ECOLOGICAL IMPACT ASSESSMENT REPORT

UMSOBOMVU SUBSTATION, CONCRETE TOWER MANUFACTURING FACILITIES AND TEMPORARY LAYDOWN AREA, SITUATED IN THE UMSOBOMVU LOCAL MUNICIPALITY (NORTHERN CAPE PROVINCE) AND THE INXUBA YETHEMBA LOCAL MUNICIPALITY (EASTERN CAPE PROVINCE)

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

UMSOBOMVU SUBSTATION, CONCRETE TOWER MANUFACTURING FACILITIES AND TEMPORARY LAYDOWN AREA, SITUATED IN THE UMSOBOMVU LOCAL MUNICIPALITY (NORTHERN CAPE PROVINCE) AND THE INXUBA YETHEMBA LOCAL MUNICIPALITY (EASTERN CAPE PROVINCE)

ECOLOGICAL IMPACT ASSESSMENT

PREPARED FOR:

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REVISIONS TRACKING TABLE

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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.

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Elena is an ecologist specialising in restoration ecology and has extensive experience in conservation and long-term research projects across southern Africa. Elena enjoys the challenge of remote field work and has conducted field surveys for a range of species (e.g., birds, snakes, small mammals, seals) and environments (e.g., Succulent Karoo, Kalahari Desert, Indian Ocean Coastal Belt Forests). She was also part of a 14-month research expedition to the sub-Antarctic, Marion Island, where she focused on seabird research. This is complimented by her expertise in the design and management of databases, GIS, and the use of remote monitoring techniques, as well as the programming language R.

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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 Practitioners 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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ACRONYM LIST

AOO	Area of Occupancy
ADU	Animal Demography Unit
BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services
CI	Conservation Importance
CR	Critically Endangered
CTMF	Concrete Tower Manufacturing Facility
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EN	Endangered
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FI	Functional Integrity
GIS	Geographical Information System
GN	Government Notice
IBA	Important Birding Areas
IUCN	International Union for Conservation of Nature
LC	Least Concern
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Ancillary Areas
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
PA	Protected Area
PNCO	Provincial Nature Conservation Ordinance
POSA	Plants of Southern Africa
PPP	Public Participation Process

RR	Receptor Resilience
SACAD	South African Conservation Areas Database
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Areas Database
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
SOTER	Soil and Terrain
QDS	Quarter Degree Square
VU	Vulnerable
TOPS	Threatened and Protected Species
WEF	Wind Energy Facility

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.

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 Plant and Animal Species (GN R.1150).

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 – vi, Appendix 5
	3.1.2	A signed statement of independence by the specialist;	Appended to the Final Basic Assessment Report
	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

Umsobomvu Wind Power (Pty) Ltd is proposing the development of infrastructure to supplement the development of the authorised Umsobomvu and Coleskop Wind Energy Facilities (WEFs) in proximity to the infrastructure site. The proposed infrastructure is situated on Portion 8 of Uitzicht Farm 3, the Remaining Extent (RE) of Winterhoek Farm 118, and the RE of Elands Kloof Farm 135. These properties are situated within the Umsobomvu Local Municipality in the Northern Cape Province and the Inxuba Yethemba Local Municipality in the Eastern Cape Province (Figure 1.1).

The proposed development includes (Figure 1.2):

- The assessment of one (1) 600 m x 900 m area which will include:
  - An IPP 132 kV Substation up to 22 500 m^2;
  - 132 kV Distribution Substation up to 22 500 m^2;
  - Operation and Maintenance (O&M) Building up to 22 500 m^2; and
  - Two (2) 132 kV Overhead Lines (OHL) of up to 500 m in length.

- The assessment of two (2) 300 m x 300 m areas which will include:
  - Area 1: A Concrete Tower Manufacturing Facility (CTMF) and Temporary Laydown Area of up to 60 000 m^2;
  - Area 2: A CTMF and a temporary laydown area of up to 60 000 m^2; and
  - The construction of an up to 3.5 km new access road, including a new intersection, with sections of the road route requiring the widening of existing roads to 12 m in width during construction which will then be rehabilitated to 8 m in width during operation.

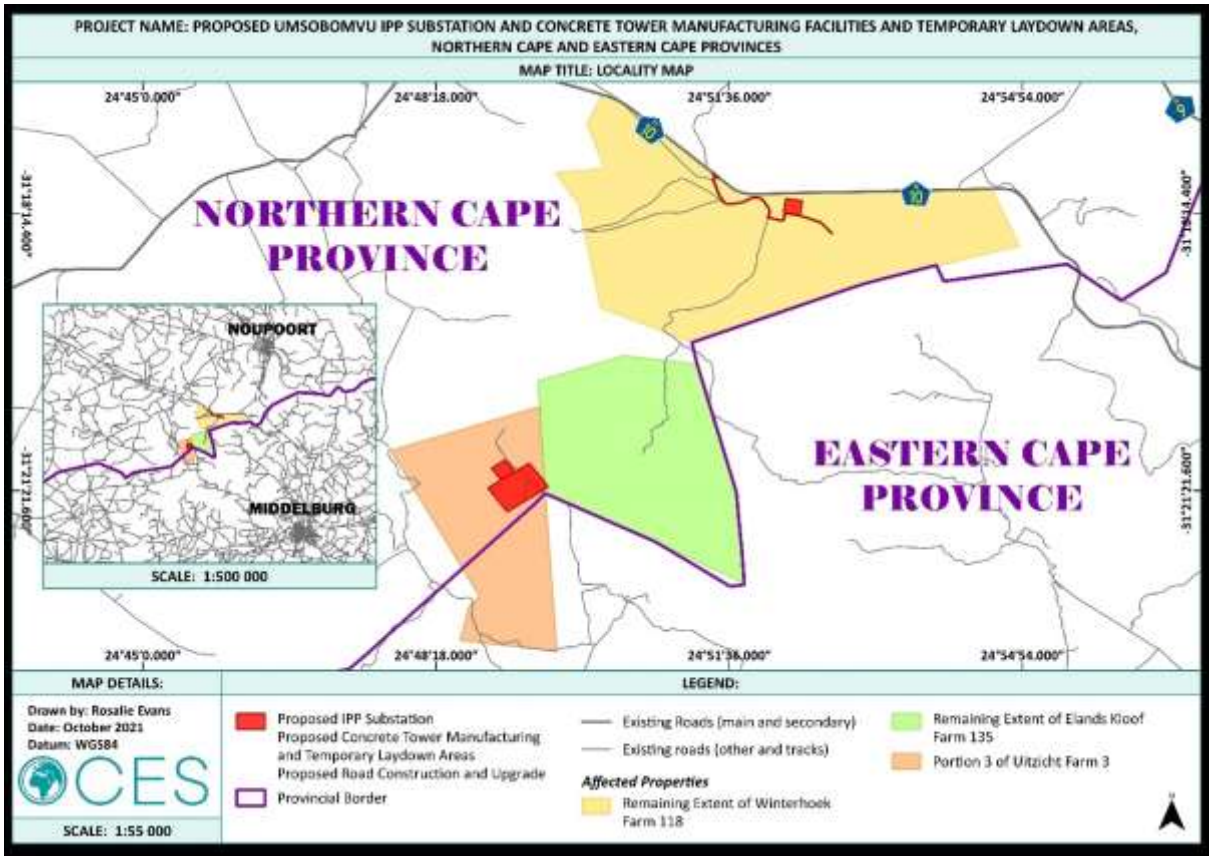

Figure 1.1: Locality Map of the proposed development.

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) and Terrestrial Animal and Plant Species (GN R. 1150), 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 development, the relative terrestrial biodiversity theme sensitivity is classified as VERY HIGH due to the development occurring within a Critical Biodiversity Area (CBA) 1 and 2 as well as Focus Areas for Land-Based Protected Areas Expansion. The Animal Species Theme is classified as HIGH while the Plant Species Theme is classified as LOW Sensitivity. 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 project area, a full **Terrestrial Ecological Impact Assessment** (this report) has been undertaken as part of the BA Process for the proposed Umsobomvu Substation, Concrete Tower Manufacturing Facilities and Temporary Laydown Area.

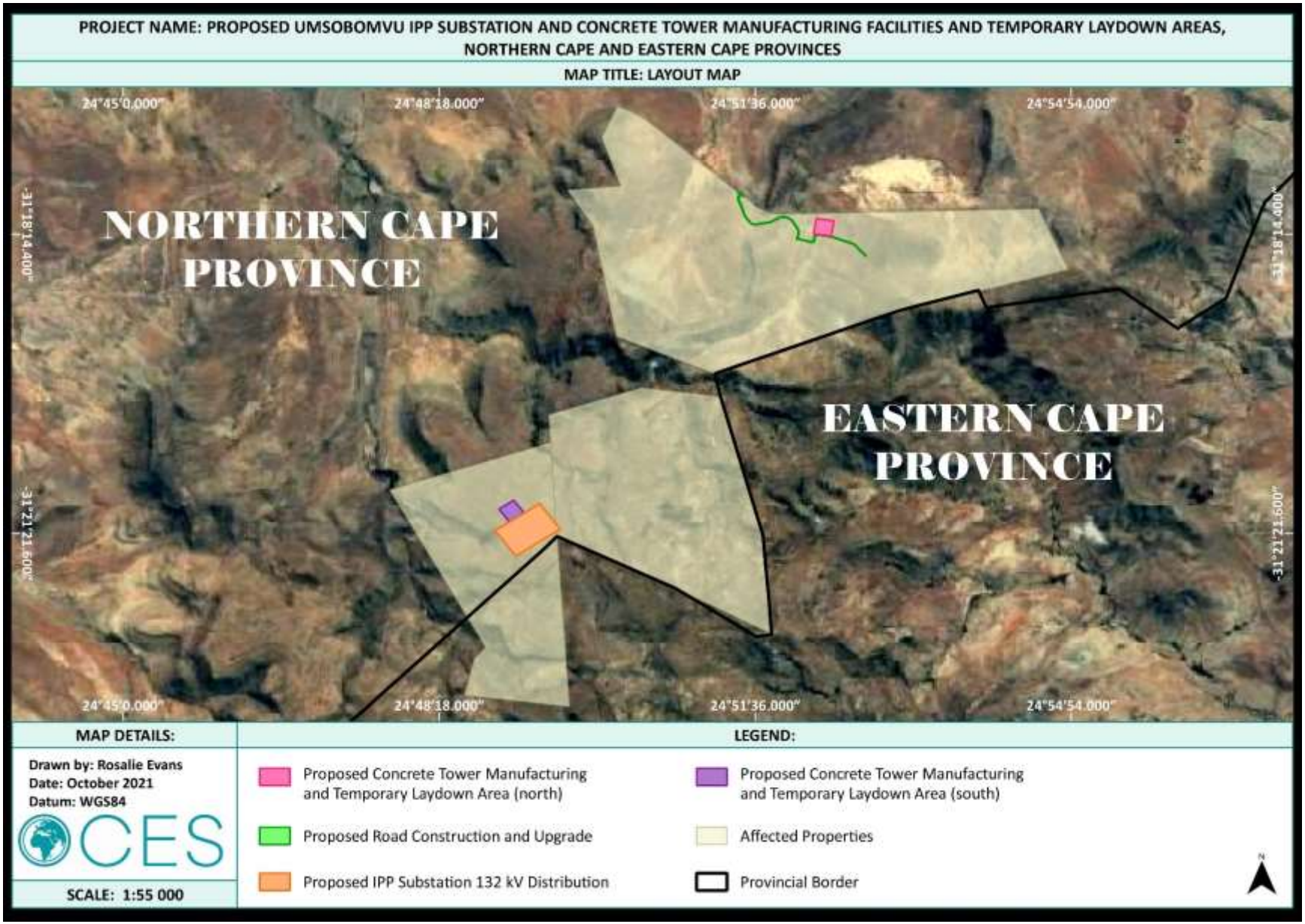

Figure 1.2: Layout Map of the proposed development.

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).
- → 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. The faunal survey was primarily a desktop study, using information from previous ecological surveys conducted in the area, 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. Due to time constraints associated with this project, the survey was conducted in Winter. Summer and Spring flowering species could therefore not be identified.
- → The lack of plant morphological features (e.g. flowers and fruits) made the identification of plant species challenging. As such, a botanical micro-siting investigation during optimal flowering time for the vegetation types occurring on site has been recommended in order to confirm plant species present, particularly SCC.
- → Seasonality and time of day are important factors to take into consideration when conducting faunal surveys. Maximum diversity is generally associated with breeding season in spring/summer and/or when foraging opportunities are greatest (i.e. flowering season). As such, it is unlikely that the faunal survey undertaken for this study captured an accurate representation of the faunal species likely to occur on site.
- → Despite the abovementioned limitations, 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, the anticipated impacts associated with the proposed development, and to identify impact management actions and outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr).

1.5 PUBLIC CONSULTATION

The Public Participation Process (PPP) followed to date has been described in detail in the Basic Assessment Report (BAR). The Draft BAR, together with the Ecological Impact Assessment Report, will be made available for a 30-day commenting and public review period. Any comments received relating to the Ecological Impact Assessment Report will be addressed by the Ecological Specialists and included in the Comments and Response Report in the Final BAR.

2 METHODOLOGY

2.1 THE ASSESSMENT

Two site visits were undertaken: one on the 20th of July 2021 for the northern CTMF, Temporary Laydown Area, and Access Road and one on the 4th of August 2021 for the the southern CTMF and IPP Substation. The purpose of the site visit was 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 the initial Ecological Impact Assessment undertaken for the Umsobomvu and Coleskop WEFs (CES, 2018).

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

- South African Vegetation Map (SA VEGMAP) (Mucina *et al*., 2018);
- Council for Geoscience (2013);
- Soil and Terrain (SOTER) Database of South Africa (2008);
- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019);
- Northern Cape Critical Biodiversity Areas (2016);
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011/14);
- The National Environmental Management: Biodiversity Act (NEMBA), 2004: Publication of Lists of Species that are Threatened or Protected, Activities that are prohibited and Exemption from Restriction (2015);
- The National Protected Areas Expansion Strategy (NPAES, 2010);
- Review of the SANBI Red Data List;
- Convention on International Trade in Endangered Species (CITES);
- The National Biodiversity Assessment (NBA, 2018): Inland Aquatic Ecosystem Assessment;
- NBA (2018): Terrestrial Ecosystem Assessment;
- Terrestrial Ecosystem Threat Status Assessment (2018) – Comparison with 2011 Assessment for Provincial Agencies (Skowno *et al*., 2019);
- South African National Land Cover (SA NLC, 2020);
- The Animal Demography Unit (ADU);
- International Union for Conservation of Nature (IUCN);
- Provincial Nature Conservation Ordinance (PNCO);
- Bird Life (2015) Important Bird Areas (IBAs);
- South African Protected Areas Database (2021) and the South African Conservation Areas Data (2021);
- Northern Cape Nature Conservation Act (Act. No 9 of 2009);
- Plants of Southern Africa (POSA) database – Quarter degree square level;
- National Biodiversity Management: Biodiversity Act (NEM:BA) Alien and Invasive Species Lists (2014); and
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees (2014).

2.2 SPECIES OF CONSERVATION CONCERN

Data on the known distribution and conservation status for each potential species of conservation concern has to 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 Northern Cape Nature Conservation Act (Act No. 9 of 2009), the List of Protected Tree Species under the National Forest Act (No. 84 of 1998) or which occur on the South African Red Data List as species of conservation concern fall within this category.

2.3 SAMPLING PROTOCOL

The footprint of the proposed development was visually surveyed to evaluate vegetation composition and to provide detailed information on the plant communities present. The aim of the site visit was to characterise and describe the vegetation community within the study site as well as identify areas of high sensitivity and SCC. Prior to the site visit, sampling locations representative of variation in plant communities present and different habitat types were identified (

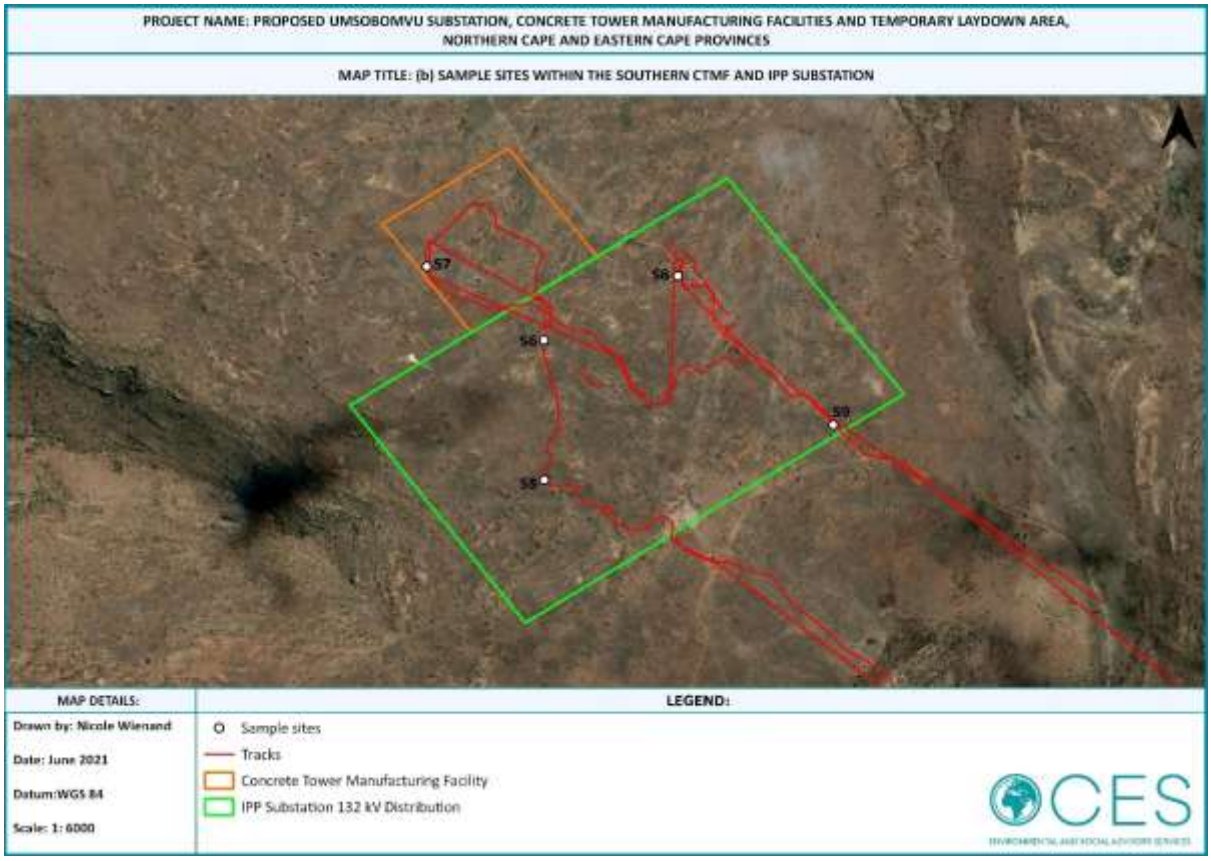

Figure 2.1). At these sampling locations, vegetation types within the study area were assessed and surveyed using plant identification guides and other published literature. Although sampling was focused around the sampling sites, additional plant species identified along the specialist's random meander within the site were also recorded. Based on the findings from

the field survey, vegetation communities were then described according to the dominant set of species recorded from each vegetation type. These were mapped and assigned a sensitivity score using the methodology outlined in the Species Environmental Assessment Guideline Document (SANBI, 2020).

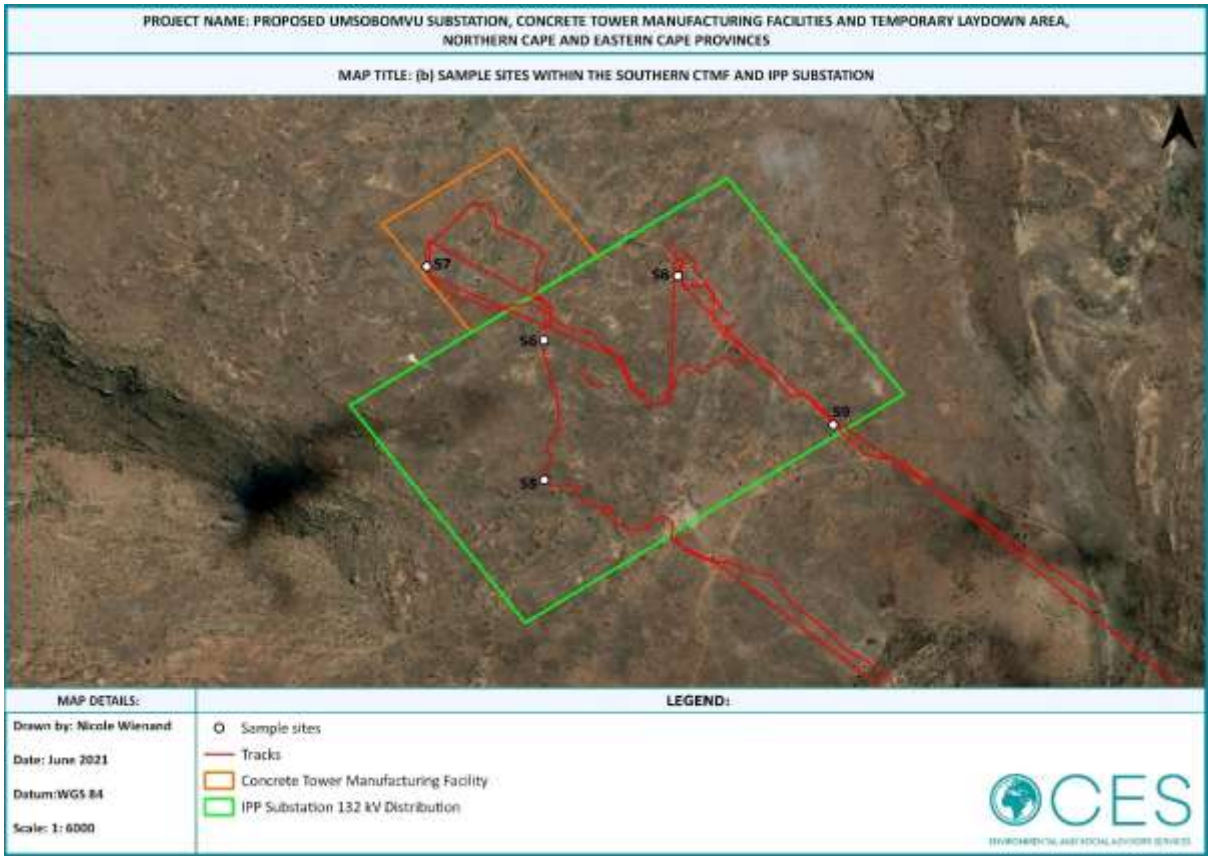

Figure 2.1: Sampling locations within the footprint of the proposed development for (a) the northern CTMF, Temporary Laydown Area and Access Road, and (b) the southern CTMF and IPP Substation.

