




TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT REPORT

**PROPOSED MULILO NEWCASTLE WIND ENERGY FACILITY, NEAR
NEWCASTLE WITHIN THE KWAZULU-NATAL PROVINCE**



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES



PROPOSED MULILO NEWCASTLE WIND POWER WEF, NEAR NEWCASTLE WITHIN THE KWAZULU-NATAL PROVINCE	
TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT	
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CES Report Revision and Tracking Schedule

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SPECIALIST TEAM

Ms Elena Reljic, Faunal Specialist and Lead Report Author (SACNASP Reg No. 129001)

Elena is a qualified Ecologist with an MSc in Zoology (*Cum Laude*), BSc Honours in Environmental Sciences and a BSc in Geography. The focus of her postgraduate research was on coastal dune forest restoration in Richards Bay, KwaZulu-Natal, where she studied tree, bird, and millipede communities. She has also done a great deal of field work in other remote regions of South Africa, including the Succulent Karoo and Kalahari Desert, and has worked with a wide range of fauna including millipedes, birds, reptiles, and small mammals. Moreover, Elena was part of a 14-month research expedition team to the sub-Antarctic Marion Island where her focus was on seabird research. This is complemented by her strong knowledge of managing and analysing large ecological databases, the programming language R, and GIS software.

Since her employment at CES in 2021, Elena has been involved in several Terrestrial Biodiversity Impact Assessments and Faunal Specialist Surveys. This has largely been in the context of renewable energy developments and related infrastructure. Currently, she is managing the entire Operational Bird & Bat Monitoring Programme for multiple wind farms in the Eastern Cape.

Ms Nicole Wienand, Botanical Specialist and Co-Author (SACNASP Reg No. 130289)

Ms Nicole Wienand (SACNASP Reg No. 130289) is an Environmental Consultant with over 3 years' experience 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. Since her employment with CES in January 2019, Nicole has specialised in the field of ecology and botanical specialist assessments, ensuring that these specialist assessments are undertaken and prepared in accordance with the Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320), Plant Species and Animal Species (GN R. 1150). Nicole has undertaken numerous Ecological Impact Assessments for a range of developments including Wind Energy Facilities (WEFs), Overhead Lines (OHL) and infrastructure, working closely with developers to ensure a development which is environmentally sustainable as well as financially and technically feasible.

Dr Greer Hawley, Report Reviewer (SACNASP Reg No. 400321/14)

Dr Greer Hawley completed her BSc degree in Botany and Zoology and a BSc Honours in Botany from the University of Cape Town in 1998 and 1999, respectively. She completed her PhD (Microbiology) at Rhodes University in 2007. Greer's core academic focus has been in the field of taxonomy both in the plant and fungal kingdom although her research experience is diverse, ranging from fresh water and marine algae, estuarine diatoms, plant species



classification and fungal species identification and ecology. Greer was employed at Coastal and Environmental Services (CES) for over 13 years where she was involved with, and managed, many projects ranging from:

- 1) Environmental impact assessments in the aquaculture, waste and renewable energy sectors;
- 2) Biodiversity impact assessments and biodiversity management projects in South Africa, Sierra Leone, Mozambique, Eswatini and Malawi;
- 3) Catchment-based mapping and management plan for climate change adaptation (Malawi) and alien invasive plants (Buffalo City Metro); and
- 4) Environmental Planning projects such as Environmental Management Frameworks, Strategic Environmental Assessments and Environmental Management Plans.

More recently, Greer has become involved with biodiversity planning projects where she managed the review of the gazetted Eastern Cape Biodiversity Conservation Plan (2019) and completed the revision of the City of Ekurhuleni Bioregional Plan (2020/2021). Through these and the above-mentioned projects, Greer has demonstrated successful co-ordination and management of multi-faceted projects with large teams, meeting deadlines and ensuring the production of high-quality deliverables.

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ACRONYM LIST

AOO	Area of Occupancy
ADM	Amajuba District Municipality
ADU	Animal Demography Unit
BA	Basic Assessment
BI	Biodiversity Importance
BSP	Biodiversity Sector Plan
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services
CI	Conservation Importance
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EN	Endangered
EMPr	Environmental Management Programme
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
FI	Functional Integrity
GIS	Geographical Information System
GN	Government Notice
Ha	Hectare
IUCN	International Union for Conservation of Nature



KM	Kilometre
kV	Kilovolt
KZN	KwaZulu-Natal
LC	Least Concern
LM	Local Municipality
m.a.s.l	Meters above sea-level
MNWP	Mulilo Newcastle Wind Power
MTS	Main Transmission System
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NFA	National Forest Act
NFEPA	National Freshwater Ecosystem Ancillary Areas
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
OHL	Overhead Line
PA	Protected Area
PNCO	Provincial Nature Conservation Ordinance
POSA	Plants of Southern Africa
RLE	Red List of Ecosystems
RR	Receptor Resilience
SACNASP	South African Council for Natural Scientific Professionals
SA NLC	South African National Land Cover
SCC	Species of Conservation Concern
SOTER	Soil and Terrain
SS	Substation
QDS	Quarter Degree Square
VU	Vulnerable
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Areas Database
SEI	Site Ecological Importance



SWSA	Strategic Water Source Area
TOPS	Threatened and Protected Species
WEF	Wind Energy Facility
WMA	Water Management Area
WWF	World Wildlife Fund



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*).

Species of Conservation Concern all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare].



SPECIALIST CHECK LIST

The contents of this specialist report comply with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 (Table 1), Terrestrial Plant Species (GN R. 1150) (Table 2) and Animal Species (GN R. 1150) (Table 3).

Table 1: Minimum Report Content requirements for environmental impacts on terrestrial biodiversity (GN R. 320).

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;	IV-VI; Appendix 5
3.1.2	A signed statement of independence by the specialist;	Appendix 6
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 1.4 & 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 and Appendix 4
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; 2.1 and 2.3
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Chapter 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 6 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	N/A



		a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	
	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.		✓

Table 2: Minimum Report Content requirements for environmental impacts on terrestrial plant species (GN R. 1150).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 1150			SECTION OF REPORT
3.1	The Terrestrial Plant Species 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;	IV-VI; Appendix 5
	3.1.2	A signed statement of independence by the specialist;	Appendix 6
	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 1.4 & 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 and Appendix 4
	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; 2.1 and 2.3
	3.1.6	A description of the mean density of observations/number of samples sites per unit area of site inspection observations;	Section 2.3
	3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 3.2.3
	3.1.8	The online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;	Section 2.3
	3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	Chapter 6
	3.1.10	A discussion on the cumulative impacts;	Chapter 5
	3.1.11	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
	3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development	Chapter 6



		should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	
	3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate.	N/A
3.2		A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓

Table 3: Minimum Report Content requirements for environmental impacts on terrestrial animal species (GN R. 1150).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 1150		SECTION OF REPORT
3.1	The Terrestrial Animal Species 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;	IV-VI; Appendix 5
3.1.2	A signed statement of independence by the specialist;	Appendix 6
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 1.4 & Section 2.1
3.1.4	A description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 2 and Appendix 4
3.1.5	A description of the mean density of observations/number of sample sites per unit area and the site inspection observations;	Section 1.4; 2.1 and 2.3
3.1.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data;	Section 1.4
3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 3.2.5 and 3.3
3.1.8	The online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;	N/A
3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	Chapter 4 and 5
3.1.10	A discussion on the cumulative impacts;	Chapter 6
3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 6 and Section 7.2
3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	Chapter 7
3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were	Section 7.3



		identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate.	
3.2		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

1.1.1 Mulilo Newcastle Wind Power

Mulilo Renewable Project Developments (Pty) Ltd (Mulilo) is developing the Newcastle Wind Energy Facility (WEF) Complex near Newcastle in the Newcastle Local Municipality, in KwaZulu-Natal Province, comprising:

- Mulilo Newcastle Wind Power WEF (up to 200 MW and up to 45 turbines) (Scoping and Environmental Impact Assessment process);
- Mulilo Newcastle Wind Power 2 WEF (up to 200 MW and up to 35 turbines) (Scoping and Environmental Impact Assessment process);
- Mulilo Newcastle Wind Power grid connection infrastructure and associated powerlines (Basic Assessment process); and
- Mulilo Newcastle Wind Power 2 grid connection infrastructure and associated powerlines (Basic Assessment process).

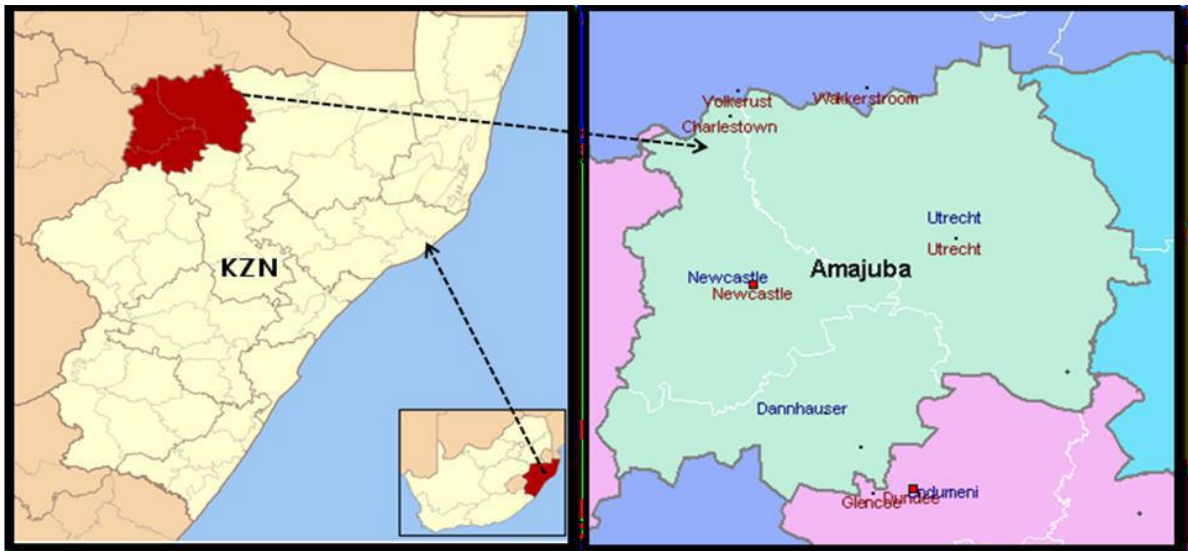


Figure 1.1: Location of the proposed Mulilo Newcastle WEF Complex in the Amajuba DM and Newcastle LM in the KZN Province.

