ESKOM KUDU ORANJEMUND POWERLINE DEVIATION

BOTANICAL IMPACT ASSESSMENT REPORT

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

BOTANICAL IMPACT ASSESSMENT REPORT

Prepared for:

Eskom

MEGAWATT PARK, SUNNINGHILL

SANDTON, 2146

Prepared by:

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

Cape Town

Also, in Cape Town, East London, Johannesburg, Port Elizabeth, Maputo (Mozambique) and Romsey (UK)

www.cesnet.co.za

In association with

Biodiversity Africa

30 Chudleigh Road,
Plumstead, Cape Town

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REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Draft Botanical Impact Assessment for the proposed Kudu Oranjemund Powerline Deviation near the Kudu Substation, Grootederm, Northern Cape		
Client Name & Address:	Eskom Holdings SOC Limited Megawatt Park Sunninghill Sandton 2146		
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Authors:	Ms Tarryn Martin	T.Martin@cesnet.co.za	
Reviewer:	Dr Ted Avis	t.avis@cesnet.co.za	
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CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES
Info@cesnet.co.za
www.cesnet.co.za

SPECIALIST TEAM

Ms Tarryn Martin: Botanical Specialist *(400018/14)*

Tarryn has over ten years of experience working as a botanist, nine of which are in the environmental sector. She has worked as a specialist and project manager on projects within South Africa, Mozambique, Lesotho, Zambia, Tanzania, Cameroon and Malawi.

She has extensive experience writing botanical impact assessments, critical habitat assessments, biodiversity management plans, biodiversity monitoring plans and Environmental Impact Assessments to International Standards, especially to those of the International Finance Corporation (IFC). Her experience includes working on large mining projects such as the Kenmare Heavy Minerals Mine, where she monitored forest health, undertook botanical impact assessments for their expansion projects and designed biodiversity management and monitoring plans. She has also project managed Environmental Impact Assessments for graphite mines in northern Mozambique and has a good understanding of the Mozambique Environmental legislation and processes.

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. Tarryn is a professional member of the South African Council for Natural Scientific Professionals (since 2014).

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 standards 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 developments, 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.

Contact Details: Botanical Specialist and Report Writer
Name Ms Tarryn Martin
Designation Director: Biodiversity Africa
E-mail **Tarryn@biodiversityafrica.com**

Contact Details: Report Reviewer and Quality Control
Name Dr Anthony Avis
Designation Managing Director
E-mail T.Avis@cesnet.co.za

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 & 2021; • 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
EIA	Environmental 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
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 iii
	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 1.3
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Chapter 5 and Chapter 7
	3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 6
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Chapter 6
	3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 6
	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);	Section 7.2
	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 7
	3.1.15	Any conditions to which this statement is subjected.	Section 7.2
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.		

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION AND PROJECT DESCRIPTION

1.1 PROJECT DESCRIPTION

Environmental Authorisation **(Ref: 14/12/16/3/3/2/977)** was granted in 2017 for two 400kV overhead powerlines to exit the Oranjemund substation and cross the Orange River into Nambia (Figure 2.1). Due to the high sensitivity of the area, the authorisation approved the specific tower locations. Subsequent to approval, the technology suggested in the Environmental Impact Assessment (EIA) has been changed to more modern structures with different dimensions to that in described in the original EIA conducted for the project.

The new design came about after a scope change in the then Kudu project where only a single 400 kV line was required. The design was re-evaluated and changed to make use of the newly developed 540 series structures to cross the river. These structures are larger, offering a larger wind span and electrical span allowing for the river to be crossed in a single span which is 975 m long.

The new technology has resulted in fewer structures but with a slightly larger footprint. The footprint of each tower has increased from 12.5m^2 to 17m^2 but the number of structures has decreased from 20 to 8 (only 6 of which falls in the borders of South Africa). The total footprint has therefore decreased from 250m^2 to 135m^2. There has also been a change from two lines down to one line.

Due to the highly sensitive nature of the site, the positions of the new towers needed to be assessed by a botanical specialist to determine the impact that an amendment to a change in type and number of towers would have on the vegetation at the site. This report must therefore be read as an appendix to the existing ecological report undertaken in 2016 by Enviroguard Ecological Services CC.

1.2 OBJECTIVES AND TERMS OF REFERENCE

The objectives of the botanical assessment are as follows:

- Undertake a field survey, visiting each pylon footprint to record the following information:
  - List of species present
  - Identification of species that are either protected (TOPS and PNCO) or considered threatened (CR, EN, VU) on the South African Red Data List
  - Assess the level of degradation/ecological status (i.e. intact, near natural, transformed)
  - Photograph of each site
- Assess the sensitivity of each site using the sensitivity analysis outlined in the Species Guideline Document (2020)
- For areas of moderate and high sensitivity, assess the impact of the proposed powerline towers on the plant species.
- Where necessary, provide mitigation measures to reduce the impact of the infrastructure on the botanical environment. This may include recommendations to shift the powerline.
- Provide a specialist statement/opinion

1.3 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.
- 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 winter/early spring when most plants were flowering. Although some late flowering species may have gone undetected, 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.

2 METHODOLOGY

2.1 THE ASSESSMENT

A site visit was undertaken on the 4th of August 2021 to assess the site-specific botanical sensitivity of each tower, identify potential sensitive ecosystems and identify plant species associated with each tower. The site visit also served to identify potential impacts of the proposed development (i.e. individual towers), and its impact on the surrounding botanical 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 July 2016 by Enviroguard Ecological Services CC.

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

- The South African Vegetation Map (Mucina and Rutherford, 2018);
- 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 NEM:BA (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

Each of the six towers that occur within South African borders as well as the tower where the line will deviate from was assessed. Each tower site was visited and the species within the site recorded. Eight compass point photographs at each location were taken and included in Appendix 2 of the report.