2.4 VEGETATION MAPPING

The revised SA VEGMAP (2018) was established in order 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 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 SANBI Vegetation map informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012.

The SA VEGMAP project has two main aims:

1. 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
2. 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 various 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.

The SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and ECBCP) 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.

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 & 2021 amendments).

The details of this rating scale are included in Appendix 4.

.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

3.1.1 Climate

The information provided herewith is based on the climate data for Middleburg and Noupoort – the nearest urban areas in proximity to the project area. The climate of Middleburg is classified as “BSk” (Tropical and Subtropical Steppe Climate) by Köppen and Geiger. The average monthly temperature in Middleburg ranges from 8.2°C in June and July to 21.7°C in January. On average, Middleburg receives approximately 396.2 mm of rain per annum, with the highest rainfall received during the month of March and the lowest rainfall received during the month of July (Table 3.1).

The climate of Noupoort is classified as “semi-arid”. The average monthly temperatures range from 5.2° C in July to 20.6° C in January. Noupoort receives an average of around 353 mm of rain per annum, with the highest rainfall received during the month of March (72 mm) and the lowest rainfall received during the month of July (11 mm) (Table 3.2).

Table 3.1: Climate data for Middleburg (Source en.climate-data.org in CES, 2018).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Avg. Temperature (°C)	21.7	20.8	18.7	14.7	11.1	8.2	8.2	10.1	13.1	15.6	18.1	20.3
Min. Temperature (°C)	13.1	13	11.2	7.3	3.6	0.7	0.2	1.8	4.5	7	9.5	11.6
Max. Temperature (°C)	30.3	28.7	26.2	22.2	18.6	15.8	16.2	18.4	21.8	24.2	26.7	29.1
Precipitation / Rainfall (mm)	47	56	62	31	16	12	11	14	13	27	36	41

Table 3.2: Climate data for Noupoort (Source en.climate-data.org in CES, 2018).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Avg. Temperature (°C)	20.6	19.9	17.6	13.6	9.6	5.5	5.2	7.8	11.6	14.7	17.1	19.5
Min. Temperature (°C)	12.2	12.2	10.3	6.2	2.3	-1.8	-2.4	-0.4	3.2	6.2	8.6	10.9
Max. Temperature (°C)	29	27.7	24.9	21	17	12.9	12.8	16.1	20.1	23.2	25.6	28.1
Precipitation / Rainfall (mm)	59	58	72	40	23	14	11	15	14	27	41	43

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.*, 2018). 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 broader area is characterised by moderate to steep sloped rocky hills and outcrops, koppies and gorges surrounded by flat to gently sloping plains. The proposed sites for the Umsobomvu Substation, Concrete Tower Manufacturing Facilities and Temporary Laydown Area are situated on a relatively flat to gently sloping plains (Figure 3.1), surrounded by relatively steep cliffs and gorges. The proposed northern CTMF, Temporary Laydown Area, and Access Road is situated at an altitude of approximately 1575 m above sea level (a.s.l) while the southern CTMF and IPP Substation is situated at an altitude of approximately 1766 m a.s.l (Figure 3.2).

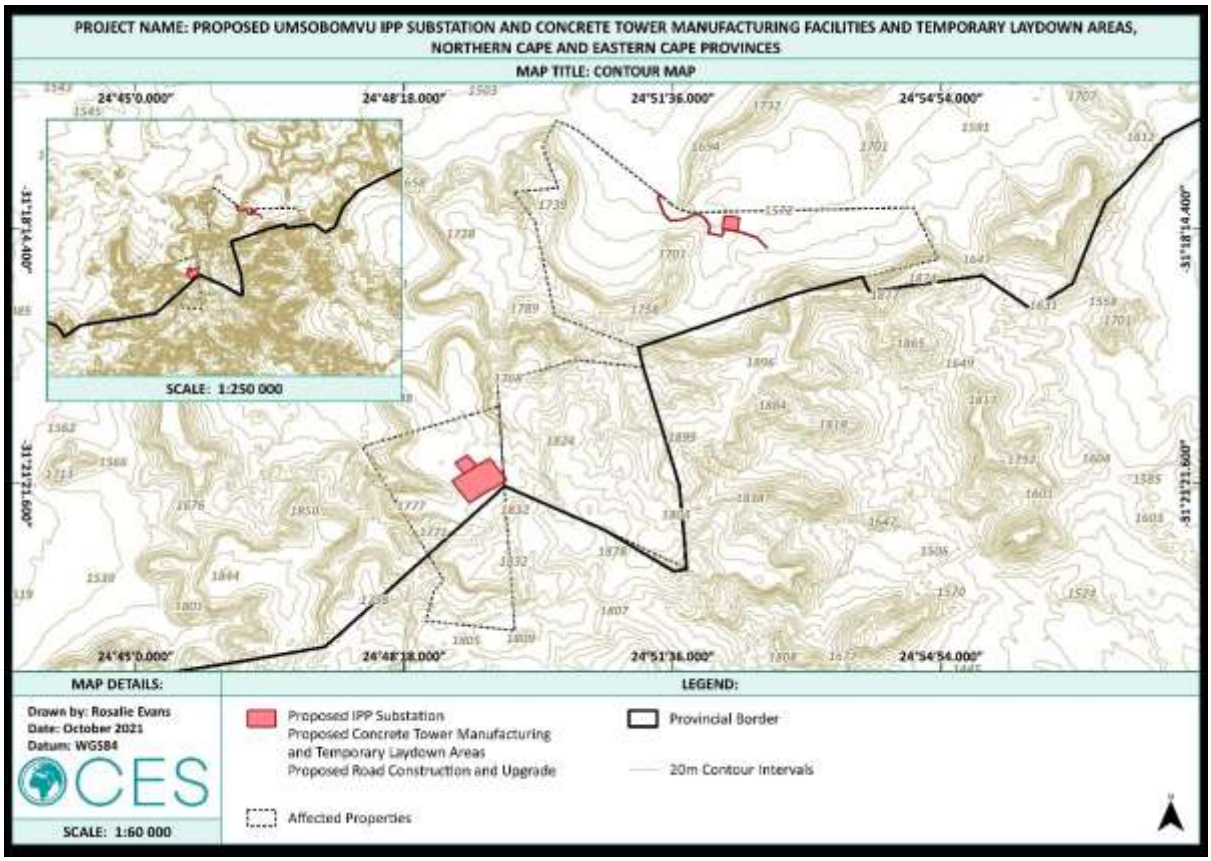

Figure 3.1:Contour Map of the study area.

Figure 3.2: Elevation profile of the study sites from north to south for (a) the northern CTMF, Temporary Laydown Area, and Access Road and (b) the southern CTMF and IPP Substation.

Geology

The proposed sites for the proposed development are underlain by sedimentary deposits of the Tarkastad Subgroup, the upper layer of the two subdivisions forming the Beaufort Group of the Karoo Supergroup (Figure 3.3). The Tarkastad Subgroup sedimentary deposits consist of fluvial sandstones and red mudstones which are rich in fossil heritage, with the most abundant Early Triassic Freshwater Fauna in the world (Lavin *via* SAHRIS, 2013).

Soils

The soils within the project area consist of shallow profiles with minimal development overlying rock. Steeper elevations are characterised by minimal soil development which grades into rocky outcrops. The water holding capacity is low (≤20 to 40 mm) on the low-lying plains to very low in the steeper areas (<20 mm) while the potential for water erosion is moderate on the plains to high on the mountainous landscapes (CES, 2018). According to SOTER (1995), the soils within the study area are classified as Lithic Leptosols (Figure 3.4). Leptosols as very shallow soils which overlie continuous rock. These soils are usually extremely gravelly and/or stony and the parent material consists of various types of continuous rock or of unconsolidated materials with less than 20 % fine earth. Leptosols generally occur in areas of high or medium altitude, with strongly dissected topographies (Nachtergaele, 2010).

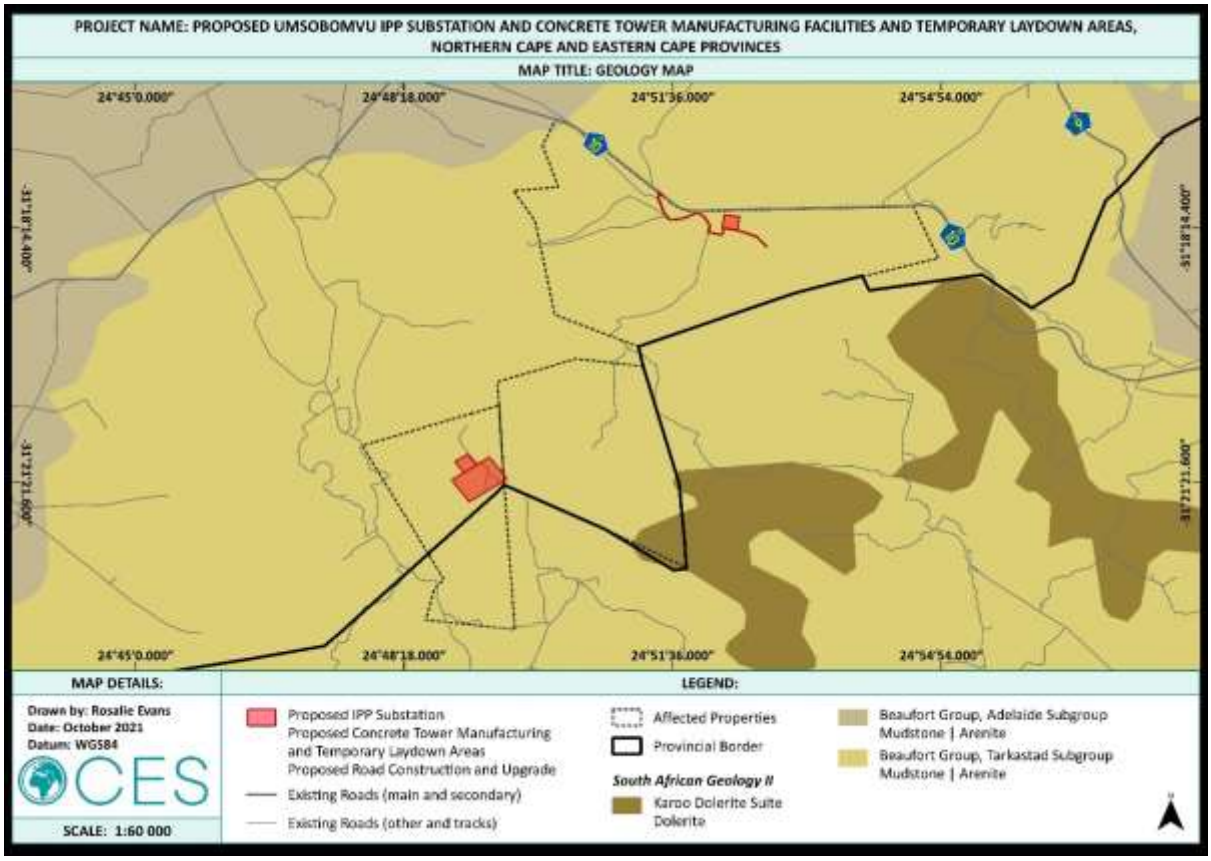

Figure 3.3: Geology Map of the study site.

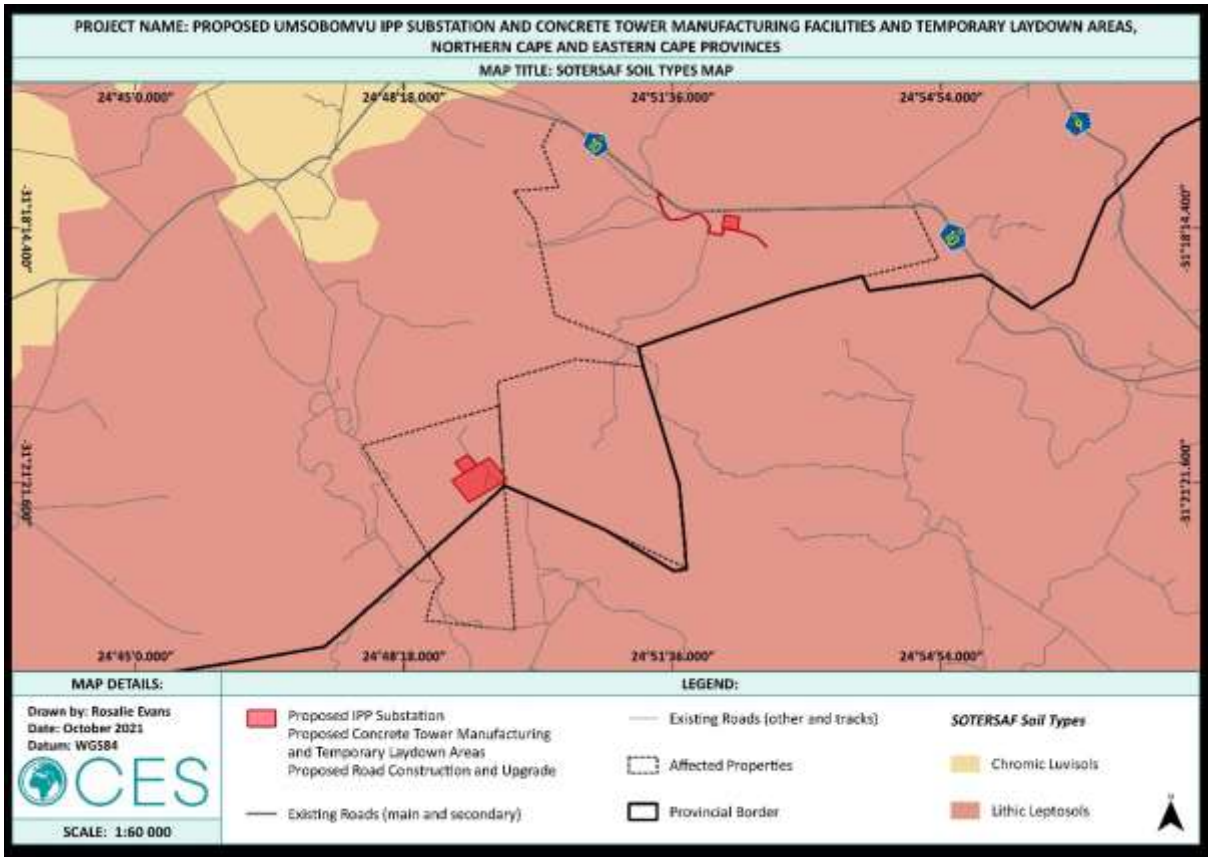

Figure 3.4: SOTER SAF Soil Map of the project area.

3.1.3 Surface Water Features

The aquatic sensitivity of the proposed site is classified as LOW in the Screening Report. The project area falls within the D32C quaternary catchments of the Orange Water Management Area (WMA). The proposed development does not occur within the 500 m regulatory buffer of a NFEPA (2011/14) wetland or a NBA (2018) wetland. Although the proposed infrastructure does not traverse a river identified by NFEPA (2011/14) or NBA (2018), both the northern CTMF, Temporary Laydown Area, and Access Road as well as the southern CTMF and IPP Substation occurs within the 100 m regulatory buffer of non-perennial drainage lines/tributaries (Figure 3.5).

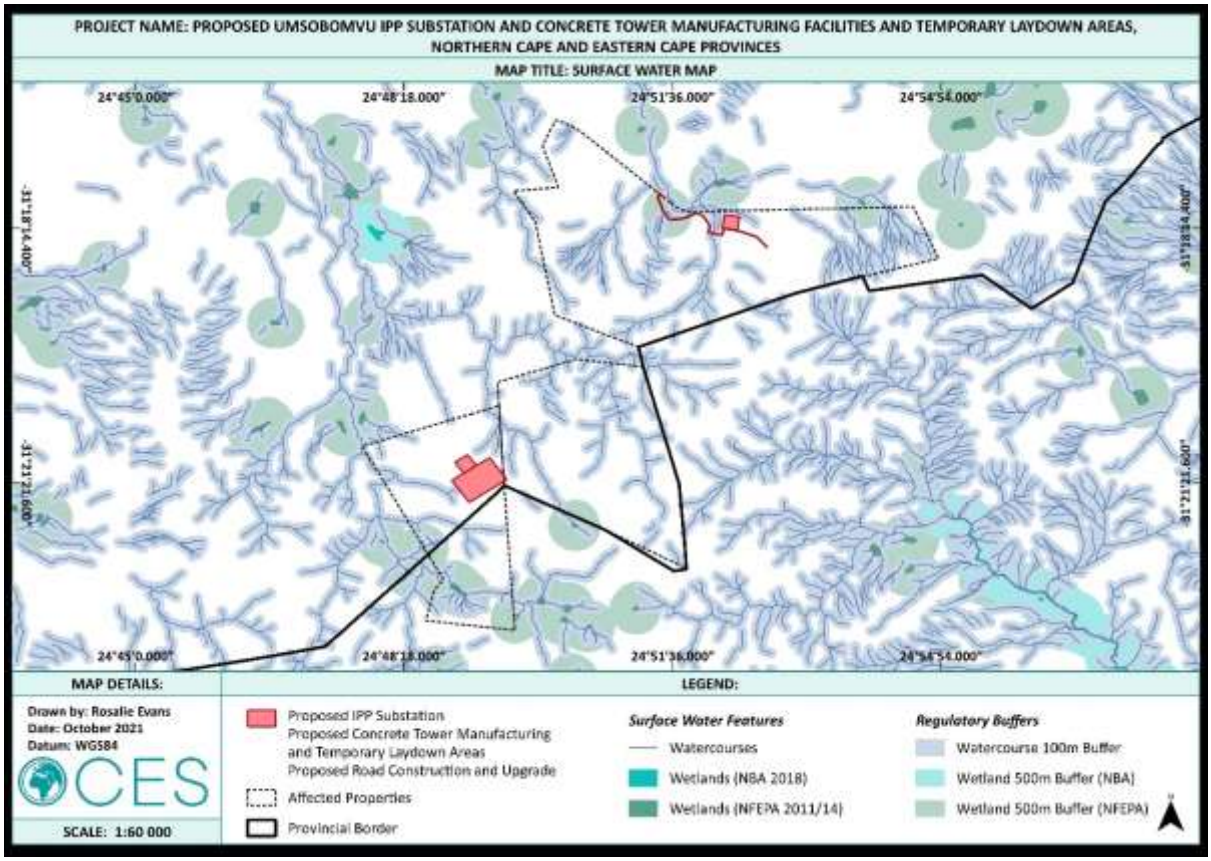

Figure 3.5: Surface water features affected by the proposed development.

3.2 Land Cover

3.2.1 South African National Land-Cover Map (2020)

According to the South African National Land-Cover (2020) spatial dataset, the majority of the northern CTMF, Temporary Laydown Area, and Access Road occurs within *Low Shrubland (Nama Karoo)* with patches of *Natural Grassland* and *Herbaceous Wetlands*, while the majority of the southern CTMF and IPP Substation occurs within *Natural Grassland* with patches of *Low Shrubland* scattered throughout the site (Figure 3.6).

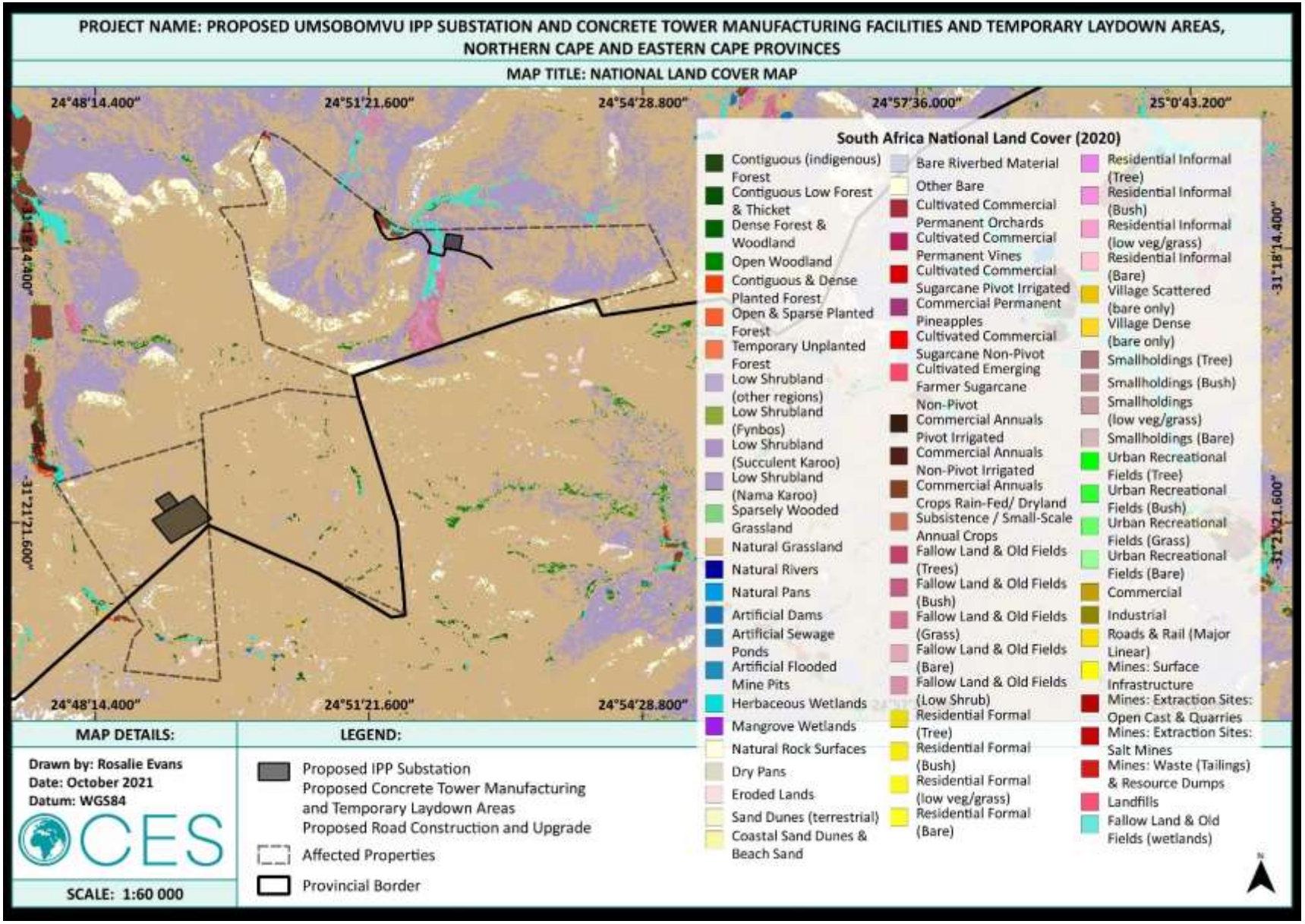

Figure 3.6: South African National Land-Cover (SANLC, 2020) Map of the project area.