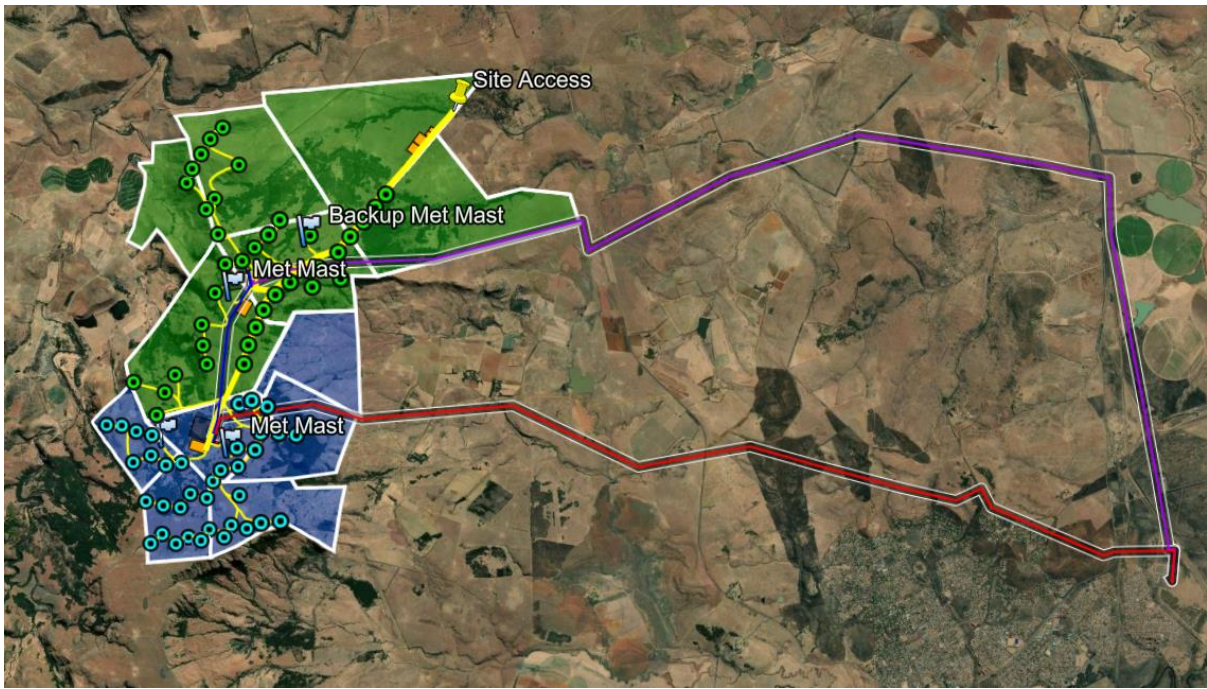


Figure 1.2: Location of the proposed Mulilo Newcastle WEF Complex showing the affected properties for the MNWP (GREEN) and MNWP 2 (BLUE), as well as the two Eskom grid connection routes, north (PURPLE) and south (RED).

A total of four (4) applications will be submitted to DFFE for Environmental Authorization (EA) for the Mulilo Newcastle WEF Complex. This draft Terrestrial Biodiversity Impact Assessment report is for:

1.1.2 Mulilo Newcastle Wind Power (Pty) Ltd (up to 200 MW and up to 45 turbines WEF)

The Mulilo Newcastle Wind Power (MNWP) WEF will be located near Newcastle, KwaZulu-Natal. The applicant is Mulilo Newcastle Wind Power (Pty) Ltd, which intends to develop, construct, and operate an up to 200 MW WEF as part of the Newcastle WEF Complex, approximately 15 kilometres northwest of the town of Newcastle in the Kwazulu-Natal Province. The study area is situated in the Newcastle Local Municipality, which forms part of the Amajuba District Municipality (ADM) and will have an anticipated lifespan of 20-25 years.

The MNWP WEF will consist of up to forty-five (45) wind turbine generators with a maximum generating output of up to two hundred (200) megawatts (MW). The proposed turbine footprints and associated facility infrastructure will cover an area of up to 85 ha after rehabilitation, depending on final layout design.

The MNWP WEF infrastructure will be located on six (6) land parcels with a total extent of 2,940 ha, although the actual infrastructure footprint will be substantially less than this.



Table 1.1: Specific Information Requirements from the Competent Authority (DFFE).

DESCRIPTION OF REQUIRED INFORMATION	DESCRIPTION OR RELEVANT SECTION IN THE REPORT			
General site information				
Description of all affected farm portions	Farm ID	Farm Name	Farm Number	Area (ha)
21-digit Surveyor General codes of all affected farm portions	N0HS00000000335000001	Geelhoutboom	1/3350	647
	N0HS00000000335000000	Geelhoutboom	RE/3350	567
	N0HS00000000944700000	Bernard	9447	465
	N0HS000000001630200000	Spitskop	16302	280
	N0HS00000000944800000	Byron	9448	392
	N0HS00000000943900000	Cliffdale	9439	587

The following Tables 4 to 6 summarise the key technical details for the Mulilo Newcastle Wind Power WEF project:

Table 1.2: Turbine specifications

Component	Specification
WEF Capacity	Up to 200 MW
Number of Turbines	Up to 45
Hub Height	Up to 140 m
Rotor Diameter	Up to 200 m
Blade length	Up to 100 m

Table 1.3: Facility component descriptions

Facility Component	Description
Crane platform and hardstand area	Crane platform and hardstand laydown for each turbine position.
Turbine Foundations	Reinforced Concrete Foundation. Depth: up to 3.5 m Diameter: up to 25 m per turbine Volume of concrete: up to 800 m ³ per turbine.
IPP Substation	33 kV to 132 kV collector substation to receive, convert and step-up electricity from the WEF to the 132 kV grid suitable supply. The substations maximum height will be Lightning Mast up to 25 m high. The facility will house control rooms and grid control yards for both Eskom and the IPP. Additional infrastructure includes parking, up to 2.8 m high fencing, storm water channels and culverts, ablutions, water storage tanks, septic tank, and borehole.
Construction/office yard	This includes banded fuel areas, oil storage areas, general stores (containers) and skips.
WTG component laydown area	Temporary laydown area.



Facility Component	Description
On-site concrete batching plant	Temporary on-site concrete batching plant.
Primary Site Access Roads	<p>Site access will, where possible, make use of existing farm roads that will be upgraded and maintained for the life of the WEF. The existing roads to be upgraded will be expanded to a width of up to 9 m.</p> <p>New roads will be constructed (in areas where there are no existing roads) with a width of up to 9 m to the IPP substation and laydown areas.</p> <p>V-drains will run on both sides of the road.</p>
Internal roads	<p>Roads connecting the turbine positions will where possible make use of existing farm roads that will be upgraded and maintained for the life of the plant. The existing roads to be upgraded will be expanded to a width of up to 6 m.</p> <p>New roads will be constructed (in areas where there are no existing roads) with a width of up to 6 m and will connect all turbines.</p> <p>V-drains will run on both sides of the road.</p>
33 kV reticulation	A combination of 33 kV overhead lines and 33 kV underground cable (where technically feasible) will be used, aligned along the road network connecting each WTG position to the IPP substation.
Operations and maintenance (O&M) buildings	Includes other infrastructure such as parking, up to 2.8 m high fencing, storm water channels and culverts, ablutions, water storage tanks, septic tank and borehole.
Met masts	Two met masts (Up to 140 m height).

Table 1.4: Facility component footprints.

Facility Component	Construction footprint	Final footprint after rehabilitation
Crane platform and hardstand area	Up to 0.8 ha per turbine which equates to up to 36 ha.	Up to 0.8 ha per turbine which equates to up to 36 ha.
Turbine foundations	Up to 0.06 ha per turbine which equates to up to 2.7 ha (included in hardstand area).	Up to 0.06 ha per turbine which equates to up to 2.7 ha (Included in hardstand area).
IPP substation	Up to 1 ha	Up to 1 ha
Construction/office yard	Up to 2 ha	0 ha
WTG component laydown area	Up to 4 ha	0 ha
On-site concrete batching plant	Up to 1 ha	0 ha
Temporary stockpiles	Up to 2 ha	0 ha



Facility Component	Construction footprint	Final footprint after rehabilitation
Primary site access road and reticulation	<p>Total width of up to 15 m consisting of:</p> <ul style="list-style-type: none"> Up to 12 m wide area prepared for road and v-drain. Up to 3 m width for underground 33 kV reticulation. Overhead lines to be used where underground cables are not technically feasible. <p>Total length up to 8 km which equates to 12 ha.</p>	<p>Total width of up to 12 m consisting of:</p> <ul style="list-style-type: none"> Up to 9 m wide road Up to 1.5 m wide v-drain on either side of road <p>Total length up to 8 km, which equates to 9.6 ha.</p> <p>33 kV underground / overhead line reticulation and stockpile areas to be rehabilitated. Final footprint up to 0.25 ha to account for cable markers and/or overhead line foundations and stays along primary site access roads.</p>
Internal roads and reticulation	<p>Total width of up to 12 m consisting of:</p> <ul style="list-style-type: none"> Up to 9 m wide area prepared for road and v-drain. Up to 3 m wide area for underground 33 kV reticulation. Overhead lines to be used where underground cables are not technically feasible. <p>Total length up to 28 km which equates to 33.6 ha.</p>	<p>Total width of up to 9 m consisting of:</p> <ul style="list-style-type: none"> Up to 6 m wide road. Up to 1.5 m wide v-drain on either side of road. <p>Total length up to 28 km, which equates to 25.2 ha.</p> <p>33 kV underground / overhead line reticulation and stockpile areas to be rehabilitated. Final footprint up to 1 ha to account for cable markers and/or overhead line foundations and stays along internal roads.</p>
Operations and maintenance (O&M) buildings	Up to 0.5 ha	Up to 0.5 ha
Met masts	Up to 0.002 ha per met mast which equates to 0.004 ha.	Up to 0.002 ha per met mast which equates to 0.004 ha.
Total	Up to approximately 105 ha	Up to approximately 85 ha



Figure 1.3 below illustrates the proposed layout of MNWP.