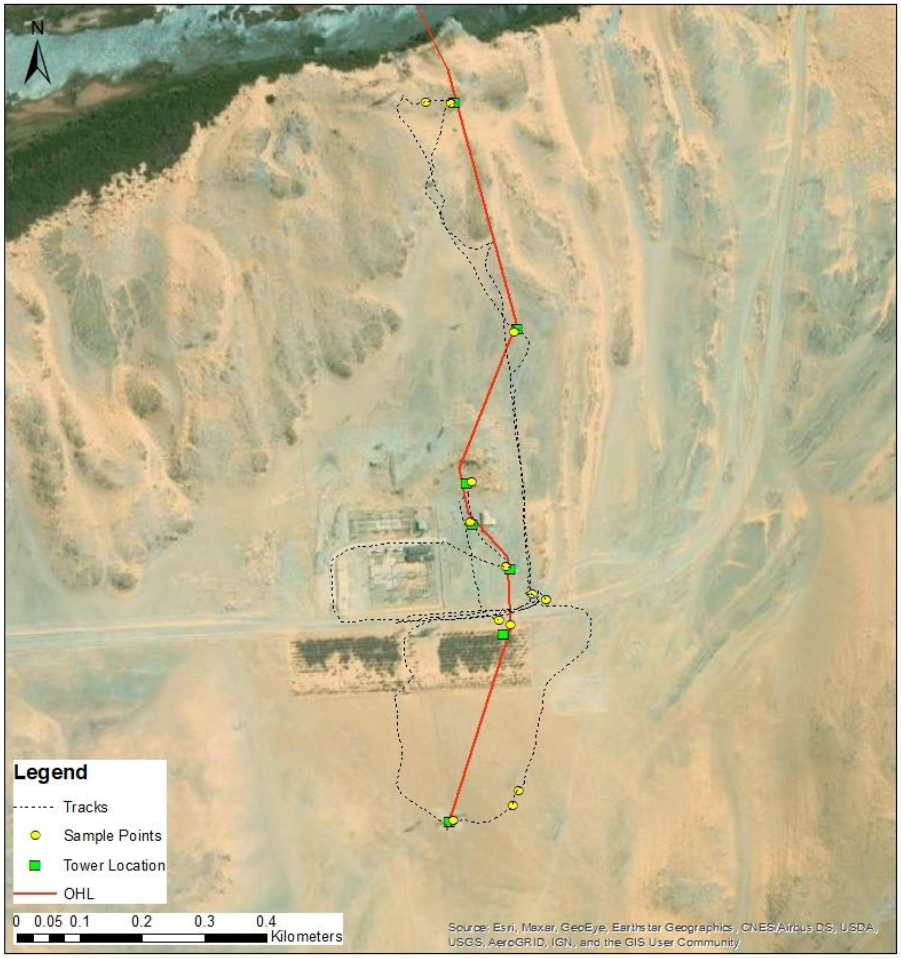

Figure 2-1: Map showing sample sites and tracks. Each tower location was sampled.

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 site.

2.5 SENSITIVITY ASSESSMENT

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of each tower. 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.

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 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 & 2021 amendments). The details of this rating scale are included in Appendix 1.

3 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

3.1 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

3.1.1 Climate

There are two climatic patterns associated with the Richtersveld: The warm temperate winter rainfall along the western border and the non-seasonal rainfall on the eastern side (Figure 3.1). The project site falls within the area that receives warm temperate winter rainfall between April and September (Nußbaum, 2003). This area is characterised by the presence of fog which moves off the Atlantic Ocean at night supplying vital precipitation for many plant species that grow in this arid environment (van Wyk and Smith, 2001).

The information provided is based on the climate data for Grootderm, Northern Cape Province, the nearest urban area in proximity to the project area. Average maximum daily temperatures in Grootderm reach a high of 33°C in February and a low of 6°C in July (Figure 3.1). Rainfall occurs throughout the year with the greatest rainfall occurring from April to June. The total annual rainfall is less than 40mm with April receiving the highest rainfall (7 mm) while January and February receive the lowest rainfall (1 mm respectively).

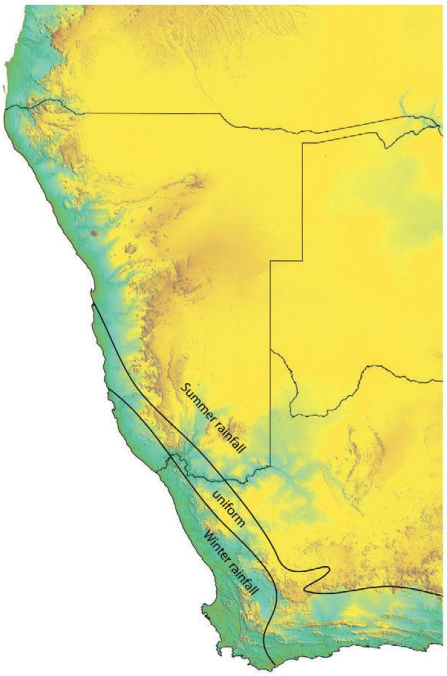

Figure 3.1: The two climatic zones found along the western coast of southern Africa. The project site fall within the winter rainfall area (Source: Nußbaum, 2003).

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.

3.1.3 Topography

The topography of the majority of the project area is relatively flat ranging from 66 to 70m above sea level. The northern section of the site (along the banks of the Orange River) slope down to the River and the elevation drops from 66m to 5 m above sea level (Figure 3.2).

3.1.4 Geology and Soils

The underlying geology of the site is comprised of the Gariep Supergroup which extends from Namibia into the Richtersveld and is characterised by a diversity of formations that include rocks such as conglomerate, sandstone, quartzite, shale, limestone, dolomite, schist, lava, volcanic breccia and tuff as well as intrusions of granite (van Wyk and Smith, 2001). Within the Gariep Supergroup is the Marmora Terrane within which the Grootderm Formation occurs (Frimmel, 2000). The Grootderm formation is predominantly volcanic and is comprised of submarine metabasalt, locally with metagabbro and serpentinite, hyaloclastite, agglomerate and tuff beds which are metamorphosed to greenschist.

Soils of the Richtersveld are typically sandy, shallow and stony and are weakly developed with low organic content (Nußbaum, 2003; van Wyk and Smith, 2001). Large areas are typically covered by aeolian sand.

The project site comprised of a combination of deep sands and rocky outcrops with medium to large boulders. This is discussed in further detail below.

Figure 3.2: Elevation profile of the study site from north to south

4 DESCRIPTION OF THE VEGETATION

The project site falls within the Gariep Centre of Endemism which is situated in the northwestern corner of the Northern Cape Province (van Wyk and Smith, 2001). It is bounded to the west by the Atlantic Ocean stretching down to Port Nolloth and then east to Steinkopf, Pofadder and Augrabies Falls and up to the Orange River Valley. The vegetation within this area is predominantly xerophytic semi-desert shrubland with a rich diversity of succulents with many endemic to the region.

4.1 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, three vegetation types are expected to occur at the proposed site (Figure 4.1).

4.1.1 Arid Estuarine Salt Marshes

This vegetation type occurs in the Northern and Western Cape at river mouths that enter the Atlantic Ocean, including the Orange River. Arid Estuarine Salt Marshes typically comprise of low succulent dwarf shrubland patches interspersed with grassy mats of creeping grass and patches of reed beds (Mucina and Rutherford, 2011).

This vegetation type is listed as Least Threatened with a conservation target of 24%.

The national vegetation map (Figure 4.1) and the field verification site visit (Section 4.2) confirmed that there are no towers situated within this vegetation type.

4.1.2 Lower Gariep Alluvial Vegetation

This vegetation type is confined to the Northern Cape Province occurring in the Orange River floodplain between Groblershoop and the mouth of the Orange River. Lower Gariep Alluvial Vegetation is characterised by flat alluvial terraces and riverine islands that support a mosaic

of riparian thickets, reed beds dominated by *Phragmites australis* and flooded grasslands and herblands (Mucina and Rutherford, 2011).

This vegetation type is listed as Endangered with a conservation target of 31% by Mucina and Rutherford (2011) but as Least Concern in the National Biodiversity Assessment (2018). This vegetation type is poorly protected and it is estimated that 65% remains.

Although Figure 4.1 shows that one tower occurs within this vegetation type, the field verification site visit confirmed that the vegetation type where this tower is located is actually Western Gariep Lowland Desert and not Lower Gariep Alluvial Vegetation (refer to Section 4.2).

4.1.3 Western Gariep Lowland Desert

This vegetation type occurs within the northwestern Richtersveld and includes the Annisvlakte pediment west of Kuboes and the hilly lava rock landscape near Arrisdrif, Brandkaros and Grootderm near the lower reaches of the Orange River (Mucina and Rutherford, 2011). Western Gariep Lowland Desert is characterised by sparse, low shrubland comprised of leaf- and stem-succulent chamaephytes. The vegetation varies from deep sands dominated by *Euphorbia gummifera* and *Ruschianthemum gigas* to shallower soils covered by grasslands to very dry and shallow sandvelds dominated by *Sarcocaulon patersonii* and finally rocky outcrops that are dominated by succulents.

