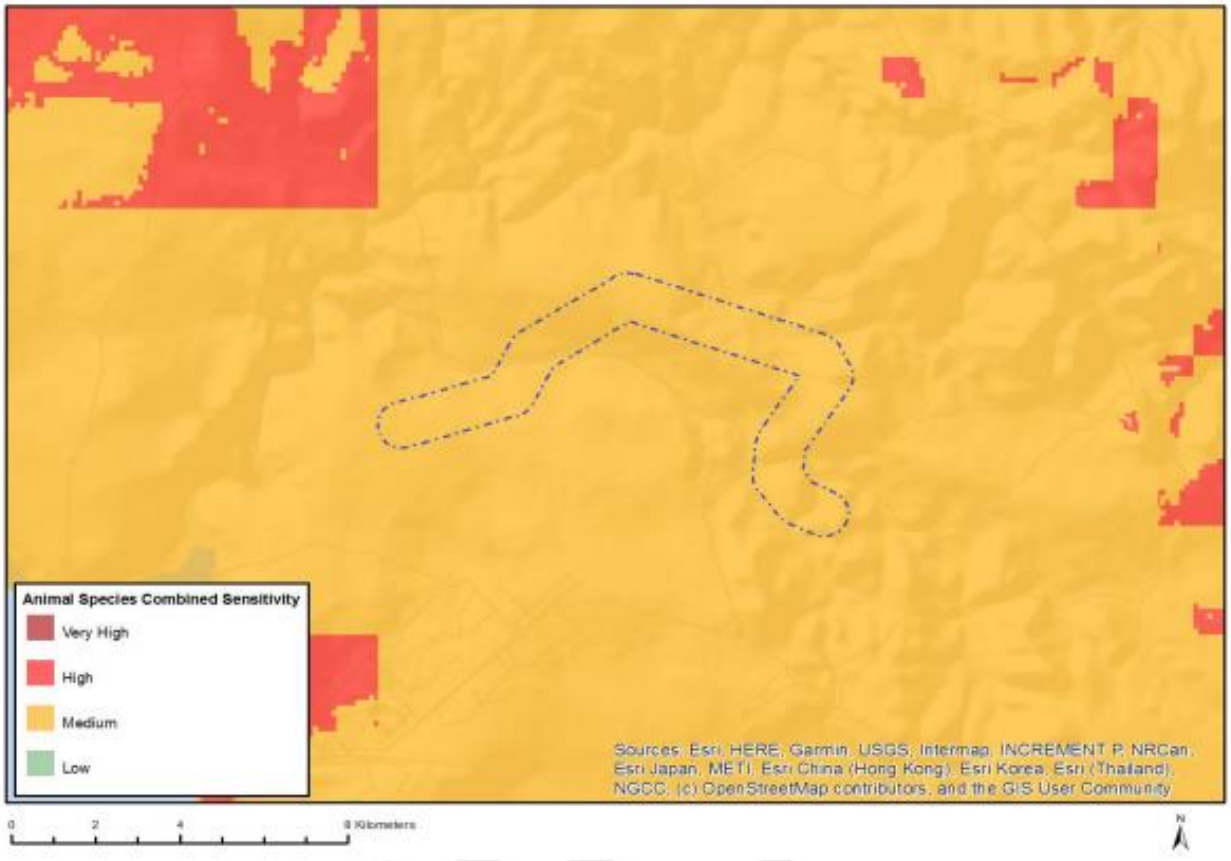


Figure 3-7: Animal species sensitivity for the proposed project area (DEA, 2020).

3.5 DESCRIPTION OF THE VEGETATION AND FLORISTICS

The project site falls within Namaqualand which is part of the Succulent Karoo biome of southern Africa (Mucina *et. al, 2006)*. With an approximate extent of 45 000km^2, Namaqualand occurs along the west coast of South Africa from the Gariep River in the north down to the Olifant's River and Bokkeveld escarpment in the south (Desmet, 2007). It is estimated that there are over 3500 species of flora from 135 families and 724 genera that occur within this region, and that approximately 25% of these species are endemic to Namaqualand.

3.5.1 National Vegetation Map: Expected Vegetation Types

Mucina and Rutherford (2018) developed the National Vegetation map as part of a South African National Biodiversity Institute (SANBI) funded project: "It was compiled to provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before." The map was developed using a wealth of data from several contributors and has allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. This project had two main aims:

- to determine the variation in and units of southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region, and
- to compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason the collective expertise of vegetation scientists from universities and state departments were harnessed to make this project as comprehensive as possible.

The map and accompanying book describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa. According to the map, seven vegetation types are expected to occur at the proposed site (Figure 3-5):

Namaqualand Inland Duneveld

This vegetation type occurs in the Northern Cape Province at two patches; one is between Kotzesrus north to Groen River and the second one is located between Wallekraal and Hondeklipbaai. This vegetation unit occurs on the coastal peneplain with mobile dunes comprised of quaternary aeolian, deep, loose, red to yellowish sand. The vegetation is dominated by non-succulent shrubs belonging to the genera *Berkheya, Eriocephalus, Euclea, Lycium, Searsia, Tetragonia, Tripteris* and *Roepera* interspersed with grasses such as *Ehrharta* and restioids such as *Willdenowia.*

This vegetation is listed as Least Threatened with a conservation target of 26%. Currently, none of this vegetation is statutorily conserved although there is no evidence of transformation.

Namaqualand Heuweltjieveld

Namaqualand Heuweltjieveld occurs in the Northern Cape along the western foothills of the Namaqualand Escarpment. It characterised by undulating plains that lead up the escarpment, and soils are typically relatively rich and derived from underlying granite or gneiss. The vegetation cover comprises a mosaic of low shrubland communities dominated by leaf-succulent shrubs that occur on slightly raised, rounded termite mounds or "heuweltjies"; ascribed to former activity of harvester termites (*Microhodotermes viator*). It is classified as

Least Threatened on a national basis (DEA 2011), with a conservation target of 28% of its original extent. Approximately 11% has been statutorily conserved (mostly in the Namaqua National Park) and 3-4% has been transformed by cultivation (Rouget et al 2004). Given that this vegetation type has moderate to low levels of species of conservation concern, it is considered to be of relatively low sensitivity (Todd, 2014).

According to the national vegetation map, a small portion of this vegetation occurs along the south eastern portion of the proposed powerline. However, it was not recorded during the field survey due to access issues described above.

Namaqualand Strandveld

Namaqualand Strandveld occurs within the Western and Northern Cape Provinces from Gemsboksvlei as far south as Donkins Bay. It occurs on the coastal peneplain and can penetrate deeply inland (up to 40km), particularly in the northern region of its extent and is typically separated from the coast by the Namaqualand Coastal Duneveld. This vegetation type is characterised by low growing shrubland, rich in species and dominated by erect and creeping succulent shrubs such as *Cephalophyllum, Didelta, Othonna, Ruschia, Tetragona* and *Roepera* as well as non-succulent shrubs such as *Eriocephalus, Lebeckia, Pteronia* and *Salvia.* It has a rich component of annual flora that flowers during the late winter/early spring.

The threat status for this vegetation type is not provided by Mucina and Rutherford (2006) although it is noted that this vegetation is threatened by coastal mining for heavy metals. The conservation target for this species is 26% and none of this vegetation is currently statutorily conserved. Ten percent has been transformed.

According to the map (Figure 3-9), this vegetation type occurs throughout the site.

Namaqualand Sand Fynbos

Namaqualand Sand Fynbos occurs within the coastal plain in the Western and Northern Cape Provinces at altitudes between 60-300m above sea level. This vegetation type occurs on aeolian, deep, loose, red sand overlying marine sediments and is characterised by scattered shrubs such as *Leucospermum praemorsum, Leucospermum rodolentum, Wiborgia obcordate and Gymnosporia buxifolia* that are 1-1.5m tall but dominated by Restionaceae in between. Restioid and asteraceaous fynbos are dominant with localised pockets of proteoid fynbos. This vegetation type is listed as Least Threatened. The conservation target for this vegetation type is 29% but presently only 1-2% has been statutorily conserved within the Namaqualand National Park.

Although listed as least threatened, this vegetation type is considered to be sensitive due to its limited and restricted extent, relatively high abundance of species of conservation concern and threats from mining operations in the area.

Although the National Vegetation map indicates that there are two patches of Sand Fynbos that occur within the centre of the proposed deviation, this vegetation type was not noted to occur on site.

Southern Namaqualand Quartzite Klipkoppe Shrubland

This vegetation type occurs in the Western Cape Province and is associated with quartzite hills between the Knersvlakte and southern Kamiesberg foothills around the towns of Nuwerus and Bitterfontein. This vegetation type is dominated by asteraceous and leaf succulent shrubs with a similar structure to the Namaqualand Klipkoppe shrubland. The major difference between this vegetation type and the Namaqualand Klipkoppe shrubland are the number of endemic species associated with this vegetation type that do not occur within the regular Klipkop Shrubland. This vegetation type falls within the Nuwerus Centre of plant endemism. The conservation target for this vegetation type is 28%.

Namaqualand Riviere

Namaqualand Riviere occurs along dry riverbeds throughout Namaqualand in the Western and Northern Cape Provinces. It is characterised by the presence of alluvial shrubland that includes species such as *Suaeda fruticosa, Roepera morgsana, Ballota africana* and *Didelta spinosa* and patches of tussock graminoids along riverbanks and banks of intermittent rivers. This vegetation type is listed as Least Threatened with a conservation target of 24%. Only a small portion is statutorily protected in nature reserves and almost 20% has been transformed for cultivation.

According to the national vegetation map, this vegetation type occurs along the river that the proposed powerline will cross.

Knersvlakte Quartz Vygieveld

Knersvlakte Quartz Vygieveld occurs in the Western Cape Province from Bitterfontein to just south of Klawer. This vegetation type is characterised by slightly undulating landscapes with prominent but patchy layers of quartzite. The vegetation is typically dwarf succulent shrublands with a number of compact and subterranean vygies. This vegetation type is listed as Least Threatened with a conservation target of 28%. Approximately 5% is statutorily conserved Moedverloren Nature Reserve.

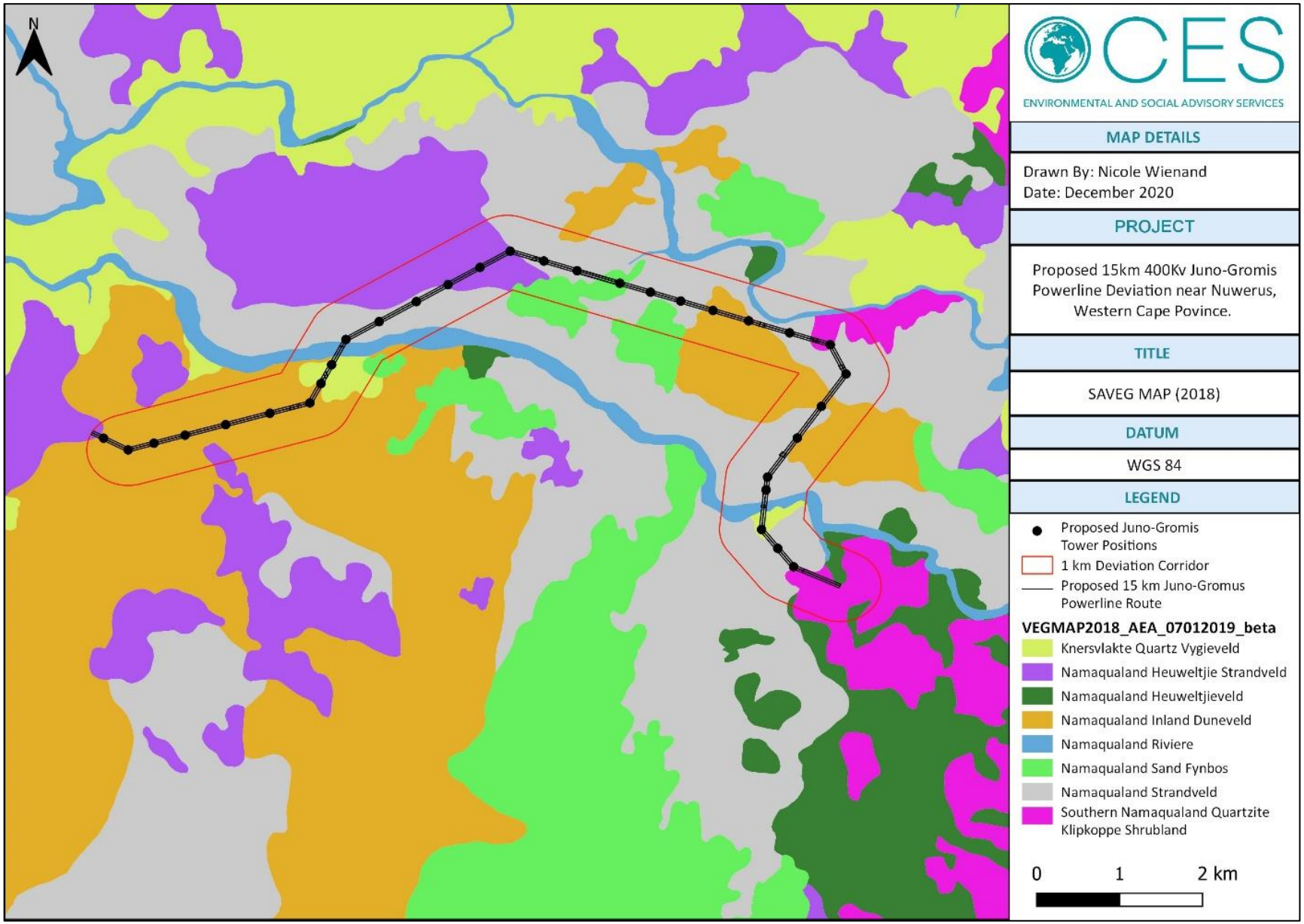


Figure 3-9**:** National vegetation map for the project site

3.5.2 Vegetation types recorded on site

While National level vegetation maps have described broad vegetation types, local conditions and micro-habitats (rainfall, soil structure, rocky outcrops, etc.) can result in variations in plant composition. According to the ecological assessment undertaken for the proposed powerline, the dominant vegetation type north of the river is Namaqualand Strandveld.