3.3 THE CURRENT LAND USE

The properties on which the proposed development is located are currently utilised for agriculture practises (livestock farming and grazing) and forms part of the approved site for the Umsobomvu and Coleskop WEF cluster. Adjacent land uses in the broader project area surrounding the Umsobomvu and Coleskop WEF cluster includes horse breeding and horse riding shows, commercial farming and subsistence farming, cattle, sheep and goat grazing and breeding, production of livestock feeding crops such as lucerne, and fruit trees/orchards within the farmers gardens (CES, 2018).

3.4 DESCRIPTION OF THE VEGETATION AND FLORISTICS

The proposed development occurs within two (2) biomes, namely the Nama-Karoo Biome and the Grassland biome.

The northern CTMF, Temporary Laydown Area, and Access Road occurs within the Nama-Karoo Biome. The Nama-Karoo Biome is the second largest biome in the region, covering the majority of the central plateau of the western half of South Africa with estimated surface area of 248 284 km^2. The distribution of this biome is mainly determined by rainfall which generally occurs in summer (100-520mm per annum). The pre-dominant soil type underlying the majority of the biome consists of lime-rich, weakly developed, shallow soil over rock. The vegetation is described as grassy, dwarf shrubland, with the grassy component more common in depressions and sandy soils and less prominent on clay soils. According to Mucina *et al* (2006), very little of the Nama-Karoo has been transformed due to crops, grazing, dams, industry and/or other forms of land use. Major alien invaders which threaten the integrity of this biome include *Opuntia aureantiaca* (Prickly Pear) and *Prosopis glandulosa* (Mesquite) (Low and Rebelo, 1996; Mucina *et al*., 2006).

According to Mucina *et al* (2006), despite relatively low floristic diversity, the vegetation of the Nama-Karoo Biome boasts a relatively high diversity of plant life forms. Natural disturbance factors / ecological drivers that may influence vegetation structure and composition is mainly linked to human actions which interact with natural causes. Factors / ecological drivers include grazing by domestic livestock and wild herbivores, fire, rainfall and runoff which results in erosion, and other major events such as hailstorms.

The southern CTMF and IPP Substation occurs within the Grassland Biome. Grasslands in South Africa boast remarkable biodiversity and cover approximately one third of South Africa's total land surface area, stretching over the majority of the Eastern Cape and KwaZulu-Natal Provinces. These ecosystems provide important habitat for a range of the country's rare, endangered and endemic animal and plant species, with plant diversity of the grassland biome only second to that of the fynbos biome. The incredible diversity and provision of ecosystem services has contributed to the classification of these ecosystems as an important biodiversity asset of global significance. Grasslands are considered important water production landscapes and provide various ecosystem services particularly for rural communities in South Africa (SANBI, 2013).

The two (2) key ecological drivers of grassland ecosystems include climate and fire which influences their character, community structure, composition and primary productivity. In

addition to climate and fire, other ecological drivers influencing these factors include grazing, soil types and nutrient status. Unfortunately, due to their high biodiversity and the suitability for human habitation, these ecosystems are impacted by various anthropogenic activities including grazing by livestock, over harvesting of natural resources, misappropriation of fire, mining, agriculture, urban and industrial expansion, amongst others (SANBI, 2013).

3.4.1 National Vegetation Map (SA VEGMAP2018): Expected Vegetation Types

The South African Vegetation Map (SA VEGMAP) of 2018 is an important resource for biodiversity monitoring and conservation management in South Africa. Under the custodianship of the South African National Biodiversity Institute (SANBI) the SA VEGMAP, (2018) was updated in order 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 provides a detailed description of each of South Africa's unique vegetation types along with a comprehensive list of the important species associated with each, including endemic and biologically important species.

According to SANBI's National Vegetation Map (2018), the proposed development occurs within two (2) vegetation types, namely Eastern Upper Karoo and Besemkaree Koppies Shrubland (**Error! Reference source not found.**).

Eastern Upper Karoo *(Nama-Karoo Biome)*

The northern CTMF, Temporary Laydown Area, and Access Road occurs within Eastern Upper Karoo vegetation. Eastern Upper Karoo vegetation occurs on flats and gently sloping plains in the Northern Cape, Eastern Cape and Western Cape Provinces. It is characterised by dwarf microphylllous shrubs and 'white' grasses of the genera *Aristida* and *Eragrosti*s. This vegetation type is classified as Least Concern (Skowno *et al*., 2019), with a conservation target of 21%. Portions of Eastern Upper Karoo vegetation is statutorily conserved in Mountain Zebra and Karoo National Park as well as in Oviston, Commando Drift, Rolfontein and Gariep Dam Nature Reserves. As of 2006, 2% transformation has been recorded for this vegetation type (Mucina *et al*., 2006).

Besemkaree Koppies Shrubland (Grassland Biome)

The southern CTMF and IPP Substation occurs within Besemkaree Koppies Shrubland. Besemkaree Koppies Shrubland vegetation occurs on the slopes of koppies, butts, and tafelbergs in the Northern Cape, Free State and Eastern Cape Provinces. The geology underlying this vegetation type typically includes dolerite koppies and sills embedded within Karoo Supergroup sediments. Besemkaree Koppies Shrubland is characterised by a two-layered karroid shrubland: the lower layer is characterised by a closed canopy dominated by dwarf small leaved shrubs and abundant grasses, while the upper canopy is characterised by a loose canopy of tall shrubs dominated by species such as *Searsia erosa*, S*. burchelii, S. cilliata, Euclea crispa*, *Diospyros austro-africana* and *Oleo europaea*.

Besemkaree Koppies Shrubland is classified as **Least Concern** (Skowno *et al*., 2019), with a Conservation Target of 28%. It is largely excluded from intensive agricultural activities. However, as of 2006, approximately 3% of the area has been lost due to the construction of large dams. Approximately 5% of this vegetation type was statutorily conserved in the Rolfontein, Tussen Die Riviere, Oviston, Gariep Dam, Caledon, and Kalkfontein Dam Nature Reserve when assessed by Mucina *et al* (2006).

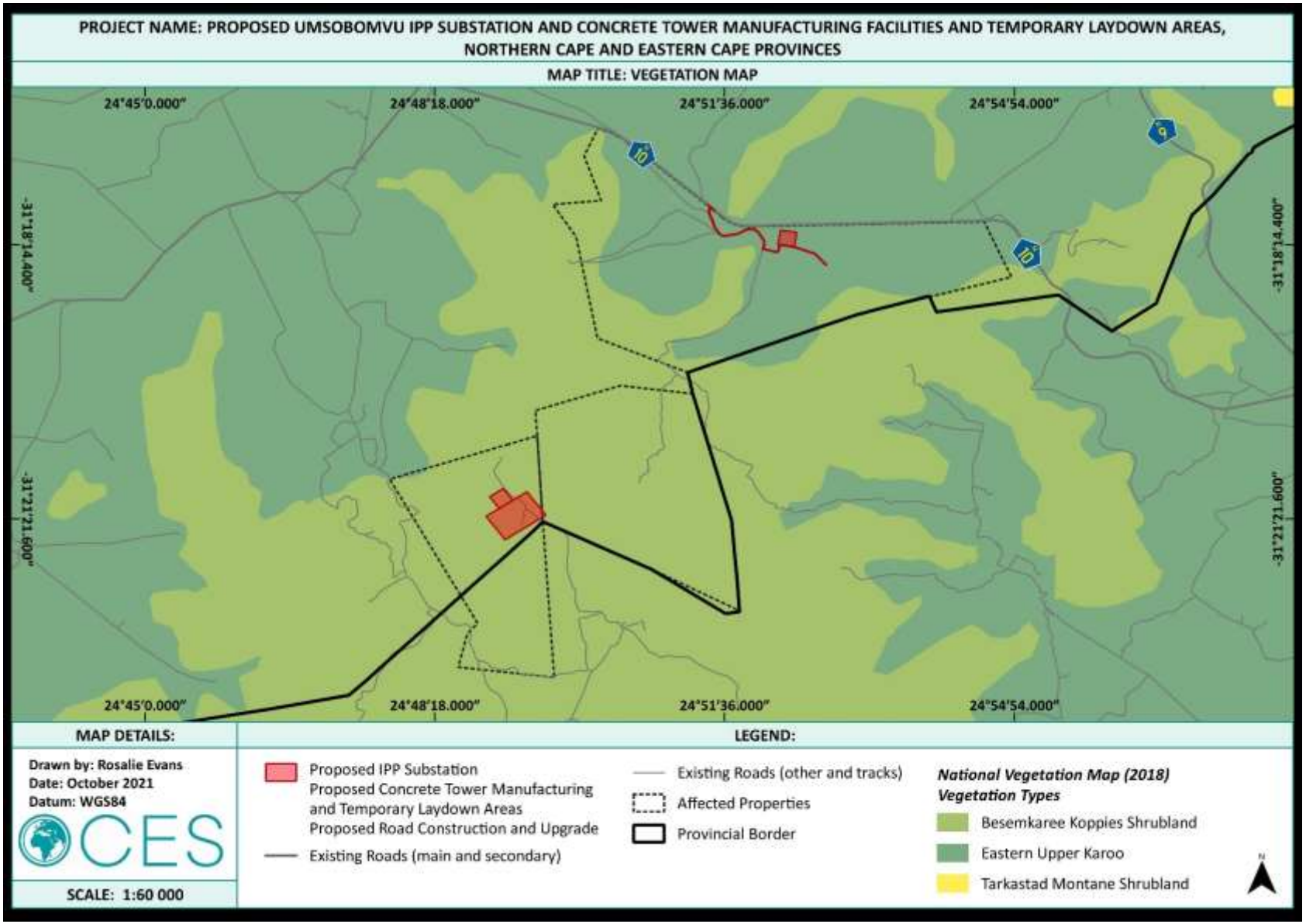

Figure 3.7: National vegetation map for the project site.

3.4.2 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. As such, site surveys are critical for the verification of desktop findings and establishing the baseline ecological conditions of a site.

The site visit conducted on the 20th of July 2021 confirmed that the vegetation of the northern CTMF, Temporary Laydown Area, and Access Road is Eastern Upper Karoo. This vegetation type was mainly associated with flat, low lying topography within the broader project area. The Eastern Upper Karoo vegetation was extremely dry, sparse, and fairly uniform throughout the site, with large patches of bare ground (sandy substrate) and signs of erosion. Small, scattered shrubs of the species *Phymaspermum parvifolium, Ruschia intricata, Dicerothamnus rhinocerotis,* amongst others, and an abundance of grasses of the genera *Eragrostis, Sporobolus, Digitaria,* and *Aristida,* dominated the site. The degraded nature of the Eastern Upper Karoo vegetation of the site is most likely attributed to the timing of the site visit (dry season) and to a degree, overgrazing. Despite the degraded nature of the Eastern Upper Karoo vegetation, the site still boasts a number of indigenous plant species and provides suitable habitat for faunal species. Large rocky platforms and outcrops present on site likely provide habitat for a range of rodent, reptile, and insects species.

Plate 3.1: Eastern Upper Karoo vegetation of the northern site for the CTMF, Temporary Laydown Area, and Access Road.

Plate 3.2: Grazing by sheep and the resultant reduction in vegetation cover within the northern site.

The site visit conducted on the 4th of August 2021 confirmed that the vegetation of the southern site (CTMF and IPP Substation) is Besemkaree Koppies Shrubland. This vegetation type was mainly associated with high lying rocky outcrops, mountain plateaus, slopes and areas near drainage lines within the broader project area. The site is utilised for grazing by sheep and cattle. As such, the condition of the vegetation within the site varied from fairly intact in the northern portion of the site to (Plate 3.3) sparse with large areas devoid of vegetation cover within the southern portion of the site (Plate 3.4). The fairly intact Besemkaree Koppies Shrubland vegetation was characterised by a mosaic of shrubs, stunted trees (due to grazing) with a matrix of grasses. Shrubs of the species *Euclea undulata, Dicerothamnus rhinocerotis, Chrysocoma cilliata,* amongst others, dominated the site, with scattered *Searsia erosa* trees. Dominant grasses included *Themeda triandra, Eragrostis spp., and Aristida sp.* Similar to the northern site, despite the degraded nature of the vegetation in southern portion of the site, the site boasts a number of indigenous plant species and provides suitable habitat for faunal species. Large rocky platforms and outcrops present on site likely provide habitat for a range of rodent, reptile, and insects species (Plate 3.5).

It should be emphasized that due to the time constraints associated with the proposed development, the field survey was conducted in late winter (dry season). The presence, behaviour, and detectability of the majority of faunal and floral species is largely influenced by the prevailing climatic conditions of the season. As such, field surveys should be conducted within the optimal flowering period to obtain results which are representative of the actual conditions of the vegetation on site (SANBI, 2020). The timing of the field survey for this study is likely to have influenced the findings of this study. As such, a botanical micro-siting investigation should be undertaken during the optimal flowering period for the biomes in which the proposed development is situated (December for both the Nama Karoo and Grassland biome, (SANBI,2020)).

Since the undertaking of the site visit, the client has agreed to two (2) micro-siting investigations. A two-week micro-siting investigation will be undertaken by a qualified botanical specialist from the 13th to the 24th of September 2021 and an additional micro-siting investigation will be undertaken in October/November 2021 (optimal survey period for Grassland/Nama-Karoo Biome) to ensure that no SCC are overlooked.

Plate 3.3: Intact Besemkaree Koppies Shrubland vegetation of the southern site.

Plate 3.4: Degraded Besemkaree Koppies Shrubland vegetation within the southern site.

Plate 3.5: Rocky outcrops present within the southern site.

3.4.3 Species of Conservation Concern

The below list of SCC (Table 3.3) likely to occur within the project area has been compiled using records from the Plants of Southern Africa (POSA) website, the National Screening Tool Report, and the species previously recorded by CES (2018). No SCC were recorded in the National Screening Tool Report generated for the proposed site. However, based on the plant species lists obtained from the POSA website and CES (2018), thirteen (13) Species of Conservation Concern (SCC) were recorded for the site, all of which are classified as Least Concern (LC). Although classified as LC, these species are protected in terms of the Provincial Nature and Environmental Conservation Ordinance No. 19 Of 1974 and the Northern Cape Nature Conservation Act No. 9 of 2009.

Two (2) of the thirteen (13) SCC, including *Stomatium middelburgense* and *Aloe broomii*, were recorded during the site visit conducted for this assessment, while three (3) of the thirteen (13) SCC were recorded in the broader project area during the field survey conducted by CES (2018), including *Gomphocarpus fruticosus*, *Morea huttonii* and *Harveya pumila.* The probability of occurrence on site based on habitat requirements for the remainder of the SCC are summarised in Table 3.3 below.

A full list of species found at the site has been included in Appendix 1.

Table 3.3: List of plant SCC likely to occur within the project area.

Family	Species	IUCN	SA Red List	PNCO (Act No. 19 of 1974)	Northern Cape Nature Conservation Act (Act No. 9 of 2009)	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements
Aizoaceae	*Delosperma lootsbergense*	LC	LC	-	Schedule 2	-	-	This species is endemic to the high mountains of the Eastern Cape interior, including the Sneeuberg Range near Graaff-Reinet, the Stormberg near Molteno, and the Suurberg Range on the border of the Northern Cape south of Noupoort. Its habitat mainly includes rocky slopes and cliffs in high altitude montane grasslands and Nama-Karoo (Clark and Raimondo, 2019).	High
Aizoaceae	*Galenia subcarnosa*	LC	LC	-	Schedule 2	-	-	This species is endemic to South Africa and mainly occurs in the Eastern Cape and Northern Cape Province (Kamundi and Victor, 2006).	High
Aizoaceae	*Stomatium middelburgense*	LC	LC	-	Schedule 2	-	-	This species is endemic to South Africa and mainly occurs in the Eastern Cape Province (Burgoyne, 2006).	Confirmed on site
Apocynaceae	*Xysmalobium gomphocarpoides*	LC	LC	Schedule 4	Schedule 2	-	-	This species is endemic to South Africa and occurs in the Eastern Cape, Free State, Northern Cape, North West, Western Cape Provinces. This taxon was not selected in any one of four screening processes for highlighting potential taxa of conservation concern for detailed assessment and was hence given an automated status of Least Concern (Foden and Potter, 2005).	Possible
Apocynaceae	*Gomphocarpus fruticosus*	-	LC	Schedule 4	Schedule 2	-	-	This species is widespread, common and not in danger of extinction. It is not endemic to South Africa. It occurs on dry sandy soils in open disturbed places (often on riverbanks) in a variety of habitats including Albany Thicket, Desert, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, and Succulent Karoo in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape Provinces (von Staden, 2012).	Confirmed in broader project area by CES (2018)
Asphodelaceae	*Aloe broomii*	LC	LC	Schedule	Schedule 2	-	-	This species is widespread in the central interior	Confirmed on site

Family	Species	IUCN	SA Red List	PNCO (Act No. 19 of 1974)	Northern Cape Nature Conservation Act (Act No. 9 of 2009)	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements
				4				of South Africa, from the eastern Karoo in the south-eastern parts of the Northern Cape and adjacent areas in the Western Cape eastwards through the southern Free State and the Eastern Cape interior. Major habitats includes Nama-Karoo and Grasslands (von Staden, 2018).	
Crassulaceae	*Crassula umbellata*	LC	LC	-	Schedule 2	-	-	This species is endemic to South Africa and occurs on sandy or gravelly slopes of the Fynbos and Succulent Karoo Biome in the Eastern Cape, Northern Cape and Western Cape Provinces (Foden and Potter, 2009).	Possible
Crassulaceae	*Crassula setulosa*	NE	LC	-	Schedule 2	-	-	This species is not endemic to South Africa and occurs in a wide variety of habitats in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, and North West Provinces.	High
Iridaceae	*Morea huttonii*	-	LC	Schedule 4	Schedule 2	-	-	This species is not endemic to South Africa. There is a lack of information on the habitat requirements for this species, however it has been recorded in the Eastern Cape, Free State, KwaZulu-Natal, and Mpumalanga Provinces (Cholo and Foden, 2006).	Confirmed in broader project area by CES (2018)
Orobanchaceae	*Harveya pumila*	-	LC	Schedule 4	-	-		This species is not endemic to South Africa and occurs in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, and Mpumalanga Provinces (Victor, 2004).	Confirmed in broader project area by CES (2018)
Scrophulariaceae	*Nemesia sp.*			-	Schedule 2	-	-	Unknown	Possible
Scrophulariaceae	*Manulea plurirosulata*	LC	LC	-	Schedule 2	-	-	This species is endemic to South Africa and occurs in the Eastern Cape and Free State Provinces. There is a lack of information on the habitat requirements for this species, however this taxon was not selected in any one of four screening processes for highlighting potential taxa of conservation concern for detailed assessment and was hence given an automated status of Least Concern (Foden and Potter, 2005).	Possible
Scrophulariaceae	*Jamesbrittenia*	LC	LC	-	Schedule 2	-	-	This species is not endemic to South Africa and	Possible

Family	Species	IUCN	SA Red List	PNCO (Act No. 19 of 1974)	Northern Cape Nature Conservation Act (Act No. 9 of 2009)	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements
	filicaulis							occurs within the Eastern Cape, Free State and KwaZulu-Natal Provinces. There is a lack of information on the habitat requirements for this species, however this taxon was not selected in any one of four screening processes for highlighting potential taxa of conservation concern for detailed assessment and was hence given an automated status of Least Concern (Foden and Potter, 2005).	

3.4.4 Alien Invasive Species Present on site

An “invasive species” is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity Ancillary areas. NEM:BA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

Although no alien invasive species were recorded on site during the site visits, the following alien invasive species have been recorded in the broader project area during the field survey conducted by CES (2018):

Table 3.4: Alien Invasive species recorded within the project area.

FAMILY	SPECIES	COMMON NAME	CARA (Act No. 43 of 1983)	NEMBA NATIONAL LIST OF INVASIVE SPECIES IN TERMS SECTIONS 70(1), 71(3) and 71A
Cactaceae	*Opuntia stricta*	Sour Prickly Pear	Category 1	Category 1b
Salicaceae	*Populus sp.*	-	Category 2	Category 2

NEM:BA Category 1b: Invasive Species

Opuntia stricta is listed under Category 1b of the NEMBA: National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A. Plants classified as Category 1b alien invasive species are prohibited from:

- Being imported into the Republic;
- Growing or in any other way propagating any specimen;
- Conveying, moving or otherwise translocating any specimen;
- Spreading or allowing the spread of any specimen; and
- Releasing any specimen.

NEM:BA Category 2: Invasive Species

Populus spp. are listed under Category 2 of the NEMBA: National List of Invasive Species. Category 2 invasive species are regulated by area. A permit is required to import, posses, grow breed, move, sell, buy or accept as a gift any species listed under Category 2.

CARA Category 1: Declared weeds

O. stricta is listed under Category 1 of CARA. Plants classified as Category 1 in CARA are Declared Weeds. These are prohibited plants, which must be controlled or eradicated where

possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents).

CARA Category 2: Invader Plants

Populus spp. is listed under Category 2 of CARA. Plants classified as Category 2 are declared Invader Plants and may only be grown under controlled conditions if a permit is acquired. No trade in these plants is permitted.

* All alien and invasive plant species must be controlled during all phases of development according to the recommendations outlined in the Environmental Management Programme (EMPr).