This vegetation type is listed as Least Concern with a conservation target of 28%.

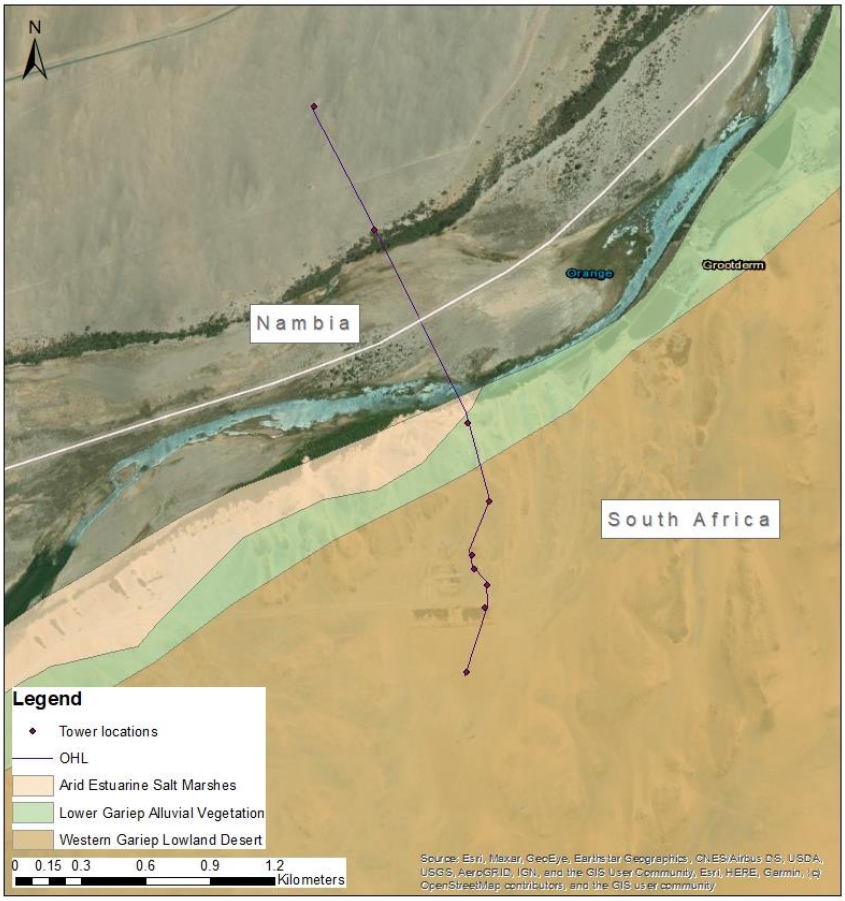

Figure 4.1: National vegetation map for the project site

4.2 VEGETATION TYPES RECORDED ON SITE

The 2021 field survey undertaken for the project site confirmed that all towers are located within the Western Gariep Lowland Desert. The 2016 report written by Enviroguard Ecological Services CC divide this vegetation type into two sub-units namely the “lowland section” and “rocky section”. The 2021 survey confirmed there is a marked difference between these two areas and has therefore kept the same terminology.

4.2.1 Lowland section

The lowland section occurs from Tower 1 (*GRO/ORA270)* to tower Tower 6 (*Border/ORA004)*. This section is predominantly flat and is sparsely vegetated with small pebbles and sand covering up to 85% of the site. Dominant species associated with this vegetation type include *Tetraena clavata, Salsola nollothensis, Didelta carnosa* and *Monsonia patersonii.*

It should be noted that Tower 2 (GRO/ORA271), Tower 3 (400kV Gantry 2) and Tower 4 (Obib 1 Gantry) all occur within a previously disturbed site with limited vegetation cover.

4.2.2 Rocky section

Only Tower 7 (*Border/ORA 003)* occurs within the “Rocky Section” which is characterised by the presence of medium to large boulders and a higher diversity of plant species. Dominant species recorded at this site include *Othonna furcata, Lycium cinereum, Tetraena clavata* and *Pelargonium crassicaule.* This area is near intact and has a high likelihood to support species of conservation concern.

4.3 FLORISTICS

4.3.1 Screening Tool: Sensitive Species

The Department of Forestry, Fisheries and the Environment (DFFE) pre-application screening tool recently included a category for species specific environmental assessment to ensure the inclusion of specific flora species in the environmental assessment process (SANBI, 2020).

The screening report illustrates that in terms of plant species sensitivity, the site is high sensitivity for one species and medium sensitivity for 28 species (Table 3.1).

Table 4.1: List of species that might potentially occur within the site based on the results of the screening tool.

Sensitivity	Species	Recorded on site
High	Sensitive species 58	-
Medium	Sensitive species 435	-
Medium	*Aridaria vespertina*	-
Medium	Sensitive species 282	-
Medium	*Astridia citrina*	-
Medium	*Astridia velutina*	*YES*
Medium	Sensitive species 1211	-
Medium	Sensitive species 1015	-
Medium	*Phyllopodium hispidulum*	-
Medium	*Phyllopodium namaense*	-
Medium	Sensitive species 827	-

Medium	Sensitive species 542	YES
Medium	Sensitive species 912	-
Medium	Sensitive species 327	-
Medium	Sensitive species 193	-
Medium	Sensitive species 407	-
Medium	Sensitive species 1110	-
Medium	*Cynanchum meyeri*	-
Medium	*Rhyssolobium dumosum*	-
Medium	Sensitive species 1090	-
Medium	Sensitive species 305	-
Medium	Sensitive species 58	-
Medium	Sensitive species 1187	-
Medium	Sensitive species 740	-
Medium	Sensitive species 1018	-
Medium	*Hexacyrtis dickiana*	-
Medium	*Calobota acanthoclada*	-
Medium	*Helichrysum dunense*	-
Medium	*Adromischus montium-klinghardtii*	-

4.3.2 Species of Conservation Concern

As previously mentioned, due to the highly sensitive nature of the site, the survey recorded the plant species present at each of the tower locations. Compass point photographs and a list of species at each location have been included in Appendix 2.

Species of conservation concern include species listed:

- On the Threatened and Protected Species (TOPS) list;
- Listed as critically endangered, endangered or vulnerable on the South African Red Data List or the IUCN red data list; and/or
- Are strict endemics to the region.

Two species of conservation concern were confirmed to occur within the project site:

Sensitive Species 542 (Critically Endangered B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v))
This species is listed as critically endangered on the South African Red Data List due to its restricted range within South Africa (EOO <10km^2) and Namibia coupled with ongoing habitat loss and degradation as a result of mining and overgrazing (von Staden and van Wyk, 2015). This species is only known from one location in South Africa and a few localities within Namibia and is associated with coastal plains. This species was recorded within 50-100m of Tower 6 (Border/ORA 004).

The SANBI guidelines for this Critically Endangered species is that "*no further loss of natural habitat should be permitted as the species is on the verge of extinction" (*SANBI, 2020).

***Astridia cf. velutina* (Vulnerable B1ab(iii,v))**
This species has an EOO of 1501km^2 and is only known from four localised locations within South Africa (von Staden, 2015). However, the Namibian population is stable and this species has therefore been categorised as Vulnerable rather than Endangered. This species is

threatened by habitat loss due to overgrazing. *Astridia cf velutina* was recorded on the rocky outcrop at Tower 7 (Border/ORA 003).

No other species listed in the screening report were observed within the footprints of the towers.