This vegetation type was characterised by a shrub layer of 1-1.5m in height with a cover of 40-50% and was associated with the red sand dunes that are dominant in this area (Plate 3-1). Dominant species included *Eriocephalus racemosa, Roepera morgsana, Asparagus capensis* and *Othonna cylindrica.* The understory was dominated by grass species such as *Aristida* and *Ehrhata* and low growing succulents (*Conicosia pugioniformis, Cleretum bruynsii, Tylecodon wallichii*). Due to the timing of the survey flowering annuals and geophytes could not be identified. However, it is these species that would be dominant during the late winter/ early spring period. Figure 3-10 illustrates the distribution of the vegetation.

In addition to the Strandveld, there were small, scattered rocky outcrops that appear to be representative of Southern Namaqualand Quartzite Klipkloppe Shrubland along the north-eastern portion of the powerline route (Plate 3-2). These areas are characterised by exposed rocks and red, shallow soils. Shrub species such as *Pteronia and Searsia* occur on the edge while the rocky areas are dominated by succulents such as *Quaqua mammillaris, Euphorbia, Tylecodon cf. wallichii., Didelta spinosa and Antimimma sp.* These areas must be avoided.

The riverbed was dominated by reeds with shrub species such as *Roepera morgsana* and *Didelta spinosa* occurring along the banks (Plate 3-3).

Due to time constraints as a result of the mine not granting the specialists timeous access, the portion of powerline to the south east and south west of the river could not be sampled. The precautionary principal has been applied and the vegetation types identified by the National vegetation map used to describe the areas where access was not feasible. As such the vegetation type south west of the river is Namaqualand Inland Duneveld with a small patch of Knersvlakte Quartz Vygieland. South east of the river is also a small patch of Knersvlakte Quartz Vygieland and Southern Namaqualand Quartzite Klipkoppe Shrubland.

3.5.3 Species of Conservation Concern

Twenty-eight species of conservation concern (SCC) were recorded for the site. Seven of these were confirmed. These seven species are listed as Least Concern on the South African Red Data List but are listed as schedule 4 on the Western Cape Provincial Nature Conservation Ordinance Act and as such have fallen into the category of SCC.

Further to the above, twenty-one additional SCC were identified as possibly occurring on site. This species list is a combination of records obtained from the Plants of Southern Africa (POSA) website and from the DEA screening report. The likelihood of each species occurring within the site is assessed in Table 3.1 and the text below. A full list of species likely to be found at the site has been included in Appendix 1.

Plate 3-1: Namaqualand Strandveld found to occur on red sand dunes and dominated by *Eriocephalus racemosa, Roepera morgsana, Asparagus capensis* and *Othonna cylindrica*

Plate 3-2: Rocky outcrop representing Southern Namaqualand Quartzite Klipkloppe Shrubland along the north eastern section of the powerline. These areas must be avoided.

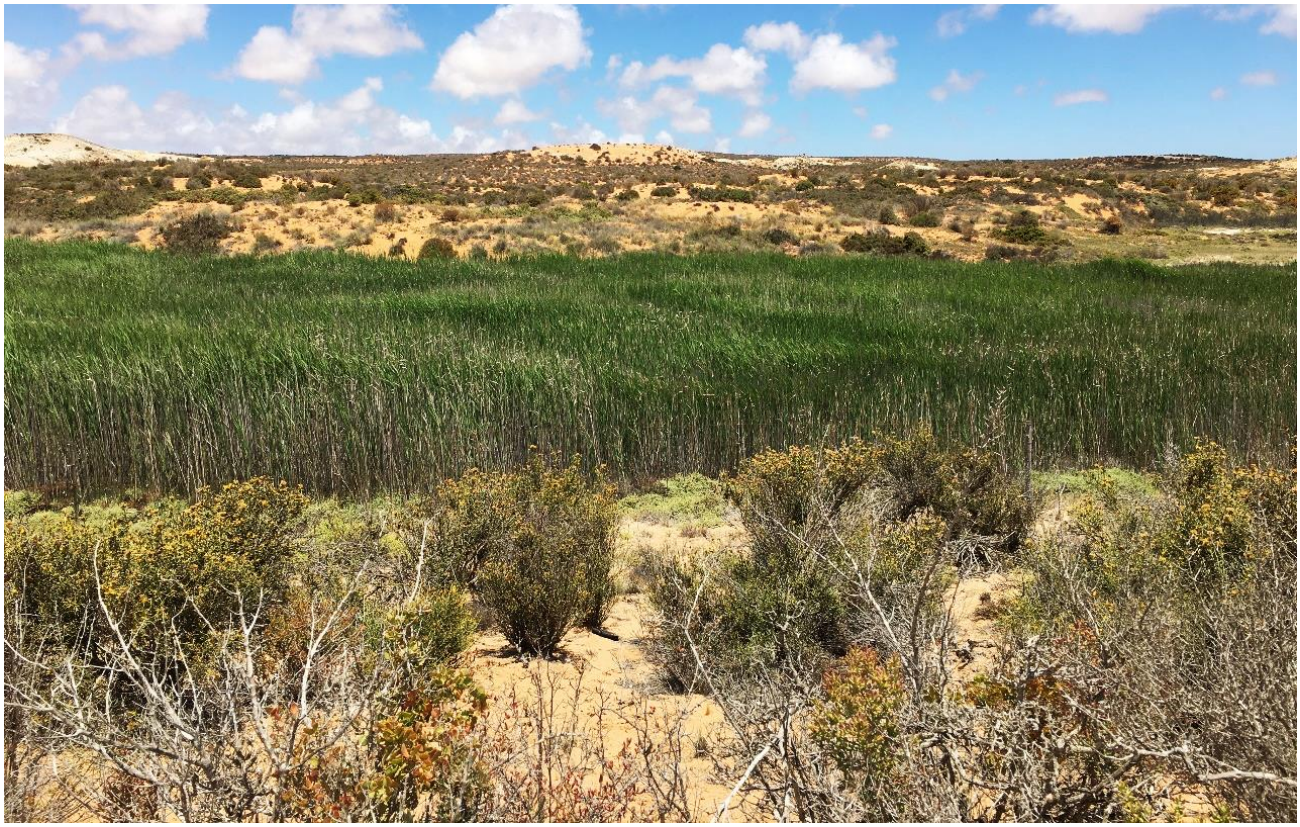


Plate 3-3: Namaqualand Riviera vegetation. The riverbed was dominated by reeds.

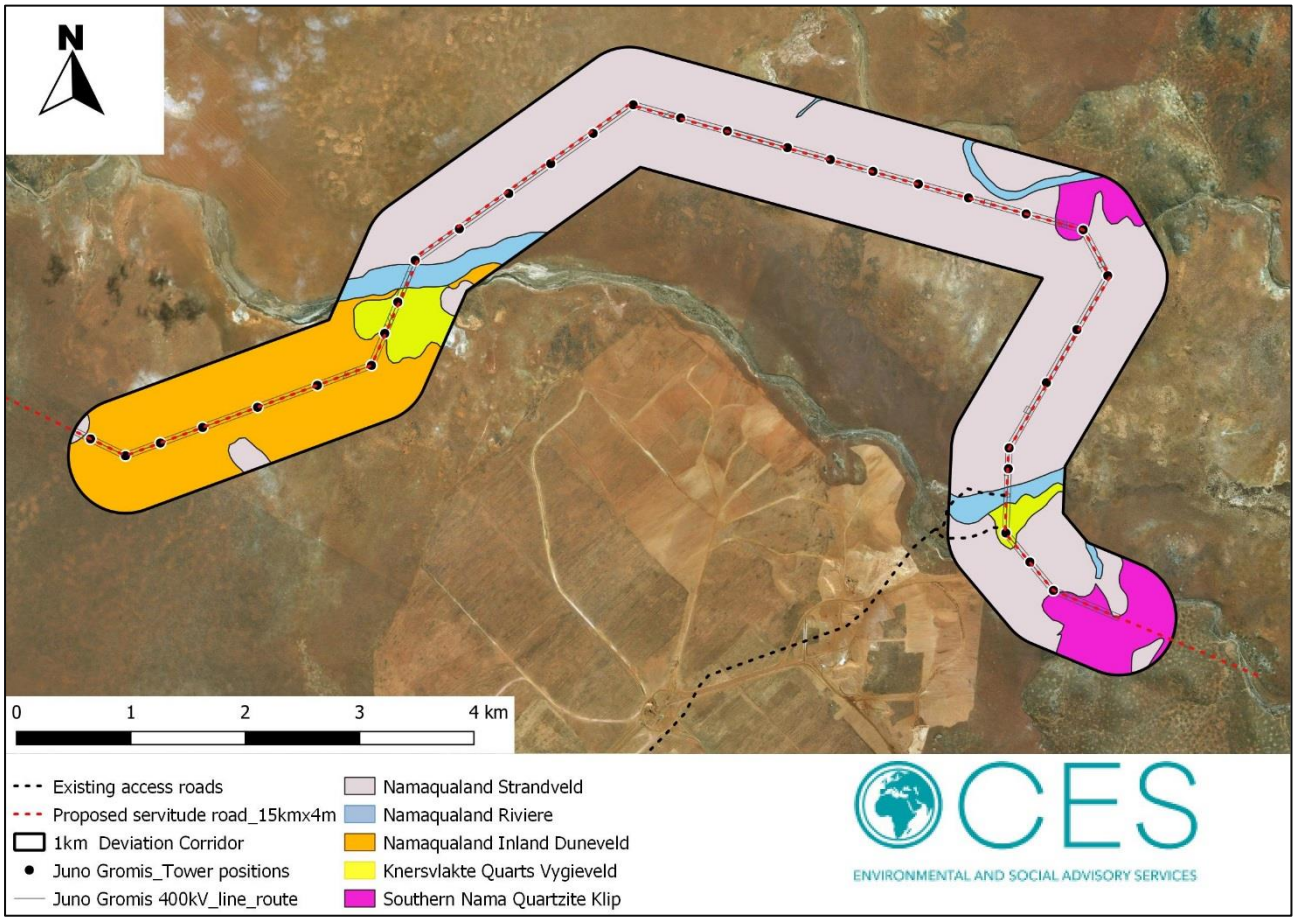


Figure 3-10: Vegetation map of the proposed project site based on data collected from the field survey.

Table 3-1: List of species listed as schedule 4 on the Western Cape PNCO list.

Family	*Scientific Name*	Species of special concern	IUCN Status	Probability of occurrence on site	Comment
AMARYLLIDACEAE	*Boophone haemanthoides*	Least Concern, Schedule 4 (PNCO)	Not Evaluated	Confirmed	Occurs in the Northern and Western Cape. Stable population occurring in the Northern and Western Cape (Snijman and Victor, 2004).
APOCYNACEAE	*Quaqua mammillaris*	Least Concern, Schedule 4 (PNCO)	Not Evaluated	Confirmed	Occurs in the Northern and Western Cape. Stable population occurring in the Northern and Western Cape (Victor, 2005).
AIZOACEAE	*Conicosia pugioniformis*	Least Concern, Schedule 4 (PNCO) Least Concern/ Schedule 4 (PNCO)	Not Evaluated	Confirmed	Stable population
	Lampranthus stipulaceus		Not Evaluated	Confirmed	Automated status of Least Concern assigned to this species (Foden and Potter, 2005a).
	Mesembryanthemum crystallinum		Not Evaluated	Confirmed	Widespread species throughout the Western, Eastern and Northern Cape (Burgoyne, 2006).
	Ruschia sp.		Not Evaluated	Confirmed	
	Tetragonia fruticosa		Not Evaluated	Confirmed	Automated status of Least Concern assigned to this species. Occurs within the Eastern Cape, Northern Cape and Western Cape (Foden and Potter, 2005b)
	Psilocaulon junceum		Not Evaluated	High	Stable population. Occurs in the Eastern Cape, Western Cape and Northern Cape (Burgoyne, 2006).
	Prenia pallens		Not Evaluated	High	Stable population. South African endemic occurring in the Western Cape (Burgoyne, 2006).
	Ruschia floribunda	DDT/ Schedule 4 (PNCO)	Not Evaluated	High	Restricted range (Raimonod and Cholo, 2008).
	Ruschia subpaniculata	Least Concern/ Schedule 4 (PNCO)	Not Evaluated	High	Assigned automated status of LC (Foden and Potter, 2005).
	Ruschia bipapillata	Vulnerable/ Schedule 4 (PNCO)	Not Evaluated	Medium	Range restricted species that occurs between Koekenaap and Klawer with an EOO of 2781km^2 and known from fewer than 10 locations (von Staden, 2016).
	Drosanthemum salicola	Least Concern/ Schedule 4 (PNCO)	Not Evaluated	High	Widespread and common along the west coast of South Africa but declining due to habitat loss (von Staden, 2020).