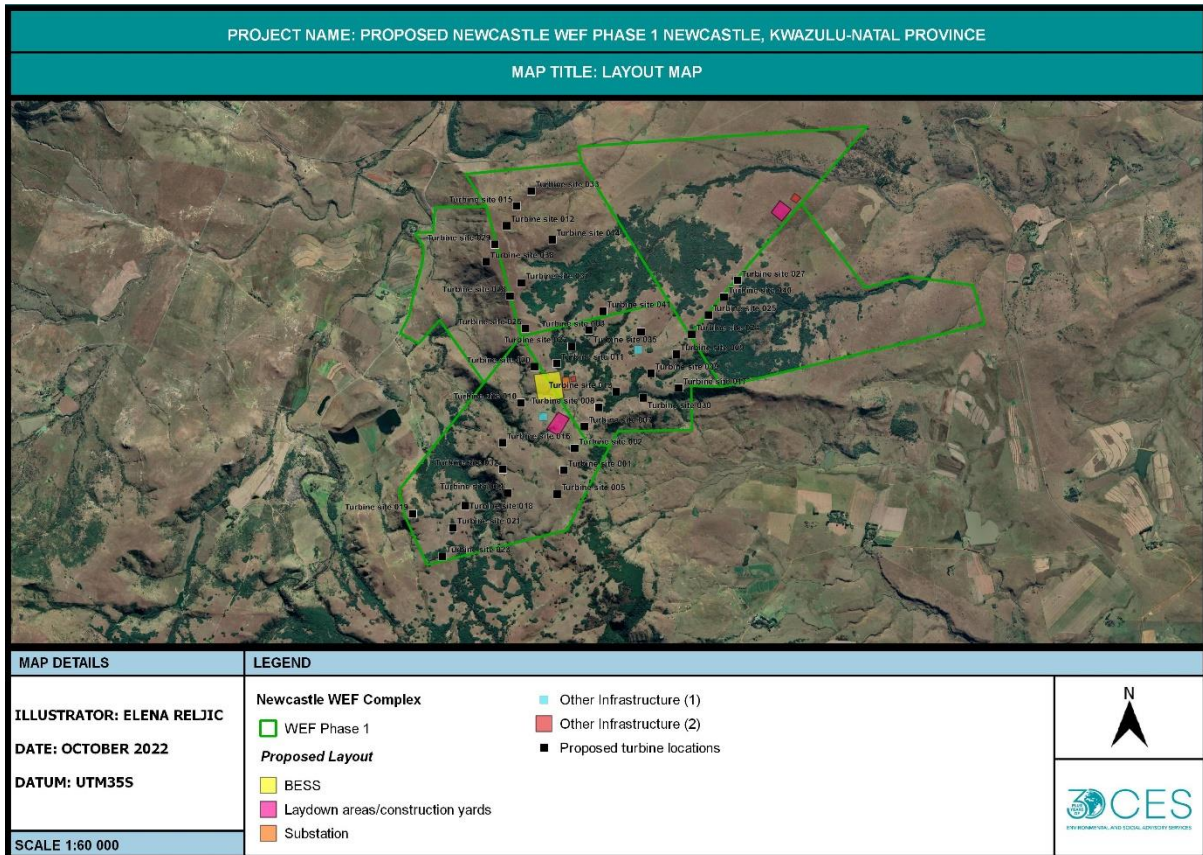


Figure 1.3: Layout of the proposed Mulilo Newcastle WEF.

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 Animal and Plant Species (GN R. 1150), prior to the commencement of a specialist assessment, the current land use(s), 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 DFFE Screening Report generated for the proposed project, the terrestrial biodiversity theme sensitivity is classified as VERY HIGH. This is due to the project site occurring within a Critical Biodiversity Area (CBA) 1 and 2, Ecological Support Area (ESA), FEPA sub-catchment, National Forestry Inventory, Vulnerable Ecosystem, Protected Area Expansion Strategy, and a Strategic Water Source Area. The Animal Species Theme is also classified as HIGH while the Plant Species Theme is classified as MEDIUM. It should be noted that a separate Avifaunal and Bat Impact Assessment has been conducted for the proposed project and impacts associated therewith are not assessed as part of this report.



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 terrestrial biodiversity sensitivity rating of the site, a full **Terrestrial Biodiversity Impact Assessment** has been undertaken as part of the full Scoping and EIA Processes undertaken for the MNWP.



1.3 OBJECTIVES AND TERMS OF REFERENCE

The objectives for the terrestrial biodiversity 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 (SCC).
- 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.
- Identify and assess the impacts of the development on local, regional, and national level biodiversity plans and spatial priorities.

1.4 LIMITATIONS AND ASSUMPTIONS

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

- This report is based on the project description received from the applicant.
- A detailed faunal survey was not conducted. The faunal assessment was primarily a desktop study, using information from relevant databases, supplemented by recording animal species that were opportunistically observed during the site investigations.
- 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 likely that additional SCC will be found during the construction and operation phases of the development.
- Sampling was conducted in February 2022. A follow up site visit was conducted in April 2022 in neighbouring areas and was used to supplement the data gathered in February 2022. The first survey falls within the optimal survey period for Grassland Biome and suboptimal survey period for the Forest biome according to the Species Environmental Assessment Guideline (SANBI, 2020). The second survey does not fall within the optimal survey period for the Grassland biome.
- The two site surveys were undertaken over the course of four days.
- Due to the rough terrain, steep slopes, limited time available for the site surveys, and the extensive area of the development footprint, the areas sampled were largely determined by accessibility. Access to the site was limited and restricted to a few gravel roads which were severely affected and eroded by the significant rainfall received in the project area.
- A detailed survey of the forest patch was not undertaken as the infrastructure layout received from the applicant avoids this vegetation type. All natural forest patches are protected in terms of the National Forest Act (Act No. 84 of 1998). As such, this vegetation type was delineated prior to the compilation of this report and declared a no-go area.
- 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 REPORT STRUCTURE

The Terrestrial Biodiversity Impact Assessment Report is structured as follows:

Chapter 1 - Introduction and Project Description: Provides a detailed description of the proposed project (including the proposed locality), outlines the objectives and terms of reference for the Terrestrial Biodiversity Impact Assessment, as well as the limitation and assumptions associated with the assessment.

Chapter 2 – Methodology: Outlines the approach to the assessment including the sampling protocol and an overview of the key resources consulted to inform the Terrestrial Biodiversity Impact Assessment.

Chapter 3 – Overview of Project Area and Description of the Environment: This chapter provides a brief overview of the physical and biological characteristics of the project area and elaborates on the receiving environment for each component of the proposed project. The Chapter has been subdivided into three sections: Section 3.1 relates to the physical characteristics of the project area, Section 3.2 relates to biological characteristics of the project area, and Section 3.3 elaborates on the receiving environment for each component of the proposed project.

Chapter 4 – Biodiversity Planning: This chapter assesses the proposed development against local, regional, and national level biodiversity plans and spatial priorities.

Chapter 5 - Site Sensitivity: This chapter classifies the Site Ecological Importance (SEI) in terms of the Species Environmental Assessment Guideline (SANBI, 2020).

Chapter 6 – Impact Identification and Assessment: Identifies all potential ecological impacts and issues posed by the proposed development.

Chapter 7 – Impact Statement, Conclusions and Recommendations: Discusses the key findings of the Terrestrial Biodiversity Impact Assessment and the recommendations for the way forward regarding the proposed development.



2 METHODOLOGY

2.1 THE ASSESSMENT

A preliminary Terrestrial Biodiversity Desktop Assessment Report was prepared and submitted to the applicant in support of the Terrestrial Biodiversity Impact Assessment for the proposed project. The Terrestrial Biodiversity Assessment Process involved two (2) site visits conducted in February (7th-9th) and April (9th) 2022, which covered MNWP and MNWP 2, as well as the grid connection options. The purpose of these visits was to assess the site-specific ecological conditions and current land uses of the project area, as well as to identify potential sensitive ecosystems and/or sensitive plant and animal species that may be impacted by the proposed project activities.