3.5 DESCRIPTION OF FAUNA

According to the Screening Report generated for the site, the Animal Species Theme is classified as HIGH sensitivity due to the presence of two bird species, including *Neotis ludwigii* and *Aquila verreauxii*. However, birds were not assessed in this report as a separate Avifaunal Assessment has been conducted for the proposed development (Smallie, 2021).

The environment of the broader project area is characterised by the Upper Karoo and Dry Highveld Grassland Bioregions and hosts a wide variety of faunal species. This section provides a brief description of the herpetofauna and mammals which occur, or which are likely to occur, within the proposed project area.

3.5.1 Herpetofauna

The Northern Cape, in which the proposed development occurs, is home to approximately seventy-four (74) herpetofauna species, which includes twenty-nine (29) amphibian species and forty-five (45) reptile species.

The IUCN (2021) database indicates that twelve (12) amphibian species and twenty (20) reptile species could occur within the proposed project area. None of these species are threatened in terms of the Regional Red Data List for frogs (2004) and reptiles (2014). However, one (1) amphibian species (*Pyxicephalus adspersus)* and one (1) reptile species (*Psammobates tentorius*) is listed as Near Threatened. Moreover, all chameleons and girdled lizards, as well as Giant Bullfrog, are listed as Schedule I species on the Northern Cape Nature Conservation Act (Act No. 9 of 2009) and all tortoises, lizards, and other frogs are listed as Schedule II. Schedule I and II species are protected in the Northern Cape Province. Table 3.5 lists the herpetofauna SCC which are likely to occur within the proposed project area.

Table 3.5: Herpetofauna SCC within the proposed project area (IUCN).

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS (IUCN 2021, MEASEY 2011, SANBI 2004 & 2014)	HABITAT	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Amphibians				
Giant Bullfrog	*Pyxicephalus adspersus*	NT	Inhabits various vegetation types of grassland, savanna, karroid and thicket habitats, generally breeding in seasonal,	Low

			shallow, grassy pans in flat, open areas (SANBI 2004)	
Southern Pygmy Toad	*Poyntonophrynus vertebralis*	LC	Inhabits primarily karroid habitat but is also found in savannah and grassland sections, occurring on a variety of substrates, from brackish soils to gravels, in open sandy and grassy areas and in karoo scrub, breeding in temporary Waterbodies (SANBI 2004).	Medium
Karoo Toad	*Vandijkophrynus gariepensis*	LC	Found in many habitats, including open, sandy areas in the semi-arid karoo, and grassland in the eastern parts of its range, breeding in various permanent and temporary waterbodies (SANBI 2004).	Medium
Bubbling Kassina	*Kassina senegalensis*	LC	Inhabits various vegetation types in savanna and grassland habitats, breeding in both temporary and permanent waterbodies (SANBI 2004).	Medium
Common Platanna	*Xenopus laevis*	LC	Occurs all over (SANBI 2004).	High
Cape River Frog	*Amietia fuscigula*	LC	Inhabits mainly grassland and fynbos habitats but occurs in parts of the karoo and is associated with permanent waterbodies and well-vegetated waterways (SANBI 2004).	Low
Delalande's River Frog	*Amietia delalandii*	LC	Found along large and small rivers, and in dams and ornamental ponds (IUCN 2017).	Low
Poynton's River Frog	*Amietia poyntoni*	LC	Occurs in grassland, forest, savanna and agricultural habitats, preferring shallow water such as wetlands, ponds,	Low

			dams, streams and rivers, and requires permanent waterbodies to breed in (IUCN 2017).	
Common Caco	*Cacosternum boettgeri*	LC	Favours open areas with short vegetation and is abundant in grassy areas within the karroid, savanna, grassland, fynbos and thicket habtiats (SANBI 2004).	Medium
Tandy's Sand Frog	*Tomopterna tandyi*	LC	Inhabits loose, sandy soils and occurs along small streams, pans and temporary rain pools or farm dams within karroid, grassland and savanna habitats (SANBI 2004).	Medium
Gray's Stream Frog	*Strongylopus grayii*	LC	Inhabits entire fynbos habitat as well as parts of the karoo, savanna, grassland, thicket and forest, breeding in small dams, ponds, pools, ditches and shallow seeps (SANBI 2004).	Low
Tortoises				
Greater Padloper	*Homopus femoralis*	LC	High presence in sweet veld areas, such as the Dry Highveld Grassland and the eastern Nama Karoo. Lower presence in Savanna and Fynbos vegetation and rocky areas (Hofmeyr *et al*. 2018).	Confirmed
Tent Tortoise	*Psammobates tentorius*	NT	Occurs in dwarf shrubland with succulents, annuals, grasses and geophytes (Hofmeyr *et al*. 2018).	High
Lizards				
Burchell's Sand Lizard	*Pedioplanis burchelli*	LC	Often associated with large mountains and found in rocky areas, especially those with exposed bedrock and sparse vegetation (SANBI, 2014).	High
Karoo Girdled Lizard	*Karusaurus polyzonus*	LC	Inhabits rocky outcrops in lowland areas and on lower	High

			mountain slopes (SANBI, 2014).	
Cape Crag Lizard	*Pseudocordylus microlepidotus*	LC	Found in montane regions on rock outcrops and cliffs, usually in fynbos or on grassy slopes, sheltering in crevices or under rocks (SANBI, 2014).	Low
Chameleons				
Eastern Cape Dwarf Chameleon	*Bradypodion ventrale*	LC	Found across several biomes and considered a habitat generalist (SANBI, 2014).	Low
Snakes				
Rhombic Egg-eater	*Dasypeltis scabra*	LC	Occurs in a wide variety of habitats where it is often found in deserted termitaria, under rocks, in crevices, under the bark of trees and rotting logs (SANBI, 2014).	Medium
Aurora House Snake	*Lamprophis aurora*	LC	Occurs in grassland, fynbos and moist savanna habitats where it is often found near streams and under rocks, occasionally in old termitaria (SANBI, 2014).	Low
Spotted Rock Snake	*Lamprophis guttatus*	LC	Found in rocky habitats throughout its range (SANBI, 2014).	High
Sundevall's Shovel-snout	*Prosymna sundevallii*	LC	Outside the Western Cape, occurs in moist and dry savanna and karroid areas where it is often found in old termitaria and under rocks (SANBI, 2014).	High

One (1) of the thirty-one (31) herpetofauna species, *Homo femoralis*, likely to occur within the project area was recorded during the field survey (Plate 3.6).

Plate 3.6: Greater Padloper (*Homo femoralis*) recorded within the northern site.

3.5.2 Mammals

The IUCN (2021) database suggests that the distributions of fifty-four (54) mammal species (excluding bats, as a sperate specialist assessment has been conducted) intersect with the proposed project area. These species have been assessed against the Regional Red List (2016) and it has been determined whether they are endemic, near endemic or not endemic, as well as their status in the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (Appendix 3). Of the fifty-four (54) mammal species, fifty (50) are SCC based on national and provincial ordinances. Table 2 lists threatened mammal SCC; a comprehensive mammal list for the proposed project area can be found in Appendix 3.

Eight (8) mammal species are endemic and two (2) are near endemic. Endemic mammal species include the Karoo Four-striped Grass Mouse, Karoo Bush Rat, Slogget's Vlei Rat, Grant's Rock Mouse, Spectacled Dormouse, White-tailed Rat, Common Mole-rat and the Cape Rock Sengi. Near-endemic mammal species include the Cape Grey Mongoose and Southern White Rhino. According to the Regional Red List Status (2016), two (2) species are threatened, namely the Black-footed Cat and White-tailed Rat (both Vulnerable), and five (5) are Near Threatened, namely the Brown Hyaena, African Striped Weasel, Cape Clawless Otter, Southern White Rhino and the Spectacled Dormouse. All mammal species listed in the report belonging to the taxonomic order *Carnivora* (except caracal and black-backed jackal), including *Perissodactyla, Artiodactyla, Tubulidentata, Hyracoidea, Rodentia, Lagomorpha and Insectivora* are listed as either a Schedule I or II species on in the Northern Cape Nature Conservation Act (Act No. 9 of 2009).

Table 3.6: Mammal SCC within the proposed project area (IUCN).

Name	Conservation Status (EWT 2016)	Conservation Actions	Habitat	Probability of occurrence (High, Medium, Low, Confirmed)
Cape Clawless Otter (*Aonyx capensis*)	NT	Present in several protected areas and included in CITES Appendix II (Jacques *et al*. 2015).	Occurs in forest, grassland, wetland (inland), and marine coastal areas (Jacques *et al*. 2015). This species is 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). Based on the proximity of the nearest watercourse, it is unlikely that this species will occur onsite.	Low
Southern White Rhino (*Ceratotherium simum*)	NT	Concentrated in fenced sanctuaries, conservancies, rhino conservation areas and intensive protection zones where law enforcement effort can be concentrated at effective levels. Rhinos are listed on CITES Appendix I (Emslie 2020).	Naturally occurs in savanna, shrubland, and desert areas (Emslie 2020). However, due to rampant poaching this species no longer occurs naturally outside of protected areas and its likelihood of occurrence on site is therefore highly unlikely.	Highly unlikely

Brown Hyaena (*Parahyaena brunnea*)	NT	Occurs in several protected areas, but can be found in non-protected areas, where they exhibit some tolerance to land-use changes (Wiesel 2015)	Favours rocky, mountainous areas with bush cover (Wiesel 2015). It shows an ability to survive close to urban areas. Is independent of drinking water but requires some type of cover in which to lie during the day. Occurs in several protected areas, but can be found in non-protected areas, where they exhibit some tolerance to land-use changes (Wiesel 2015). Populations of Brown Hyaenas in non-protected areas comprise a significant proportion of the global population, suggesting that such areas are likely to be important for their sustained conservation. Based on the above, it is possible that this species could occur within the project area.	Medium
Black-footed Cat (*Felis nigripes*)	VU	Human activities that lead to habitat degradation and the loss of prey species need to be addressed, particularly in the Karoo region which is likely to be the remaining stronghold region for the species (Silwa *et al*. 2015)	Inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover (Silwa *et al*. 2015). Predominantly ground dwellers and during the day use dens in termite mounds or made by other animals. As the proposed site contains this species preferred habitat, it is possible that this species could occur within the project area.	Medium

Spectacled Dormouse (*Graphiurus ocularis*)	NT	Present in several protected areas (Cassola 2016).	Occurs in shrubland and rocky areas, such as inland cliffs and mountain peaks (Cassola 2016). Nocturnal and hides during the day mainly in rock crevices and feeds mainly on invertebrates but also seeds and other plant material.	Medium
White-tailed Rat (*Mystromys albicaudatus*)	VU	Conservation of grasslands through protected area expansion and biodiversity stewardship schemes is suspected to be the most important intervention for this species (Avenant *et al*. 2016).	Habitat requirements need further investigation but often associated with calcrete soils within shrubland and grasslands (Avenant *et al*. 2016). They are never found on soft, sandy substrate, rocks, wetlands or riverbanks. In the Maclear district of the Eastern Cape Province, it was found in habitats with crests and ridges and trapped on bare patches with sparse vegetation (Avenant, et. al., 2019). The proposed site is not underlain by calcrete soils but rather mudstone and arenite with isolated rocky platforms . Based on the above, it is unlikely that this species would occur within the project area.	Low

African Striped Weasel (*Poecilogale albinucha*)	NT	Present in several protected areas across its range. Outside protected areas, land-use planning should continue to conserve grassland habitats through protected area expansion, conservancy formation or stewardship schemes (Child *et al*. 2016).	Mainly found in savannah and grassland habitats, although it probably has a wide habitat tolerance and has been recorded from lowland rainforest, semidesert grassland, fynbos (with dense grass) and pine plantations (Child *et al*. 2016). As the proposed site contains this species known habitat type, it is possible that this species could occur within the project area.	High

During the field surveys, evidence of burrowing activity, namely from Common Mole-rat, Cape Ground Squirrel, Aardvark, as well as from unidentified animals was observed. Droppings from Rock Hyrax and a Cape Porcupine quill were also found on site. Other mammal species such as Bat-eared Fox, Yellow and Grey mongooses, Cape Ground Squirrel, Suricate, Steenbok, Springbok, Duiker, Red Rock Rabbit, Secretary Bird and two unidentified rodents were observed in the nearby areas surrounding the proposed sites.

4 SITE SENSITIVITY

4.1 CRITICAL BIODIVERSITY AREAS

The proposed development is located on the boarder of the Northern Cape and Eastern Cape Province. As such, both the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) and the Northern Cape Critical Biodiversity Areas (2016) were consulted for this section.

The ECBCP (2019) replaces the ECBCP (2007) in its entirety and provides a map of important biodiversity areas, outside of the Protected Areas network, which must be used to inform land use and resource-use planning and decision making. The objectives of the ECBCP (2019) are to:

1) Identify the minimum spatial requirements needed to maintain a living landscape that continues to support all aspects of biodiversity and retain/maintain essential ecological infrastructure. This is achieved through the selection of areas, based on achieving targets, which represent important biodiversity pattern AND ecological processes;
2) Serve as the primary source of biodiversity information for land use planning and decision-making; and
3) Inform conservation and restoration action in important biodiversity areas.

The aim of the ECBCP (2019) was to map biodiversity priority areas through a systematic conservation planning process. The main outputs of the ECBCP include Protected Areas (PA), Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA) and No Natural Habitat Remaining (NNR) for both terrestrial and aquatic ecosystems.

The Northern Cape Critical Biodiversity Area (NC CBA, 2016) Map provides an updated and revised systematic biodiversity plan for the Northern Cape Province. It identifies and maps biodiversity priority areas, including CBAs, Ecological Support Areas (ESAs), Protected Areas (Pas), and Other Natural Areas (ONAs), through a Systematic Conservation Planning Approach. The plan provides important information on the minimum spatial requirements for the persistence of a viable representative sample of all ecosystem types and species required in order to ensure the maintenance of ecological functioning and landscapes as a whole.

Terrestrial CBAs

According to the ECBCP (2019), only a portion of the southern site (IPP Substation) occurs within a terrestrial CBA 2 (Figure 4.1). According to the NC CBA (2016), both the northern and southern CTMF as well as the majority of the IPP Substation occurs within a CBA 2. The south-western corner of the proposed IPP Substation occurs within a NC CBA 1 (Figure 4.3).

Aquatic CBAs

According to the ECBCP (2019), the proposed development does not occur within an aqautic CBA or ESA (Figure 4.2). The Northern Cape CBA Map (2016) does not include spatial data relating to aquatic CBAs.

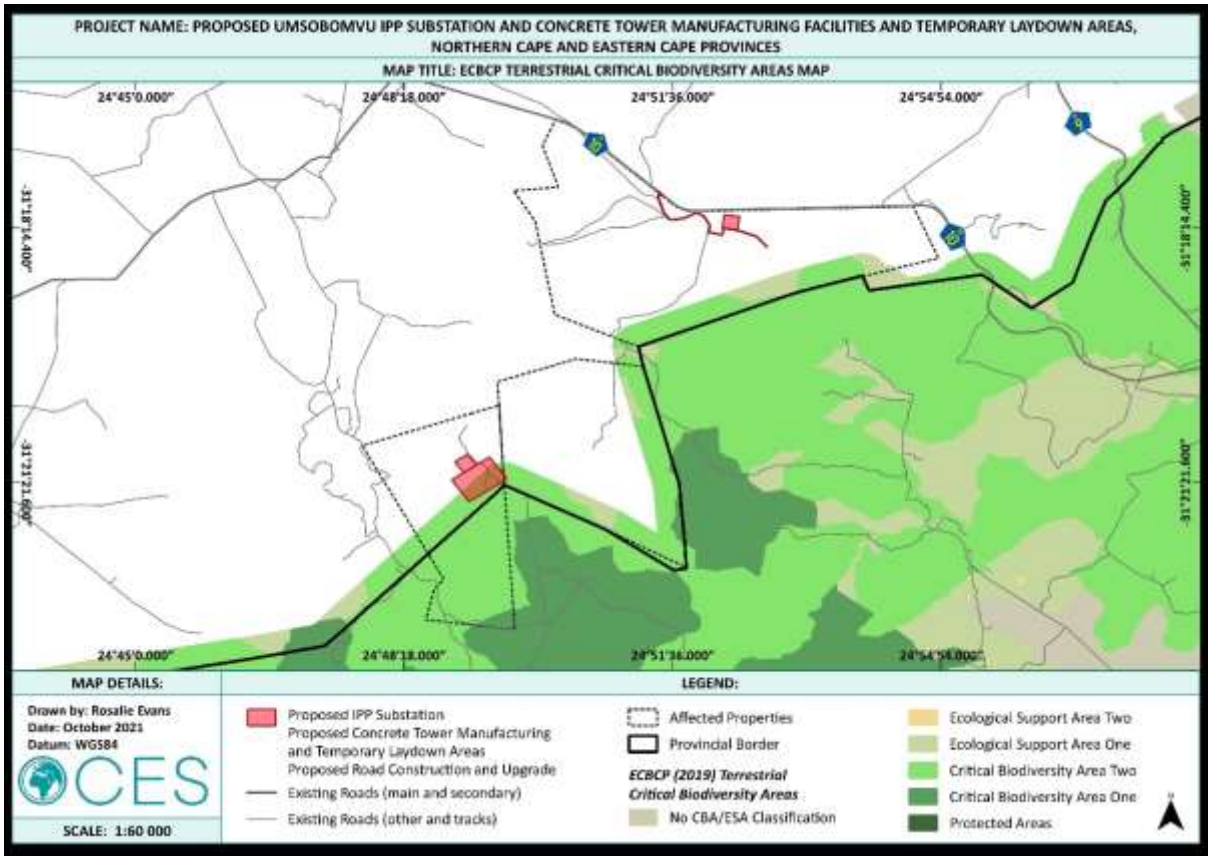

Figure 4.1: ECBCP (2019) Terrestrial CBAs located within the project area.

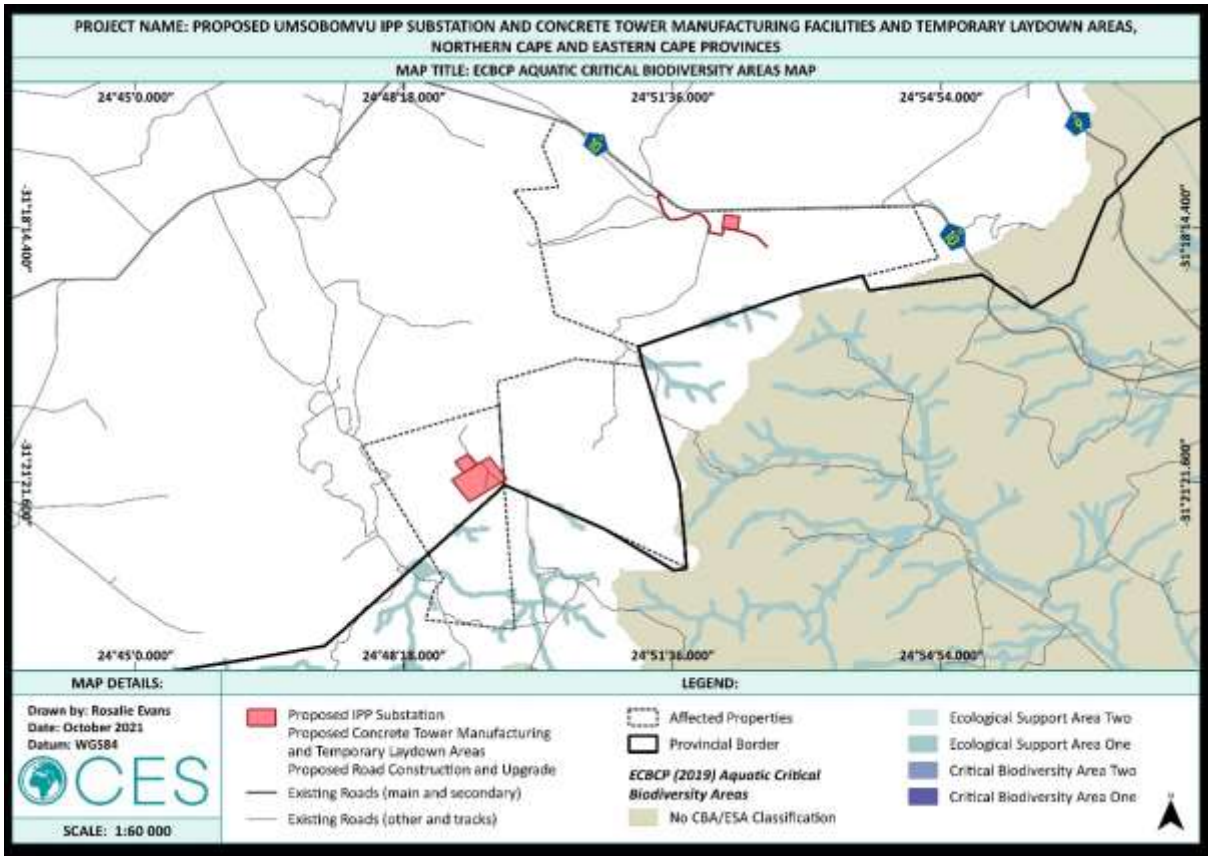

Figure 4.2: ECBCP (2019) Aquatic CBAs located within the project area.