Family	*Scientific Name*	Species of special concern	IUCN Status	Probability of occurrence on site	Comment
	Antimima komkansica	Vulnerable/ Schedule 4 (PNCO)	Not Evaluated	High	Endemic, localised species with an EOO of 17km^2 recorded at three locations between Brand-se-Baai and Komkans (von Staden, 2015).
ASTERACEAE	*Helichrysum dunense*	Vulnerable	Not Evaluated	Low	Five known populations of this species occur along the coast of the Western Cape Province and Northern Cape Province, It has an EOO of 1500km^2 (Helme and Raimondo, 2006).
	Leucoptera nodosa	Vulnerable	Not Evaluated	High	This species occurs from lamberts Bay to Kleinsee and has an EOO of 2854 km^2. It is threatened by habitat loss as a result of mining, infrastructure developments and overgrazing (Helme and von Satden, 2013).
FABACEAE	*Aspalathus obtusata*	Vulnerable	Vulnerable	High	This species is associated with Rocky Quartz ridges and has a small EOO of 11 265 km^2 with small, isolated populations occurring in the Northern Cape and Western Cape Provinces and which are severely fragmented (Helme and von Staden, 2013).
	Otholobium incanum	Endangered	Not Evaluated	High	This species has a very small EOO of 565km^2 between the Groot Goerap River to Doringbaai nd is only known from three locations. It is thus a rare and localised species (Helme *et. al.* , 2012).
IRIDACEAE	*Babiana brachystachys*	Least Concern, Schedule 4 (PNCO)	Not Evaluated	High	Found between Lambert's Bay and Hondeklipbaai, this species is threatened by habitat loss from heavy mineral mining (Goldblatt and Victor, 2016).
POLYGALACEAE	*Muraltia obovata*	Vulnerable	Not Evaluated	Medium	This species occurs between Brand-se-Baai and Saldanha and is characterised by small subpopulations of less than 50 individuals and is associated with sandy flats. This species is threatened by habitat loss as a consequence of agricultural expansion and mining (Helme *et.al.*, 2013).
PROTEACEAE	*Leucospermum praemorsum*	Vulnerable	Near Threatened	Low	This species occurs from Namaqualand to the Cedarberg Mountains and

Family	*Scientific Name*	Species of special concern	IUCN Status	Probability of occurrence on site	Comment
					outside of the Fynbos biome, occurs on linear dune systems. It is threatened by habitat loss due to agriculture, overgrazing and too infrequent fires (Rebelo *et. al.*, 2005).
	Leucospermum rodolentum	Vulnerable	Near Threatened	Low	This species occurs along the west coast of South Africa from Namaqualand down to the Cape Peninsula and is associated with Sand Fynbos (Rebelo *et. al.*, 2005).
SCROPHULARIACEAE	*Manuela cinerea*	Vulnerable	Not Evaluated	Low	Known from less than 10 locations with an EOO of less than 600km^2. Threatened by habitat loss from heavy mineral mining sand and diamond mining (Helme and Raimondo, 2005).
	Sensitive Species 703	Vulnerable	Not Yet Evaluated	Low	This species is associated with quartzitic outcrops within the Knersvlakte Quartz Vygieveld, Southern Namaqualand Quartzite Klipkoppe Shrubland and the Namaqualand Sand Fynbos. It has a small EOO of 11000 km^2, only occurs at 5-10 locations and is declining due to mining activities in the area.
	Sensitive species 91	Critically Endangered	Not Yet Evaluated	Medium	This species is extremely range restricted with a small EOO of 254km^2 occurring west of Koekenaap (von Staden and Helme, 2015).
	Sensitive Species 276	Near Threatened/ Schedule 4 (PNCO)	Not Evaluated	Medium	Range restricted species with an EOO of 4027km^2 and an Area of Occupancy of 100km^2. This species occurs in the Western Cape and Northern Cape and occurs in the Knersvlakte and southern Namaqualand coast around Kotzesrus and Lutzville. (Klak *et. al.* , 2018.).
	Sensitive Species 345	Vulnerable	Not Evaluated	High	This species occurs in the Northern and Western Cape

Family	*Scientific Name*	Species of special concern	IUCN Status	Probability of occurrence on site	Comment
					between Veldrif and Wallekraal. It has an EOO of 12 000km^2
	Sensitive Species 754	Endangered	Not Evaluated	Low	This species is found within Cape Seashore and Namaqualand Seashore vegetation and is associated with rock outcrops close to the seashore.

Antimima komkansica (Vulnerable)
This is a localised species with a small Extent of Occurrence (EOO) of 17km^2 occurring along the west coast in the north of the Western Cape Province. This species is associated with Namaqualand Strandveld and Namaqualand Heuweltjieveld, both of which occur within the assessed area. It is therefore highly likely that this species is present.

Sensitive Species 276 (Near Threatened)
This species has an Extent of Occurrence of 4027km^2 and an Area of Occupancy (AOO) of 100km^2. It is a localised species associated with Namaqualand Riviere, Knersvlakte Quartz Vygieveld and Southern Namaqualand Quartzite Klipkloppe Shrubland. It is associated with saline soils characterised by a cover of quartz pebbles. There was a small patch of Southern Namaqualand Quartzite Klipkloppe Shrubland in the north eastern corner showing quartzite present on the surface. It is therefore possible that this species is present within this area and the likelihood of occurrence has been rated as medium.

Babiana brachystachys (Least Concern)
Although listed as Least Concern, this species is threatened by heavy mineral sand mining and it is believed that two historical subpopulations from the Namaqua Sands operation are likely to be extinct. Since the powerline is located directly adjacent to this mine site, this species has been highlighted as a species of conservation concern despite its red list status of Least Concern.

This species is associated with Sandveld and Strandveld and given that the site visit confirmed that a large majority of the powerline is in Strandveld, there is a high probability of this species occurring on site. Given the survey was done in early summer, this species probably went undetected as it would not have been flowering at the time of the field survey.

Manulea cinerea (Vulnerable)
Munulea cinerea occurs in the Northern Cape and Western Cape Provinces from Lamberts Bay to the Orange River and has a small EOO of 600km^2. Less than 10 locations for this species are known (Helme and Raimondo, 2005).
This species is associated with coastal dunes occurring up to 500m inland in vegetation types such as Namaqualand Inland Duneveld, Namaqualand Coastal Duneveld, Namaqualand Strandveld and Richtersveld Coastal Duneveld. Given that this species typically occurs within a 500m belt from the coast, the likelihood of it occurring in the project site is low. The project site is located 10km inland.

Ruschia floribunda (DDT)

This species is listed as Data Deficient on the South African Red List. It is listed as a South African endemic occurring in the Western Cape. The distribution map indicates that it occurs along the west coast in the north of the province. With so little information available on its distribution and habitat preferences, and because there are historical records of collections of this species from the area, the precautionary approach is used and it is assumed that the likelihood of it occurring on site is relatively high.

***Ruschia bipapillata* (Vulnerable)**
This species is range restricted and known from fewer than 10 locations within the north western portion of the Western Cape Province. It prefers deep, sandy soils and is associated with Namaqualand Strandveld and Namaqualand Heuweltjie Strandveld which were identified to occur on site (von Staden, 2016). It is probable that this species may occur on site given that the habitat requirements are present. However, occurrence data on the GBIF website indicates these populations are found closer to Lutzville and information on the plant profile on the South African Red Data List indicates it occurs near Koekenaap and the Gifberg Mountains which are south of the site. As such, the likelihood of this species occurring on site is Medium.

***Helichrysum dunense* (Vulnerable)**
Helichrysum dunense has an EOO of 1500km^2 and occurs along the west coast of the Western Cape and Northern Cape and is associated with coastal calcareous dunes (Helme and Raimondo, 2006). The major habitats this species is associated with (Namaqualand Coastal Duneveld, Richtersveld Coastal Duneveld, Langebaan Dune Strandveld, Saldanha Flats Strandveld, Lambert's Bay Strandveld, Alexander Bay Coastal Duneveld, Cape Seashore Vegetation, Namaqualand Seashore Vegetation, Lower Gariep Alluvial Vegetation) were not found within the project area and as such the likelihood of this species occurring on site is Low.

***Leucoptera nodosa* (Vulnerable)**
Leucoptera nodosa is found along the west coast of South Africa in the Western Cape and Northern Cape Province between Lamberts Bay and Kleinsee and is associated with Coastal Dune Strandveld including Namaqualand Strandveld and Namaqualand Heuweltjie Strandveld (Helme and von Satden, 2013). It is known from less than 10 locations and is described as a rare and localised species that occurs in isolated subpopulations scattered throughout its EOO. This species is currently threatened by habitat loss as a consequence of mining, overgrazing and infrastructure development. Based on collection records for this species (GBIF, 2021) the likelihood of it occurring on site is high.

***Aspalathus obtusata* (Vulnerable)**
Aspalathus obtusata is found in small, fragmented populations in Namaqualand, north of Koingnaas to the Matsikamma Mountain and Lamberts Bay occurring in both the Western and Northern Cape Provinces. It has an EOO of 11 265 km^2 and is threatened by habitat loss due to mining and habitat degradation. This species is associated with rocky quartz ridges found in Namaqualand Strandveld, Namaqualand Heuweltjie Strandveld and Knersvlakte Quartz Vygieveld (vegetation types recorded on site). Although not recorded on site, there are records of this species on the GBIF website indicating that this species has been collected from the area near the mine site. The likelihood of this species occurring on site is therefore high.

***Otholobium incanum* (Endangered)**
This species is a rare and localised species with a small EOO of 565 km^2 and is only known from three locations between the Groot Goerap River (which the powerline crosses) and Dorinbaai (Helme *et. al.* 2012). This species is found in Namaqualand Inland Duneveld,

Namaqualand Strandveld and Knersvlakte Quartz Vygieveld on calcareous soils. There is a small patch of this soil that the western portion of the powerline crosses. It is located south of the river. It is likely that this species may occur on site but the pylons can be located to avoid these areas.

***Muraltia obovata* (Vulnerable)**
Muraltia obovata occurs in the Western and Northern Cape Provinces with a distribution that stretches from Brand-se-Baai to Saldanha (Helme *et. al.*, 2013). It characterised by small subpopulations of less than 50 individuals and the total population is estimated to be less than 5000 species. Habitat loss as a result of agricultural expansion and open cast mining poses a threat to this species. There is a record on iNaturalist (https://www.inaturalist.org/observations/11070149) indicating that this species has been found at the Namakwa Sands mine site directly adjacent to the project area. As such, it is highly likely that this species may occur within the sandy flats surrounding the project site but since the project site itself is located on ridges and hills, the likelihood of its occurrence is Medium.

***Lecospermum praemosum* (Vulnerable)**
Although this species occurs from Namaqualand to the Cedarberg Mountains, there are no records on either iNaturalist or GBIF website indicating records of this species in the vicinity of the project site. Additionally, no protea species were recorded during the field survey. As such the likelihood of this species occurring on site is low.

***Lecospermum rodolentum* (Vulnerable)**
This species occurs from Namaqualand down to the Cape Peninsula and is associated with Sand Fynbos on the west coast lowlands (Rebelo *et. al.,* 2005). The closest occurrence record for this species in relation to the site is 16km south. No evidence of fynbos was recorded on site nor were any proteoid species observed. The likelihood of this species being present on site is therefore low.

Sensitive Species 703
Since this species is associated with fynbos, which was not recorded at the site, and given that the closest record of occurrence to the site in north east of Nuwerus (approximately 50km away) the likelihood of this species occurring at the site is low.

Sensitive species 91
This species occurs in coastal sands and is known from a limited area between Brand-se-Baai and Olifants River. This species is known from two collection localities, one of which is located at the existing open cast mine near Brand-se-Baai (von Staden and Helme, 2015). This species occurs in Namaqualand Sand Fynbos, and although no fynbos vegetation types at the site were observed, given that the one known population was at the mine site, there is a medium likelihood that it will occur on site.

Sensitive Species 345
This species has an EOO of 12 000km^2 and occurs in West Coast Strandveld and Succulent Karoo Shrubland. It is associated with white and red Aeolian soils and occurs under karroid bushes. The species is known from five locations although more undiscovered populations are likely. This species has been recorded adjacent to the Namakwa Sands mine site and as such is highly likely to occur within the project site.

Sensitive Species 754

This species is associated with Cape Seashore vegetation and is found on rock outcrops close to the seashore. Based on its habitat preference it is very unlikely to occur within the project site.
Of the twenty-one additional species identified from the POSA website and the DEA screening report, and based on habitat preference and available collection records, thirteen have a high significance of occurring on site, two have a medium likelihood and six have a low likelihood of occurrence on site.

3.5.4 Alien Invasive Species Present on site

The site is typically intact and because it has been protected from grazing has a high species diversity. No alien invasive plant species were present within the site.

3.6 DESCRIPTION OF FAUNA

South Africa is a faunally diverse country, with approximately 1,663 terrestrial vertebrate faunal species of which 850 species are birds, 343 species are mammals, 350 species are reptiles and 120 species are amphibians spread across seven biomes and 122 million km². The Western Cape (WC) Province is home to approximately 153 reptile species, 55 amphibian species, 172 mammal species and 674 bird species (Turner, 2017).

3.7 AMPHIBIANS

3.7.1 Amphibians of the Western Cape

Of the 60 species of amphibians known to occur in the Western Cape ten (10) have a distribution which coincides with the project area (Appendix 2) (Turner & de Villiers, 2017; Du Preez & Carruthers, 2017; IUCN, 2020).

Of these two species have been recorded within the same QDS of the project area, namely the Cape River Frog (*Amietia fuscigula*) and Karoo Toad (*Vandijkophrynus gariepensis gariepensis*) and six within the same municipality as the project area, the Namaqua Rain Frog (*Breviceps namaquensis),* Raucous Toad (*Sclerophrys capensis*), Cape Sand Frog (*Tomopterna delalandii),* Cape Sand Toad *(Vandijkophrynus angusticeps)* and African Clawed Frog *(Xenopus laevis).* No amphibians were recorded during the field survey, given that the survey was conducted outside of the breeding season this is not unusual. Six of these amphibian species require permanent water for their breeding cycle, given these rivers are ephemeral it is unlikely these species will occur, if they do it will be along the water course. These include A. *delalandii, A. fuscigula, A. poyntoni, S. capensis, S. grayii* and *X. laevis.* Whereas although T. *delalandii, V. angusticeps and V. g. gariepensis* require water they can breed in temporary depressions which may form throughout the project area.

The WC supports 15 known threatened and near-threatened amphibian species (Turner & de Villiers, 2017, Minter *et al*., 2004). No threatened or near-threatened species have a distribution which includes the project area.