Key resources consulted during the assessment process include the following:

National level:

- South African Vegetation Map (SA VEGMAP) (Mucina *et al.*, 2006-2018);
- Red List of South African Plants (SANBI, 2020);
- South Africa's Terrestrial Red List of Ecosystems (RLE): Technical report on the revision of the list of terrestrial ecosystems that are threatened and in need of protection (SANBI, 2021);
- Red List of Ecosystems (RLE) for terrestrial realm for South Africa (SANBI, 2021);
- National Biodiversity Management: Biodiversity Act (NEM:BA) Alien and Invasive Species Lists (2014);
- NEM:BA: List of Threatened or Protected Species (TOPS) (2007);
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees (2014);
- The National Biodiversity Assessment (NBA, 2018): Inland Aquatic Ecosystem Assessment;
- NBA (2018): Terrestrial Ecosystem Assessment;
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011/14);
- The National Protected Areas Expansion Strategy (NPAES, 2010);
- South African Protected Areas Database (2022, Q3);
- South African Conservation Areas Data (2022, Q3);
- Council for Geoscience (2013);
- Soil and Terrain (SOTER) Database of South Africa (2008);
- South African National Land Cover (SA NLC, 2020);
- iNaturalist;
- Plants of Southern Africa (POSA) database – Quarter degree square level;
- The Animal Demography Unit (ADU) – Quarter degree square level;
- Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (Minter *et al.*, 2004);
- Red Listing the Amphibians of South Africa (Measey, 2010);
- Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research (Measey, 2014); and



- Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Minter *et al.*, 2014);
- Red Data Book of Southern African Mammals: A Conservation Assessment (EWT, 2016 & 2020 updates);
- Convention on International Trade in Endangered Species (CITES);
- International Union for Conservation of Nature (IUCN);

Provincial level:

- Provincial Nature Conservation Ordinance (PNCO);
- Amajuba District Municipality: Biodiversity Sector Plan (Ezemvelo KZN Wildlife, 2014);
- Conservation Targets and Status for Vegetation Types in KZN (Jewitt, 2011);
- Draft KwaZulu-Natal Biodiversity Spatial Planning Terms and Processes (Escott *et al.*, 2014)

2.2 SPECIES OF CONSERVATION CONCERN

A list of 'Species of Conservation Concern' (SCC) was drawn up for the site based on the known distribution and conservation status of species. According to the Species Environmental Assessment Guideline (SANBI, 2020), the term 'SCC' refers to all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare]. These species may be impacted significantly by the proposed activity. Species that are afforded special protection, notably those that are protected by NEM:BA (Act No. 10 of 2004), PNCO (Act No. 15 of 1974), the List of Protected Tree Species under the National Forest Act (Act No. 84 of 1998), or which occur on the South African Red Data List as SCC, fall within this category.

2.3 SAMPLING PROTOCOL

Using aerial imagery and available spatial data, the site was visually examined to identify different uniform vegetation units. These units were surveyed on foot and by vehicle using a plotless sampling method to record data. Random meanders were made around single sampling points (n=10) until no new plant species were recorded (Figure 2.1 – tracks highlighted in red). This data was used to determine the floristic composition of each unit, based on the dominant set of plant species. The desktop faunal assessment was supported by opportunistic on-site observations. Species records were uploaded to iNaturalist (www.inaturalist.org).

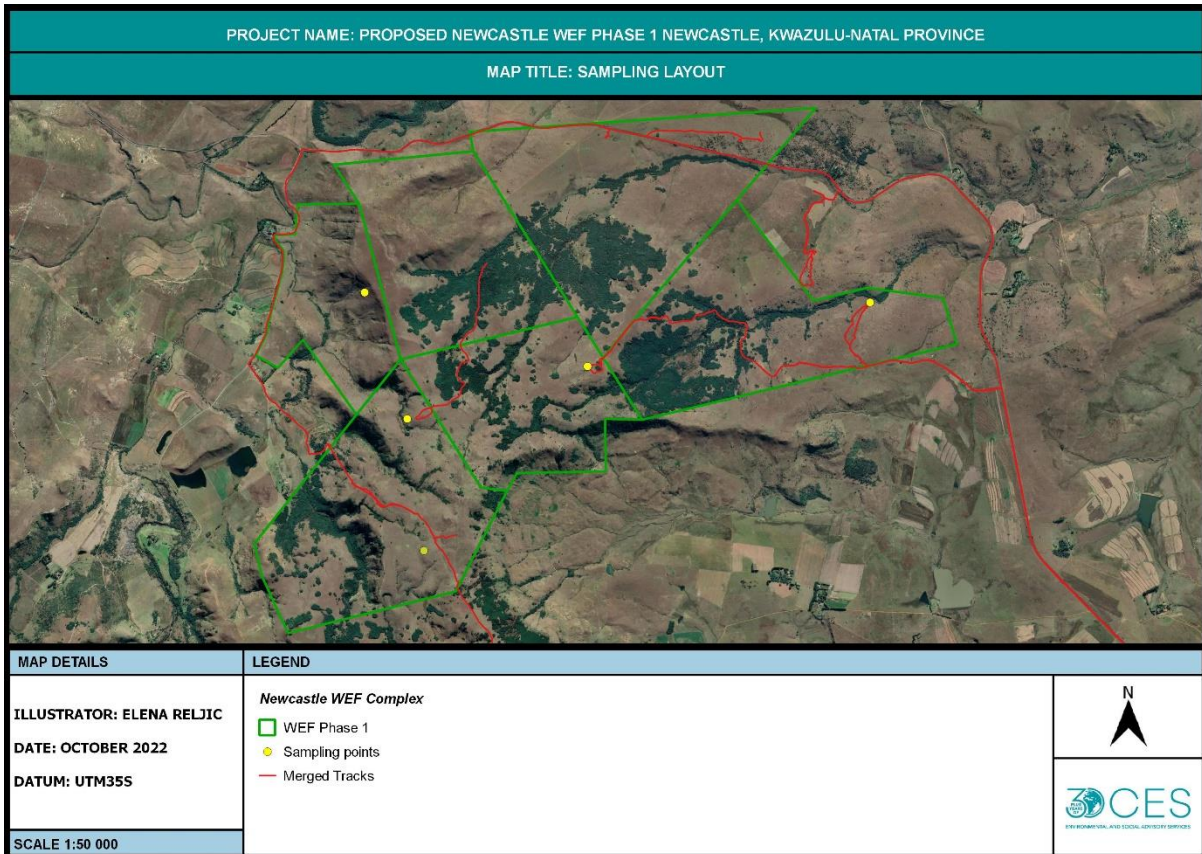


Figure 2.1: Sampling protocol for Mulilo Newcastle WEF.

2.4 VEGETATION MAPPING

The revised SA VEGMAP (2006-2018) was established 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.

The SA VEGMAP project has two main aims:

1. To determine the variation in 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 describe each vegetation type in detail, along with the most important species, including endemic species and those that are biogeographically important.

In this assessment, the SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site survey and related data gathered on the ground, as well as the KwaZulu-Natal (KZN) Provincial Pre-transformation Vegetation Map (2011).



The KZN Vegetation Map shows the historical distribution of the vegetation types in KZN and was last updated in 2011.

2.5 BIODIVERSITY PLANNING

This section of the assessment aims to describe the biodiversity plans and spatial priorities relevant to the project area, particularly the KZN Biodiversity Sector Plans (BSP) (2014).

The aim of the KZN BSP is to:

- Identify and map Critical Biodiversity Areas (CBAs) in the KZN DMs, in this case the Amajuba DM.
- Provide associated management guidelines which aim to maintain the integrity of these biodiversity features.

The objectives of the BSP are to:

- Ensure aquatic and terrestrial biodiversity targets are met at the district level.
- Conserve representative samples of biodiversity pattern.
- Conserve the ecological and evolutionary processes that allow biodiversity to persist over time; and
- Serve as a first step towards the development of a Bioregional Plan.

The main purpose of this BSP is to *“assist and guide land use planners and managers within various district and local municipalities, to account for biodiversity conservation priorities in all land use planning and management decisions, thereby promoting sustainable development and the protection of biodiversity, and in turn the protection of ecological infrastructure and associated ecosystem services”* (KZN BSP 2014).

Key resources consulted for the biodiversity assessment include the following:

- Draft KZN Biodiversity Spatial Planning Terms and Processes (Ezemvelo KZN Wildlife, 2016);
- Protected Area Expansion Strategy (2011);
- Strategic Water Source Areas (CSIR, 2011);
- Amajuba BSP (2014); and
- Conservation Targets and Status for Vegetation Types in KZN (Jewitt, 2011).

2.6 SITE 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, with specific focus on the KZN BSPs, as well as by applying the SEI sensitivity criteria based on the site survey.



Table 2.1: Criteria for establishing Site Ecological importance and description of criteria.

Criteria	Description
Conservation Importance (CI)	<i>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.</i>
Functional Integrity (FI)	<i>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.</i>
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	<i>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.</i>
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

2.7 IMPACT ASSESSMENT

2.7.1 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 and 3 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 OVERVIEW OF THE PHYSICAL CHARACTERISTICS OF THE PROJECT AREA

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, climate, topography (landform), geology, and soils are considered four of the major factors determining habitat heterogeneity and species diversity.

3.1.1 Climate

As the proposed WEF is located at the top of the escarpment, we used weather data at Memel (and not Newcastle) in the Free State Province (www.weather-atlas.com) because it lies at a similar altitude, which is better to use to infer local climatic conditions. The warmest month (with the highest average high temperature) is December (26.7°C), while the coldest month (with the lowest average low temperature) is July (4.5°C). The wettest month (with the highest rainfall) is December (59 mm), while the driest month (with the least rainfall) is July (2 mm).

3.1.2 Topography

The topography of the Newcastle area is undulating (Figure 3.1). The project area is located on a plateau approximately 1800 m above sea level (a.s.l). The landscape is cut by numerous drainage lines (**Error! Reference source not found.**).