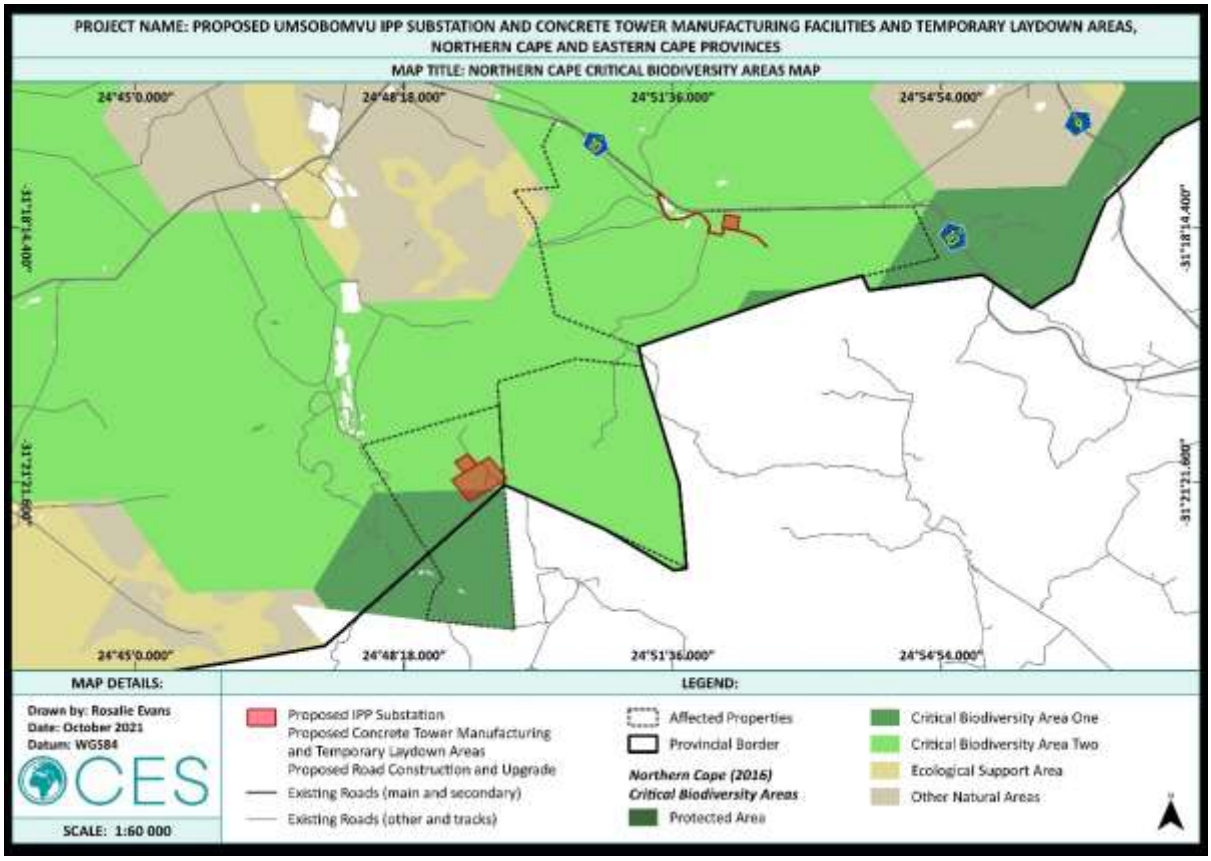

Figure 4.3: Northern Cape CBAs (2016) located within the project area.

Table 4.1: Biodiversity Priority areas affected by the proposed development.

Category	Sensitivity Features	Desired Management Objective	Recommendation
ECBCP (2019) Terrestrial CBAs			
CBA 2	• These areas are considered as natural or near-natural landscapes and biodiversity must be managed for minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.	Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA2, the following objectives apply: • Ecosystems and species must remain intact and undisturbed; • There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA2 area may elevate other CBA 2 areas to a CBA 1 category.	The management objectives state that set-aside areas must be designed in the layout and implemented where land use activities are unavoidable in CBA 2 areas, depending on the condition of the site. As development within the CBA 2 is not avoidable, all mitigations and recommendations as specified in this report must be implemented and adhered to. The development footprint must be limited to that which is strictly necessary. Existing roads must

		• These biodiversity features are at risk of reaching their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.	be utilised where feasible. A set-aside area is not deemed necessary due to the small footprint of the proposed development, the availability of the remaining intact ecosystem surrounding he proposed sites, and the fact that the site has been previously impacted due to grazing. In the medium to long term, the development of the Umsobomvu and Coleskop WEF will result in a higher level of protection for these vegetation types and associated floral species, as access to the site will be restricted, and farming activities substantially reduced within the boundaries of the project area.
Northern Cape CBAs (2016)			
CBA 1	The Critical Biodiversity Areas of the North Cape: Technical Report (Holness and Oosthuysen, 2016) does not provide information on the defining/sensitivity features or the management objectives for biodiversity priority areas.		
CBA 2			

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 NEM:BA 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 (Figure 4.4).

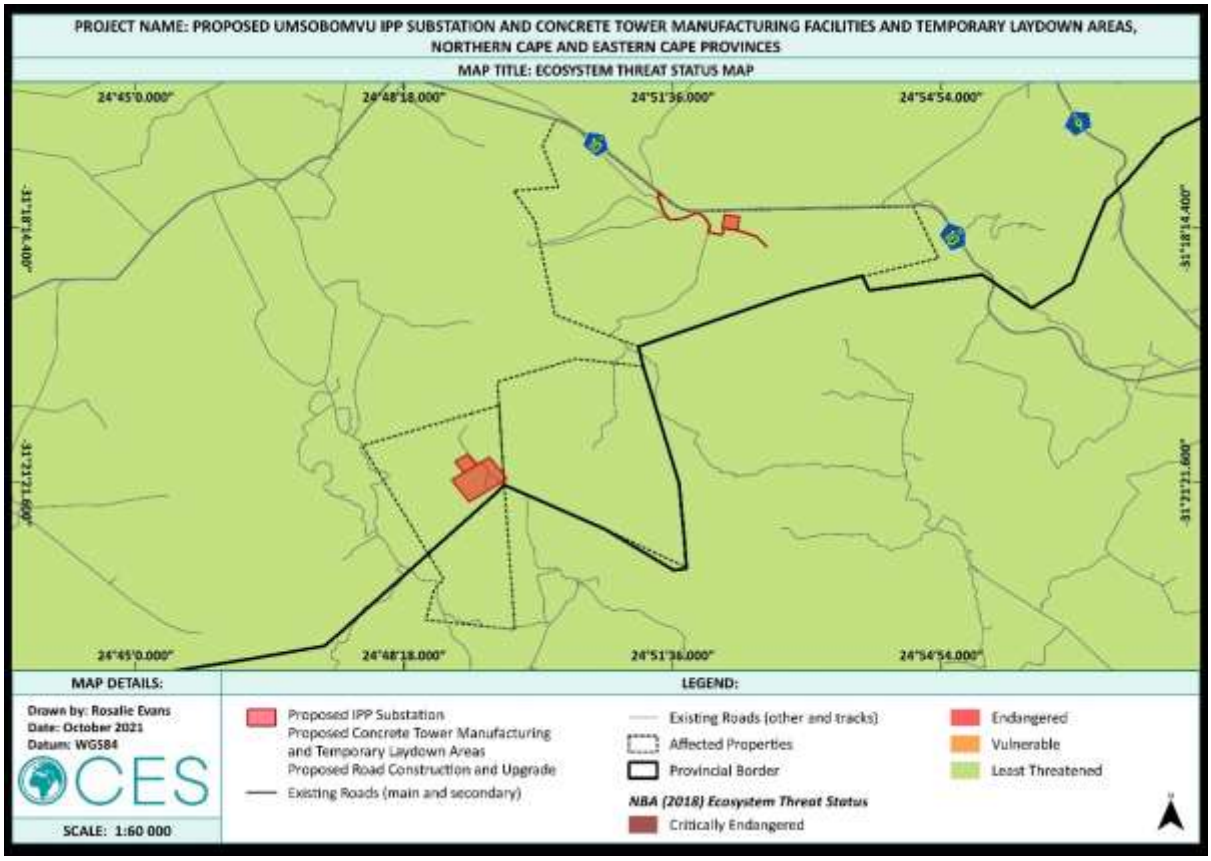

Figure 4.4: Threatened Ecosystem Map of the Project Area.

4.3 PROTECTED AREAS

The National Protected Areas Expansion Strategy (NPAES, 2011) 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 processes. The NPAES sets targets for expanding South Africa's protected area network, placing emphasis on those ecosystems that are least protected.

The proposed IPP Substation (southern site) occurs within the Karoo Escarpment Grassland NPAES Focus Area (Figure 4.5). The site does not occur within a protected area identified by the South African Protected Areas Database (SAPAD, 2021), a conservation area identified by the South African Conservation Areas Database (SACAD, 2021), or an Important Bird Area (IBA) (Bird Life, 2015).

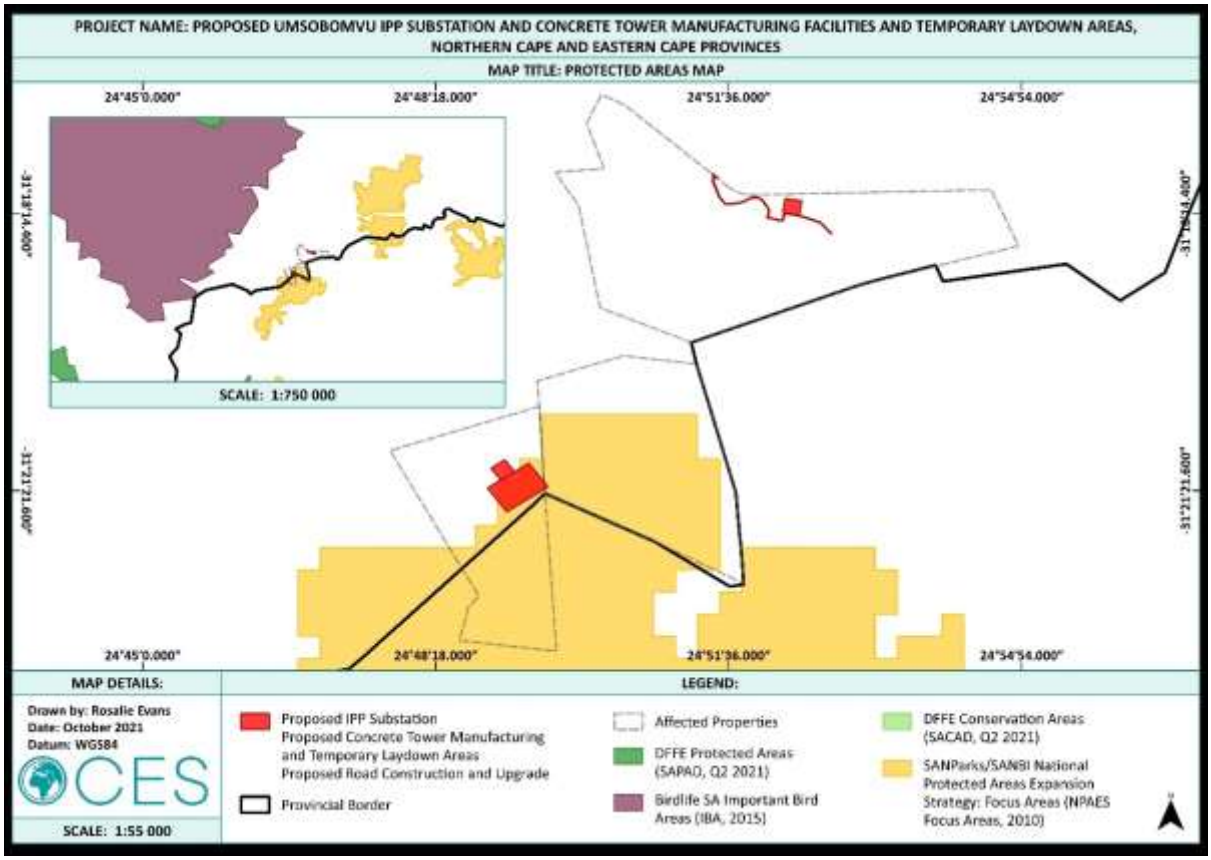

Figure 4.5: NPAES Focus Areas and Protected Areas surrounding the Project Area.

4.4 SITE SENSITIVITY

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the SCC in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (Table 4.2). 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 4.2: 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)	

Areas of medium sensitivity include the Eastern Upper Karoo vegetation and the Besemkaree Koppies Shrubland.

Table 4.3 provides a summary of how each vegetation type was assessed.

Areas of medium sensitivity include the Eastern Upper Karoo vegetation and the Besemkaree Koppies Shrubland.

Table 4.3: Evaluation of Site Ecological Importance (SEI) of habitat and SCC.

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Eastern Upper Karoo	Low No confirmed or highly likely populations of threatened SCC or range restricted species.	Very High Very large (>100 ha) intact area for any conservation status of ecosystem type. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. Current negative ecological impacts (grazing) within the proposed site.	Medium	Medium • Vegetation responses to disturbance may depend on several factors including stress resistance (e.g., Chambers *et al*. 2014), vegetative reproduction (e.g., Yang & Kim 2016) and seed dispersal (e.g., Neushulz *et al*. 2016). • Annual and biannual grass and herbs are more stress-resistant than the seedlings of perennial grasses and shrubs (Gonzalez & Ghermandi, 2019). Seedlings of the latter also recruit in gaps but do not usually survive in water deficient situations such as prolonged drought. • Annual species typically recover more quickly from a disturbance than perennial species as they put more energy into reproduction from seed than perennial species do. Therefore, whether the dominant plant species are annuals or perennials, as well as the availability of water, will greatly influence the resilience of plant communities. The proposed development will impact plant communities though soil disturbance, vegetation loss and habitat fragmentation, which can decrease receptor resilience (Ott *et al*. 2020). However, the potential for alien invasion is minor and 98 % of this vegetation is still relatively intact, apart from impacts due to grazing, and road infrastructure will be limited allowing for seed dispersal. These factors, combined with the implementation of the proposed mitigation and management measures, should make it resilient to anthropogenic disturbance of this nature. In addition, despite the fact that the majority of species on site are perennials, the Nama-Karoo biome is adapted to disturbance factors such as fire and grazing by livestock and herbivory, which has been found to increase species richness. This suggests that	**Medium**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
				the vegetation of the Nama-Karoo Biome is resilient to disturbance.	
Besemkaree Koppies Shrubland	Low No confirmed or highly likely populations of threatened SCC or range restricted species.	Very High Very large (>100 ha) intact area for any conservation status of ecosystem type. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. Current negative ecological impacts (grazing) within the proposed site.	Medium	Medium • Vegetation responses to disturbance may depend on several factors including stress resistance (e.g., Chambers *et al*. 2014), vegetative reproduction (e.g., Yang & Kim 2016) and seed dispersal (e.g., Neushulz *et al*. 2016). • Annual and biannual grass and herbs are more stress-resistant than the seedlings of perennial grasses and shrubs (Gonzalez & Ghermandi, 2019). Seedlings of the latter also recruit in gaps but do not usually survive in water deficient situations such as prolonged drought. • Annual species typically recover more quickly from a disturbance than perennial species as they put more energy into reproduction from seed than perennial species do. The resilience of plant communities here will therefore largely depend on whether the community is dominated by perennials or annuals and availability of water. • The existence of plant communities within this vegetation type is also linked to specific habitat conditions involving shallow soils and rocky outcrops (Mucina & Rutherford, 2006). • Grassland plant communities generally are highly vulnerable to anthropogenic disturbances that alter soils (Buisson et al. 2019), therefore these plants, especially shrubs, may be more vulnerable to soil erosion, reducing receptor resilience. • Most grassland species, however, can withstand some grazing pressure and may even play a critical role in maintaining the structure of grasslands (SANBI, 2013).	**Medium**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
				• This vegetation remains largely intact as it is generally excluded from intensive agricultural activities (Mucina & Rutherford, 2006). The proposed development will impact plant communities though soil disturbance, vegetation loss and habitat fragmentation, which can decrease receptor resilience (Ott *et al*. 2020). However, the potential for alien invasion is minor and 98 % of this vegetation is still relatively intact, apart from impacts due to grazing, and road infrastructure will be limited allowing for seed dispersal. These factors, combined with the implementation of the proposed mitigation and management measures, should make it resilient to anthropogenic disturbance of this nature. The Grassland Biome is adapted to disturbance factors such as fire, climate, and to a degree, grazing by livestock and herbivory. This suggests that the vegetation of the grassland biome is resilient to disturbance.	

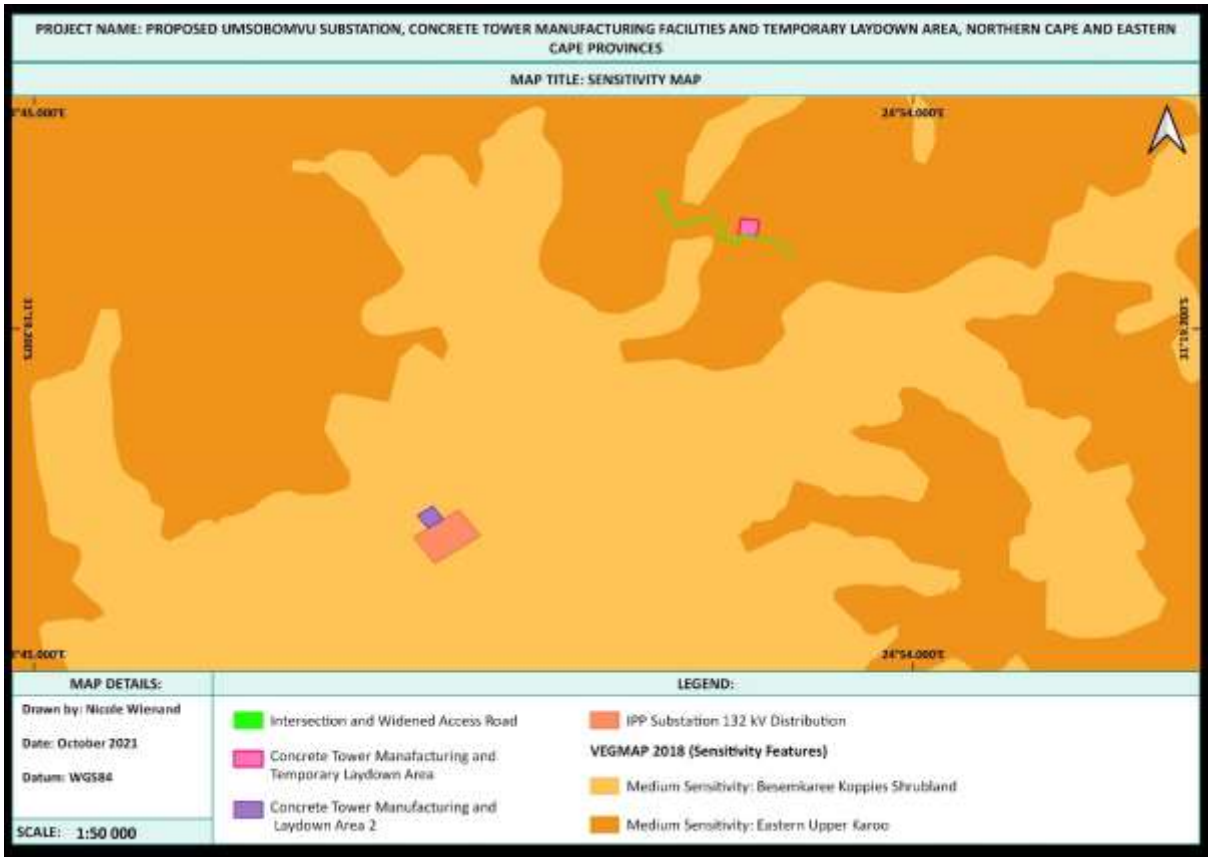

Figure 4.6: Sensitivity map of the proposed Umsobomvu Substation, CTMFs, and Temporary Laydown Areas.

It should be noted that at the time of the site sensitivity assessment undertaken as part of the Ecological Impact Assessment conducted by CES in 2018 for the Umsobomvu I WEF, there was no legally recognised guideline for assessing sensitivity and the specialist therefore used the system developed by CES. Under this system, areas of high sensitivity were areas that needed to be avoided while development was permitted in areas of moderate sensitivity, provided mitigation measures were implemented to avoid and minimise the impacts where feasible. Table 4.4 below summarises the site sensitivity and reasons therefore utilised in the original Umsobomvu I WEF Ecological Impact Assessment (CES, 2018).

Table 4.4: Site sensitivity and features as identified by CES (2018) for the Umosbomvu I WEF.

Sensitivity Rating	High	Moderate	Low
Reason	• Process areas such as rivers, tributaries and wetlands which are important for ecosystem functioning; • 20 m buffers on all rivers and tributaries for the protection of riparian vegetation and ecosystem functioning; • 50 m buffers on all NFEPA wetlands for the protection of riparian vegetation and ecosystem functioning; and	• 100 m regulatory (DWS) buffers on all rivers and tributaries; • 500 m regulatory (DWS) buffers on all wetlands; and • Areas classified as CBA 2 (NC CBA, 2016 and ECBCP, 2019)	• Transformed areas such as roads and urban areas; and • Highly degraded areas which are unlikely to support SCC.

	• Areas classified as CBA 1 (NC CBA, 2016 and ECBCP, 2019) which are likely to contain SCC.	which might contain SCC.	

Since the ecological assessment for the proposed Umsobomvu Substation, CTMFs, and Temporary Laydown Areas (this report) took place after the release of the new Species Environmental Guideline (2020) document, the methodology to determine sensitivity (SEI) was used so that the report met the legislated requirements as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when Applying for Environmental Authorisation (2020). Using these guidelines, the overall SEI for the Eastern Upper Karoo and Besemkaree Koppies Shrubland was determined to be of moderate sensitivity and as such the following guidelines must be applied:

"Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities".

These findings are in line with those of the Umsobomvu I WEF Ecological Impact Assessment (CES, 2018).

5 IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information in order to assess the impacts of the proposed Umsobomvu Substation, Concrete Tower Manufacturing Facilities, Access Raod and Temporary Laydown Area on the ecology of the area at the appropriate spatial and temporal scales. The impacts identified and described in Section 5.1 below have been assessed in terms of the criteria described in Appendix 4 of this report.

5.1 IMPACT ASSESSMENT

Table 5.1: Assessment of impacts associated with the proposed Umsobomvu Substation, Concrete Tower Manufacturing Facilities and Temporary Laydown Area.

CONSTRUCTION PHASE
IMPACT 1: LOSS OF NATURAL VEGETATION DUE TO VEGETATION CLEARING
Cause and Comment ***Direct Impact (Preferred Alternative)*** The clearing of land for the construction of the proposed northern CTMF, Temporary Laydown Area, and Access Road will result in the direct loss of approximately 8.8 ha of Eastern Upper Karoo vegetation while the southern CTMF and IPP Substation will result in the direct loss of approximately 12.75 ha of Besemkaree Koppies Shrubland. Given the small footprint of the proposed development which has been placed within the authorised footprint of the Umsobomvu and Coleskop Wind Energy Facilities (WEFs), as well as the extent of remaining intact Eastern Upper Karoo vegetation and Besemkaree Koppies Shrubland outside of and surrounding the project area, it is unlikely that the loss of vegetation associated with the proposed development will impact on the extent and long-term conservation of these vegetation types, which is classified as Least Threatened. The overall significance of the loss of natural vegetation due to vegetation clearing at the sites for the proposed development, provided the recommended mitigation measures are implemented, is classified as moderate negative. ***Cumulative Impact*** Minor portions of these vegetation types have already been lost mainly due to agriculture, grazing by livestock, and the construction of roads. However, the footprint of the proposed development is relatively small compared to the approved authorised WEFs. The additional (cumulative) loss of vegetation as a consequence of the construction of the Umsobomvu Substation, CTMFs and Temporary Laydown Area is therefore classified as moderate negative. ***No-Go Alternative*** The site forms part of the authorised Umsobomvu and Coleskop WEFs. If the proposed development is not approved, the current land use impacts such as grazing will continue. The No-go Alternative is therefore classified as moderate negative.
Mitigation Measures: → The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint. → Employees must be prohibited from making fires and harvesting plants. → As far as practically possible, existing access roads should be utilised. → The development footprint/construction area must be demarcated to prevent encroachment of construction activities into surrounding areas. → Ensure that roads on slopes incorporate storm water diversion.