In total, 36 amphibian species are endemic to the Western Cape Province (Turner & de Villiers, 2017) and none of these have a distribution which includes the project area. However, one SA endemic is range restricted and has a distribution which includes the project area *B. namaquensis*. It is highly likely it will occur in the project area (Table 3-2*).* Although range restricted, they are not exclusively dependent on the project area, therefore, the loss of the developable area will unlikely impact on the viability of the population.

Table 3-2: Range restricted amphibian in relation to the project area (black star).

Species	Threat Status	Habitat	Distribution (IUCN, 2020).
Namaqua Rain Frog *(Breviceps namaquensis)*	**LC**	*It is a fossorial species that lives in scrub-covered sandy areas in the Succulent Karoo biome.* *It breeds by direct development, and is not associated with water.* (IUCN SSC ASG, 2013)	

3.8 REPTILES

Of the 153 reptile species that occur in the WC, 59 species have a distribution that coincides with the project area (Appendix 3) (IUCN, 2020; Branch, 1998; Bates *et al*. 2014; Turner & de Villers, 2017).

Approximately 21 of these species have been recorded in the Matzikama Municipality, 8 Lizard species, 11 snake species and two tortoise species (iNaturalist, 2020) (Appendix 3). Approximately 14 reptile species have been recorded within the same QDS as the project area, 10 lizards, one snake and three tortoises (ADU, 2020). During the field survey several Angulate Tortoise (*Chersina angulate*) shells were found across the project area and Lizard's observed onsite include the Giant Desert Lizard (*Meroles ctenodactylus*) and Knox's Desert Lizard (*Meroles knoxii*) (Plate 3-4).

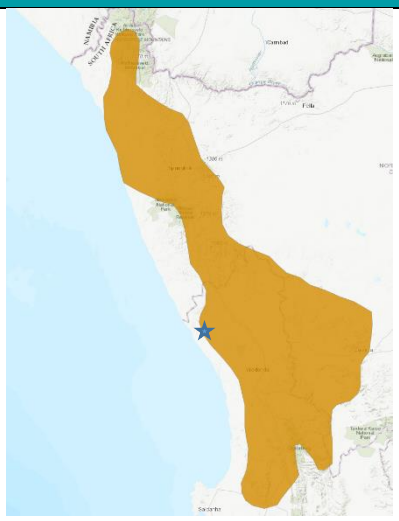
3.8.1 Reptiles of Conservation Concern

The WC Province supports 20 threatened or near threatened reptile species and 22 endemic reptile species (Bates *et al*., 2014; Turner & Villiers, 2017). The project area intersects the distribution of Sensitive Species 4 which is listed as Endangered and the Tent tortoise (*Psammobates tentorius*) listed as near-threatened. No WC Province endemics have a distribution which includes the project area. However four SA endemics have a distribution which includes the project area (Table 3-3).

Sensitive species 4 may occur in the rocky outcrop in the north east of the project area (Figure 3.9). *M. ctenodactylus* was confirmed onsite. Habitat is available for *S. sexlineatus* within the project area. Ruschia plants occur in the project area and thus habitat is available for *A. litoralis.*

Although range restricted, these species are not endemic to the project area and not exclusively dependent on it, therefore, the loss of the developable area will not impact on the viability of the population.

Table 3-3: Threatened and Range Restricted species with a distribution that includes the project area.

Species	Threat Status	Habitat	Distribution
Sensitive Species 4	EN	Occurs in Namaqualand succulent blomveld, heuweltjieveld, fynbos and strandveld shrub vegetation. It prefers rocky terrain, such as Namaqualand and Hardeveld granite koppies in the northern portion of its distribution and Sandveld and Cederberg sandstone koppies and rocky ridges in the south. Species 4 home range is 0.35 ha and only moves 30-50m a day. Although endangered it is considered well protected in South Africa. (Hofmeyr, et al., 2018)	

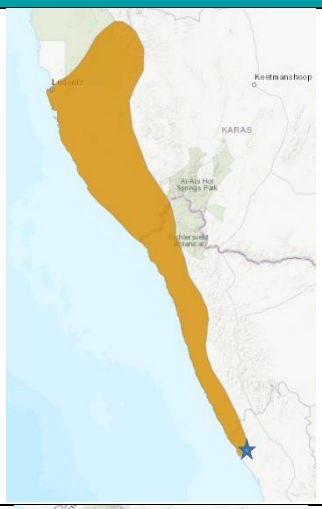
Species	Threat Status	Habitat	Distribution
Giant Desert Lizard (*Meroles ctenodactylus*)	LC	Inhabits sparsely vegetated areas with loose sand (Branch 1998). Recorded from well-vegetated dune slacks and dune hummocks as well as sandy flats (Branch 2013). Individuals forage during the day on the sand surface and shelter under the sand. (Tolley, et al., 2020)	
Coastal Legless Skink (*Acontias litoralis)*	LC	Fossorial species found in sparsely vegetated coastal dunes in sandy soils. Common at the base of *Ruschia crassisepala* under leaf litter. (Bauer & Conradie, 2018)	
Striped Dwarf Burrowing Skink (*Scelotes sexlineatus*)	LC	Inhabits sandy soils in Succulent Karoo and fynbos at elevations of 0-500. (Bauer, et al., 2018)	

Plate 3-4: Photos of reptiles recorded in the project area. (Top-Bottom): Angulate Tortoise shell, Giant Desert Lizard and Knox's Desert Lizard

3.9 MAMMALS

The WC is home to 172 mammal species, 68 of which have a distribution which includes the Project Area (Birss, 2017; Child *et al*., 2016, IUCN, 2020) (Appendix 4). Approximately 25 mammal species have been recorded within a 30km radius of the project area (MammalMAP, 2020; iNaturalist, 2020) (Appendix 4).

The mammals observed onsite during the field survey were predominantly domestic livestock, namely sheep. Indigenous mammals observed include three Bat-eared Fox, two Cape Grysbok, one Four-striped Grass Rat, Springbok, and evidences of Aardvark (spoor, burrow and feeding sites) (Plate 3-5).

3.9.1 Mammals of Conservation Concern

The Western Cape has 24 threatened mammal species and 13 near threatened species (Birss, 2017). Four (4) vulnerable species and three (3) Near-Threatened species have a distribution which includes the project area (Table 3-4).

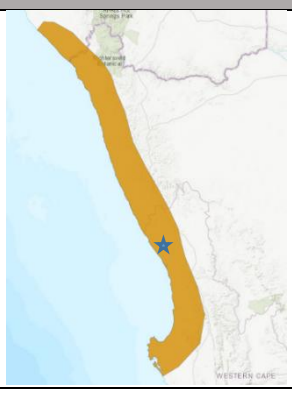
Table 3-4: Threatened Mammal Species with a distribution that includes the project area

Name	Threat Status	Habitat	Likelihood of occurrence
Grant's Golden Mole (*Eremitalpa granti granti*)	VU	Strandveld, Succulent Karoo and Namib Desert. Soft sands with clumps of the dune grass (*Aristida sabulicola*), Ostrich Grass (*Cladoraphis spinosa*) and Long Bushman Grass (*Stipagrostis ciliata*). Specializes on termites, but also consumes other invertebrates and small vertebrates. (Maree, 2015)	Possible The project area is predominantly shrubland interspersed with grass but may be more grass dominant in the wet season
Black Foot Cat (*Felis nigripes*)	VU	Karoo semi-desert with sparse shrub and tree cover. Predominantly ground-dwellers and during the day use dens in termite mounds or made by other animals (Sliwa, et al., 2016)	Possible The heuweltjieveld hosts an abundance of termitaria. It has been recorded in the NW of WC (pre-2000).
White-tailed Rat (*Mystromys albicaudatus*)	VU	Very little is known about this rare species in the wild and more research is required into their habitat requirements and ecology. They exhibit a preference for Dune Thicket on sloped clay soils and are often associated with calcrete soils within grasslands. In addition they are never found on soft, sandy substrate, rocks, wetlands or riverbanks. (Avenant, et al. 2019).	Unlikely even though it has been recorded in the NW of WC (pre-2000). The majority of the project area is covered in soft sand.
Leopard (*Panthera pardus*)	VU	Wide habitat tolerance and highly varied diet. Habitats include woodland, grassland savannah and mountain habitats but also	Unlikely. No records exist for the most NW corner of the WC. Generally restricted

Name	Threat Status	Habitat	Likelihood of occurrence
		occur widely in coastal scrub, shrubland and semidesert. (Swanepoel, et al. 2016)	to the Cederberg and other rocky mountain ranges in the WC.
African Clawless Otter (*Aonyx capensis)*	NT (CITES II)	African Clawless Otters are predominantly aquatic and seldom found far from water. They are also found in many seasonal or episodic rivers in the Karoo (South Africa). (Okes, et al., 2016).	Possible along the River System when the river is in flow.
Spectacled Dormouse (*Graphiurus ocularis*)	NT	Associated with rock piles, outcrops, crevices and stone kraals and occurs within the Cape sandstone formations. (Wilson, et al. 2016)	Unlikely. Nearest record is in the Cederberg
Grey Rhebok *(Pelea capreolus)*	NT	Rocky hills of mountain fynbos. Predominantly browsers, often feeding on ground-hugging forbs, and largely water independent. Western Cape, they are often observed on agricultural lands. (Taylor, et al., 2016).	Unlikely. Nearest record is in the Cederberg

Eight mammal species are endemic to the Western Cape and ten (10) are near endemic. Of these, one endemic and three near-endemic mammal species have distribution ranges that included through the project area (Table 3-5).

Table 3-5: Endemic and Near-endemics WC Mammals (Birss, 2017) with a distribution that includes the project area

Species	Threat Status	Habitat	Distribution
Endemic			
Cape Gerbil *Gerbilliscus afra*	LC	In Karoo and shrubland fringes in sandy soils. (Cassola, 2016)	
Near Endemic			
Grant's Golden Mole *Eremitalpa granti granti*	VU	See table above	

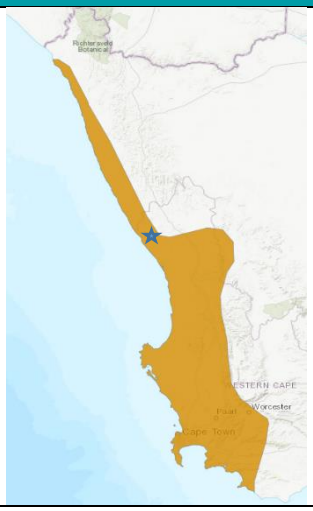
Species	Threat Status	Habitat	Distribution
Cape Golden Mole *Chrysochloris asiatica*	LC	Renosterveld, Fynbos and Strandveld Succulent Karoo Sandy soils. (Bronner, 2015)	
Cape Grysbok *Raphicerus melanotis*	LC	Fynbos Biome and extends into the Forest, Succulent Thicket and Succulent Karoo Biomes and marginally into the Nama-Karoo and Grassland Biomes. Dense cover is an important habitat requirement. (Palmer, et al., 2017)	

Plate 3-5: Evidence of mammals recorded in the project area. (Clockwise): Aardvark tracks and burrow , Small Antelope skull, Mongoose Skull and Mole-rat (likely Common).

4 SITE SENSITIVITY

4.1 CRITICAL BIODIVERSITY AREAS

The Western Cape Biodiversity Spatial Plan (WCBSP, 2017) maps biodiversity priority areas, including Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) which require safeguarding to ensure the persistence of biodiversity and ecosystems functioning, through a systematic conservation planning process.

CBA's are defined as "areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species" (WCBSP Handbook, 2017). The provided map distinguishes between CBA 1 areas, which are those that are likely to be in a natural condition, and CBA 2 areas, which are areas that are potentially degraded or represent secondary vegetation.

ESA's are "Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of Protected Areas (Pas) or CBAs and are often vital for delivering ecosystem services. They support landscape connectivity, encompass the ecological infrastructure from which ecosystem goods and services flow, and strengthen resilience to climate change." ESA's should be maintained in a functional and natural state although some habitat loss may be acceptable. As with the CBAs, a distinction is made between ESA 1 that are areas in a natural, near natural or moderately degraded condition and ESA 2 which are degraded and need to be restored.

According to the WCBSP (2017), the footprint of the powerline falls within *Other Natural Area*. However, the powerline does traverse a number of ESA 1 (Rivers) areas (Figure 4.1 below) and is adjacent to a few CBA1 areas. With careful placement of infrastructure, these areas can be avoided.

The desired management objectives of the affected biodiversity priority areas are tabulated below (Table 4.1).

Table 4-1: Biodiversity priority areas affected by the proposed 15km 400kV Juno-Gromis Powerline Deviation.

Category	Sensitivity Features	Desired Management Objective	Recommendation
CBA 1	Terrestrial Areas	Maintain in a natural or near natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	It is recommended that all infrastructure avoids these areas. It may be necessary to shift the north western portion of the line slightly so as to avoid the CBA that lies directly adjacent to it.
ESA 1	River	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and	It is recommended that the location of the towers are sited so as to avoid being located within these areas.

Category	Sensitivity Features	Desired Management Objective	Recommendation
		ecological functioning are not compromised.	
ONA	Natural Area	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land-uses, but some authorisation may still be required for high-impact land-uses.	It is recommended that existing roads are used where feasible and that laydown areas and new roads are kept to a minimum.