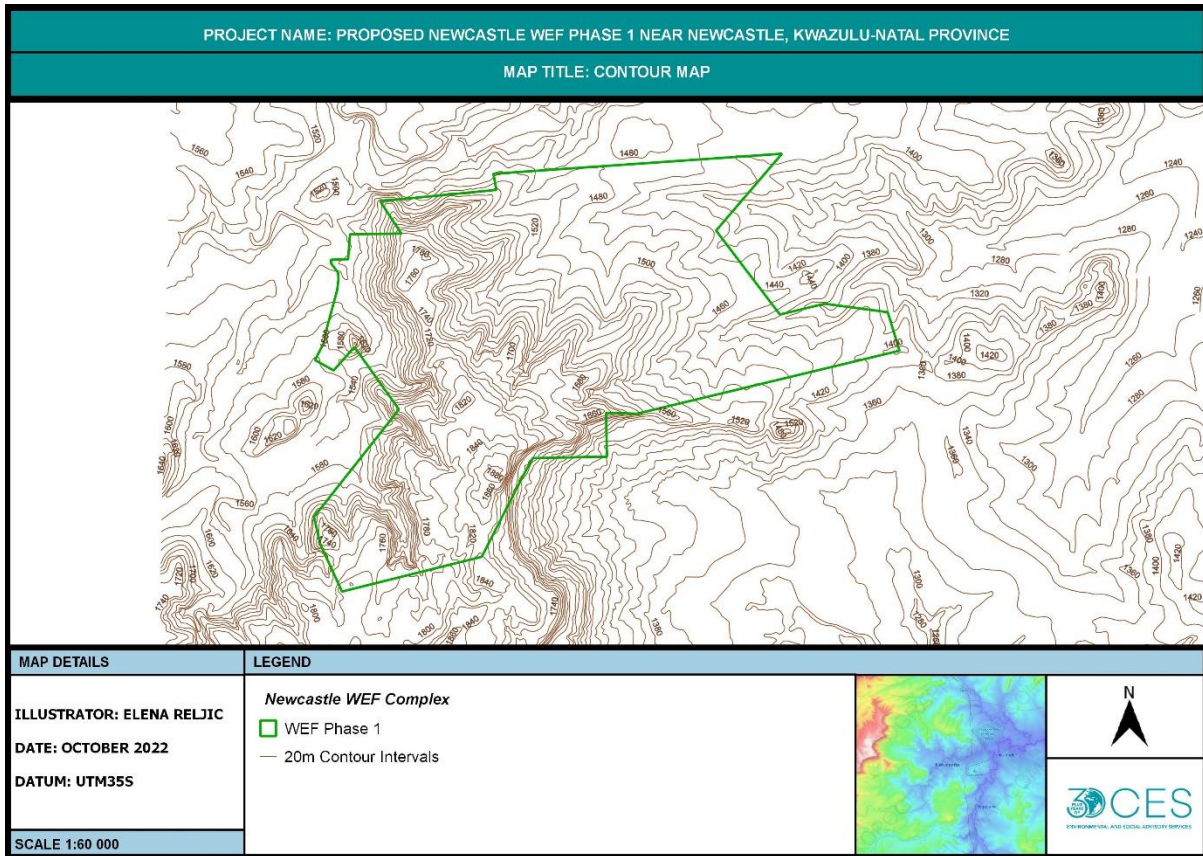


Figure 3.1: Contour Map of Mulilo Newcastle WEF.

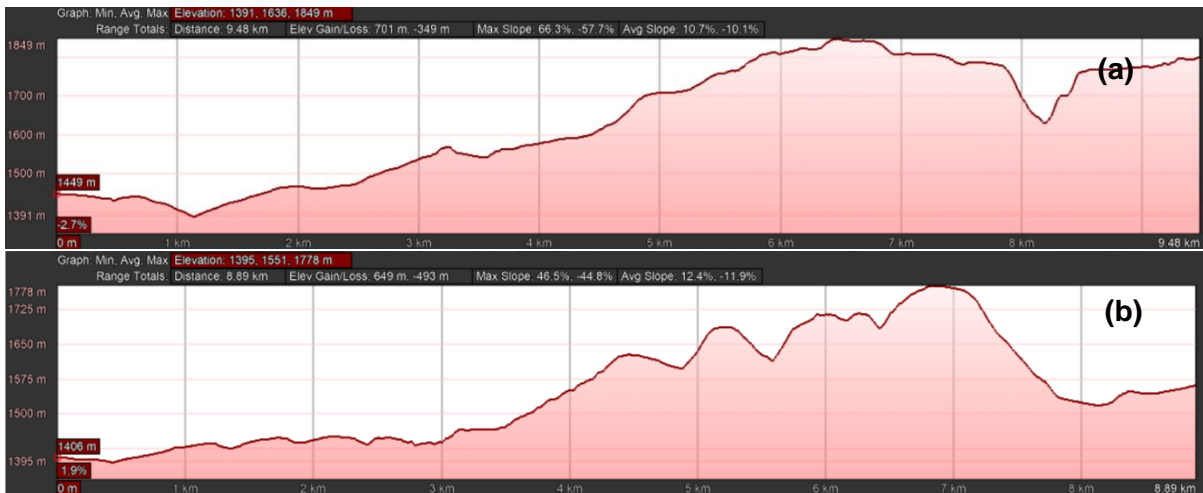


Figure 3.2: Elevation profile of Mulilo Newcastle WEF from (a) south-west to north-east and (b) west to east.

3.1.3 Geology

The underlying geology of the project area comprises mainly of sedimentary deposits from the Karoo Dolerite Suite, followed by the Beaufort Group and Volkrust Formation of the Karoo Supergroup and Ecca Group, respectively (Figure 3.3).

Karoo Dolerite Suite represents a network of igneous dykes and sills that intruded rocks of the Beaufort Group in the Karoo Basin about 180 million years ago (Neumann *et al.* 2011).



Beaufort Group covers a surface area of approximately 200 000 km² and is made up of fluvial rocks deposited about 250 million years ago within the Main Karoo Basin of South Africa. The strata in the Beaufort Group consist predominantly of mudstones and sandstones deposited by a variety of fluvial systems (Catuneanu *et al.* 2005).

Volksrust Formation is a transgressive argillaceous succession occurring about 252 million years ago that superimposes the Vryheid Formation in the northern part of the Karoo Basin (Catuneanu *et al.* 2005). Rocks of the Volksrust Formation consist mainly of shale and mudrocks, and minor coals.

3.1.4 Soils

According to SOTER (1995), the soils in the project area are classified as Lithic Leptosols and Rhodic Nitisols (**Error! Reference source not found.**).

Leptosols as very shallow soils which overly 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).

Nitisols are deep, well-drained, red, clayey soils that are generally found in hilly landscapes under tropical forests or grasslands. These soils are strongly weathered and considered to be fertile, making them relatively good for farming and plantations (ISRIC, 2021).

The Amajuba BSP (Ezemvelo KZN Wildlife, 2014), describes three types of soils that occur within the project area, including transported soils, colluvial and residuals of the Pleistocene and recent origin. These soils are subject to erosion by wind and water and the clay content of the soil leads to swelling and shrinking depending on the relative water content of the soil.

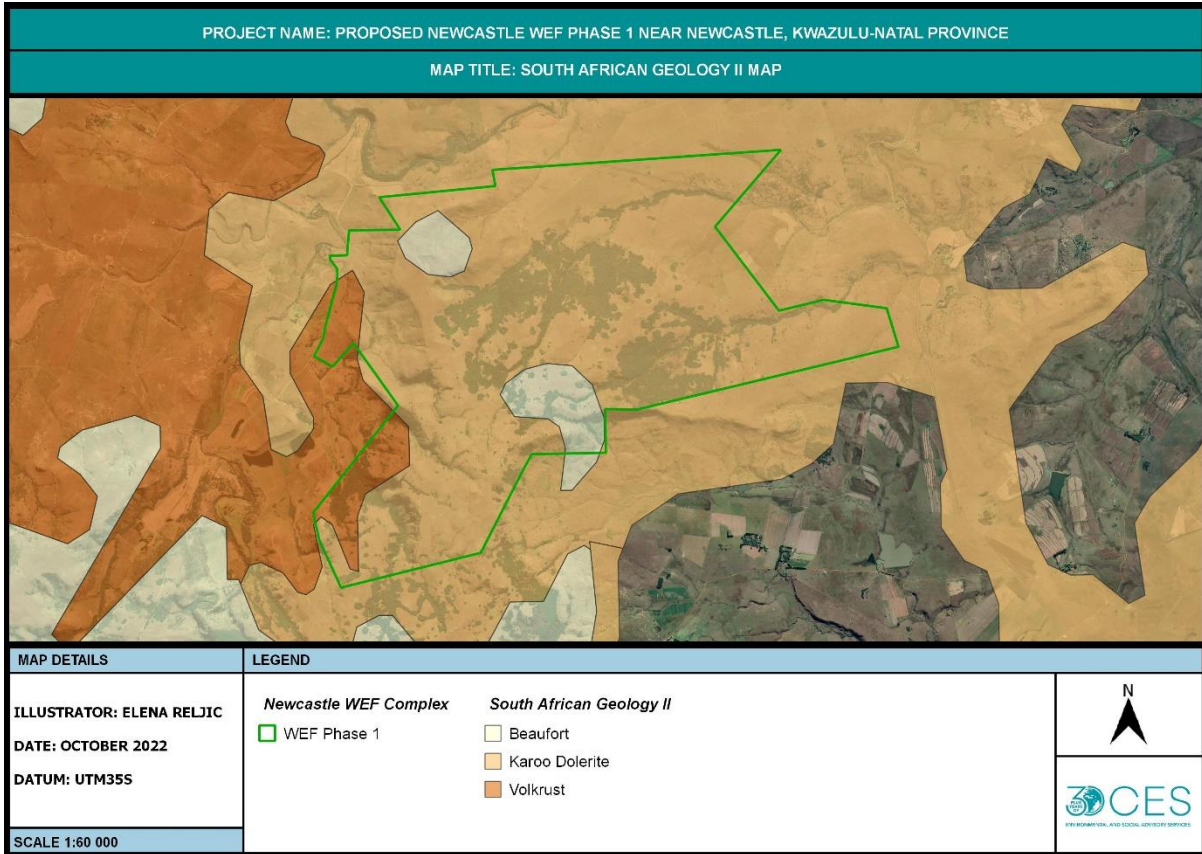


Figure 3.3: Geology Map of Mulilo Newcastle WEF.