The SANBI guidelines for this Vulnerable species is that "*there is no further loss of habitat as this will increase the extinction risk of the species"* (SANBI, 2020).

4.3.3 Species requiring permits

In addition to the species of conservation concern listed above, the Northern Cape Nature Conservation Act (No. 9 of 2009) lists species that require permits for their removal. Based on the results of the survey, three species are listed as Schedule 1 (Specially Protected) species, eight species as Schedule 2 (Protected) species and eight species as Schedule 3 (Common indigenous) species (Table 4.2). Permits will be required for Schedule 1 and 2 species.

Table 4.2: Species recorded within the project site

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
AIZOACEAE	*Astridia cf. velutina*	Vulnerable	Schedule 2
AIZOACEAE	*Cheirodopsis verrucosa*	Least Concern	Schedule 2
AIZOACEAE	*Fenestraria rhopalophylla*	Least Concern	Schedule 2
AIZOACEAE	*Stoebaria gigas*	Least Concern	Schedule 2
AMARANTHACEAE	*Salsola nollothensis*	Least Concern	Schedule 3
APOCYNACEAE	*Larryleachia cf marlothii*	Least Concern	Schedule 2
ASPARAGACEAE	*Asparagus capensis*	Least Concern	Schedule 3
ASPHODELACEAE	*Aloe gariepensis*	Least Concern	Schedule 2
ASTERACEAE	*Curio sulcicalyx*	DDT	Schedule 3
ASTERACEAE	*Didelta carnosa*	Least Concern	Schedule 3
ASTERACEAE	*Osteospermum polycephalum*	Least Concern	Schedule 3
ASTERACEAE	*Othonna furcata*	Least Concern	Schedule 3
CASUARINACEAE	Casuarina sp.	Exotic	N/A
CRASSULACEAE	*Crassula elegens*	Least Concern	Schedule 2
EUPHORBIACEAE	*Euphorbia ephedroides*	Least Concern	Schedule 2
GERANIACEAE	*Monsonia patersonii*	Least Concern	Schedule 1
GERANIACEAE	*Pelargonium crassicaule*	Least Concern	Schedule 1
GERANIACEAE	*Sensitive Species 542*	Critically Endangered	Schedule 1
SOLANACEAE	*Lycium cinereum*	Least Concern	Schedule 3
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3

4.3.4 Alien Invasive Species Present on site

The site is typically intact and has a high species diversity. No alien invasive plant species were recorded within the site although exotic *Casuarina* sp. trees have been planted adjacent to the substation.

5 SITE SENSITIVITY

5.1 CRITICAL BIODIVERSITY AREAS

Critical Biodiversity Areas (CBA) maps have been designed to identify priority areas of biodiversity that are important for the persistence of viable populations of species and ecosystem types and therefore need protecting. These maps are used for strategic planning to ensure sustainable development within the natural environment (NBA, 2018).

Critical Biodiversity Areas are defined in the NBA (2018) as *"areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan"*

The location of the towers on the South African side of the project all fall within a CBA 1 (Figure 5.1). These areas are typically in a natural to near natural state. Since there is no handbook available for the Northern Cape that outlines the desired management objectives for CBA 1 areas, the Western Cape handbook (WCBSP Handbook, 2017) has been used. CBA1 areas should be maintained in a natural to near natural state with no further loss of natural habitat required. Only low impact land uses that are sensitive to the biodiversity of the area should be allowed.Powerlines fall within this category.

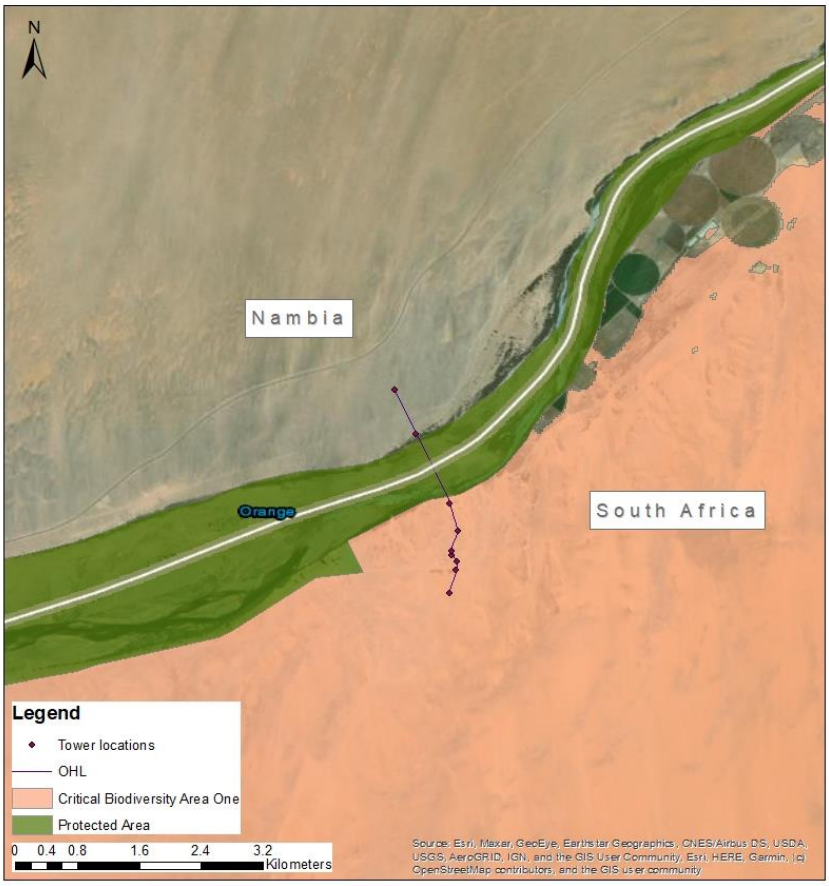

Figure 5.1: Critical Biodiversity Areas (CBAs) located within the project area (Holness and Oosthuysen, 2016).

5.2 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 NEM:BA List of threatened ecosystems, Tower 7 (Border/ORA 003) falls within the Endangered Ecosystem Lower Gariep Alluvial Vegetation (Figure 5.2). The NBA (2018), however, lists this vegetation type as Least Threatened (Skowno *et al*., 2019).

Although the map indicates that there is infrastructure within this vegetation type, the field survey found that the vegetation at Tower 7 (Border/ORA 003) was representative of Western Gariep Lowland Desert rather than Lower Gariep Alluvial Vegetation (Refer to section 4.1.2, 4.1.3 and 4.2). The project will therefore not impact on this ecosystem.