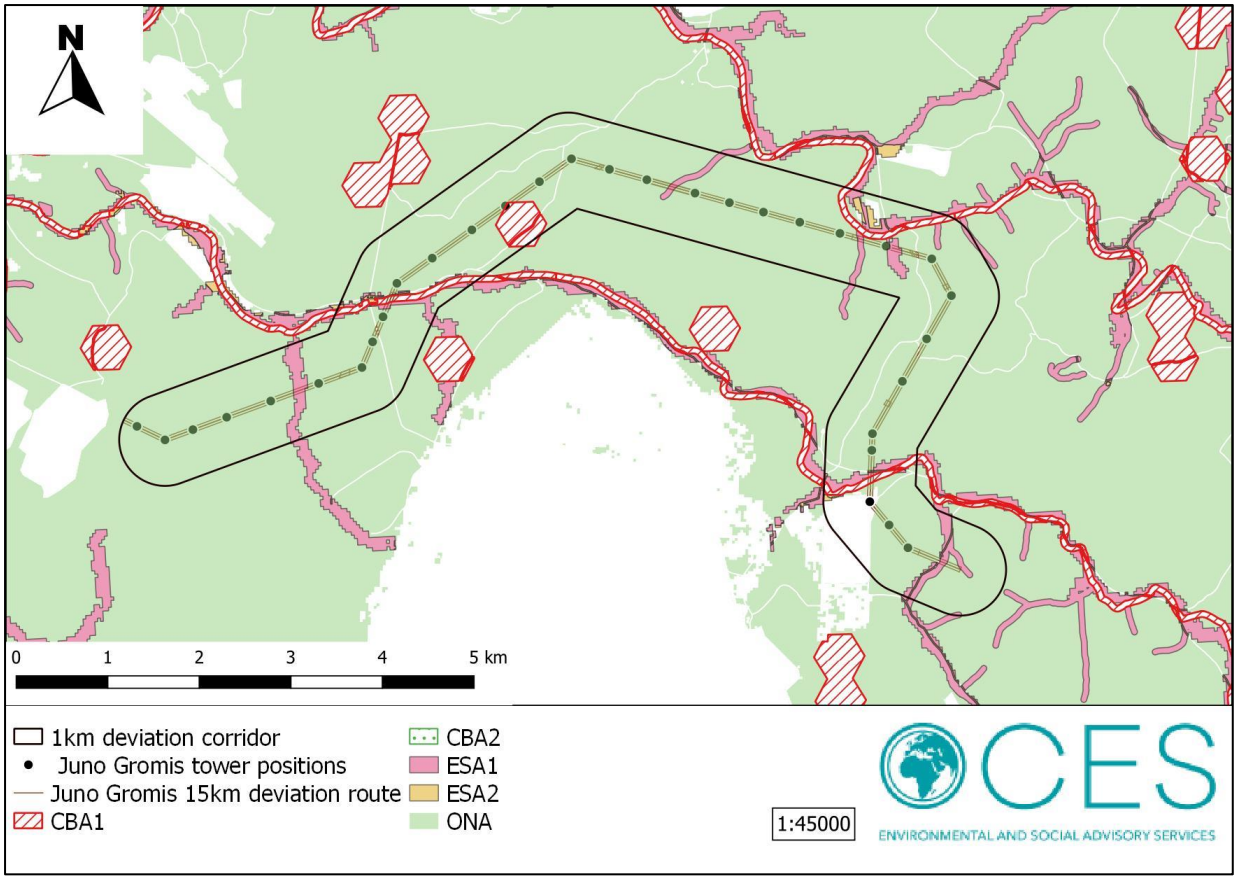


Figure 4-1: WCBSP (2017) Critical Biodiversity Areas (CBAs) located within the project area.

4.2 Ecosystem Threat Status

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. According to the NEMBA List of threatened ecosystems, the project does not occur within or near to a threatened ecosystem. These findings are supported by the NBA (2018) *Terrestrial ecosystem threat status assessment* (Skowno *et al.*, 2019) which confirmed that the ecosystems within and surrounding the project area are classified as Least Concern. The nearest threatened ecosystem identified by the NBA (2018) is Bokkeveld Sandstone Fynbos which is located approximately 81 km south-east of the project area.

4.3 PROTECTED AREAS

The National Protected Areas Expansion Strategy (NPAES, 2008) was developed to "achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change." The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and critical ecological process. The NPAES sets targets for expanding South Africa's protected area network, placing emphasis on those ecosystems that are least protected.

The site is not located within an NPAES Focus Area, formal or informal protected area (Figure 4.2). The nearest NPAES Focus Area (Knersvlakte Hantam NPAES Focus Area) is located approximately 38 km south-east of the study site. The site is not located within a protected area as identified by the South African Protect Areas Database (SAPAD, 2019) (Figure 5.9).

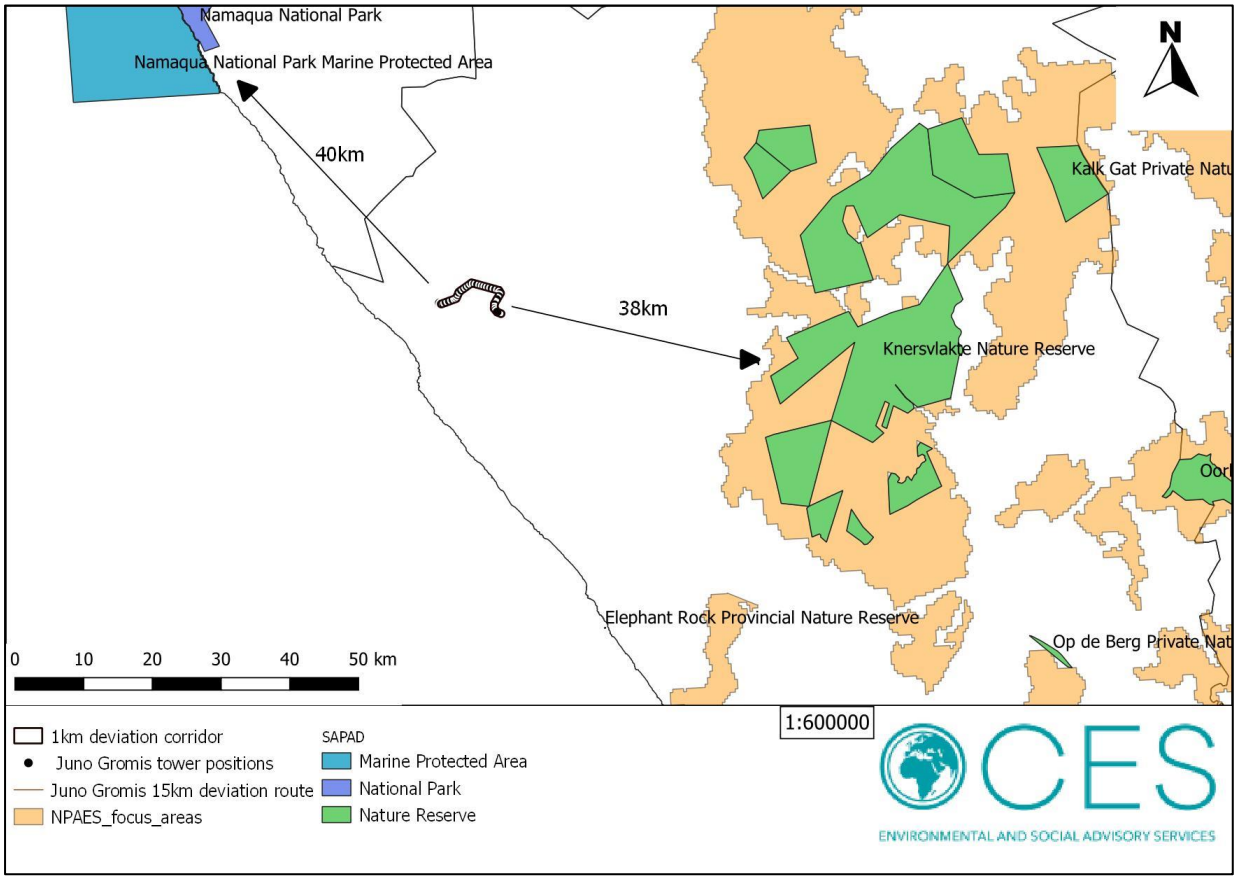


Figure 4-2: NPAES Focus Areas and Protected Areas.

4.4 SITE SENSITIVITY

The method used to assess site sensitivity has been described in section 2.5 above. Table 4.2 provides a summary of how each vegetation type was assessed.

Table 4-2: Evaluation of Site Ecological Importance (SEI) of habitat and SCC

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience	SEI
Namaqualand Strandveld	**High**	**High**	**Medium**	**HIGH**
	One critically endangered, one endangered and six vulnerable species of conservation concern with EOO of >10 km², that are either known from less than 10 locations or have a population of < 10 000 mature individuals remaining.	Good habitat connectivity with potentially functional ecological corridors. Only minor current negative impacts and good rehabilitation potential.	Succulent Karoo plants in Namaqualand typically have a short lifespan of <20 years (Jurgens *et. al.*, 1999 in Desmet, 2007) resulting in a high spatial and temporal dynamic in community structure and composition as a result of the high turnover of individuals. Additionally, species diversity in Namaqualand is not distributed evenly at either a local or regional scale with rocky substrates typically supporting a high species diversity than surrounding plains (Desmet and Cowling, 1999). The Namaqualand Strandveld observed at the site was not characterised by rocky outcrops but rather red aeolian sand dunes with little variation in plant species composition and structure. The areas that will be disturbed by the proposed powerline appear to be able to recover relatively quickly (5-10 years) given the high turnover and short lifespan of species in Namaqualand.	
Southern Namaqualand Quartzite Klipkloppe Shrubland	**Medium**	High	Low	**HIGH**
	>50% of receptor contains natural habitat with potential to support SCC.	Good habitat connectivity with potentially functional ecological corridors. Only minor current negative impacts and good rehabilitation potential.	Quartz rocky outcrops typically have a higher species diversity and higher number of SCC. Disturbance to these areas can result in the permanent loss of this habitat type resulting in the permanent loss of populations with restricted distributions associated with these habitat features. Habitat is therefore unlikely to recover fully after a relatively long period (>15 years). Species will have a low likelihood of returning to a site	

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience	SEI
			once the disturbance or impact has been removed.	
Namaqualand Riviere	This vegetation type has been assessed in the aquatic report.			
Knersvlakte Quartz Vygieland	High	Medium	Very Low	HIGH
	Three vulnerable and one Near Threatened species of conservation concern with EOO of >10 km², that are either known from less than 10 locations or have a population of < 10 000 mature individuals remaining.	Medium (>5ha but <20ha) of semi-intact area for any conservation status of ecosystem type.	The core of this vegetation type is found to the north and northwest of Vanrhynsdorp with smaller scattered patches elsewhere. Quartz fields in arid regions of south Africa represent edaphically defined special habitats with distinct vegetation units. This vegetation type carries one of the largest local densities of endemic species. More than 60 species from three genera have been found to be associated with this vegetation type. Disturbance to this habitat that cause significant change to the habitat type will result in the permanent loss of species found here. Species associated with this habitat are therefore unlikely to remain at the site or return to the site if the disturbance significantly alters the habitat type.	

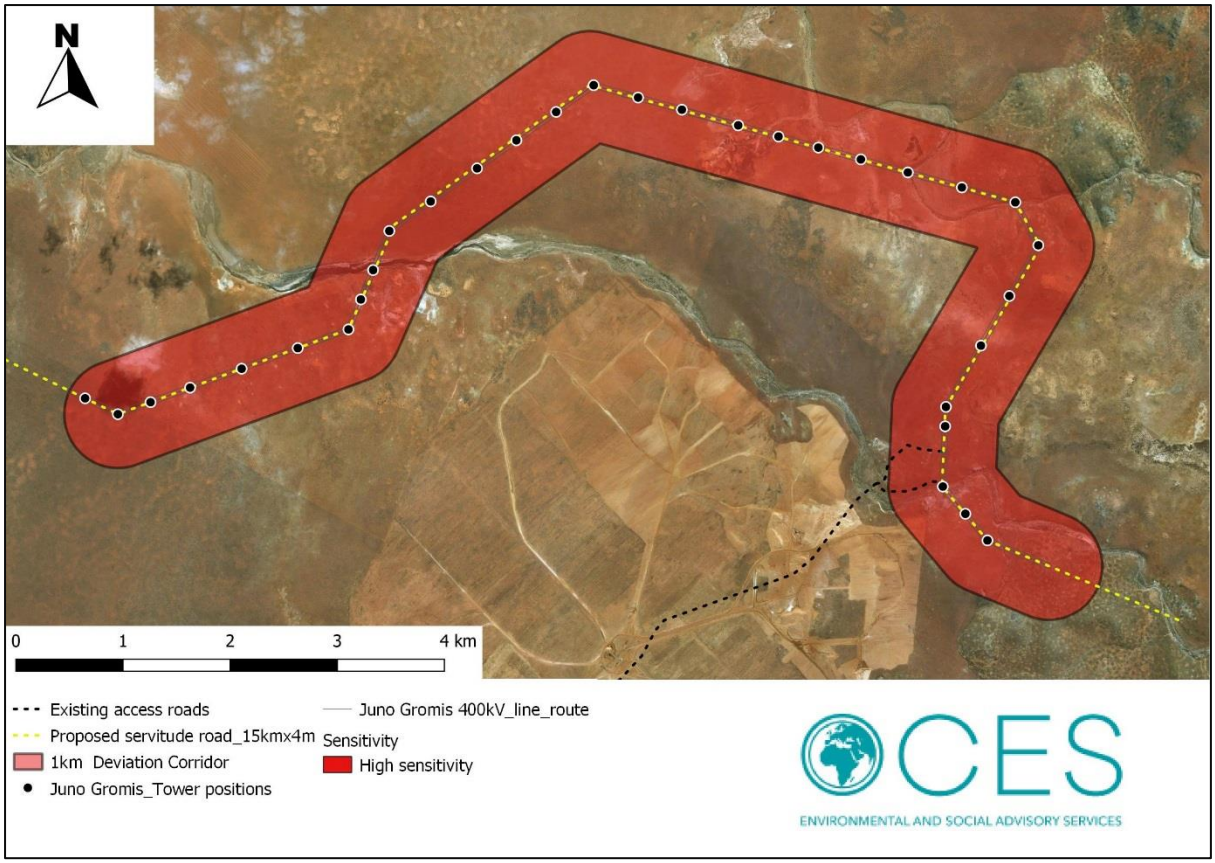


Figure 4-3: Sensitivity map showing areas of high sensitivity.