→ Where possible, reserve and store natural vegetation for re-vegetation post-construction.
→ Only indigenous plant species must be used for rehabilitation purposes.
→ Topsoil must be carefully removed and used to rehabilitate the site.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct	Permanent	Localised	Moderate	Definite	**MODERATE (-)**	Reversible	Resource will be partly lost	Achievable	**MODERATE (-)**
Cumulative	Cumulative	Long-Term	Study-Area	Moderate	Definite	**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.			**N/A**
No-Go	Direct	Long-Term	Study Area	Moderate	Definite	**MODERATE (-)**	**N/A**			

IMPACT 2: LOSS OF PLANT SPECIES OF CONSERVATION CONCERN

Cause and Comment

Direct Impact (Preferred Alternative)

The clearance of vegetation for the construction of the proposed development could result in the loss of plant Species of Conservation Concern (SCC). However, it should be noted that no threatened SCC have been recorded or are likely to occur within the project area (refer to Section 3.4.3.).

Cumulative Impact

SCC have likely already been lost as a result of the existing developments within and surrounding the broader area. As such, the loss of SCC associated with the proposed development will likely contribute to the cumulative loss of non-threatened SCC within the region. However, if the mitigation measures as described in this report are implemented and adhered to, this impact can be reduced to low negative.

No-Go Alternative

The No-go alternative will not require the clearance of vegetation and will therefore not result in the loss of plant SCC.

Mitigation Measures:

→ A botanical micro-siting of the development footprint, by an experienced botanist with knowledge of the SCC that have been identified as possibly occurring within the site, must be undertaken in peak flowering season prior to construction. In the unlikely event that population of endangered SCC are found, infrastructure should be shifted to avoid these. Where this is not possible, SCC that are known to survive translocation, must be translocated to the nearest available habitat on the same property.

→ If the translocation or removal of SCC is required, a permit must be obtained from the relevant issuing authority.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct	Permanent	Localised	Moderate	May Occur	**MODERATE (-)**	Irreversible	Resource will be partly lost	Achievable	**LOW (-)**
Cumulative	Cumulative	Permanent	Study-Area	Moderate	May Occur	**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.			**N/A**
No-Go	N/A					**NEGLIGIBLE**	**N/A**			

IMPACT 3: DISTURBANCE OF FAUNAL SPECIES AND LOSS OF FAUNAL HABITAT

Cause and Comment

Direct Impact (Preferred Alternative)

During the construction phase, vegetation clearance and associated construction activities (including noise and vehicular movement) could result in the mortality or disturbance of faunal species and the subsequent movement of species out of the area. Additionally, the loss of vegetation coincides with the loss of faunal habitat, reducing feeding, breeding and rearing locales. Other mammal SCC are likely to move away from the areas during construction.

Cumulative Impact

The addition of the proposed development will exacerbate the impact on faunal species caused by existing developments and activities (including the traffic, farming, amongst others).

No-Go Alternative

Under the no-go alternative there will be no clearance of habitat within the project area therefore there will be no loss of faunal SCC. The no-go alternative is therefore negligible.

Mitigation Measures:

- → Faunal Search and Rescue to be undertaken directly prior to vegetation clearance.
- → The appointed ECO must be trained in snake removal techniques
- → ECO to walk ahead of clearing construction machinery and move slow moving species e.g. tortoises and cryptic species out of harm's way and into suitable neighbouring habitat.
- → Any faunal species that may die as a result of construction must be recorded (photographed, GPS coordinates) and if somewhat intact, preserved and donated to SANBI.
- → Any faunal species observed onsite must be recorded (photographed, GPS coordinates) and loaded onto iNaturalist.
- → Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.
- → It is illegal to remove or kill any of the frogs, toads, tortoises, lizards, chameleons and snakes within the proposed project area that are listed as ether Schedule I or II on the NCNCA List. Not all areas can be avoided, but it is recommended that construction staff are educated with regards to herpetofauna conservation and that all staff employed by the developer ensure that any herpetofauna encountered are not harmed or killed.
- → Amphibians and/or reptiles encountered must be allowed to move away from the construction area and a permit is required to remove or relocate these species. Amphibians must be released in the same catchment areas while reptiles must be relocated to directly adjacent areas of the proposed development.
- → Speed restrictions (40 km per hour is recommended) must be in place to reduce the chance of road kills, as well as to reduce the amount of dust caused by vehicle movement along the roads.
- → All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Both Layout Alternatives	Direct	Short-term	Study-Area	Moderate	Probable	**MODERATE (-)**	Reversible	Resource will be partly lost	Achievable	**MODERATE (-)**
Cumulative	Cumulative	Short-term	Study-Area	Moderate	Probable	**MODERATE (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the			**N/A**

							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.			
No-Go	**N/A**					**NEGLIGIBLE**	**N/A**			

IMPACT 4: WILDLIFE POACHING

Cause and Comment

Direct Impact (Preferred Alternative)

During the construction phase, the increase in individuals accessing the project area for the proposed development could result in an increase in wildlife poaching (particularly of reptile species).

Cumulative Impact

Wildlife poaching, particularly of reptile species, is a serious problem in the Northern Cape Province. Should the increase in individuals associated with the construction of the proposed development lead to the increase in wildlife poaching, this will exacerbate the loss of faunal species within the broader project area.

No-Go Alternative

The no-go alternative has been classified as Low Negative as wildlife poaching has been identified as an existing impact in the project area.

Mitigation Measures:

- → All individuals should sign a register prior to accessing the construction site, including construction workers.
- → Construction workers must not be housed onsite.
- → No animal shall be killed or injured as a result of the construction of the proposed development and presence of construction staff.
- → The appointed ECO should inquire and undertake an overview inspection of the site for the evidence of snares during the construction phase.
- → No hunting, baiting or trapping shall be allowed within the affected properties or surrounding properties by construction staff.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation

Preferred	Direct/ Indirect	Short-term	Study Area	Moderate	May Occur	**MODERATE (-)**	Reversible	Resource will be partly lost	Achievable	**LOW (-)**
Cumulative	Cumulative	Short-term	Study Area	Moderate	May Occur	**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.			**N/A**
No-Go	Direct	Long-term	Study area	Moderate	Definite	**LOW (-)**	**N/A**			

IMPACT 5: DISTURBANCE OF SENSITIVE AREAS

Cause and Comment

Direct Impact (Preferred Alternative)

During the construction phase, negligent construction activities within the 100 m regulatory buffer of a drainage line (non-perennial river) could cause the erosion, sedimentation, or subsequent degradation of nearby watercourses and the associated riparian vegetation. However, considering the footprint of the proposed development, the impact associated therewith has been classified as moderate.

Cumulative Impact

Disturbance of sensitive areas such as watercourses has already occurred within the broader project area due to the construction of roads, agricultural practises which have caused erosion and degradation of watercourses (including drainage lines) and riparian vegetation, amongst others. Therefore, should the proposed development lead to the further disturbance of sensitive areas such as watercourses, this could impact the characteristics of the greater catchment area. However, considering the footprint of the proposed development, the cumulative impact associated therewith has been classified as moderate.

No-Go Alternative

Disturbance of sensitive areas such as watercourses has already occurred within the broader project area due to the construction of roads, agricultural practises which have caused erosion and degradation of watercourses (including drainage lines) and riparian vegetation, amongst others. Therefore, the no-go alternative has been classified as moderate.

Mitigation Measures:

- → It is recommended that the construction area is demarcated and fenced off, where possible, to prevent the encroach of construction activities into nearby sensitive areas.
- → Stormwater must be managed in accordance with the recommendations outlined in the EMPr to ensure that runoff does not enter nearby surrounding water courses or drainage lines.
- → All erosion control mechanisms should be regularly maintained. The appointed ECO must conduct regular checks for signs of erosion.
- → Re-vegetation of disturbed surfaces must occur immediately after the construction activities have been completed.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct/ Indirect	Long-term	Localised	Moderate	May Occur	**MODERATE (-)**	Reversible	Resource will be partly lost	Achievable	**LOW (-)**
Cumulative	Cumulative	Long-term	Localised	Moderate	May Occur	**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.			**N/A**
No-Go	Existing	Long-term	Localised	Moderate	Definite	**MODERATE (-)**	**N/A**			

IMPACT 6: ESTABLISHMENT OF ALIEN PLANT SPECIES

Cause and Comment

Direct Impact (Preferred Alternative)

The removal of existing natural vegetation creates 'open' habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate which could pose a threat to surrounding ecosystems. Failure to successfully rehabilitate land to its natural state will exacerbate this impact.

Cumulative Impact

Scattered alien invasive species have already established in the broader area surrounding the proposed development footprint. Therefore, should the proposed development lead to the further establishment of alien invasive species in the project area, the invasion by alien species could be exacerbated. Considering the relatively small footprint of the proposed development, the cumulative impact associated therewith has been classified as low.

No-Go Alternative

There is already evidence of scattered alien invasive species in the broader area surrounding the proposed development footprint. Under the no-go alternative these species are likely to continue multiplying if left unchecked. The current no-go alternative is thus low negative.

Mitigation Measures:

- → The site must be checked regularly for the presence of alien invasive species.
- → The Alien Invasive Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to.
- → 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.
- → Any alien seedlings which establish within the construction area must be removed and disposed of as per the Working for Water Guidelines relating to the management of invasive alien plants.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct/ Indirect	Long-Term	Study Area	Moderate	May Occur	**MODERATE (-)**	Reversible	Resource will be partly lost	Achievable	**LOW (-)**
Cumulative	Cumulative	Long-Term	Study Area	Slight	May Occur	**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.			**N/A**
No-Go	Existing	Long-Term	Study Area	Slight	Probable	**LOW (-)**	**N/A**			

OPERATIONAL PHASE

IMPACT 7: ESTABLISHMENT OF ALIEN PLANT SPECIES

Cause and Comment

Direct Impact (Preferred Alternative)

During the operational phase, failure to remove and manage alien vegetation could result in the permanent establishment of alien vegetation in the study area. Failure to successfully rehabilitate land to its natural state will exacerbate this impact and lead to the permanent degradation of ecosystems as well as allow invasion by alien plant species.

Cumulative Impact

Scattered alien invasive species have already established in the broader area surrounding the proposed development footprint. Therefore, should the proposed development lead to the further establishment of alien invasive species in the project area, the invasion of alien species could be exacerbated. Considering the relatively small footprint of the proposed development, the cumulative impact associated therewith has been classified as low.

No-Go Alternative

There is already evidence of scattered alien invasive species surrounding the proposed development footprint. Under the no-go alternative these species are likely to continue multiplying if left unchecked. The current no-go alternative is thus low negative.

Mitigation Measures:

- The site must be checked regularly for the presence of alien invasive species.
- The Alien Invasive Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to during the operational phase.
- Monitoring of the establishment of alien seedlings within the boundaries of the proposed development should continue throughout the operational phase. Any alien seedlings should be removed and disposed of as per the Working for Water Guidelines relating to the management of invasive alien plants.
- The Rehabilitation Management Plan, compiled for the authorised Umsobomvu and Coleskop WEFs, must be implemented and adhered to during the operational phase.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct/ Indirect	Long-term	Study Area	Moderate	May Occur	**MODERATE (-)**	Reversible	Resource will be lost	Achievable	**Low (-)**
Cumulative	Cumulative	Long-Term	Study Area	Slight	May Occur	**Low (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the			**N/A**

							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.	
No-Go	Existing	Long-Term	Study Area	Slight	Probable	**Low (-)**	**N/A**	

IMPACT 8: IMPACTS OF NOISE AND LIGHTING ON FAUNAL POPULATIONS

Cause and Comment

Direct Impact (Preferred Alternative)

During the operational phase, noise and lighting associated with the proposed development (including maintenance activities) could cause a disturbance to surrounding faunal populations within the project area.

Cumulative Impact

The addition of the noise and lighting associated with the proposed development will exacerbate the impact on faunal species caused by existing developments and activities (including the traffic).

No-Go Alternative

The nearby roads, and the noise and lighting associated with the passing traffic, already impacts surrounding faunal population. As such, the no-go alternative is low negative.

Mitigation Measures:

- → Regular maintenance and checks of the infrastructure must be undertaken.
- → The mitigation measures specified in the Noise Impact Assessment conducted for the Coleskop and Umsobomvu WEFs must be implemented and adhered to during the operational phase of the proposed development.
- → External lighting should be avoided where possible. However, is required, lighting should be down lighting and low wattage
- → Where possible, minimise access to the site.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct	Long-term	Localised	Moderate	Definite	**MODERATE (-)**	Reversible	Resource will not be lost	Achievable	**LOW (-)**

Cumulative	Cumulative	Long-Term	Localised	Slight	May Occur	**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.	**N/A**
No-Go	Existing	Long-Term	Study Area	Slight	Definite	**Low (-)**	**N/A**	

DECOMMISSIONING PHASE

The proposed CTMFs and Laydown Area will be temporary and decommissioned after the construction phase of the authorised Umsobomvu and Coleskop WEFs. However, it is unlikely that the proposed IPP Substation will be decommissioned in the near future. Should the IPP Substation be decommissioned, the impacts associated with the decommissioning phase would be similar to those for the construction phase and most of the mitigation measures stipulated for the construction phase will, therefore, be relevant. The EMPr must include additional decommissioning phase recommendations and mitigation measures relating to the ecological environment based on case studies of the decommissioning of the relevant infrastructure components and it must consider the relevant legislation, policies and guidelines at the time of decommissioning.

IMPACT 9: INADEQUATE REHABILITATION

Cause and Comment

Direct Impact (Preferred Alternative)

The inadequate rehabilitation of the development footprint could result in unsuccessful site re-vegetation and resultant long-term ecological degradation.

Cumulative Impact

Minor ecological degradation has already taken place due to agriculture, grazing by livestock, and the construction of roads within the project area. The additional (cumulative) ecological degradation as a consequence of inadequate rehabilitation of temporary disturbed areas is therefore classified as moderate negative.

No-Go Alternative

The no-go alternative will not result in environmental disturbance and will therefore not require rehabilitation.

Mitigation Measures:

→ A portion of the operational phase earnings should be set aside for costs associated with the landscaping and re-vegetation of the development footprint.

- → All temporary disturbed areas that do not form part of development, must be rehabilitated using only indigenous vegetation.
- → All impacted areas must be restored as per the EMPr requirements.
- → The Rehabilitation Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to during the Decommissioning Phase.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct	Long-term	Localised	Moderate	May Occur	**MODERATE (-)**	Reversible	Resource will be lost	Easily Achievable	**LOW (-)**
Cumulative	Cumulative	Long-Term	Localised	Moderate	May Occur	**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.			**N/A**
No-Go	**N/A**					**N/A**	**N/A**			

IMPACT 10: INFESTATION OF ALIEN PLANT SPECIES

Cause and Comment

Direct Impact (Preferred Alternative)
Disruption of habitats often results in the infestation of alien species unless these are controlled. Should this happen, the impact will be of moderate significance as the alien species could result in the displacement of indigenous species and possible local extinctions of SCC.

Cumulative Impact
Scattered alien invasive species have already established in the broader area surrounding the proposed development footprint. Therefore, should the decommissioning of the proposed development lead to the further establishment of alien invasive species in the project area, the invasion of alien species could be exacerbated. Considering the relatively small footprint of the proposed development, the cumulative impact associated therewith has been classified as low.

No-Go Alternative
There is already evidence of scattered alien invasive species in the broader area surrounding the proposed development footprint. Under the no-go alternative these species are likely to continue multiplying if left unchecked. The current no-go alternative is thus low.

Mitigation Measures:

- The site must be checked regularly for the presence of alien invasive species. Any alien seedlings which establish within the site must be removed and disposed of as per the Working for Water Guidelines relating to the management of invasive alien plants.
- The Alien Invasive Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to.
- 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.
- The project site must be rehabilitated in accordance with the approved EMPr and Rehabilitation Plan should be compiled and implemented.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct	Long-term	Study Area	Moderate	May Occur	**MODERATE (-)**	Reversible	Resource will be partly lost	Easily Achievable	**LOW (-)**
Cumulative	Cumulative	Long-term	Study Area	Slight	May Occur	**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.			**N/A**
No-Go	Direct	Long-term	Study Area	Slight	Probable	**LOW (-)**	**N/A**			

IMPACT 11: IMPACTS OF DECOMMISSIONING NOISE ON SURROUNDING FAUNAL POPULATIONS

Cause and Comment

Direct Impact (Preferred Alternative)

Faunal species will be disturbed during decommissioning due to noise and vibrations of heavy plant and machinery. Faunal Species that vacate the immediate area may return following completion of the decommissioning phase or new individuals or species may inhabit the area. Heavy plant or machinery may cause unintentional mortalities of faunal species.

Cumulative Impact

The addition of the noise associated with the decommissioning of the development will exacerbate the impact on faunal species caused by existing developments and activities (including the traffic).

No-Go Alternative

The nearby roads, and the noise and lighting associated with the passing traffic, already impacts surrounding faunal population. As such, the no-go alternative is low negative.

Mitigation Measures:

- → Vehicles and machinery must meet best practice standards.
- → Staff and contractors' vehicles must comply with speed limits of 40 km/hr
- → Decommissioning activities must start and be completed within the minimum timeframe. i.e. may not be started and left incomplete.
- → The mitigation measures specified in the Noise Impact Assessment conducted for the Coleskop and Umsobomvu WEFs must be implemented and adhered to during the decommissioning phase of the proposed development.
- → External lighting should be avoided where possible. However, if required, lighting should be down lighting and low wattage.
- → Where possible, minimise access to the site.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Preferred	Direct	Short-term	Localised	Moderate	Definite	**MODERATE (-)**	Reversible	Resource will not be lost	Easily Achievable	**LOW (-)**
Cumulative	Cumulative	Short-term	Localised	Slight	May Occur	**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.			**N/A**
No-Go	Existing	Long-Term	Study Area	Slight	Definite	**LOW (-)**	**N/A**			

6 IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The proposed Umsobomvu Substation, Concrete Tower Manufacturing Facilities and Temporary Laydown Area will result in the loss of approximately 6 ha of Eastern Upper Karoo vegetation and 12.75 ha of Besemkaree Koppies Shrubland.

Eleven (11) impacts were identified for the proposed development; all eleven (11) impacts were classified as moderate prior to mitigation. If mitigation measures are implemented, these impacts will be reduced to two (2) moderate impacts and nine (9) low impacts (Figure 6.1).

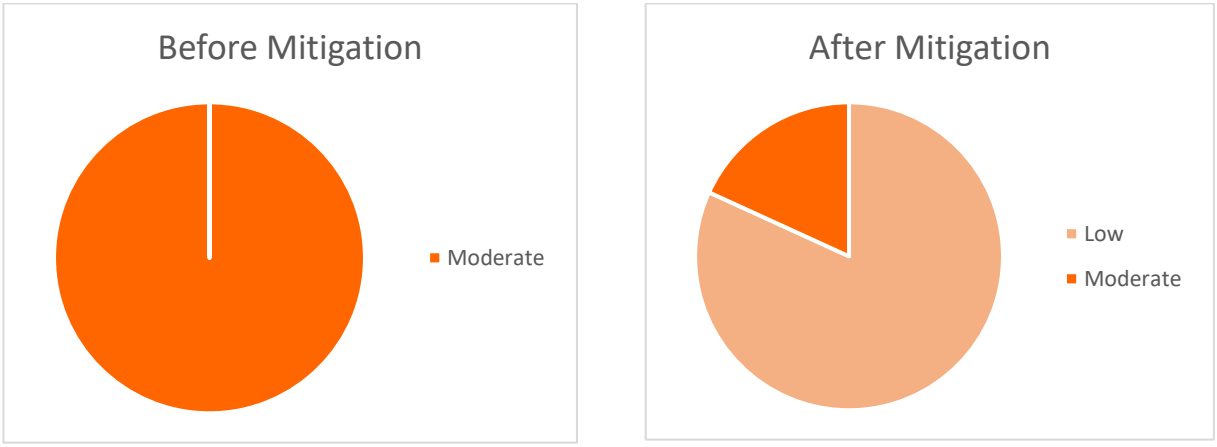

Figure 6.1: Pie charts summarising the number of high, moderate and low impacts before and after mitigation.

6.2 CONDITIONS OF EMPR, EA AND MONITORING

All management / mitigation measures identified for the impacts associated with the proposed development must be incorporated into the EMPr and implemented during the relevant phases of the proposed Umsobomvu Substation, Concrete Tower Manufacturing Facilities and Temporary Laydown Area (please refer to Section 5.1 above for the recommended mitigation measures associated with each impact identified). Specific mitigation measures and recommendations that should be incorporated into the EA (if granted) include:

- 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 by an experienced botanist, prior to vegetation clearance, 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 shifted to avoid these areas.
- A comprehensive Search and Rescue for fauna and flora should be conducted prior to vegetation clearance.
- All SCC which are known to survive translocation 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.
- The Alien Invasive Vegetation Management compiled for the Umsobomvu and Coleskop WEFs must be implemented and adhered to during all phases of the proposed development.
- The Rehabilitation Plan compiled for the Umsobomvu and Coleskop WEFs must be 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

The proposed development is deemed environmentally acceptable, provided the mitigation measures and recommendations specified in this report are implemented and adhered to. Specific mitigation measures, as specified above, should be incorporated into the EA, if granted, for implementation during the relevant phases of the development.

Furthermore, the development footprint of the proposed Umsobomvu Substation, Concrete Tower Manufacturing Facilities and Temporary Laydown Area 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 OCCURRING WITHIN THE PROJECT AREA.