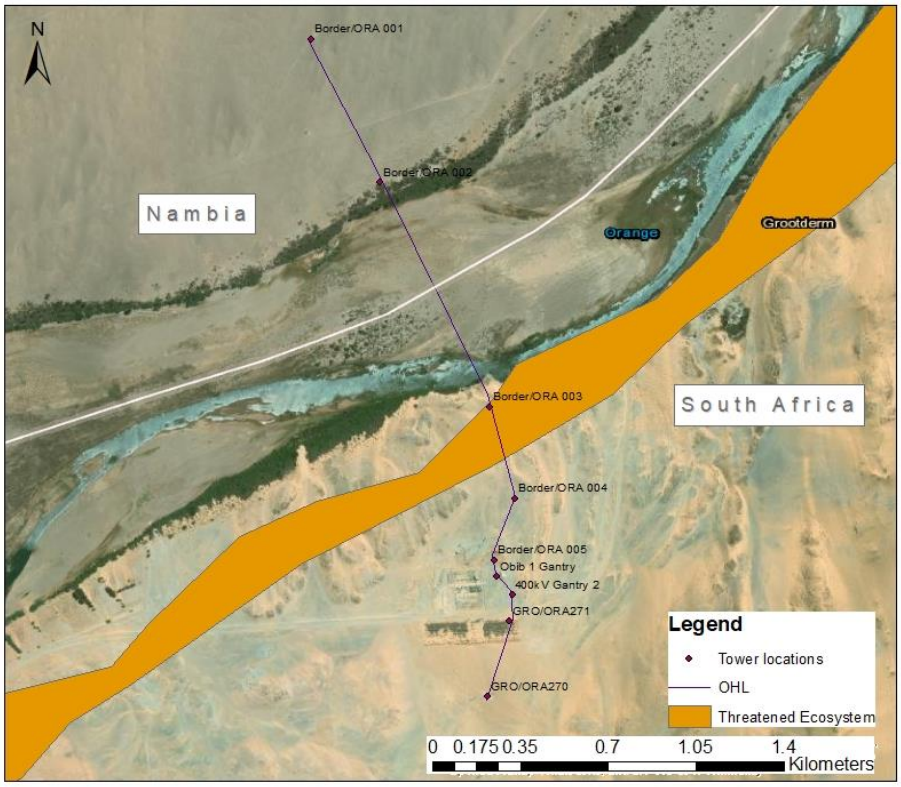

Figure 5.2: Threatened Ecosystems adjacent to the project infrastructure National List of Ecosystems (2011)

5.3 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 located adjacent to the Richtersveld NPAES Focus Area to the south (Figure 5.3).

Although the towers are not located within a protected area, the powerline does cross the Orange River Mouth Wetland which is designated as a protected area.

Figure 5.3: NPAES Focus Areas and Protected Areas found adjacent to the site.

5.4 SITE SENSITIVITY

The sensitivity for each tower was assessed rather than the general sensitivity of the site. By knowing the sensitivity at each of the tower locations, this allows the location of the towers to be shifted to reduce the impact of the project on sensitive areas.

Tower 1 (GRO/ORA270), which is already built, is located within an area of high sensitivity due to it having a low receptor resilience, good habitat connectivity with limited disturbance and its likelihood to support SCC (Table 5.1).

Towers 2 (GRO/ORA271), 3 (400kV Gantry 2) and 4 (Obib 1 Gantry) are located at sites that are degraded and transformed and thus have a low sensitivity.

Tower 5 (Border/ORA 005) has a medium sensitivity due its relatively high diversity, its likelihood to support SCC and its low potential for rehabilitation.

Tower 6 (Border/ORA 004) has been assigned a High sensitivity due to it having a low receptor resilience, good habitat connectivity with limited disturbance and its likelihood to support SCC. It must be noted that although not recorded at the tower itself, Sensitive Species 542 was recorded within 50-100m of the tower position. This species is Critically Endangered with an EOO of <10km2. The area where this population is located is considered to be of very high sensitivity and as such must be cordoned off and managed as a no-go area.

Tower 7 (Border/ORA 003) has been assigned a Very High sensitivity due to the presence of a vulnerable species (*Astridia velutina)*, the high diversity of species present on the rocky outcrop, the low rehabilitation potential of this habitat and the low likelihood of the current species returning to the site after the disturbance. If the tower is shifted west to the alternative site that was surveyed, this will lower the sensitivity from very high to high which is preferable. The alternative site is a better option as the conservation importance is lower than at the current site and the receptor resilience is slightly higher.

The method used to assess site sensitivity has been described in Section 2.5 above. Table 5.1 provides a summary of how each tower was assessed and Figure 5.4 illustrates the sensitivity at each site.

Table 5.1: Evaluation of Site Ecological Importance (SEI) of habitat and SCC for each tower

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience	SEI
Tower 1 GRO/ORA270 *This tower already exists. The line will deviate from this existing tower to GRO/ORA271*	Medium >50% of the receptor contains natural habitat that has the potential to support SCC	High Good habitat connectivity with functional ecological corridors and a regularly used road network between intact habitat patches. Some ecological impacts observed.	Low The project site is located within the semi-arid desert and is dominated by slow growing perennials. Studies in the Sonoran Desert have indicated that it took more than 50 years for perennial vegetation to recover from prolonged human disturbance (Guo, 2004). Habitat is unlikely to recover fully after a relatively long period (>15 years) and species have a low likelihood of returning to site after the disturbance.	**HIGH**
Tower 2 GRO/ORA271	Low The site has been transformed and planted with exotic trees. It is suspected that these trees were planted to stabilise the sand dune and prevent it blowing onto the substation. There are no confirmed SCC and it is unlikely that there are populations of SCC present as the area has been disturbed	Low Habitat has been transformed and rehabilitation potential is low however migrations across this area is still possible.	High Since this site has already been disturbed, returning it to its current state will be feasible. It is estimated that the habitat will return to its natural state within 5-10 years.	**VERY LOW**
Tower 3 400kV Gantry 2	Low This tower occurs within the substation	Low Habitat has been transformed	Very High Since this site is mostly transformed and degraded, receptor resilience is very high	**VERY LOW**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience	SEI
	area which has been cleared previously. As such species diversity was low and due to the disturbance at the site it is unlikely that this location will support populations of SCC.	and rehabilitation potential is low however migrations across this area is still possible.	as it is estimated that the current species composition will return within less than five years.	
Tower 4 Obib 1 Gantry	Very Low	Low	Very High	**VERY LOW**
	This site has been cleared previously and as such is transformed i.e. no natural habitat remains.	Habitat has been transformed and rehabilitation potential is low however migrations across this area is still possible.	Since this site is transformed, receptor resilience is very high as it is estimated that the current species composition will return within less than five years.	
Tower 5 Border/ORA 005	Low	Medium	Low	**MEDIUM**
	This hillock is representative of near intact vegetation. No SCC were recorded at this site.	Semi-intact area with evidence of some minor and major ecological impacts and moderate rehabilitation potential.	Habitat is unlikely to recover fully after a relatively long period (>15 years) and species have a low likelihood of returning to site after the disturbance.	
Tower 6 Border/ORA 004	Medium	Medium	Low	**HIGH**
	>50% of the receptor contains natural habitat that has the potential to support SCC.	Semi-intact area with evidence of some minor and major ecological impacts and moderate	The project site is located within the semi-arid desert and is dominated by slow growing perennials. Studies in the Sonoran Desert have indicated that it took more than 50 years for perennial vegetation to recover from prolonged human disturbance (Guo, 2004).	

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience	SEI
		rehabilitation potential.	Habitat is unlikely to recover fully after a relatively long period (>15 years) and species have a low likelihood of returning to site after the disturbance.	
Tower 7 Border/ORA 003	High	Medium	Very Low	VERY HIGH
	Confirmed occurrence of *Astridia velutina* (Vulnerable B1ab(iii,v)	Narrow corridors of good habitat connectivity with minor negative ecological impacts.	Habitat is unable to recover from major impacts and species are unlikely to return to site after the disturbance has ceased.	
ALTERNATIVE Tower 7 Border/ORA 003	Medium	Medium	Low	HIGH
	>50% of the receptor contains natural habitat that has the potential to support SCC but no SCC were recorded	Narrow corridors of good habitat connectivity with minor negative ecological impacts.	Habitat is unlikely to recover fully after a relatively long period (>15 years) and species have a low likelihood of returning to site after the disturbance.	