5 IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information in order to assess the impacts of the proposed 15km 400kV Juno-Gromis Powerline Deviation on the ecology of the area at the appropriate spatial and temporal scales. The impacts identified and described below have been assessed in terms of the criteria described in Appendix C of this report.

Direct impacts, cumulative impacts and the no-go alternative have been assessed for each of the impacts. For the cumulative impacts, the additive effect of the construction and operation in relation to the existing impacts associated with the mining activities has been assessed. For example, the cumulative impact of noise on faunal populations as a consequence of construction activities associated with the powerline is low as the mine is already having an impact.

5.1 IMPACT ASSESSMENT

Table 5-1: Assessment of impacts associated with the proposed 15km 400kV Juno-Gromis Powerline Deviation.

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
CONSTRUCTION PHASE														
Loss of Namaqualand Strandveld	Preferred Alternative	The clearing of land for the construction of the powerline and access road will result in the loss of up to 4.7 ha of Namaqualand Strandveld. The project will definitely result in the permanent loss of this vegetation type however, given that the loss will be limited to 4.7 ha, it is unlikely to impact on the extent and long-term conservation of the vegetation, which is listed as Least Threatened. The overall significance of the project activities at this site, provided the recommended mitigation measures are implemented, would be moderate negative.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	• Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. • Activities within 500m of a wetland must obtain the necessary Water Use License prior to the commencement of such activities. • Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). • Only indigenous species must be used for rehabilitation. • Lay down areas must not be located within any watercourses or drainage lines. • Employees must be prohibited from making open fires during the construction phase. • An alien invasive management plan for the site must be created. • An in-situ search and rescue plan must be developed and implemented for succulents and geophytes that will be impacted by the construction of the project site.	Moderate
	Cumulative	Portions of this vegetation type have already been lost due to mining activities that are currently occurring adjacent to the site as well as from grazing of livestock on neighbouring farms. However, the footprint of the powerline is relatively small compared to the adjacent mine. The additional loss of vegetation will therefore have a Low cumulative impact.	Negative	Direct	Moderate	Local	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	LOW	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above..	LOW
	No-Go	Given that the area has been protected from grazing by the mine fence and the vegetation is therefore mostly intact, if the project were not to go ahead, the vegetation would remain as is. The impact of the no-go alternative is therefore negligible.	N/A									Negligible	N/A	
Southern Namaqualand Quartzite Klipkloppe Shrubland	Preferred Alternative	The clearing of land for the construction of the powerline will result in the loss of up to 0.55ha of Southern Namaqualand Quartzite Klipkloppe Shrubland which occurs as a single confirmed patch along the north east of the powerline route. If the powerline infrastructure is located within this vegetation type, the impact will be of high significance. If the infrastructure is moved to avoid this area, the impact can be reduced to low or even negligible significance for this vegetation type.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource will be completely lost.	Difficult	High	• In addition to the mitigation measures listed above, this vegetation type should be avoided as far as possible and the infrastructure layout designed to avoid impacting this vegetation type. • No laydown areas should occur in this vegetation type. • Access and service roads must avoid this vegetation type where possible. • A botanical walkthrough of the final layout to ensure no populations of SCC is recommended. This must be done during the flowering season (July-August).	Moderate

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	Cumulative	Portions of this vegetation type have already been lost due to mining activities that are currently occurring adjacent to the site. However, the footprint of the powerline is relatively small compared to the adjacent mine and the powerline has been shifted so that the infrastructure avoids impacting this vegetation type. There will therefore be no cumulative impact on this vegetation type from this development.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource will be completely lost.	Difficult	High	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above, including the placement of unnecessary infrastructure within this vegetation type.	Moderate
	No-Go	Given that the area has been protected from grazing by the mine fence and the vegetation is therefore mostly intact, if the project were not to go ahead, the vegetation would remain as is. The impact of the no-go alternative is therefore negligible.	N/A									Negligible	N/A	
Loss of Namaqualand Riviere	Preferred Alternative	The powerline will traverse this vegetation type with the pylons occurring on either side of this vegetation type. Based on the project layout, the impact to this vegetation type will be limited. It is estimated that the access road will result in the loss of 0.14 ha of this vegetation type.	Negative	Direct	Slight	Localised	Permanent	Unlikely	Irreversible	Resource will be completely lost.	Achievable	Low	In addition to the mitigation measures listed above the following should be implemented: • The footprint of each pylon should be placed to avoid impacting this area. • No laydown areas must be located within this vegetation type.	Low
	Cumulative	Portions of this vegetation type have already been lost due to mining activities that are currently occurring adjacent to the site. However, the footprint of the powerline within this vegetation type is relatively small compared to the adjacent mine. The additional loss of vegetation will have a low cumulative impact.	Negative	Direct	Moderate	Regional	Permanent	Definite	Irreversible	Resource could be partially lost	Achievable	Low	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above.	Low
	No-Go	As per the above, under the no-go alternative the vegetation will remain unchanged and the current impacts are therefore negligible.	N/A									Negligible	N/A	
Loss of Knersvlakte Quartz Vygieland	Preferred Alternative	Two small patches of this vegetation type occur where the powerline crosses the river. One at the western crossing and a second at the eastern crossing. It is estimated that approximately 0.34 ha of vegetation will be permanently lost if the existing layout is implemented with an impact significance of high. However, if the powerline if shifted to the west at the western crossing and the pylons and access roads are placed outside of this vegetation type, this can be reduced to low.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource will be completely lost.	Difficult	High	• In addition to the mitigation measures listed above, this vegetation type should be listed as a no-go area and the infrastructure layout designed to avoid impacting this vegetation type. • Where this is not feasible, the design should ensure that the footprint of the infrastructure is limited. • A botanical walkthrough of the final layout to ensure no populations of SCC is recommended. This must be done during the flowering season (July-August).	Low

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	Cumulative	Portions of this vegetation type have already been lost due to mining activities that are currently occurring adjacent to the site as well as from grazing of livestock on neighbouring farms. However, the footprint of the powerline is relatively small compared to the adjacent mine. The impact will be of high significance. If the powerline is positioned to avoid impacting this vegetation type, the cumulative impact will be low.	Negative	Direct	Moderate	Regional	Permanent	Definite	Irreversible	Resource could be partially lost	Achievable	Moderate	If the powerline is positioned to avoid direct impacts on this vegetation type, the cumulative impact will be low.	Low
	No-Go	As per the above, under the no-go alternative the vegetation will remain unchanged and the current impacts are therefore negligible.	N/A									Negligible	N/A	
Loss of Plant Species of Conservation Concern	Preferred Alternative (If SCC present)	The permanent loss of plant species of conservation concern may occur. Some of these are restricted range species with less than ten known populations. The severity of the impact will be of very high significance if a population of one or more of these species is affected.	Negative	Direct	Very Severe	Regional	Permanent	Definite	Irreversible	Resource will be completely lost.	Difficult	Very High	• A botanical walkthrough of the powerline route, by an experienced botanist with knowledge of the SCC that have been identified as possibly occurring within the site, must be undertaken between July and August (when the plants are flowering). If restricted range SCC populations are found, the powerline must be shifted to avoid these populations.	Moderate
	Preferred Alternative (If SCC not present)	If no populations of restricted range SCC are present then the impact will be of moderate significance.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource will be completely lost.	Achievable	Moderate		Low
	Cumulative	If populations of SCC with restricted ranges are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be very high as some SCC have already been lost as a consequence of mining that is currently occurring in the region. This impact can be reduced if a thorough botanical walkthrough of the site is undertaken during the optimum flowering season.	Negative	Direct	Very Severe	Regional	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Very High	If the powerline is positioned to avoid direct impacts on this vegetation type, the cumulative impact will be low.	Low
	No-Go	As per the above, under the no-go alternative the vegetation will remain unchanged and the current impacts are therefore negligible.	N/A									Negligible	N/A	
Impact on faunal species of conservation concern	Preferred Alternative	Sensitive species 4 may occur at rocky outcrops throughout the project area.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	High	Habitat is available within the project are for Species 4 and it is therefore recommended that a 100m buffer is applied to all rocky outcrops.	Moderate

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	Cumulative	If populations of SCC with restricted ranges are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be very high as some SCC have already been lost as a consequence of mining that is currently occurring in the region.	Negative	Direct	Severe	Regional	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	High	If the powerline is positioned to avoid direct impacts on rocky outcrops, the cumulative impact will be low.	Low
	No-Go	As per the above, under the no-go alternative the vegetation will remain unchanged and the current impacts are therefore negligible.	N/A									Negligible	N/A	
Reduced Faunal Habitat along new access roads and at pylons footprints	Preferred Alternative	The project will definitely result in the temporary loss of habitat along new access roads and permanent habitat loss of the pylon footprint.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	High	• New access roads used for construction must be decommissioned and rehabilitated to the original habitat type. At the very least these must be reduced in size and roads consolidated.	Low
	Cumulative	Portions of habitat have already been lost due to mining activities that are currently occurring adjacent to the site as well as from grazing of livestock on neighbouring farms. The footprint of the powerline is relatively small compared to the adjacent mine.	Negative	Direct	Moderate	Regional	Permanent	Definite	Irreversible	Resource could be partially lost	Achievable	Moderate	• Powerline to avoid intact areas and place pylons in degraded areas. • Road network to be kept to a minimum	Moderate
	No-Go	Given that the area has been protected from grazing by the mine fence and the vegetation is therefore mostly intact, if the project were not to go ahead, the vegetation would remain as is. The impact of the no-go alternative is therefore negligible.	Negligible									N/A		
Disruption of Ecosystem Function and Process	Preferred Alternative	Fragmentation is one of the most important impacts on vegetation as it creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. It also impacts on fauna as it separates habitats and necessitates fauna having to move across exposed areas like roads to get to another section of their habitat or territory. This impact occurs when more and more areas are cleared, resulting in the isolation of functional ecosystems, which results in reduced biodiversity and reduced movement due to the absence of ecological corridors.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	• Rehabilitate laydown areas. • Use existing access roads and upgrade these where necessary	Moderate
	Cumulative	The powerline is located adjacent to the existing Namaqua Sands Mine which is already considered a highly fragmented environment. Since the footprint of the powerline is relatively small compared to the adjacent mine, the additional break in habitat caused by the construction of the powerline will be of moderate significance.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above.	Moderate

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	No-Go	Under the no go alternative, habitat fragmentation has already occurred and will continue to do so while mining activities take place at the adjacent site.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	N/A	N/A
Disturbance to faunal species and potential reduction in abundance and mortality of faunal species	Preferred Alternative	Faunal species will be disturbed during construction due to noise and vibrations of construction machinery. Faunal Species that vacate the immediate area may return following completion of construction or new individuals or species may inhabit the area. Construction machinery may cause unintentional mortalities of faunal species. Even with the mitigations applied the construction will still have an impact on faunal species.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	• Vehicles and machinery must meet best practice standards. • Staff and contractors' vehicles must comply with speed limits of 40km/hr • Project must start and be completed within the minimum timeframe. i.e. may not be started and left incomplete. • ECO to walk ahead of clearing construction machinery and move slow moving species e.g. tortoises out of harms way and into suitable neighbouring habitat. • Any faunal species that may die as a result of construction must be recorded (photographed, gps co-ord) and if somewhat intact preserved and donated to SANBI. • Any faunal species observed onsite must be recorded (photographed, gps co-ord) and loaded onto iNaturalist. • Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.	Moderate
	Cumulative	The adjacent mine has already caused an increase in ambient noise in the area. The additional noise generated from the construction of the powerline will be a short term impact and will be of moderate significance.	Negative	Direct	Moderate	Study Area	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	Moderate	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above.	Low
	No-Go	Under the no-go alternative, some faunal populations at the study site will still be impacted by noise from the adjacent mine.	Negative	Direct	Moderate	Study Area	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	Low	N/A	N/A
Establishment of Alien Plant Species	Preferred Alternative	No alien species were recorded at the sites. However, disruption of habitats often results in the infestation of alien species unless these are controlled. Should this happen the impact will be of high significance since the project site is of high sensitivity and the alien species could result in the displacement of indigenous species and possible local extinctions of SCC.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Achievable	High	The site must be checked regularly for the presence of alien invasive species. An alien invasive management plan must be incorporated into the EMPr.	Low
	Cumulative	Since no alien invasive species were noted on the adjacent farmlands there is currently no cumulative impact.	N/A									Negligible	N/A	N/A
	No-Go	Under the no-go alternative, the infestation of alien species is unlikely to occur. The significance of this impact will be negligible.	N/A									Negligible	N/A	N/A

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Operational Phase														
Infestation of Alien Plant Species	Preferred Alternative	If laydown areas and roads are not rehabilitated, these disturbed areas can become places for alien invasive species to become established and if left unmitigated these species can spread and establish themselves in intact vegetation resulting in the displacement of indigenous species and possible local extinctions of SCC.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Achievable	High	• The site must be checked regularly for the presence of alien invasive species. When alien invasive species are found, immediate action must be taken to remove them. • An alien invasive management plan must be incorporated into the EMPr. • The ECO must create a list with accompanying photographs of possible alien invasive species that could occur on site prior to construction. This photo guide must be used to determine if any alien invasive species are present.	Low
	Cumulative	Since no alien invasive species were noted on the adjacent farmlands there is currently no cumulative impact.	N/A									Negligible	• N/A	• N/A
	No-Go	Under the no-go alternative, the infestation of alien species is unlikely to occur. The significance of this impact will be negligible.	N/A									Negligible	• N/A	N/A
Decommissioning Phase														
Loss of Indigenous Vegetation	Preferred Alternative	The decommissioning of the powerline and removal of pylons will require laydown areas and will disrupt vegetation that has re-established around the areas that were disturbed during the construction phase. The loss of vegetation will be similar to the construction phase impacts.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	• Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. • Activities within 500m of a wetland must obtain the necessary Water Use License prior to the commencement of such activities. • Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). • Only indigenous species must be used for rehabilitation. • Lay down areas must not be located within any watercourses or drainage lines. • Employees must be prohibited from making open fires during the construction phase. • An alien invasive management plan for the site must be created. • An in-situ search and rescue plan must be developed and implemented for succulents and geophytes that will be impacted by the construction of the project site.	Moderate
	Cumulative	Portions of this vegetation type have already been lost due to mining activities that are currently occurring adjacent to the site as well as from grazing of livestock on neighbouring farms. However, the footprint of the powerline is relatively small compared to the adjacent mine. The additional loss of vegetation will have a Moderate cumulative impact.	Negative	Direct	Moderate	Regional	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. • However, it is imperative that the applicant implement the mitigation measures listed above..	Moderate
	No-Go	Given that the area has been protected from grazing by the mine fence and the vegetation is therefore mostly intact, if the project were not to go ahead, the vegetation would remain as is. The impact of the no-go alternative is therefore negligible.	N/A									Negligible	N/A	N/A