Table A.1 Plant species occurring within the project area and observed during the site visit.

FAMILY	SPECIES	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA	Northern Cape Nature Conservation Act	SAMPLE SITE
EASTERN UPPER KAROO (Northern CTMF, Temporary Laydown Area, and Access Road)							
POACEAE	*Aristida congesta*	LC	-	-	-	-	S1-S4
POACEAE	*Aristida diffusa*	LC	-	-	-	-	S1-S4
ASTERACEAE	cf *Eriocephalus ericoides*	LC	-	-	-	-	S1-S4
ASTERACEAE	*cf Phymaspermum parvifolium*	LC	-	-	-	-	S2; S3; S4
AIZOACEAE	*cf Psilocaulon coriarium*	LC	Schedule 4	-	-	Schedule 2	S2
AIZOACEAE	*Ruschia intricata*	LC	Schedule 4	-	-	Schedule 2	S1-S4
ASTERACEAE	*Dicerothamnus rhinocerotis*	LC	-	-	-	-	S1-S4
POACEAE	*Digitaria eriantha*	LC	-	-	-	-	S1-S4
POACEAE	*Eragrostis bicolor*	LC	-	-	-	-	S1-S4
POACEAE	*Eragrostis obtusa*	LC	-	-	-	-	S1-S4
ASTERACEAE	*Eriocephalus spinescens*	LC	-	-	-	-	S2; S3
ANACARDIACEAE	*Sersia erosa*	LC	-	-	-	-	S2
POACEAE	*Sporobolus fimbriatus*	LC	-	-	-	-	S1-S4
ASTERACEAE	*Chrysocoma ciliata*	LC	-	-	-	-	S1-S4
SOLANACEAE	*Lycium sp.*	LC	-	-	-	-	S2
ASPARAGACEAE	*Asparagus sp.*	LC	-	-	-	-	S1-S4

FAMILY	SPECIES	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA	Northern Cape Nature Conservation Act	SAMPLE SITE
ANACAMPSEROTACEAE	*Anacampseros ustulata*	LC	-	-	-	Schedule 2	S2; S3;S4
EBENACEAE	*Diospyros austro-africana*	LC	-	-	-	-	S2; S3;S4
BESEMKAREE KOPPIES SHRUBLAND (Southern CTMF and IPP Substation)							
ASPHODELACEAE	*Aloe broomii*	LC	Schedule 4	-	-	Schedule 2	S8
ASPARAGACEAE	*Asparagus mucronatus*	LC	-	-	-	-	S5-S9
ASPARAGACEAE	*Asparagus burchellii*	LC	-	-	-	-	S5-S9
ASPARAGACEAE	*Asparagus sp.*	LC	-	-	-	-	S5-S9
AIZOACEAE	*Ruschia intricata*	LC	Schedule 4	-	-	Schedule 2	S5-S9
ASTERACEAE	*Dicerothamnus rhinocerotis*	LC	-	-	-	-	S5-S9
POACEAE	*Digitaria eriantha*	LC	-	-	-	-	S5-S9
EBENACEAE	*Euclea undulata*	LC	-	-	-		S5; S6; S7
AMARYLLIDACEAE	*Haemanthus* cf *humilis*	LC	Schedule 4	-	-	Schedule 2	S8
ASTERACEAE	*Helichrysum sp.*	Unknown	-	-	-	-	S5-S9
POACEAE	*Sporobolus sp.*	LC	-	-	-	-	S5-S9
POACEAE	*Themeda triandra*	LC	-	-	-	-	S5-S9
POACEAE	*Aristida congesta*	LC	-	-	-	-	S5-S9
Aizoaceae	*Stomatium middleburgense*	Not listed	Schedule 4	-	-	Schedule 2	S6
ANACARDIACEAE	*Searsia undulata*	LC	-	-	-	-	S5; S6; S7
ANACARDIACEAE	*Sersia erosa*	LC	-	-	-	-	S5; S6; S7
ASTERACEAE	*Pentzia globosa*	LC	-	-	-	-	S5-S9

FAMILY	SPECIES	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA	Northern Cape Nature Conservation Act	SAMPLE SITE
CRASSULACEAE	*Crassula* cf *exilis*	LC	-	-	-	Schedule 2	S6

Table A2: plant species recorded during the Ecological Impact Assessment conducted by CES in 2018.

FAMILY	SPECIES	IUCN	SA RED LIST	CITES	NEMBA	PNCO	PROTECTED TREES
Asphodelaceae	*Aloe broomii*	-	LC	Appendix II	-	Schedule 4	-
Scrophulariaceae	*Aptosimum procumbens*	-	LC	-	-	-	-
Asteraceae	*Arctotis prostrata*	-	LC	-	-	-	-
Poaceae	*Aristida sp*	-	-	-	-	-	-
Fabaceae	*Aspalathus sp.*	-	-	-	-	-	-
Asparagaceae	*Asparagus mucronatus*	-	LC	-	-	-	-
Asteraceae	*cf Euryops annae*	-	LC	-	-	-	-
Aizoaceae	*Cf Gibbaeum petrense*	-	VU	-	-	-	-
Cyperaceae	*cf Scirpoides thunbergii*	-	LC	-	-	-	-
Sinopteridaceae	*Cheilanthes hirta*	-	LC	-	-	-	-
Asteraceae	*Chrysocoma ciliata*	-	LC	-	-	-	-
Poaceae	*Cotyledon dactylon*	-	LC	-	-	-	-
Crassulaceae	*Cotyledon orbiculata*	-	LC	-	-	-	-
Poaceae	*Cymbopogan sp*	-	LC	-	-	-	-
Asteraceae	*Elytropappus rhinocerotis*	-	LC	-	-	-	-
Poaceae	*Eragrostis chloromelas*	-	LC	-	-	-	-
Poaceae	*Eragrostis curvula*	-	LC	-	-	-	-
Ebenaceae	*Euclea undulata*			-	-	-	-
Euphorbiaceae	*Euphorbia mauritanica*	-	LC	Appendix II	-	-	-
Asteraceae	*Felicia muricata*	-	LC	-	-	-	-
Apocynaceae	*Gomphocarpus fruticosus*	-	LC	-	-	Schedule 4	-
Malvaceae	*Grewia occidentalis var. occidentalis*	-	LC	-	-	-	-
Orobanchaceae	*Harveya pumila*	-	LC	-	-	Schedule 4	-
Fabaceae	*Lessertia cf diffusa*	-	LC	-	-	-	-
Solanaceae	*Lycium horridum*	-	LC	-	-	-	-
Melianthaceae	*Melianthus comosus*	-	LC	-	-	-	-
Fabaceae	*Melolobium microphyllum*	LC	LC	-	-	-	-
Iridaceae	*Morea cf huttonii*	-	LC	-	-	Schedule 4	-
Asteraceae	*Osteospermum pinnatum*	-	LC	-	-	-	-
Asteraceae	*Pteronia glauca*	-	LC	-	-	-	-
Salicaceae	*Populus cf alba*	-	LC	-	-	-	-
Anacardiaceae	*Rhus erosa*	-	LC	-	-	-	-

Anacardiaceae	*Rhus lancea*			-	-	-	-
Anacardiaceae	*Rhus pendulina*	-	LC	-	-	-	-
Anacardiaceae	*Rhus undulata*	-	LC	-	-	-	-
Aizoaceae	*Ruschia intricata*	-	LC	-	-	-	-
Aizoaceae	*Rushia cf cradockensis*	-	-	-	-	-	-
Aizoaceae	*Tetragonia cf verrucosa*	-	LC	-	-	-	-
Poaceae	*Themeda triandra*	-	LC	-	-	-	-

APPENDIX 2: LIST OF HERPETOFAUNA SPECIES.

Table A3: List of Herpetofauna species which are likely to occur within the proposed project area (IUCN).

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS (IUCN 2021, MEASEY 2011, SANBI 2014)	CITES	NCNCA	RECORDED ON SITE (YES/NO)
Amphibians					
Southern Pygmy Toad	*Poyntonophrynus vertebralis*	LC	-	Schedule II	-
Karoo Toad	*Vandijkophrynus gariepensis*	LC	-	Schedule II	-
Bubbling Kassina	*Kassina senegalensis*	LC	-	Schedule II	-
Common Platanna	*Xenopus laevis*	LC	-	Schedule II	-
Cape River Frog	*Amietia fuscigula*	LC	-	Schedule II	-
Delalande's River Frog	*Amietia delalandii*	LC	-	Schedule II	-
Poynton's River Frog	*Amietia poyntoni*	LC	-	Schedule II	-
Common Caco	*Cacosternum boettgeri*	LC	-	Schedule II	-
Tandy's Sand Frog	*Tomopterna tandyi*	LC	-	Schedule II	-
Giant Bullfrog	*Pyxicephalus adspersus*	NT	-	Schedule I	-
Gray's Stream Frog	*Strongylopus grayii*	LC	-	Schedule II	-
Terrapins & Tortoises					
Marsh Terrapin	*Pelomedusa galeata*	LC	-	-	-

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS (IUCN 2021, MEASEY 2011, SANBI 2014)	CITES	NCNCA	RECORDED ON SITE (YES/NO)
Greater Padloper	*Homopus femoralis*	LC	Appendix II	Schedule II	Yes
Tent Tortoise	*Psammobates tentorius*	NT	Appendix II	Schedule II	-
Geckos					
Marico Gecko	*Pachydactylus mariquensis*	LC	-	-	-
Spotted Gecko	*Pachydactylus maculatus*	LC	-	-	-
Golden Spotted Gecko	*Pachydactylus oculatus*	LC	-	-	-
Karoo Flat Gecko	*Afroedura karroica*	LC	-	-	-
Agamas					
Southern Rock Agama	*Agama atra*	LC	-	-	-
Skinks					
Short-headed Legless Skink	*Acontias breviceps*	LC	-	-	-
Red-sided Skink	*Trachylepis homalocephala*	LC	-	-	-
Speckled Rock Skink	*Trachylepis punctatissima*	LC	-	-	-
Lizards					
Burchell's Sand Lizard	*Pedioplanis burchelli*	LC	-	Schedule II	-

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS (IUCN 2021, MEASEY 2011, SANBI 2014)	CITES	NCNCA	RECORDED ON SITE (YES/NO)
Karoo Girdled Lizard	*Karusaurus polyzonus*	LC	Appendix II	Schedule I	-
Cape Crag Lizard	*Pseudocordylus microlepidotus*	LC	Appendix II	Schedule II	-
Chameleons					
Eastern Cape Dwarf Chameleon	*Bradypodion ventrale*	LC	Appendix II	Schedule I	-
Snakes					
Rhombic Egg-eater	*Dasypeltis scabra*	LC	-	Schedule II	-
Aurora House Snake	*Lamprophis aurora*	LC	-	Schedule II	-
Spotted Rock Snake	*Lamprophis guttatus*	LC	-	Schedule II	-
Sundevall's Shovel-snout	*Prosymna sundevallii*	LC	-	Schedule II	-
Montane Grass Snake	*Psammophis crucifer*	LC	-	Schedule III	-

APPENDIX 3: LIST OF MAMMAL SPECIES.

Table A4: List of mammal species which are likely to occur within the proposed project area (IUCN).

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	NCNCA
Carnivora					
Caracal	*Caracal caracal*	LC	No	-	Schedule IV
African Wildcat	*Felis silvestris*	LC	No	-	Schedule I
Black-footed Cat	*Felis nigripes*	VU	No	Protected	Schedule I
Bat-eared Fox	*Otocyon megalotis*	LC	No	-	Schedule I
Cape Fox	*Vulpes chama*	LC	No	Protected	Schedule I
Black-backed Jackal	*Canis mesomelas*	LC	No	-	Schedule IV
Aardwolf	*Proteles cristata*	LC	No	-	Schedule I
Brown Hyaena	*Parahyaena brunnea*	NT	No	Protected	Schedule I
Small-spotted Genet	*Genetta genetta*	LC	No	-	Schedule II
Striped Polecat	*Ictonyx striatus*	LC	No	-	Schedule I

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	NCNCA
African Striped Weasel	*Poecilogale albinucha*	NT	No	-	Schedule I
Cape Clawless Otter	*Aonyx capensis*	NT	No	Protected	Schedule II
Honey Badger	*Mellivora capensis*	LC	No	Protected	Schedule I
Yellow Mongoose	*Cynictis penicillate*	LC	No	-	Schedule II
Cape Grey Mongoose	*Herpestes pulverulentus*	LC	**Near**	-	Schedule II
Suricate	*Surcatta suricatta*	LC	No	-	Schedule II
Perissodactyla					
Southern White Rhino	*Ceratotherium simum*	NT	**Near**	Protected	Schedule I
Artiodactyla					
Springbok	*Antidorcas marsupialis*	LC	No	-	Schedule II
Steenbok	*Raphicerus campestris*	LC	No	-	Schedule II
Blesbok	*Damaliscus pygargus*	LC	No	-	Schedule II
Red Hartebeest	*Alcelaphus buselaphus caama*	LC	No	-	Schedule II
African Buffalo	*Syncerus caffer*	LC	No	-	Schedule II

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	NCNCA
Black Wildebeest	*Connochaetus gnou*	LC	No	Protected	Schedule II
Common Eland	*Tragelaphus oryx*	LC	No	-	Schedule II
Common Duiker	*Sylvicapra grimmia*	LC	No	-	Schedule II
Primates					
Vervet Monkey	*Chlorocebus pygerythrus*	LC	No	-	Schedule IV
Chacma Baboon	*Papio ursinus*	LC	No	-	Schedule IV
Tubulidentata					
Aardvark	*Orycteropus afer*	LC	No	-	Schedule I
Hyracoidea					
Rock Hyrax	*Procavia capensis*	LC	No	-	Schedule II
Rodentia					
Karoo Four-striped Grass Mouse	*Rhabdomys intermedius*	LC	**Yes**	-	Schedule II
Karoo Bush Rat	*Otomys unisulcatus*	LC	**Yes**	-	Schedule II

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	NCNCA
Slogget's Vlei Rat	*Otomys sloggetti*	LC	**Yes**	-	Schedule II
Grant's Rock Mouse	*Micaelamys granti*	LC	**Yes**	-	Schedule II
Namaqua Rock Mouse	*Micaelamys namaquensis*	LC	No	-	Schedule II
Cape Short-eared Gerbil	*Desmodillus auricularis*	LC	No	-	Schedule II
Highveld Gerbil	*Gerbilliscus brantsii*	LC	No	-	Schedule II
Hairy-footed Gerbil	*Gerbillurus paeba*	LC	No	-	Schedule II
Brant's Whistling Rat	*Parotomys brantsii*	LC	No	-	Schedule II
Multimammate Mouse	*Mastomys coucha*	LC	No	-	Schedule II
Spectacled Dormouse	*Graphiurus ocularis*	NT	**Yes**	-	Schedule II
White-tailed Rat	*Mystromys albicaudatus*	VU	**Yes**	-	Schedule II
Large-eared Mouse	*Malacothrix typica*	LC	No	-	Schedule II
Common Mole-rat	*Cryptomys hottentotus*	LC	**Yes**	-	Schedule II
Cape Porcupine	*Hystrix africaeaustralis*	LC	No	-	Schedule II
Cape Ground Squirrel	*Xerus inauris*	LC	No	-	Schedule II

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	NCNCA
Springhare	*Pedetes capensis*	LC	No	-	Schedule II
Lagomorpha					
Cape Hare	*Lepus capensis*	LC	No	-	Schedule II
Hewitt's Red Rock Rabbit	*Pronolagus saundersiae*	LC	No	-	Schedule II
Insectivora					
Reddish-grey Musk Shrew	*Crocidura cyanea*	LC	No	-	Schedule II
Lesser Dwarf Shrew	*Suncus varilla*	LC	No	-	Schedule II
Karoo Round-eared Sengi	*Macroscelides proboscideus*	LC	No	-	Schedule II
Cape Rock Sengi	*Elephantulus edwardii*	LC	**Yes**	-	Schedule II
Eastern Rock Sengi	*Elephantulus myurus*	LC	No	-	Schedule II
Western Rock Sengi	*Elephantulus rupestris*	LC	No	-	Schedule II

APPENDIX 4: IMPACT RATING SCALE

Pre-Mitigation Evaluation Criteria

This rating scale adopts four (4) key factors to determine the overall significance of the impact prior to mitigation:

1. **Temporal Scale**: This scale defines the duration of any given impact over time. 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.
2. **Spatial Scale:** This scale defines the spatial extent of any given impact. This may extend from the local area to an impact that crosses international boundaries. The wider the impact extends, the more significant it is likely to be.
3. **Severity/Benefits Scale:** This scale defines how severe negative impacts would be, or how beneficial positive impacts would be. This negative/positive scale is critical in determining the overall significance of any impacts.
4. **Likelihood Scale:** This scale defines the risk or chance of any given 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.

Table A5: Pre-Mitigation Evaluation Criteria.

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	
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	
SEVERITY SCALE	SEVERITY	BENEFIT
Slight	Slight impacts on the affected system(s) or party(ies)	Slightly beneficial to the affected system(s) and party(ies)
Moderate	Moderate impacts on the affected system(s) or party(ies)	Moderately beneficial to the affected system(s) and party(ies)
Severe/ Beneficial	Severe impacts on the affected system(s) or party(ies)	A substantial benefit to the affected system(s) and party(ies)

Very Severe/ Beneficial	Very severe change to the affected system(s) or party(ies)	A very substantial benefit to the affected system(s) and party(ies)
LIKELIHOOD SCALE		
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	

Table A6: Significance Descriptions.

SIGNIFICANCE RATE		DESCRIPTION
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.*

Post-Mitigation Criteria

Once mitigation measures are proposed, the following three (3) 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 A7: Post-Mitigation 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. For this reason, impacts of especially a social nature need to reflect the values of the affected society.
- **Cumulative Impacts**: These affect the significance rating 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 and the BA. 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 and, with management measures being imposed accordingly (e.g. dust suppression measures being implemented during the dry season).

APPENDIX 5: CURRICULUM VITAE OF PROJECT TEAM

Nicole Wienand
Curriculum Vitae

CONTACT DETAILS

Name of Company	**Coastal and Environmental Services (Pty) Ltd trading as CES**
Designation	Port Elizabeth Branch
Profession	Environmental Consultant / Junior Ecological Specialist
Years with firm	1.5 Years
E-mail	n.wienand@cesnet.co.za nicole.wienand@eoh.com
Office number	+27 (0)41 045 0496 +27 (0)41 393 0700
Nationality	South African
Key areas of expertise	➢ Environmental and Ecological Impact Assessments ➢ Botanical Specialist Studies ➢ Environmental Auditing/Compliance Monitoring ➢ GIS Mapping

PROFILE

Ms Nicole Wienand

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. Since her appointment with CES in January 2019, Nicole has undertaken a number of Ecological Impact Assessments under the guidance of Dr Greer Hawley and Tarryn Martin.

Nicole Wienand
Curriculum Vitae

Employment Experience

Environmental Consultant, CES
07 January 2019 – Present

- Basic Assessment Reports
- Ecological Impact Assessments
- Environmental Audit/Compliance Monitoring
- Environmental Management Programmes
- GIS Mapping
- Public Participation

Academic Qualifications

Nelson Mandela University, Port Elizabeth
BSc Honours Botany (Environmental Management)
2018

Nelson Mandela Metropolitan University, Port Elizabeth
BSc Environmental Sciences
2015-2017

Consulting Experience

Basic Assessments

- Basic Assessment Report (BAR) for the proposed Duyker Island Prospecting Right, North West Province (Role: Assistant Report Writer).
- Basic Assessment Report (BAR) for the proposed Fairview Sand Mine near Port Alfred, Eastern Cape Province (Role: Report Writer).
- Basic Assessment Report (BAR) for the proposed Kareekrans Boerdery Agricultural Development near Kirkwood, Eastern Cape Province (Role: Report Writer).
- Basic Assessment Report (BAR) for the proposed Sitrusrand Dwarsleegte Farm Citrus Development near Kirkwood, Eastern Cape Province (Role: Report Writer).
- Basic Assessment Report (BAR) for the Proposed Private Jetty in Bushman's Estuary near Kenton-On-Sea, within the Eastern Cape Province (Role: Report Writer).

Ecological Assessments

- ZMY Steel Traders (Pty) Ltd., Steel Recycling Plant, Zone 5 of the Coega SEZ, Eastern Cape Province (Role: Ecological Chapter Writer).
- Ecological Impact Assessment for the proposed Kareekrans Boerdery Agricultural Development near Kirkwood Eastern Cape Province (Role: Report Writer).
- Ecological Impact Assessment for the proposed Sitrusrand Dwarsleegte Farm Citrus Development near Kirkwood, Eastern Cape Province – Ecological Impact Assessment and Report Writing (Role: Report Writer).
- Ecological Impact Assessment for the proposed Uitsig Boerdery Trust Citrus Development near Kirkwood, Eastern Cape Province (Role: Report Writer).
- Ground Truthing Survey for *Aloe bowiea* on Portion 2 of Farm 683 for the proposed Uitsig Boerdery Trust Citrus Development near Kirkwood, Eastern Cape Province (Role: Report Writer).
- Mosselbankfontein Coastal Dune and Ecological Impact Assessment near Witsand, Western Cape Province (Role: Report Writer).

- Ecological Impact Assessment for the proposed Nomzamo Citrus Farm Development near Kirkwood, Eastern Cape Province (Role: Report Writer).
- Mangrove Forest Survey for the Kenmare Biodiversity Management Plan, Topuito, Mozambique (Role: Report Writer).
- Ecological Impact Assessment for the proposed Refele Village Sports Facility, Mount Fletcher, Elundini Local Municipality, Eastern Cape Province of South Africa (Role: Report Writer).
- Aquatic and Ecological Impact Assessment for the proposed Hamburg Quarry Expansion, R72, Ngqushwa Local Municipality (Role: Report Writer).
- Ecological Opinion and Site Sensitivity Report for the proposed Woodlands Dairy 22kV Overhead Line near Humandsdorp, Eastern Cape Province (Role: Report Writer).
- Tyolomnqa River Estuary Situation Assessment (Role: Assistant Report Writer).