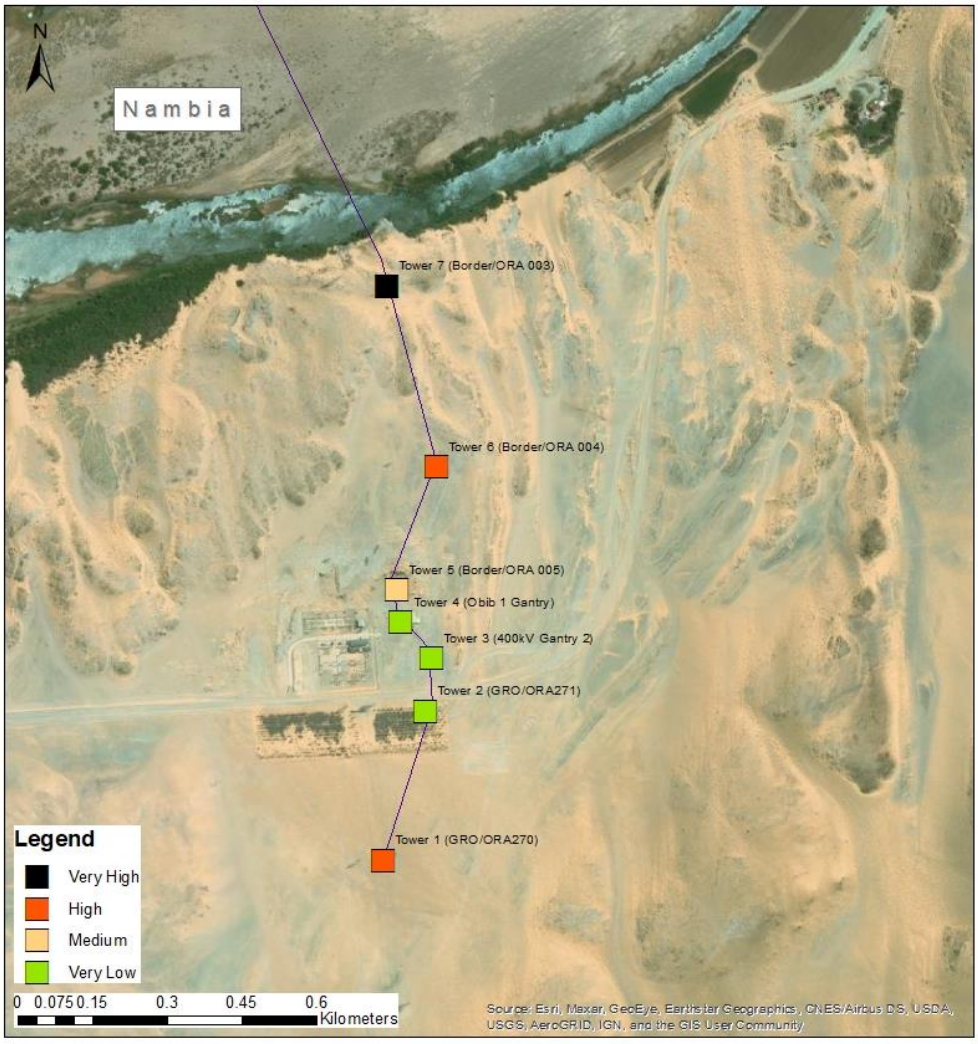

Figure 5.4: Sensitivity map showing areas of high sensitivity.

6 IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information in order to assess the impacts of the proposed Powerline Deviation on the vegetation and flora of the area at the appropriate spatial and temporal scales. The impacts identified and described below (Table 6.1) have been assessed in terms of the criteria described in Appendix 1 of this report.

6.1 IMPACT ASSESSMENT

Table 6-1: Assessment of impacts associated with the proposed 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 western Gariep Lowland Desert	Towers 2 (GRO/ORA271), 3 (400kV Gantry 2) and 4 (Obib 1 Gantry)	The clearing of land for the construction of the towers will result in the loss of approximately 51m² of degraded Western Gariep Lowland Desert. Since these areas are degraded and mostly transformed the impact at these sites will be of low significance.	Negative	Direct	Low	Localised	Permanent	Definite	Reversible	Resource could be partially lost	Difficult	LOW	• Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. • 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 be located within previously disturbed sites for Towers 2, 3 and 4. • Employees must be prohibited from making open fires during the construction phase. • Employees must be prohibited from collecting plants. It is recommended that spot checks of pockets and bags are done on a regular basis to ensure that no unlawful harvesting of plant species is occurring. • An alien invasive management plan for the site must be developed. • An in-situ search and rescue plan must be developed and implemented for succulents and geophytes that will be impacted by the construction. • Plant translocation to adjacent suitable habitat may only be done for species that are not range restricted and for populations that have not been quantified as regionally significant. • In such cases that this is not feasilble, any requirement for translocation must be discussed with DENC prior to translocation taking place.	LOW
	Tower 5 (Border/ORA 004)	The clearing of land for the construction of Tower 5 will result in the loss of approximately 17m² of degraded Western Gariep Lowland Desert. Since this area is of moderate sensitivity and shows evidence of disturbance the impact will be of moderate significance.	Negative	Direct	Moderate	Local	Permanent	Definite	Reversible	Resource could be partially lost	Difficult	MODERATE		MODERATE

Commented [TM1]: ESKOM: It is not clear whether there will be laydown areas and access roads for the construction phase. Please provide an estimate of the size of the laydown areas and length and width of the roads so that we can provide comment for this impact.