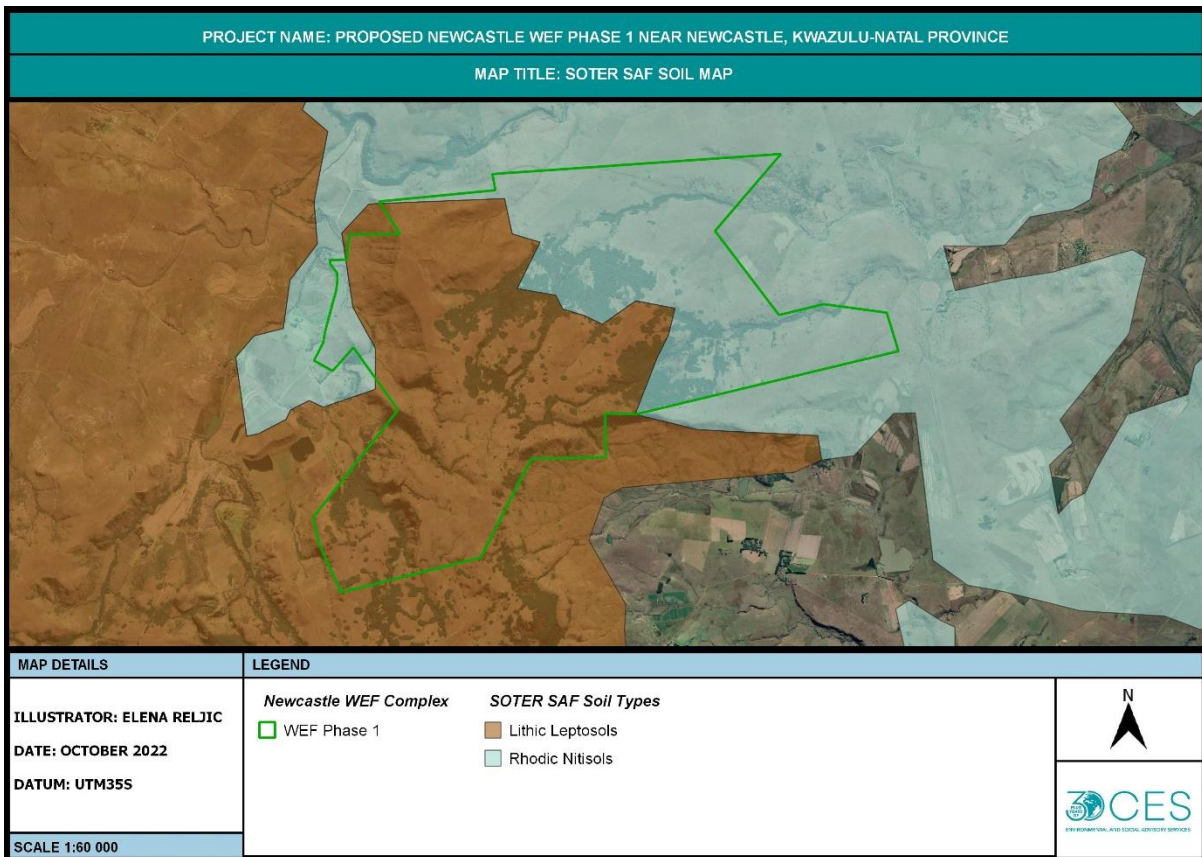


Figure 3.4: SOTER SAF Soil Map of Mulilo Newcastle WEF.



3.1.5 Surface Water Features

The aquatic sensitivity of the project area is classified as VERY HIGH in the Screening Report due to the interception of the project area with Aquatic CBAs, a Strategic Water Source Area, Wetlands, and freshwater ecosystem priority area quinary catchments. The proposed Newcastle WEF Complex falls within four (4) quaternary catchments of the Pongola Mtamvuna Water Management Area (WMA 4), including V31C, V31D, V31J and V31K.

The MNWP does not traverse an NBA (2018) priority river, but numerous rivers flow through the project area, namely tributaries of the Seepwaterspruit River and Ngogo River. In addition, the project area comprises wetland ecosystems classified under Wetland Freshwater Priority Areas (FEPAs). Accordingly, there are numerous waterbodies on site which provide important habitat for a range of aquatic faunal and floral species.

It should be noted that a separate Aquatic Biodiversity Impact Assessment has been undertaken for the proposed project. Therefore, only the impacts associated with the loss and/or fragmentation of terrestrial faunal and botanical habitats within the project area are assessed in this report. The assessment of impacts on the aquatic features themselves do not form part of the scope for this study.

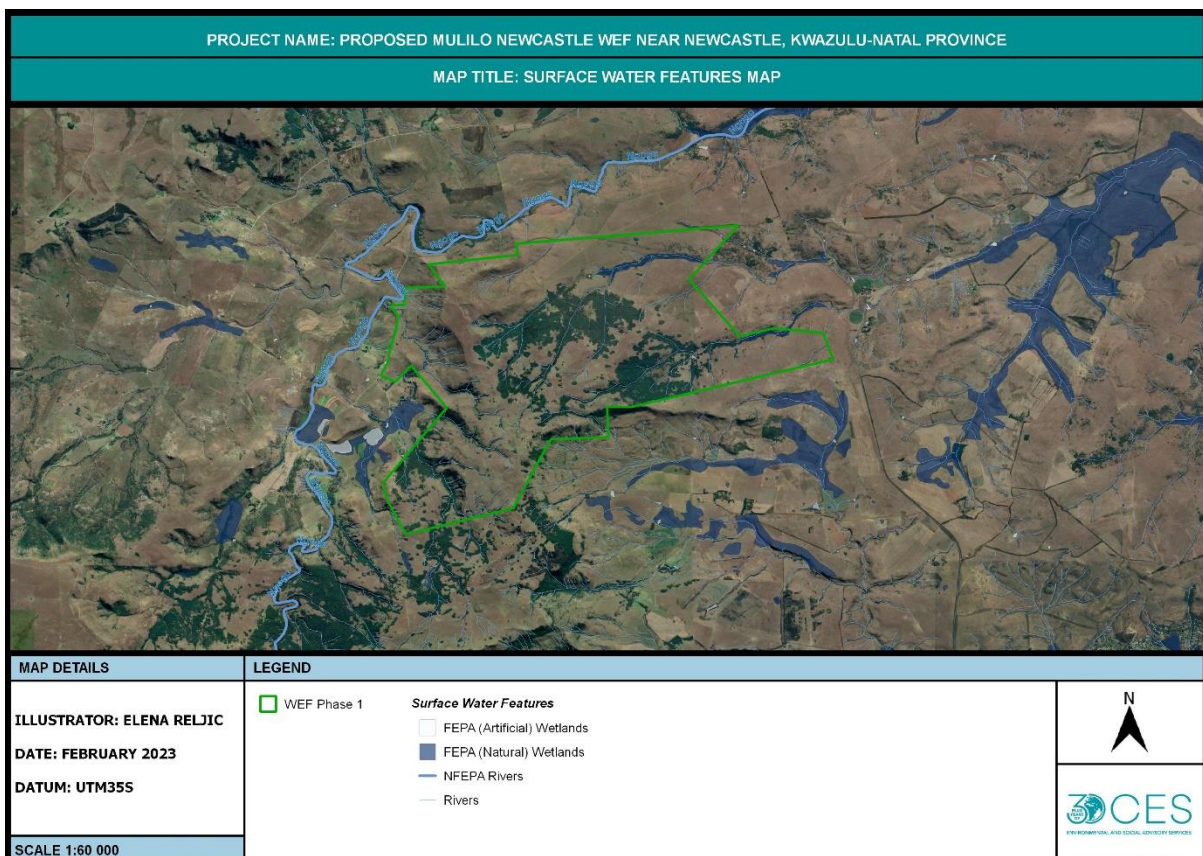


Figure 3.5: Surface Water Features Map of Mulilo Newcastle WEF.

3.1.6 National Land Cover



According to the South African National Land-Cover (2020) spatial dataset, the major land class that covers the MNWP is 'natural grassland', representing Low Escarpment Moist Grassland and KwaZulu-Natal Highveld Thornveld (both Least Concern). This is followed by 'dense forest & woodland' and 'contiguous low forest & thicket'. Minor land classes include 'fallow land & old fields (grass)', 'herbaceous wetlands', 'contiguous & dense plantation forest', and 'commercial annual crops rain-fed / dry-land' among others (**Error! Reference source not found.**).