Environmental Auditing

- Khayamnandi Extension on Erven 114, 609, 590 and 24337, Bethelsdorp, within the Nelson Mandela Bay Municipality;
- Aberdeen Bulk Water Supply Phase 2, Dr Beyers Naude Local Municipality, Eastern Cape Province, South Africa;
- The Milkwoods Integrated Residential Development, Remainder Erf 1953, Victoria Drive, Walmer, Nelson Mandela Bay Municipality, Eastern Cape Province;
- Fishwater Flats Wastewater Treatment Works Refurbishment, Nelson Mandela Bay Municipality, Eastern Cape Province;
- The Refurbishment of the Kwanobuhle Wastewater Treatment Plant, Nelson Mandela Bay Municipality, Eastern Cape Province, South Africa; and
- Driftsands Sewer Collector Augmentation (Phase Ii), Within the Nelson Mandela Bay Municipality, Eastern Cape Province.

Geographical Information Systems (GIS) Mapping

- ZMY Steel Traders – Basic Assessment Report and Biophysical Mapping;
- Duyker Island – Prospecting Area Mapping & Biophysical Mapping;
- Fairview Sand Mine near Port Alfred, Eastern Cape Province – Biophysical and Layout Mapping;
- St Francis Coastal Protection Scheme – Kromme Estuary Functional Zone Mapping; Biophysical Mapping; and Sand Source Area Mapping;
- Kareekrans Boerdery Agricultural Development – Biophysical and Layout Mapping;
- Nomzamo Citrus Farm Development near Kirkwood, Eastern Cape Province - Biophysical and Layout Mapping;
- Siyahluma Citrus Farm Development near Addo, Eastern Cape Province – Biophysical and Layout Mapping; and
- Sitrusrand Dwarsleegte Farm Citrus Development – Biophysical and Layout Mapping.
- Marine Intake and Outfall Infrastructure Servitude Project, Zone 10, Coega SEZ, Eastern Cape Province, South Africa.
- Proposed Private Jetty in Bushman's Estuary near Kenton-On-Sea, within the Eastern Cape Province.
- Proposed Woodlands Dairy 22kV Overhead Line near Humandsdorp, Eastern Cape Province.

- Tyolomnqa River Estuary Situation Assessment.
- Hamburg Quarry Expansion, R72, Ngqushwa Local Municipality.
- Refele Village Sports Facility, Mount Fletcher, Elundini Local Municipality, Eastern Cape Province of South Africa.

Public Participation process

- Duyker Island Prospecting Right, North West Province St Francis Coastal Protection Scheme;
- Fairview Sand Mine near Port Alfred, Eastern Cape Province;
- Kareekrans Boerdery Agricultural Development near Kirkwood Eastern Cape Province;
- Proposed Coastal Protection Scheme, St Francis Bay, Kouga Local Municipality, Eastern Cape Province; and
- Sitrusrand Dwarsleegte Farm Citrus Development near Kirkwood, Eastern Cape Province.
- Marine Intake and Outfall Infrastructure Servitude Project, Zone 10, Coega SEZ, Eastern Cape Province, South Africa.

Social Auditing

- Malawi Millennium Development Trust – Resettlement Action Plan Implementation Auditing.

Nicole Wienand
Curriculum Vitae

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Nicole Wienand **Date: September 2020**

ELENA RELJIC
Curriculum Vitae

CONTACT DETAILS

Legal Name of Company	**Coastal and Environmental Services (Pty) Ltd**
Trading Name of Company	**CES Environmental and Social Advisory Services**
Designation	Environmental Consultant
Profession	Environmental Consultant
E-mail	elena.reljic@cesnet.co.za
Office number	+27 087 549 0240
Mobile	+27 079 535 2693
Nationality	South African
Professional Affiliations	➢ SACNASP: South African Council for Natural Scientific Profession *(Registration in process)* ➢ APECS: Association of Polar Early Career Scientists ➢ ZSSA: Zoological Society of Southern Africa ➢ PADI: Professional Association of Diving Instructors ➢ Golden Key International Honours Society Member
Key areas of expertise	➢ Conducting ecological field surveys for a wide range of species and habitats (mainly faunal) ➢ Animal identification, monitoring, trapping, and handling (e.g., for birds, snakes, small mammals) ➢ Report and scientific writing ➢ Use of GIS software (e.g., ArcGis and QGIS) and remote monitoring techniques (e.g., camera traps, PIT tags, data loggers, iButtons) ➢ Use of the programming language R for statistical analysis

PROFILE

Elena Reljic

Elena is an ecologist with an MSc in Zoology (Cum Laude). The focus of her academic research was on coastal dune forest restoration, post-mining, in Richards Bay, KwaZulu-Natal.

She has done a great deal of field biology in remote regions of South Africa and has experience with a range of species, including birds, reptiles, small mammals, and arthropods. Moreover, she was part of a 14-month research expedition team to the sub-Antarctic Marion Island where she was a seabird researcher.

This is complemented by her strong knowledge of managing and analysing large ecological databases, the programming language R, and GIS software.

EMPLOYMENT EXPERIENCE	➢ July 2021 – Present: Environmental Consultant (CES, Port Elizabeth, South Africa)

ELENA RELJIC
Curriculum Vitae

- January 2021 – April 2021: Research Assistant (Succulent Karoo Research Station, Northern Cape, South Africa)
- October 2020 – November 2020: Research Assistant (University of Cape Town, Western Cape, South Africa)
- April 2019 – May 2020: Field Biologist (Department of Environmental Affairs, Western Cape, South Africa)
- November 2018 – January 2019: Research Assistant (South African National Biodiversity Institute, Gauteng, South Africa)
- January 2018 – October 2018: Research Assistant (University of Pretoria, Gauteng, South Africa).
- March 2017 – April 2017: Field Assistant (University of Pretoria, Gauteng, South Africa)

ACADEMIC QUALIFICATIONS

- M.Sc. (Zoology) *Cum Laude* University of Pretoria, South Africa 2018
- B.Sc. Honours (Geography and Environmental Science) University of Pretoria, South Africa 2016
- B.Sc. (Geography) University Of Pretoria, South Africa 2014
- NATIONAL SENIOR CERTIFICATE• 2010 • CRAWFORD COLLEGE SANDTON, SOUTH AFRICA

VOLUNTEER EXPERIENCE OR LEADERSHIP

- Volunteered for a marine conservation program, Blue Ventures, in Madagascar from 09 Nov 2018 to 19 Dec 2018, where she received scientific dive training.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

ELENA RELJIC

23 JUNE 2021

ANTHONY MARK AVIS
Curriculum Vitae

CONTACT DETAILS

Legal Name of Company	**Coastal and Environmental Services (Pty) Ltd**
Trading Name of Company	**CES Environmental and Social Advisory Services**
Designation	Cape Town Branch
Profession	Managing Director
Years with firm	Thirty (30) years
E-mail	t.avis@cesnet.co.za
Office number	+27 (0)21 045 0900
Nationality	South African
Professional Affiliations	**SACNASP**: South African Council for Natural Scientific Profession **EAPSA**: Environmental Assessment Practitioner Southern Africa **MRSSAF**: Member of the Royal Society of South Africa **BotSoc**: Botanical Society of South Africa **SAAB**: South African Association of Botanists **IAIA:** International Association of Impact Assessment
Key areas of expertise	Environmental & Social Impact Assessment Environmental & Social Management Plan preparation Terrestrial vegetation and flora specialist studies Coastal dune ecology specialist studies Integrated coastal zone management Strategic Environmental & Social Assessment

PROFILE

Dr Anthony Mark Avis

Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale ESIAs to international standards, especially those of the International Finance Corporation (IFC). From 1997 to 2005 Ted acted was principle environmental consultant to Corridor Sands Limitada, managing all environment aspects of the US$1,2billion Corridor Sands Project, including five ESIA's, associated ESMPs, and the RAP. He has managed ESIA studies and related environmental assessments of similar scope in Kenya, Madagascar, Egypt, Malawi, Zambia and South Africa. Ted also has experience in large scale Strategic Environmental Assessments in southern Africa and has been engaged by the IFC on a number of projects.

Between 1994 and 1996 Ted was instrumental in establishing the Environmental Science Department at Rhodes University, whilst a Senior lecturer in Botany at that time. This resulted from his experience running honours modules in EIA practice and environmental management, as well as the applied research he undertook in these disciplines. He was an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes between 1998 and 2003. He was one of the first certified Environmental Assessment Practitioner in South Africa, gaining certification in April 2002. 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.

ANTHONY MARK AVIS
Curriculum Vitae

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". Ted is a Certified Environmental Assessment Practitioner (since 2002) and a professional member of the South African Council for Natural Scientific Professionals (since 1993).

EMPLOYMENT EXPERIENCE

- 2020: Full-time Managing Director of Coastal & Environmental Services. Exco member. Nextec Advisory Cluster.
- 2017 – 2019: Divisional Director and head of the Environmental Cluster at NEXTEC (part of the EOH Group). EXCO member of the Industrial Technologies Division of NEXTEC.
- 1998 – Present: Full-time Managing Director of Coastal & Environmental Services.
- 1989 – 1997: Lecturer and Senior Lecturer in Botany at Rhodes University.
- 1990 – 1997: Private environmental consultant and partner of Coastal & Environmental Services (CES, established January 1990).
- 1987 – 1988: Ecological Consultant with Loxton Venn and Associates, responsible for vegetation, soils and land surveys; veld conditions assessments and EIAs.
- 1983 – 1987: Full time post-graduate research in plant ecology, including coastal management studies and Environmental Impact Assessments (EIAs).

ACADEMIC QUALIFICATIONS

- PhD, Rhodes University, 1993
- BSc (Honours), Rhodes University, 1984
- BSc, Rhodes University, 1983

PUBLICATIONS AND TEACHING

- *Presented 29 conference papers at local and international conferences, including plenary presentations.*
- *Published 19 scientific articles in peer reviewed scientific journals.*
- *Published 6 popular articles in local journals.*
- *Published 2 chapters in scientific books.*
- *Supervised 17 post graduate students (honours (10), masters (4), PhD (3)) in plant ecology, coastal ecology and vegetation science.*

COURSES PRESENTED

Presented the following:

- *Tools of Sustainable Coastal Zone Management. Short course (2 x 1-week courses) presented on behalf of NACOMA / World Bank. (Presenter on Coastal zone management and strategic environmental assessment).*
- *Environmental training and teaching for a number of professional short courses, and at undergraduate and postgraduate level at Rhodes University, most notably as a key presenter on the EIA Short Course offered by CES since 2000*
- *Training course on the Integrated Coastal Zone Management Act. Four two-day short courses presented to various Government and NGO stakeholders to introduce and explain the NEMA: Integrated Coastal Zone Management Act. Presented on behalf of DEA: Oceans & Coasts. [Study leader and lead presenter).*

ANTHONY MARK AVIS
Curriculum Vitae

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

CONSULTING EXPERIENCE

SELECTED LARGE ENVIRONMENTAL IMPACT ASSESSMENTS

- Principal consultant for the specialist studies for the Environmental Impact Assessments of proposed dune mining on the Eastern Shores of Lake St Lucia.
- Overall responsibility as EIA project manager for all environmental aspects of Billiton's TiGen mineral sand mining operations in Mozambique, to produce an EIA that meets international standards.
- EIA project manager for the Corridor Sands mineral sand mining project in southern Mozambique, to produce four EIAs to World Bank standards for the project's bankable feasibility study. EIAs produced for the mine site and smelter, the 400Kv power line, the 87km rail route and a bulk cargo facility at Matola Port. All these EIAs included the preparation of Environmental Management Plans.
- EIA project manager for Tiomin Resources Inc (Toronto, Canada) for their Kwale mineral sands project in southern Kenya. Responsible for producing all six volumes of the EIA, regarded as the most comprehensive in Kenya to date.
- EIA project manager for the EIA to support the rezoning of land to special purposes for the establishment of the Coega Industrial Development Zone (IDZ).
- EIA project manager for the EIA to support the rezoning of land to special purposes for the establishment of the East London IDZ.
- Numerous small-scale Scoping Reports as part of the Environmental Impact Assessment Process and in accordance with the requirements of the Environmental Conservation Act.
- Pre-feasibility Environmental Impact Assessments, including one for BHP's mineral sand mining project in northern Mozambique, and similar projects in south-west Madagascar and Mozambique.
- Study leader for a comprehensive EIA for the World Bank funded 400Kv Mozambique Malawi Interconnector project power line, Malawi sector.
- EIA for a dedicated haul road, material handling facility and jetty near Praia de Xai Xai, Mozambique for WMC Resources, Australia.
- EIA Project Manager for the Nuclear Materials Authority of Egypt, to prepare the EIA as part of the Downer EDI Feasibility Study Team. (2007).
- EIA for a large-scale resort development, including two golf courses and three hotels in the Eastern Cape, South Africa. (Ongoing).
- EIA for the Madiba Bay resort development, incorporating the development of various portions of land within a 5000-hectare site for a range of resort type facilities. (2005 – 2008).
- Study Leader for an EIA for a large heavy mineral mining project in South West Madagascar for Exxaro (2006 – 2008).
- Study Leader for an EIA for a proposed heavy mineral mine on the shores of Lake Malawi near Chipoka. (2005 – 2006).
- Study Leader for an ESIA for a proposed large-scale integrated tourism resort development in the Eastern Cape (2007 – 2008).
- Environmental and Social consultants to the International Finance Corporation for the Kafue Gorge Lower Hydropower project, Zambia.

ANTHONY MARK AVIS
Curriculum Vitae

- Study Leader for an Environmental, Social and Health Impact Assessment for a proposed large sugar cane to ethanol biofuel project in Sierra Leone for Addax Bioenergy, Geneva (2009 - 2010).
- Study Leader for an ESHIA for a proposed large-scale Jatropha biofuels project in Mozambique (2009 - 2010).
- Study leader for Environmental Impact Assessment for a proposed large-scale copper and nickel mine in the North West Province of Zambia (2010).
- Lead consultant for an addendum Environmental Impact Assessment for the proposed expansion of a heavy mineral mining project in Nampula Province, Mozambique (2010).
- Quality control reviewer for approximately 8 EIA's for various Windfarm Projects in South Africa (2009 – 2010).
- Study leader for an ESHIA for a proposed large-scale palm oil plantation in Sierra Leone (2010).
- Study leader for ESIA for a rare earth mine in Kangankula, Malawi for the Lynas Corporation.
- Study leader for ESIA for a large-scale copper mine in the North West Province of Zambia for First Quantum Minerals (2011).
- Study leader for an ESIA for a proposed Cement Plant and for a proposed Limestone quarry in southern Mozambique (2012).
- Study Leader for an Environmental Impact Assessment of the Mooi-Mgeni Transfer Scheme – Phase 2, KwaZulu-Natal Province, South Africa for TCTA (2012).
- Study leader for an ESHIA for a proposed large-scale palm oil plantation and estate in Liberia, compliant with international sector specific guidelines. For EP Oil (2012).
- Study leader for an ESHIA for a proposed large-scale forestry plantation in Niassa Province, Mozambique for Niassa Green Resources and to be compliant with international sector specific guidelines (2010).
- Study leader for an EIA for a proposed golf course in Makana District, South Africa (2012)
- Study leader for an EIA for a proposed housing and residential estate in Makana District, South Africa (2012).
- Study Leader for an ESHIA for a heavy mineral mining project in South West Madagascar for World Titanium Resources (2013).
- Study Leader for an ESHIA for a heavy mineral mining project on the West Coast of South Africa for Zirco Resources (2013).
- Study Leader for the Tete Iron Ore project ESHIA located in Tete province, Mozambique for Baobab Resources and Capitol Resources Lda (2013 - 2016).
- Study Leader for an ESHIA for the Nicanda Hills Graphite mining project in Cabo Delgado Province, Mozambique for Triton Resources, Perth (2015 - 2016)
- Study Leader for an EIA for the proposed Riemvasmaak Hydropower Station in the Augrabies Falls National Park, undertaken for HydroSA (2015-2016).

ANTHONY MARK AVIS
Curriculum Vitae

- Study Leader for an ESHIA for the Ancuabe Hills Graphite mining project in Cabo Delgado Province, Mozambique for Triton Resources, Perth (2015 – 2016)
- Study Leader for an ESHIA for a tin mine in North Kivu province, DRC for Alphamin Resources (2015 - 2016).
- Study Leader for an EIA for a floating power plant, Port of Ngqura, Eastern Cape Province of South Africa. Prepared as part of the Independent Power Producers Programme on behalf of the Department of Energy's IPP Office and Transnet (2015-2106).
- Study Leader for an EIA to facilitate the import of Liquefied Natural Gas (LNG) at the Port of Ngqura, Eastern Cape Province of South Africa. Prepared as part of the Independent Power Producers Programme on behalf of the Department of Energy's IPP Office and Transnet (2015-2106).
- Study Leader for an ESHIA for the Balama Graphite mining project in Cabo Delgado Province, Mozambique for Battery Minerals Resources, Perth (2017 – 2018)
- Reviewer and co-author for an ESHIA for the Pilivili Mineral Mine, Nampula Province, Mozambique for Kenmare Resources (2018 - 2019)
- Reviewer, co-author and study leader for the Boulders Wind Farm EIA located at near Paternoster, Western Cape, South Africa for Vredenberg Wind Farm (Pty) Ltd. (2019).
- Reviewer for the EIA for the proposed Coastal Protection Scheme, St Francis Bay, Kouga Local Municipality, Eastern Cape Province (2019-2020).
- Study Leader for an ESHIA for a Coal to Urea project in the Highveld Industrial Park on behalf of Wison Engineering (China) and the Industrial Development Corporation (2019 – 2020).

POLICY AND STRATEGIC ASSESSMENTS

- The development of the Eastern Cape Coastal Management Plan, to be adopted as policy by the Eastern Cape Government
- Study leader for the preparation of a State of Environment Report, and Environmental Implementation Plan for the Amatole District Municipality, covering an area of approximately 25 000 km.
- Reports on ecological assessments of the damage caused to the environment by alleged illegal developments along the former Transkei coastline.
- Study leader and project manager for the preparation of a World Bank/Global Environmental Facility funded geographic Strategic Environmental Assessment of the proposed greater Addo Elephant National Park, Eastern Cape, South Africa.
- A Strategic Environmental Assessment of four land use options in the Centane district of the Wild Coast.
- SEA covering an area half the size of the Eastern Cape (former Transkei) to identify where afforestation projects could be implemented on a sustainable basis for poverty alleviation. Prepared for the Department of Water Affairs and Forestry (2006 – 2007).

- Integrated Coastal Zone Management Plan for the Buffalo City Municipality, Eastern Cape South Africa, including numerous Management Plans for estuaries, beaches etc. (2006 – 2007).
- A Sustainability Analysis of various land use alternatives to determine optimum land use for the future rehabilitation of lease areas at Richards Bay Minerals. (2006).
- State of Environmental Report and Environmental Management System for the Ukhulambe District Municipality. (2005).
- Strategic Environmental Overview for two integrated tourism anchor projects in Mozambique for the International Finance Corporation (2007).
- Study Leader of the Western Cape State of Coast report prepared for the Department of Environmental Affairs & Development Planning (2017-2018).
- Study leader for the revised Coastal Management Programme of the West Coast, on behalf of the West Coast District Municipality (2019).

ECOLOGICAL AND COASTAL

- Ecological impact assessment for a proposed Zinc and Phosphoric Acid plant in the Eastern Cape.
- Ecological specialist reports for the Coega Industrial Development Zone Strategic Environmental Assessment
- Ecological impact assessment of proposed 800km Wild Coast N2 Toll Road, Eastern Cape.
- Study leader for the ecological impact assessment of the Wild Coast Toll Road EIA, Eastern Cape and Kwazulu/Natal, South Africa (2004).
- Study Leader for Baseline Ecological Surveys of coastal lease areas in southern Mozambique for Rio Tinto exploration (2008).
- Pre-feasibility Ecological Survey of the Skeleton Coast to identify critical impacts linked to Diamond and Mineral Mining exploration (2008).
- Coordinator for ecological investigations to establish a sound baseline prior to implementing an EIA, North West Province, Zambia (2011).
- Assessment of the extent and conservation value of forested areas along the Wild Coast within the former Transkei, on behalf of the Eastern Cape Parks Board (2011)
- Study Leader for a biological and archaeological (including heritage) baseline and impact assessment study of the Lesotho Highlands Water Project – Phase II. Prepared for the Lesotho Highlands Development Authority (2013-2014)
- Study Leader for the preparation of the Nhangonzo Critical Habitat Biodiversity Assessment, Inhambane Province, Mozambique. Prepared for Sasol Petroleum Mozambique Limitada and Sasol Petroleum Temane Limitada (2015).
- Bookram Coastal Dune Specialist Study (2017).
- Coastal Dune and Ecological Impact Assessment for the proposed Mosselbankfontein Farm Housing Development near Witsand, Western Cape Province (2019).

ANTHONY MARK AVIS
Curriculum Vitae

- Strategic Environmental Overview: Development Opportunities and Constraints. Cape Agulhas Municipality: Duiker Street to Struisbaai Harbour Precinct Development Plan (2019 -2020).
- Environmental Management and Maintenance Plans for 3 sites (Gouritz; Still Bay & Witsands) in the Hessenque Local Municipality (2020)
- Environmental Risk Assessment and Revegetation Plan for the Witsands Landfill site near Scarborough, for City of Cape Town (2020).

ENVIRONMENTAL MANAGEMENT

- Project manager for a five-year rehabilitation programme of Samancor's Chemfos mine on the West Coast, which later became the West Coast Fossil Park.
- Development of an Open Space Management Plan for the Coega Industrial Development Zone (IDZ), including the demarcation of open spaces, formulation of uses within the open space, integration with MOSS principles and developing guidelines and a business plan for the management of the open space system.
- Preparation of numerous Environmental Management Programme Reports, in terms of the Minerals Act, for quarry operations in the Eastern Cape, including EMPRs for both the Eastern and Western Coega Kops.
- Study Leader for the development of two detailed and definitive Environmental Management Plans for the construction of two large bridges across rivers in the Wild Coast, as part of the Wild Coast N2 Toll Road Project, for South African National Roads Agency Limited. (2006).
- Joint Study Leader for the development of numerous Construction and Operational Phase Environmental and Social Management Plans for Tiomin's proposed Kwale mineral mine in Kenya.
- Completion of numerous (>20) Environmental & Social Management Plans as part of the EIA process and ESIA deliverables.
- Development of a range of Standard Operating Procedures (SOPs) as part of the operational phase ESMP for a large-scale agricultural project.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

ANTHONY M. AVIS (TED) Date: 06th April 2021

Coastal & Environmental Services **2021** **Page 7 of 7**