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
	Tower 6 (Border/ORA 004)	**Tower 6** Although tower six is located within an area of high sensitivity it is adjacent to a population of sensitive species 542 that was found to occur within 50-100m of the tower. The area where this population is located would be considered to be of Very High sensitivity. If not managed properly, the construction of this tower could have a very high negative impact on this species. However, if this population is demarcated as a no-go area and all construction activity avoids this area the impact can be reduced to moderate sensitivity.	Negative	Direct	Very High	Global	Permanent	Definite	Reversible	Resource will be completely lost	Difficult	VERY HIGH	• In addition to the mitigation measures listed above the following is recommended: • Demarcate the population of Sensitive species 542 and ensure that this is a no go area. • The ECO must mark this area off with hazard tape and ensure that no construction activities impact this population. This should be checked on a daily basis during the construction of Tower 6.	MODERATE-
	Tower 7 (Border/ORA 003)	The clearing of land for the construction of Tower 7 will result in the loss of approximately 17m^2 of Western Gariep Lowland Desert. This tower is located within an area designated as Very High Sensitivity due to the presence of a range restricted Vulnerable species. If the location of this tower is moved 30-40m west into an area of high sensitivity rather than very high sensitivity, the significance of the impact will also be reduced.	Negative	Direct	Very High	Regional	Permanent	Definite	Irreversible	Resource will be completely lost	Difficult	VERY HIGH-	• In addition to the mitigation measures recommended for the towers listed above, it is recommended that the location of Tower 7 is moved to the west by 30 to 40 meters to avoid impacting the rocky outcrop of the proposed site. • Further to this, it is advised that the rocky outcrop must be marked as a no-go area using hazard tape and the ECO must ensure that project activities do not impact this area.	MODERATE-
	Cumulative Impact	There are no known similar activities expected to occur within the vicinity of the project site and as such the cumulative impact is not applicable.	N/A									N/A	N/A	N/A
	No-Go Impact	If the project did not go ahead, the vegetation would remain intact and the no-go alternative would be negligible..	Negligible									Negligible	N/A	N/A
Loss of Plant Species of Conservation Concern	Towers 2 (GRO/ORA271), 3 (400kV Gantry 2) and 4 (Obib 1 Gantry), Tower 5 (Border/ORA 004)	No restricted range species or CR, EN or VU species were recorded at Towers 2, 3, 4 or 5. Loss of SCC will therefore be limited at these tower locations and the impact will therefore be low. It must be noted that Schedule 2 species as per the Northern Cape Nature Conservation Act (No. 9 of 2009) were recorded at these sites and these will require permits for their removal.	Negative	Direct	Low	Localised	Permanent	Definite	Reversible	Resource could be partially lost	Difficult	LOW	All mitigation measures listed under impact one must be implemented.	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
	Tower 6 (Border/ORA 004)	Sensitive Species 542 was found to occur within close proximity of Tower 6. Since this species is Critically Endangered and has a restricted range, the loss of this species will be of very high significance. However, if this area is cordoned off an managed appropriately so that this population is not impacted, the impact will be of low significance.	Negative	Direct	Very High	Global	Permanent	Definite	irreversible	Resource will be completely lost	Easily Achievable	VERY HIGH	The only way to reduce this impact is to ensure that the project avoids impacting on Sensitive Species 542. As such the following mitigation measures must be implemented at Tower 6: • Demarcate the population of Sensitive species 542 and ensure that this is a no-go area. • The ECO must mark this area off with hazard tape and ensure that no construction activities impact this population. This should be checked on a daily basis during the construction of Tower 6. • If contractors impact on this population, a fin must be issued and a biodiversity offset for the loss of this species implemented.	LOW-
	Tower 7 (Border/ORA 003)	*Astridia velutina* was found to occur at Tower 7, the loss of which would be of high significance for this species.	Negative	Direct	Very High	Regional	Permanent	Definite	irreversible	Resource will be completely lost	Difficult	VERY HIGH	This impact can be reduced to moderate if the location of the Tower 7 is shifted to the west by 30m and the following mitigation measures implemented: • It is recommended that the location of Tower 7 should be moved to the west by 30 to 40 meters to avoid impacting the rocky outcrop. • The rocky outcrop must be marked as a no-go area using hazard tape and the ECO must ensure that project activities do not impact this area.	MODERATE-
	Cumulative Impact	There are no known similar activities expected to occur within the vicinity of the project site and as such the cumulative impact is not applicable.	N/A									N/A	• N/A	N/A
	No-Go Impact	If the project did not go ahead, the vegetation would remain intact and the SCC would not be impacted. The impact would therefore be negligible.	Negligible									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
Disruption of Ecosystem Function and Process	All towers	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. 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. The construction of the towers in parallel to an existing line will have a short term impact on ecosystem function and process from a botanical perspective as functions such as seed dispersal will not be impacted in the long term by the placement of these structures. It is also likely that species will eventually return to the impacted area although the diversity will be less than what it was previously.	Negative	Direct	Moderate	Study Area	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	MODERATE-	• Rehabilitate laydown areas, impacted areas underneath each tower and construction roads. • Use existing access roads and upgrade these where necessary.	LOW-
	Cumulative Impact	The cumulative impact associated with the addition of 5 more towers to the existing project infrastructure will be of low significance since the towers are already located within an area where there is fragmentation.	Negative	Direct	Low	Localised	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	LOW-	• N/A	N/A
	No-Go Impact	If the project does not go ahead, the vegetation would remain intact and there will be limited impacts to ecosystem function and process.	Negligible									Negligible	• N/A	N/A
Operational Phase														
Infestation of Alien Plant Species	All Towers	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	Localised	Permanent	Definite	Reversible	Resource could be partially lost	Achievable	MODERATE-	• 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-
Decommissioning Phase														

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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
Loss of Indigenous Vegetation	All Towers	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. • 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 sensitive features such as watercourses, drainage lines or on rocky outcrops. • Employees must be prohibited from making open fires during the construction phase. • Employees must be prohibited from collecting any plants. • An alien invasive management plan for the site must be developed. • 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-
Infestation of Alien Plant Species	All Towers	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-

7 IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

Due to the highly sensitive nature of the project site, each individual tower was assessed and a sensitivity score assigned for each tower using the Species Environmental Assessment Guideline (2020).

Tower 1 (GRO/ORA 270) is where the line will deviate from the existing line and has already been constructed. The sensitivity at this site was determined to be high. Since this tower already exists, there will be no anticipated impacts at this site and no further assessment was undertaken.

Towers 2 (GRO/ORA 271), 3 (400kV Gantry 2) and 4 (Obib 1 Gantry) all occur within degraded areas that are mostly transformed. The sensitivity at these sites was to determined to be low. Impacts associated with the location of these towers were of moderate to low significance.

Tower 5 (Border/ORA 005) was determined to be of moderate sensitivity based on species assemblages and some degradation that has already occurred at this site. Impacts associated with the location of this tower were predominantly of moderate to low significance.

Tower 6 (Border/ORA 004) has been assigned a high sensitivity due to it having a low receptor resilience, good habitat connectivity with limited disturbance and its likelihood to support SCC. It must be noted that although not recorded at the tower itself, Sensitive Species 542 was recorded within 50-100m of the tower position. This species is Critically Endangered with an EOO of <10km2. The area where this population is located is considered to be of very high sensitivity and as such must be cordoned off and managed as a no-go area.

Tower 7 (Border/ORA 003) has been assigned a Very High sensitivity due to the presence of a vulnerable species (*Astridia velutina)*, the high diversity of species present on the rocky outcrop, the low rehabilitation potential of this habitat and the low likelihood of the current species returning to the site after the disturbance. If the tower is shifted west to the alternative site that was surveyed, this will lower the sensitivity from very high to high which is preferable. The alternative site is a better option as the conservation importance is lower than at the current site and the receptor resilience is slightly higher.

For towers 6 and 7, the following is recommended:

- Strict, daily monitoring by the ECO of Towers 6 and 7 during the construction phase to ensure that activities do not impact on these two populations of SCC;
- The implementation of the recommended mitigation measures; and
- A commitment from Eskom that they will avoid impacts on these populations.

It is recommended that if this population is negatively impacted as a direct result of project activities, DFFE (1) issue Eskom with a fine that is paid to the Richtersveld National Park to

be used for further conservation (2) require that ESKOM implement a biodiversity offset to offset the impact they have on this population.

Impacts associated with the construction, operation and decommissioning of the project were assessed. Without mitigation measures the project will result in four very high impacts, one high impact, four moderate impacts and two low impacts. These impacts can be reduced to five moderate impacts and six low impacts if the recommended mitigation measures are implemented.

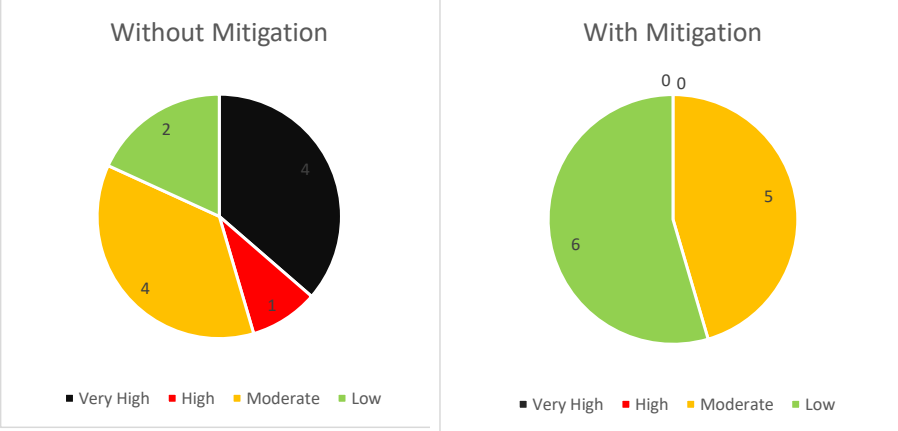

Figure 7-1: Pie charts summarising the number of very high, high, moderate and low impacts before and after mitigation.