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Infestation of Alien Plant Species	Preferred Alternative	No alien species were recorded at the site. However, disruption of habitats often results in the infestation of alien species unless these are controlled. Should this happen the impact will be of high significance since the project site is of high sensitivity and the alien species could result in the displacement of indigenous species and possible local extinctions of SCC.	Negative	Direct	Severe	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Achievable	High	The site must be checked regularly for the presence of alien invasive species. • An alien invasive management plan must be incorporated into the EMPr.	Low
	Cumulative	Since no alien invasive species were noted on the adjacent farmlands there is currently no cumulative impact.	N/A									Negligible	N/A	N/A
	No-Go	Under the no-go alternative, the infestation of alien species is unlikely to occur. The significance of this impact will be negligible.	N/A									Negligible	N/A	N/A
Impacts of Noise on surrounding faunal populations	Preferred Alternative	Faunal species will be disturbed during construction due to noise and vibrations of construction machinery. Faunal Species that vacate the immediate area may return following completion of construction or new individuals or species may inhabit the area. Construction machinery may cause unintentional mortalities of faunal species. Even with the mitigations applied the construction will still have an impact on faunal species.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	Moderate	• Vehicles and machinery must meet best practice standards. • Staff and contractors' vehicles must comply with speed limits of 40km/hr • Project must start and be completed within the minimum timeframe. i.e. may not be started and left incomplete. • ECO to walk ahead of clearing construction machinery and move slow moving species e.g. tortoises out of harms way and into suitable neighbouring habitat. • Any faunal species that may die as a result of construction must be recorded (photographed, gps co-ord) and if somewhat intact preserved and donated to SANBI. • Any faunal species observed onsite must be recorded (photographed, gps co-ord) and loaded onto iNaturalist. • Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.	Moderate
	Cumulative	The adjacent mine has already caused an increase in ambient noise in the area. The additional noise generated from the construction of the powerline will be a short term impact and will be of moderate significance.	Negative	Direct	Low	Study Area	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	Low	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. • However, it is imperative that the applicant implement the mitigation measures listed above.	Low
	No-Go	Under the no-go alternative, some faunal populations at the study site will still be impacted by noise from the adjacent mine.	Negative	Direct	Moderate	Study Area	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	Low	• N/A	• N/A

6 IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The project infrastructure will result in the loss of approximately 5.7 ha of natural vegetation comprised of Namqualand Strandveld, Southern Namaqualand Quartzite Klipkloppe Shrubland, Namaqualand Riviere, Knersvlakte Quartz Vygieland.

Fifteen ecological impacts were identified for the project site; two were rated as very high, seven were rated as high, five as moderate and one as low (Figure 6-1). If mitigation measures are implemented these impacts will be reduced to ten moderate and five low impacts.

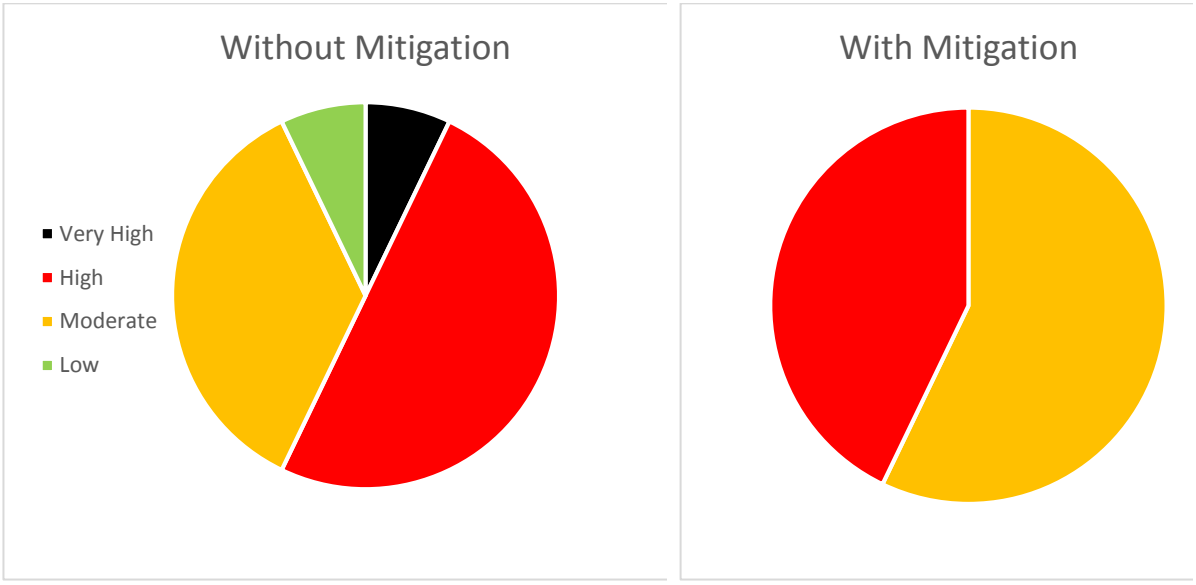


Figure 6-1: Pie charts summarising the number of high, moderate and low impacts before and after mitigation.

6.2 CONDITIONS OF EMPR, EA AND MONITORING

It is recommended that the following conditions are included in the Final EMPr as well as the conditions of the Environmental Authorisation (EA), if granted:

- All necessary permitting and authorisations must be obtained prior to the commencement of any construction activities;
- A suitably qualified ECO must be appointed prior to the commencement of the construction phase;
- The site must be ground truthed during the flowering season (July to August) by an experienced botanist to ensure that no populations of restricted range species will be lost. If it is found that there are populations that will be affected then the infrastructure must be moved to avoid these areas;
- A comprehensive Search and Rescue for fauna and flora should be conducted prior to vegetation clearance;

- All SCC must be relocated to nearest appropriate habitat;
- An Erosion Management Plan must be developed prior to the commencement of construction activities in order to mitigate the unnecessary loss of topsoil and runoff;
- An Alien Vegetation Management plan should be compiled (for implementation during the phases that follow the Planning and Design Phase);
- A comprehensive Rehabilitation Plan should be compiled and implemented. Only indigenous plant species typical of the local vegetation should be used for rehabilitation purposes.

6.3 Ecological Statement and Opinion of the Specialist

It is recommended that the footprint of the proposed development avoids the Southern Namaqualand Quartzite Klipkloppe Shrubland patches and the Knersvlakte Quartz Vygieland.

A ground-truthing survey must be undertaken between July and August (flowering season) to establish areas with high populations of SCC and ensure that these areas are avoided. Populations with species listed as Critically Endangered (CR) and Endangered (EN) must be avoided as no further loss must be permitted for these species.

Where the destruction of SCC (not listed as EN or CR) cannot be avoided, plant permits must be obtained, and an *in-situ* search and rescue program implemented for species that can successfully be relocated. The search and rescue must include both fauna and flora.

Furthermore, the development footprint of the proposed powerline and associated infrastructure (roads and laydown areas) must be demarcated to prevent any encroachment of construction or operational activities into surrounding natural areas. Minor location deviations from the proposed works is deemed acceptable but the footprint may not be made larger.

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APPENDIX 1: LIST OF PLANT SPECIES OBSERVED FROM THE PROJECT AREA.

Table A.1 Plant species observed at the site.

Species	SA RED DATA LIST	PNCO	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	Rocky Outcrop	T12	T13
AIZOACEAE																
Cleretum bruynsii	Least Concern	Schedule 4	x	x	x											
Conicosia pugioniformis	Least Concern	Schedule 4	x		x											
Lampranthus stipulaceus	Least Concern	Schedule 4														
Mesembryanthemum crystallinum	Least Concern	Schedule 4													x	
Ruschia sp.	Least Concern	Schedule 4	x	x						x			x			x
Tetragonia fruticosa	Least Concern	Schedule 4		x				x	x							
Antimimma sp.	Unknown													x	x	
AMARANTHACEAE																
Manochlamys albicans	Least Concern		x		x			x	x							
Boophone haemanthoides	Least Concern	Schedule 4														
ANACARDIACEAE																
Searsia glauca	Least Concern															x
Searsia longispina	Least Concern							x	x							
APOCYNACEAE																
Quaqua mammillaris	Least Concern	Schedule 4												x	x	
ASPARAGACEAE																
Asparagus capensis	Least Concern		x		x			x	x							x
Asparagus racemosus	Least Concern							x	x	x						
ASTERACEAE																
Crassothonna cylindrica	Least Concern		x	x				x	x	x	x	x		x	x	x
Didelta carnosa	Least Concern										x	x				
Didelta spinosa	Least Concern		x			x						x	x	x	x	
Eriocephalus africanus	Least Concern		x					x	x	x	x	x	x	x	x	x

Hollophyllum spinosum	Least Concern			x				x	x					x	x	
Oncosophin sufffruticosum	Least Concern					x	x	x	x							
Pteronia ovalifolia	Least Concern															
Helichrysum tricostatum	Near Threatened		x													
CRASSULACEAE																
Tylecodon wallichii	Least Concern					x	x							x	x	x
Crassulaceae	Unknown															
CYPERACEAE																
Cyperus sp.	Least Concern			x												
EUPHORBEACEAE																
Euphorbia burmannii	Least Concern														x	
GERANIACEAE																
Monsonia ciliata	Least Concern													x	x	
cf. Erodium ciutarium	Not Evaluated										x	x				
LAMIACEAE																
Salvia africana-lutea	Least Concern								x							
MALVACEAE																
Hermannia trifurca	Least Concern								x							
POACEAE																
Aristida congesta	Least Concern		x					x	x	x						x
cf. Ehrharta calycina	Least Concern					x	x	x	x				x			
SCROPHULARIACEAE																
Manuela cinerea	Vulnerable		x	x	x	x	x						x			x
SOLANACEAE																
Lycium cineruem	Least Concern							x	x							
Zygophyllaceae																
Zygophyllum cordifolium	Least Concern			x		x	x		x							x
Zygophyllum morgsana	Least Concern		x	x	x	x	x	x	x	x	x	x	x	x	x	

APPENDIX 2: LIST OF AMPHIBIAN SPECIES.

Scientific name	Common name	Red list category (Minter et al. 2004)	IUCN (Global)	ENDEMIC	Recorded within project area QDS 3118AA; 3117BB (ADU, 2020)		Recorded within Municipality (iNaturalist, 2020)
					# Records	Last record date	
Amietia delalandii	Common River Frog	LC	LC	-			
Amietia fuscigula	Cape River Frog	LC	LC	Endemic - SA	1	2000/09/07	Matzikama, 12/7/2007
Amietia poyntoni	Poyton's River Frog		LC	-			
Breviceps namaquensis	Namaqua rain frog	LC	LC	Endemic - WC			Matzikama, August 10, 2018
Sclerophrys capensis	Raucous Toad	LC	LC	-			Matzikama, January 6, 2018
Strongylopus grayii	Clicking stream frog	LC	LC	-			
Tomopterna delalandii	Cape Sand Frog	LC	LC	Endemic - SA			Matzikama, 8/21/2020
Vandijkophrynus angusticeps	Cape Sand Toad	LC	LC	Endemic - SA			Matzikama, Aug 18, 2019
Vandijkophrynus gariepensis gariepensis	Karoo Toad	LC	LC	-	2	2000/09/07	
Xenopus laevis	African Clawed Frog	LC	LC	-			Matzikama, 11/17/2015

APPENDIX 3: LIST OF REPTILE SPECIES.