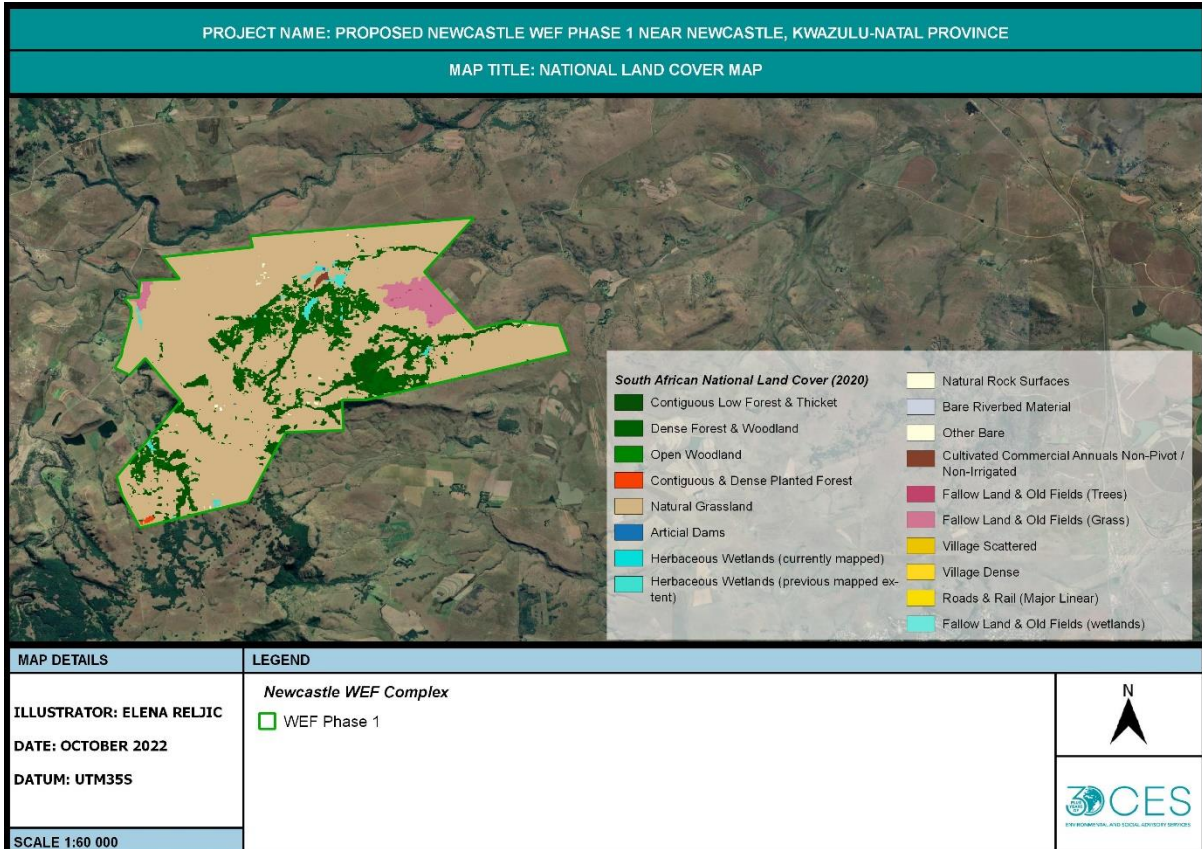


Figure 3.6: South African National Land-Cover (SANLC, 2020) Map of Mulilo Newcastle WEF.



3.2 OVERVIEW OF THE BIOLOGICAL CHARACTERISTICS OF THE PROJECT AREA

3.2.1 Biomes of the Project Area

The proposed Mulilo Newcastle WEF falls within the Grassland (Mucina *et al.*, 2006-2018).

Grassland

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 second only to that of the fynbos biome. The incredible diversity and provision of ecosystem services has contributed to the classification of this ecosystem 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).

Approximately 40% of the grassland biome in South Africa has been transformed due to anthropogenic activities. In addition, 60% of the remaining extent of grassland is classified as threatened due to the loss of vital aspects of their composition, structure, and function. Only 3% of this valuable biome is formally conserved. The fragmentation and degradation of grassland ecosystems severely affects the ecosystems' ability to provide valuable ecosystem services such as soil formation, freshwater, climate regulation and erosion prevention. As such, development within the remaining natural grassland areas should be well informed and err on the side of caution (SANBI, 2013).

Two key drivers of grassland ecosystems include climate and fire. Both influence the character, community structure, composition, and primary productivity of grassland habitats. In addition to climate and fire, other ecological drivers of grassland habitat include grazing, soil types, and nutrient status. Due to their high biodiversity and their suitability for human habitation, these ecosystems are often negatively impacted by various anthropogenic activities including grazing by livestock, over harvesting of natural resources, inappropriate fire regime, mining, agriculture, urban and industrial expansion, amongst others (SANBI, 2013).

3.2.2 Description of Vegetation

National Vegetation Map (SA VEGMAP, 2018)

The South African Vegetation Map (SA VEGMAP, 2006-2018) 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 was updated 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 (2006-2018), the vegetation types affected by the MNWP will include KwaZulu-Natal Highland Thornveld and Low Escarpment Moist Grassland (**Error! Reference source not found.**). These vegetation types are described in detail below:

KwaZulu-Natal Highland Thornveld

KwaZulu-Natal Highland Thornveld occurs in a series of patches in the central-northern regions of KwaZulu-Natal in dry valleys and moist uplands at an altitude of approximately 920-1440 m. This vegetation type falls within the summer rainfall region (MAP: ± 750 mm) and is characterised by tall tussock grassland dominated by *Hyparrhenia hirta*, with occasional savannoid woodlands with scattered *Vachellia sieberiana*, *V. karroo* and *V. nilotica* which usually occur in small pockets. It is typically underlain by a variety of Karoo Supergroup rocks (SANBI, 2006 in SANBI, 2021).

According to South Africa's Terrestrial Red List of Ecosystems (RLE), KwaZulu-Natal Highland Thornveld is classified as **Least Concern** (SANBI, 2021). The historical extent of this vegetation type amounted to 5227.49 km² but only 63% of its natural extent remains. It is considered poorly protected and the conservation target for this vegetation type is 23% (SA VEGMAP, 2018). Major threats which lead to the loss of this ecosystem include cultivation, urban sprawl, the development of dams, bush encroachment and invasion by *Opuntia sp.*, *Eucalyptus sp.*, *Populus sp.*, *Acacia sp.*, and *Melia sp* (Mucina *et al.*, 2006).

Low Escarpment Moist Grassland

Low Escarpment Moist Grassland occurs on complex mountain topography such as steep (generally east- and south-facing) slopes at a range of altitudes within the KwaZulu-Natal, Free State and Mpumalanga Provinces. It is characterised by tall, closed grassland dominated by *Hyparrhenia hirta* and *Themeda triandra* with patches of *Protea caffra* and *Leucosidea* scrub communities appearing at higher altitudes. This vegetation type falls within the summer rainfall region and is typically underlain by mudstone and shales of the Ecca and Beaufort Groups (Karoo Supergroups). Patches of Northern KwaZulu-Natal Mistbelt Forest occur within the sub-escarpment regions and deep-kloof positions (SANBI, 2006 in SANBI, 2021).

According to South Africa's Terrestrial Red List of Ecosystems (RLE), Low Escarpment Moist Grassland is classified as **Least Concern** (SANBI, 2021). Its historical extent was 1742.25 km² and the remaining extent is 90%. It is considered poorly protected and the major threats which lead to the loss and degradation of this ecosystem includes plantations, cultivation, and invasion by *Acacia dealbata*.

Amajuba District Municipality: BSP (2014) Vegetation Types

According to the Ezemvelo KZN Wildlife Vegetation Map (2009) and the Amajuba District Municipality: BSP (2014), the vegetation types occurring within the project area include KwaZulu-Natal Highland Thornveld and Low Escarpment Moist Grassland, as described in the SA VEGMAP (2018). However, these maps include two additional aquatic ecosystem types, which have not been delineated in the SA VEGMAP (2018), namely Alluvial Wetlands (Temperate Alluvial Vegetation) and Freshwater Wetlands: Eastern Temperate Wetlands (Figure 3.8).



The conservation status and extent of the ecosystem types are listed in **Error! Reference source not found.** below. Both aquatic ecosystems are listed as 'Vulnerable'.

Table 3.1: Conservation status and extent of vegetation types within the project area (Amajuba District Municipality: BSP, 2014).

Vegetation Type	Conservation Status	Historical Area (Ha)	2008 Area (Ha)	Percentage Lost (Ha)	WEF (MNWP, MNWP 2, Both)
Freshwater Wetlands: Eastern Temperate Wetlands	Vulnerable	24481.368	20339.582	16.92	Both
Alluvial Wetlands: Temperate Alluvial Vegetation	Vulnerable	32996.645	23114.188	29.95	Both
KwaZulu-Natal Highland Thornveld	Least Threatened	73206.077	54468.829	25.60	MNWP
Low Escarpment Moist Grassland	Least Threatened	62941.885	56930.63	9.55	Both