7.2 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 ECO must monitor construction activities at Towers 6 and 7 on a daily basis when these two towers are being constructed to ensure that no activities impact on the two populations of SCC.
- The population of Senstivie Species 542 must be demarcated as a no-go area. No construction activities must occur within this area. If this population is impacted by a staff member or contractor, it is recommended that DFFE issue ESKOM with a fine that is paid to the Richtersveld National Park and that ESKOM is required to implement a biodiversity offset to offset the impact that occurred.
- Employees must be prohibited from harvesting/collecting plant material. If employees or contractors are found to be harvesting plant material or collecting plants (specifically succulents), it is recommended that they are issued with a fine by ESKOM and their employment immediately terminated.

- A comprehensive Search and Rescue for fauna and flora should be conducted prior to vegetation clearance;
- All Schedule 1 and 2 species 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.

7.3 Ecological Statement and Opinion of the Specialist

It is recommended that Tower 7 (Border/ ORA 003) is moved 30m to the west. This will reduce the impacts of these towers to acceptable levels.

Where the destruction of Schedule 1 and 2 species cannot be avoided, plant permits must be obtained, and an *in-situ* search and rescue program implemented for species that can successfully be relocated.

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.

The specialist is therefore of the opinion that it is acceptable for this project to proceed provided the recommended mitigation measures are implemented.

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APPENDIX 1: 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 & 2021 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).

APPENDIX 2: COMPASS POINT PHOTOGRAPHS OF EACH TOWER WITH ASSOCIATED SPECIES

Tower 1 (GRO/ORA270)

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
AIZOACEAE	*Fenestraria rhopalophylla*	Least Concern	Schedule 2
AIZOACEAE	*Cheirodopsis verrucosa*	Least Concern	Schedule 2
AMARANTHACEAE	*Salsola nollothensis*	Least Concern	Schedule 3
ASTERACEAE	*Didelta carnosa*	Least Concern	Schedule 3
GERANIACEAE	*Monsonia patersonii*	Least Concern	Schedule 1
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3

Tower 2 (GRO/ORA271)

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
CASUARINACEAE	Casuarina sp.	Exotic	N/A
GERANIACEAE	*Monsonia patersonii*	Least Concern	Schedule 1
AMARANTHACEAE	*Salsola nollothensis*	Least Concern	Schedule 3

Tower 3 (400kV Gantry 2)

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
AMARANTHACEAE	*Salsola nollothensis*	Least Concern	Schedule 3
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3

Tower 4 (Obib 1 Gantry)

Species Present

No plant species present

Tower 5 (Border/ORA 005)

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
AIZOACEAE	*Cheirodopsis verrucosa*	Least Concern	Schedule 2
AIZOACEAE	*Stoebaria gigas*	Least Concern	Schedule 2
AMARANTHACEAE	*Salsola nollothensis*	Least Concern	Schedule 3
EUPHORBIACEAE	*Euphorbia ephedroides*	Least Concern	Schedule 2
SOLANACEAE	*Lycium cinereum*	Least Concern	Schedule 3
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3

Tower 6 (Border/ORA 004)

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
AIZOACEAE	*Fenestraria rhopalophylla*	Least Concern	Schedule 2
ASTERACEAE	*Othonna furcata*	Least Concern	Schedule 3
GERANIACEAE	*Pelargonium sibthorpiifolium*	Critically Endangered	Schedule 1
GERANIACEAE	*Monsonia patersonii*	Least Concern	Schedule 1
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3

Tower 7 (Border/ORA 003)

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
ASPHODELACEAE	*Aloe gariepensis*	Least Concern	Schedule 2
AIZOACEAE	*Astridia cf. velutina*	Vulnerable	Schedule 2
APOCYNACEAE	*Larryleachia cf marlothii*	Least Concern	Schedule 2
ASPARAGACEAE	*Asparagus capensis*	Least Concern	Schedule 3
ASTERACEAE	*Othonna furcata*	Least Concern	Schedule 3
ASTERACEAE	*Curio sulcicalyx*	DDT	Schedule 3
ASTERACEAE	*Didelta carnosa*	Least Concern	Schedule 3
ASTERACEAE	*Osteospermum polycephalum*	Least Concern	Schedule 3
CRASSULACEAE	*Crassula elegens*	Least Concern	Schedule 2
GERANIACEAE	*Pelargonium crassicaule*	Least Concern	Schedule 1
SOLANACEAE	*Lycium cinereum*	Least Concern	Schedule 3
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3

Tower 7 (Border/ORA 003) ALTERNATIVE

Species Present

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
APOCYNACEAE	*Larryleachia cf marlothii*	Least Concern	Schedule 2
ASPARAGACEAE	*Asparagus capensis*	Least Concern	Schedule 3
ASTERACEAE	*Othonna furcata*	Least Concern	Schedule 3
ASTERACEAE	*Didelta carnosa*	Least Concern	Schedule 3
SOLANACEAE	*Lycium cinereum*	Least Concern	Schedule 3
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3
AIZOACEAE	*Cheirodopsis verrucosa*	Least Concern	Schedule 2

APPENDIX 3: SPECIES LIST

FAMILY	Species	Conservation Status (SA RED LIST)	PNCO
AIZOACEAE	*Astridia cf. velutina*	Vulnerable	Schedule 2
AIZOACEAE	*Cheirodopsis verrucosa*	Least Concern	Schedule 2
AIZOACEAE	*Fenestraria rhopalophylla*	Least Concern	Schedule 2
AIZOACEAE	*Stoebaria gigas*	Least Concern	Schedule 2
AMARANTHACEAE	*Salsola nollothensis*	Least Concern	Schedule 3
APOCYNACEAE	*Larryleachia cf marlothii*	Least Concern	Schedule 2
ASPARAGACEAE	*Asparagus capensis*	Least Concern	Schedule 3
ASPHODELACEAE	*Aloe gariepensis*	Least Concern	Schedule 2
ASTERACEAE	*Curio sulcicalyx*	DDT	Schedule 3
ASTERACEAE	*Didelta carnosa*	Least Concern	Schedule 3
ASTERACEAE	*Osteospermum polycephalum*	Least Concern	Schedule 3
ASTERACEAE	*Othonna furcata*	Least Concern	Schedule 3
CASUARINACEAE	Casuarina sp.	Exotic	N/A
CRASSULACEAE	*Crassula elegens*	Least Concern	Schedule 2
EUPHORBIACEAE	*Euphorbia ephedroides*	Least Concern	Schedule 2
GERANIACEAE	*Monsonia patersonii*	Least Concern	Schedule 1
GERANIACEAE	*Pelargonium crassicaule*	Least Concern	Schedule 1
GERANIACEAE	*Sensitive Species 542*	Critically Endangered	Schedule 1
SOLANACEAE	*Lycium cinereum*	Least Concern	Schedule 3
ZYGOPHYLLACEAE	*Tetraena clavata*	Least Concern	Schedule 3