Scientific name	Common name	Protection Level	Red list category (SARCA, 2014)	IUCN (Global)	Recorded within project area QDS 3118AA; 3117BB (ADU, 2020)		Recorded within Matzikama Municipality
					# Records	Last record date	
Lizards							
Agamidae							
Agama atra	Southern Rock Agama	W	LC	LC			Oct 22, 2009
Agama hispida	Spiny Ground Agama	W	LC	LC	3	2020/10/14	5/31/2016
Chamaeleonidae							
Bradypodion occidentale	Namaqua Dwarf Chameleon	W	LC	LC	1	2020/10/14	11/18/2020
Gekkonidae							
Chondrodactylus angulifer angulifer	Common Giant Ground Gecko	W	LC	LC			1/6/2018
Pachydactylus austeni	Austen's Gecko	W	LC	LC			
Pachydactylus labialis	Western Cape Gecko	W	LC	LC			
Pachydactylus weberi	Weber's Gecko	W	LC	LC			
Cordylidae							
Karusasaurus polyzonus	Karoo Girdled Lizard	W	LC	LC	1		
Ouroborus cataphractus	Armadillo Girdled Lizard	W	LC	LC			
Gerrhosauridae							
Cordylosaurus subtessellatus	Dwarf Plated Lizard	W	LC	LC	1	2014/10/24	
Gerrhosaurus typicus	Karoo Plated Lizard	W	LC	LC			
Lacertidae							
Meroles knoxii	Knox's Desert Lizard	W	LC	LC	1	2012/07/10	
Meroles ctenodactylus	Giant Desert Lizard	W	LC	LC			
Nucras tessellata	Western Sandveld Lizard	W	LC	LC	1	2020/07/22	

Pedioplanis lineoocellata pulchella	Common Sand Lizard	W	LC		3	2016/11/14	
Pedioplanis namaquensis	Namaqua Sand Lizard	W	LC				10/15/2018
Scincidae							
Acontias litoralis	Coastal Legless Skink	W	LC	LC			
Scelotes caffer	Cape Dwarf Burrowing Skink	W	LC	LC			
Scelotes sexlineatus	Striped Dwarf Burrowing Skink	W	LC	LC	3	1982/10/08	
Trachylepis occidentalis	Western Three-striped Skink	W	LC				10/4/2020
Trachylepis sulcata sulcata	Western Rock Skink	W	LC		2	1981/06/15	7/26/2019
Trachylepis variegata	Variegated Skink	W	LC		1	1981/06/15	10/3/2020
Trachylepis capensis	Cape Skink	W	LC		2	1982/10/08	
Snakes							
Atractaspididae							
Colubridae							
Dasypeltis scabra	Rhombic Egg Eater	W	LC	LC			6/23/2020
Dispholidus typus typus	Common Boomslang	W	LC				11/18/2020
Elapidae							
Aspidelaps lubricus	Cape Coral Snake	W	LC				1/6/2018
Naja nivea	Cape Cobra	W	LC				10/11/2020
Lamprophiidae							
Boaedon capensis	Brown House Snake	W	LC				4/24/2020
Dipsina multimaculata	Dwarf Beaked snake	W	LC				11/5/2020
Homoroselaps lacteus	Spotted Harlequin Snake	W	LC	LC			6/18/2020
Lamprophis fiskii	Fisk's Snake	W	LC	LC			
Lamprophis guttatus	Spotted Rock Snake	W	LC	LC			
Prosymna sundevallii	Sundevall's Shovel-snout	W	LC	LC			
Psammophis crucifer	Montane Grass Snake	W	LC	LC			
Psammophis notostictus	Karoo Sand Snake	W	LC				11/14/2020
Psammophylax rhombeatus	Rhombic Skaapsteker	W	LC				11/14/2020
Pseudaspis cana	Mole Snake	W	LC				Nov 14, 2020

Typhlopidae							
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	W	LC		1	1982/10/08	
Viperidae							
Bitis schneideri	Namaqua Dwarf Adder	W	NT (2018)	LC (2019)			9/10/2015
Bitis arientans	Puff Adder	W	LC				
Bitis cornuta	Many-horned Adder	W	LC				
Tortoises and terrapins							
Chersina angulata	Angulate Tortoise	W	LC	LC	3	2014/09/24	Nov 19, 2020
Chersobius signatus	Speckled Dwarf Tortoise	W	EN (2018)	EN	3	2017/07/22	
Psammobates tentorius	Tent Tortoise	W	NT (2018)	NT	6	2020/10/14	Sep 15, 2015
Pelomedusa galeata	Southern African Helmeted Terrapin	W	LC	LC			

APPENDIX 4: LIST OF MAMMAL SPECIES.

Scientific name	Common name	National Threat Status (Child, et al., 2016)	Recorded within project QDS (MammalMap, 2020)		Recorded within Matzikama Muniipality
			# Records	Last record date	
Afrosoricida					
Chrysochloris asiatica	Cape Golden Mole	LC			
Eremitalpa granti granti	Grant's Golden Mole	VU			
Artiodactyla					
Antidorcas marsupialis	Springbok	LC			
Oreotragus oreotragus	Klipspringer	LC			10/2/2019
Pelea capreolus	Grey Rhebok	NT			
Raphicerus campestris	Steenbok	LC	5	2020/07/22	8/24/2020
Raphicerus melanotis	Cape Grysbok	LC			
Sylvicapra grimmia	Common Duiker	LC	1	2020/10/14	8/24/2020
Carnivora					
Aonyx capensis	African Clawless Otter	NT			
Atilax paludinosus	Marsh Mongoose	LC			
Canis mesomelas	Black-backed Jackal	LC			10/30/2018
Caracal caracal	Caracal	LC			
Cynictis penicillata	Yellow Mongoose	LC			
Felis nigripes	Black Foot Cat	VU			
Felis silvestris	Wild Cat	LC			
Genetta genetta	Common Genet	LC			
Herpestes ichneumon	Egyptian Mongoose	LC			
Herpestes pulverulentus	Cape Grey Mongoose	LC	1	1985/11/03	
Ictonyx striatus	Striped Polecat	LC			
Mellivora capensis	Honey Badger	LC			

Otocyon megalotis	Bat-eared Fox	LC	1	2020/06/13	8/8/2016
Panthera pardus	Leopard	VU			
Poecilogale albinucha	African Striped Weasel	LC			
Proteles cristata	Aardwolf	LC		1985/11/01	8/6/2016
Suricata suricatta	Meerkat	LC	2	2020/06/13	3/24/2016
Vulpes chama	Cape Fox	LC			
Chiroptera					
Eidolon helvum	African Straw-coloured Fruit-bat	LC			
Eptesicus hottentotus	Long-tailed house bat	LC			
Miniopterus natalensis	Natal Long-fingered Bat	LC			
Neoromicia capensis	Cape Bat	LC			
Nycteris thebaica	Cape Long-eared Bat	LC			
Rhinolophus capensis	Cape Horseshoe Bat	LC			
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC			
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC			
Eulipotyphla					
Crocidura cyanea	Reddish-gray Musk Shrew	LC	3	1985/11/03	
Crocidura flavescens	Greater red musk shrew	LC			
Myosorex varius	Forest Shrew	LC	3	1985/11/01	
Suncus varilla	Lesser dwarf shrew	LC			
Hyracoidea					
Procavia capensis	Rock Hyrax	LC	2	2020/07/22	10/31/2011
Lagomorpha					
Lepus capensis	Cape Hare	LC			9/30/2012
Lepus saxatilis	Cape Scrub Hare	LC			
Macroscelidea					
Elephantulus edwardii	Cape Rock Sengi	LC			7/8/2019
Macroscelides proboscideus	Karoo Round-eared Sengi	LC			

Primates					
Papio ursinus	Chacma Baboon	LC			3/22/2020
Rodentia					
Cryptomys hottentotus	African Mole Rat	LC	27	---	August 24, 2020
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	1		
Dendromus melanotis	Grey climbing mouse	LC			
Gerbilliscus afra	Cape Gerbil	LC			
Gerbilliscus paeba	Paeba Hairy-footed Gerbil	LC	1		
Gerbilliscus vallinus	Brush-tailed Hairy-footed Gerbil	LC	1		
Graphiurus ocularis	Spectacled Dormouse	NT			
Hystrix africaeaustralis	Cape Porcupine	LC	1	2014-09-24	9/23/2018
Malacothrix typica	Gerbil mouse	LC			
Micaelamys namaquensis	Namaqua Rock Rat	LC	1		
Mus minutoides	African pygmy mouse	LC			
Mus musculus	House Mouse				
Myomyscus verreauxii	Verreaux's Mouse	LC			
Mystromys albicaudatus	White-tailed Rat	VU			
Otomys irroratus	Southern African Vlei Rat	LC			
Otomys unisulcatus	Karoo Bush Rat	LC	1		
Parotomys brantsii	Brants's whistling rat	LC	2	2020/10/14	
Parotomys littledalei	Littledale's whistling rat	LC			
Petromyscus barbouri	Barbour's Rock Mouse	LC			
Rattus rattus	Roof Rat		1		
Rhabdomys pumilio	Xeric Four-striped Grass Rat	LC	2		
Tubulidentata					
Orycteropus afer	Aardvark	LC			8/24/2020

APPENDIX 5: IMPACT RATING SCALE

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardised rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements outlined in Appendix 1 of the EIA Regulations (2014 and subsequent 2017 amendments).

Impact significance pre-mitigation

This rating scale adopts six key factors to determine the overall significance of the impact prior to mitigation:

1. **Nature of impact:** Defines whether the impact has a negative or positive effect on the receiving environment.
2. **Type of impact:** Defines whether the impact has a direct, indirect or cumulative effect on the environment.
3. **Duration:** defines the relationship of the impact to temporal scales. The temporal scale defines the significance of the impact at various time scales as an indication of the duration of the impact. This may extend from the short-term (less than 5 years, equivalent to the construction phase) to permanent. Generally, the longer the impact occurs the greater the significance of any given impact.
4. **Extent:** describes the relationship of the impact to spatial scales i.e. the physical extent of the impact. This may extend from the local area to an impact that crosses international boundaries. The wider the spatial scale the impact extends, the more significant the impact is considered to be.
5. **Probability:** refers to the likelihood (risk or chance) of the impact occurring. While many impacts generally do occur, there is considerable uncertainty in terms of others. The scale varies from unlikely to definite, with the overall impact significance increasing as the likelihood increases.
6. **Severity or benefits:** the severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on the receiving environment. The severity of an impact can be evaluated prior and post mitigation to demonstrate the seriousness of the impact if it is not mitigated, as well as the effectiveness of the mitigation measures. The word 'mitigation' does not only refer to 'compensation', but also includes concepts of containment and remedy. For beneficial impacts, optimization refers to any measure that can enhance the benefits. Mitigation or optimisation should be practical, technically feasible and economically viable.

For each impact, the duration, extent and probability are ranked and assigned a score. These scores are combined and used to determine the overall impact significance prior to mitigation. They must then be considered against the severity rating to determine the overall significance of an activity. This is because the severity of the impact is far more important than the other three criteria. The overall significance is either negative or positive (Criterion 1) and direct, indirect or cumulative (Criterion 2).

Table D1: Evaluation Criteria.

Duration (Temporal Scale)		
Short term	*Less than 5 years*	
Medium term	*Between 5-20 years*	
Long term	*Between 20 and 40 years (a generation) and from a human perspective also permanent*	
Permanent	*Over 40 years and resulting in a permanent and lasting change that will always be there*	
Extent (Spatial Scale)		
Localised	*At localised scale and a few hectares in extent*	
Study Area	*The proposed site and its immediate environs*	
Regional	*District and Provincial level*	
National	*Country*	
International	*Internationally*	
Probability (Likelihood)		
Unlikely	*The likelihood of these impacts occurring is slight*	
May Occur	*The likelihood of these impacts occurring is possible*	
Probable	*The likelihood of these impacts occurring is probable*	
Definite	*The likelihood is that this impact will definitely occur*	
Severity Scale	*Severity*	*Benefit*
Very Severe/ Beneficial	An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
Severe/ Beneficial	Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these.	A long-term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
Moderately severe/Beneficial	Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
Slight	Medium- or short-term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and

		quicker, or some combination of these.
No effect/don't or can't know	The system(s) or party(ies) is not affected by the proposed development.	In certain cases, it may not be possible to determine the severity of an impact.

** In certain cases, it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know.*

Table D2: Description of Overall Significance Rating

Significance Rate		***Description***
Don't Know		*In certain cases, it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.*
NO SIGNIFICANCE		*There are no primary or secondary effects at all that are important to scientists or the public.*
LOW NEGATIVE	***LOW POSITIVE***	*Impacts of low significance are typically acceptable impacts for which mitigation is desirable but not essential. The impact by itself is insufficient, even in combination with other low impacts, to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural environment or on social systems.*
MODERATE NEGATIVE	**MODERATE POSITIVE**	*Impacts of moderate significance are impacts that require mitigation. The impact is insufficient by itself to prevent the implementation of the project but in conjunction with other impacts may prevent its implementation. These impacts will usually result in a negative medium to long-term effect on the natural environment or on social systems.*
HIGH NEGATIVE	***HIGH POSITIVE***	*Impacts that are rated as being high are serious impacts and may prevent the implementation of the project if no mitigation measures are implemented, or the impact is very difficult to mitigate. These impacts would be considered by society as constituting a major and usually long-term change to the environment or social systems and result in severe effects.*
VERY HIGH NEGATIVE	***VERY HIGH POSITIVE***	*Impacts that are rated as very high are very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.*

Impact significance post-mitigation

Once mitigation measures are proposed, the following three factors are then considered to determine the overall significance of the impact after mitigation.

1. **Reversibility Scale**: This scale defines the degree to which an environment can be returned to its original/partially original state.

2. **Irreplaceable loss Scale:** This scale defines the degree of loss which an impact may cause.

3. **Mitigation potential Scale:** This scale defines the degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table D3: Post-mitigation Evaluation Criteria

Reversibility	
Reversible	*The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.*
Irreversible	*The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.*
Irreplaceable loss	
Resource will not be lost	*The resource will not be lost/destroyed provided mitigation measures are implemented.*
Resource will be partly lost	*The resource will be partially destroyed even though mitigation measures are implemented.*
Resource will be lost	*The resource will be lost despite the implementation of mitigation measures.*
Mitigation potential	
Easily achievable	*The impact can be easily, effectively and cost effectively mitigated/reversed.*
Achievable	*The impact can be effectively mitigated/reversed without much difficulty or cost.*
Difficult	*The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.*
Very Difficult	*The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.*

The following assumptions and limitations are inherent in the rating methodology:

- Value Judgements: Although this scale attempts to provide a balance and rigor to assessing the significance of impacts, the evaluation relies heavily on the values of the person making the judgment.
- Cumulative Impacts: These affect the significance ranking of an impact because it considers the impact in terms of both on-site and off-site sources. This is particularly problematic in terms of impacts beyond the scope of the proposed development. For this reason, it is important to consider impacts in terms of their cumulative nature.
- Seasonality: Certain impacts will vary in significance based on seasonal change. Thus, it is difficult to provide a static assessment. Seasonality will need to be implicit in the temporal scale, with management measures being imposed accordingly (e.g. dust suppression measures being implemented during the dry season).