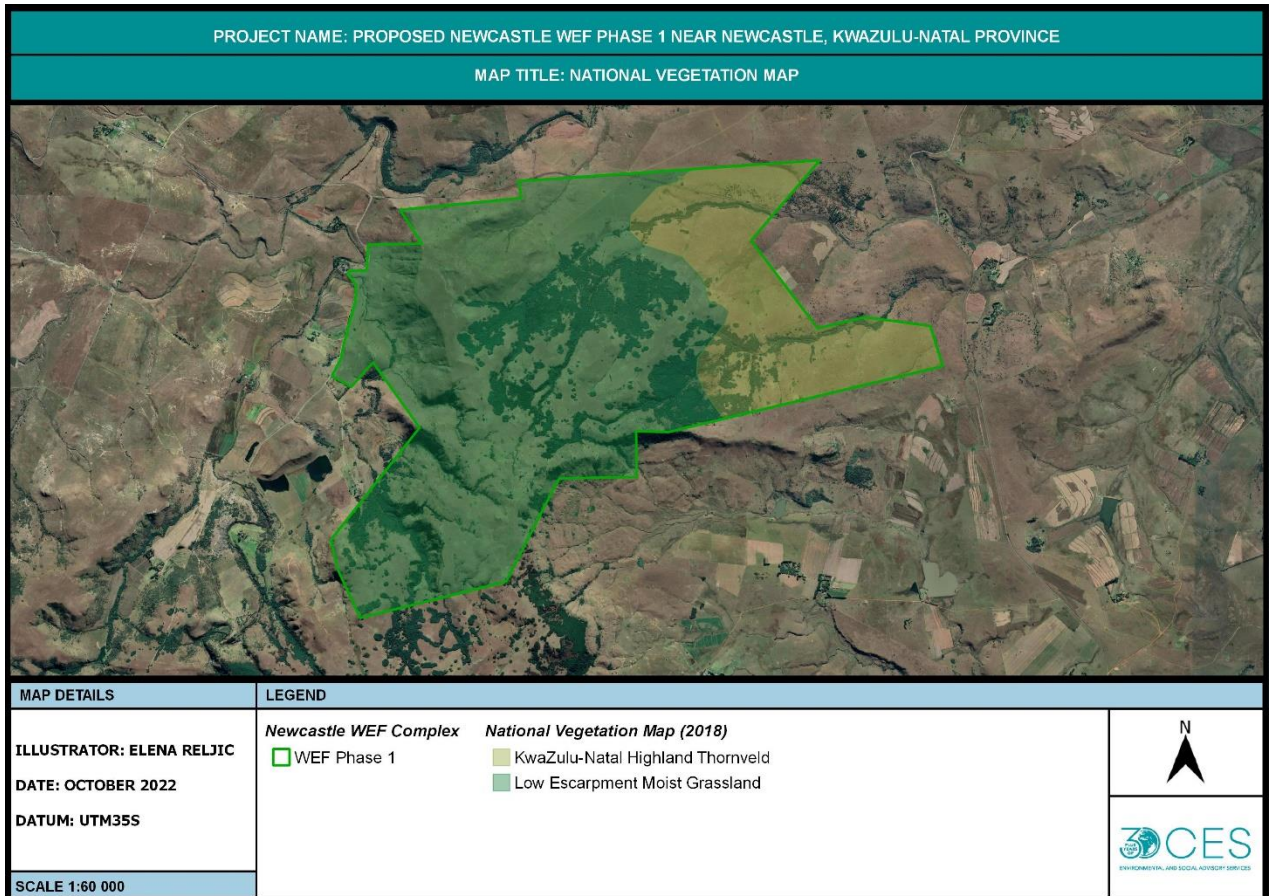


Figure 3.7: National Vegetation Map of Mulilo Newcastle WEF.

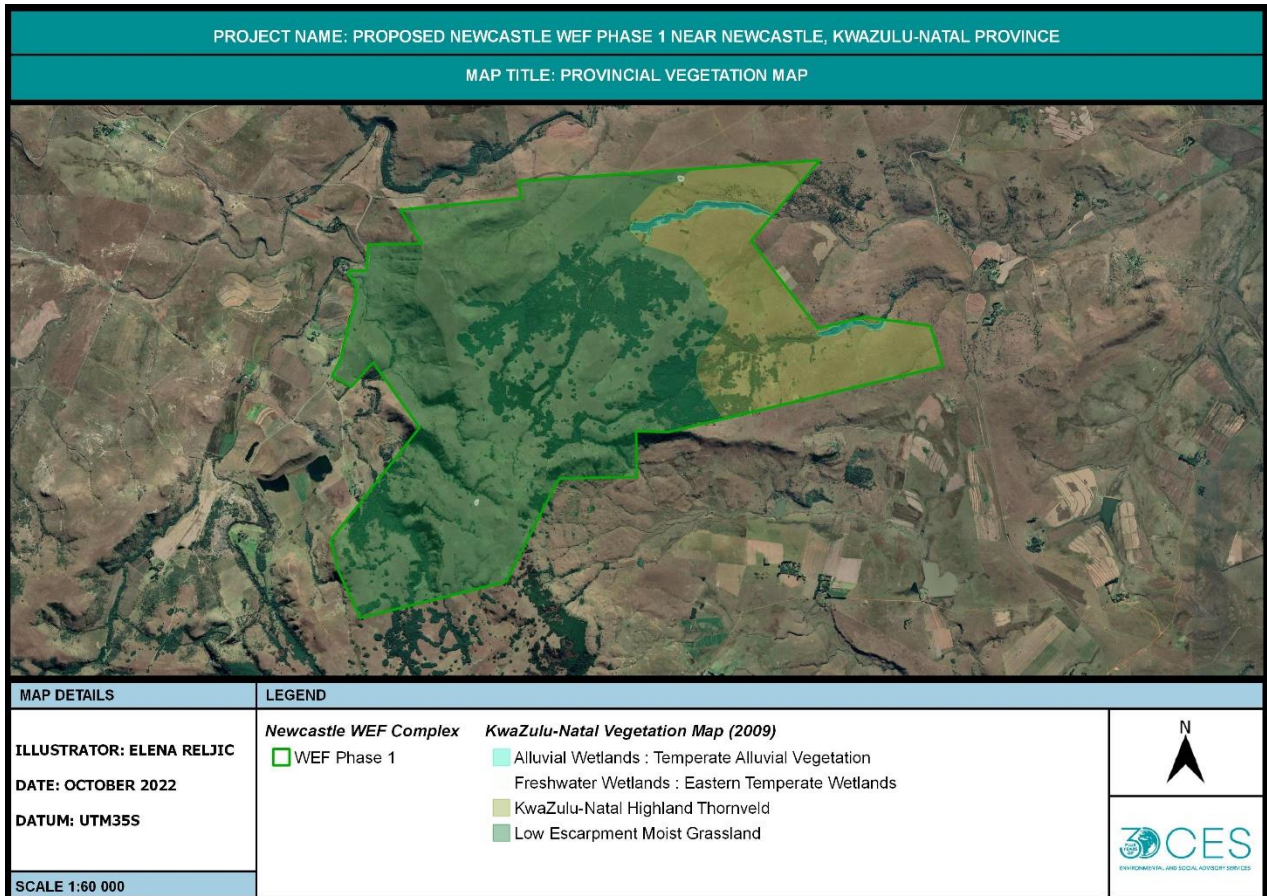


Figure 3.8: KZN Vegetation Map of Mulilo Newcastle WEF.



3.2.3 Botanical Species of Conservation Concern

The below species list has been compiled using records obtained from the National Screening Report, the list of species recorded for each vegetation type (Mucina *et al.*, 2006-2018), as well as the list of Red Data Plant Species known to occur, or likely to occur, within the Amajuba District Municipality (EKZMW, 2014). The likelihood of each species occurring within the wider project area is assessed in Table 3.2 below.

In total, 13 threatened botanical SCC were recorded within the wider project area, consisting of three species classified as 'rare', three Endangered (EN), six Vulnerable (VU), and one Near-threatened (NT).

It should be noted that two species, *Eucomis montana* and *Erica revoluta*, are listed as NT and VU, respectively in the Amajuba District Municipality BSP (EKZMW, 2014). However, according to red list assessments in the Red List of South African Plants accessed in June 2022, these species are currently classified as Least Concern.

Although none of the SCC were confirmed to occur within the project area, only a representative sample of the project area was surveyed. Therefore, it cannot be assumed that the species are not present. It should be noted that several of the indigenous plant species recorded during the survey are protected in terms of the Natal Nature Conservation Ordinance No. 15 of 1974 and the List of Protected Trees under the National Forest Act (Act No. 84 of 1998). Permits for the removal of these species must be obtained. No TOPS species were recorded on site.

A full list of species found during site investigations has been included in Appendix 1.



Table 3.2: List of plant SCC likely to occur within the wider project area.

Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
FABACEAE	<i>Lotononis amajubica</i>	Rare	Schedule 12A	-	-	According to Lötter et al (2013), this is a South African endemic occurring in the Free State, KwaZulu-Natal, and Mpumalanga Provinces. It is a habitat specialist which occurs on well-drained, high-altitude grassland (1600-1800 m). It can be locally very common, and its population trend is stable.	Based on the known distribution and habitat requirements of <i>L. amajubica</i> , it is possible that this species occurs within the project area.	No
STILBACEAE	<i>Bowkeria citrina</i> <i>Thode</i>	Rare	-	-	-	According to Steiner and Naidoo (2005), this species is endemic to the Mpumalanga and KwaZulu Natal Province of South Africa. It occurs in forest margins and cliff edges on cool slopes in southern Mpumalanga and northern KwaZulu-Natal between Groenvlei, Wakkerstroom and Luneburg. This is a habitat specialist with an EOO of 277 km ² . There are currently no known threats.	Based on the known distribution and habitat requirements, it is possible that this species occurs within the project area.	No
ORCHIDACEAE	<i>Holothrix majubensis</i>	Rare	Schedule 12	-	-	This species is endemic to the KwaZulu-Natal Province. It occurs on sandstone cliffs in montane grassland at an altitude of approximately 2200 m. This is a rare, high altitude habitat specialist known from only two (2) locations. However, it is not threatened (Mtshali, 2015).	Although the project area contains suitable habitat for this species, based on the restricted range and known distribution it is unlikely that this species occurs on site.	No
LAURACEAE	<i>Ocotea bullata</i>	EN	Schedule 12	Schedule A	-	According to Williams <i>et al</i> (2008), this widespread species is endemic to South Africa, occurring from the Cape Peninsula	Based on the known distribution and habitat requirements of <i>O. bullata</i> it	No



Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
						to the Wollkberg Mountains in Limpopo. Its major habitats include Northern Coastal Forest, Southern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Southern Mistbelt Forest, Northern Afrotropical Forest, and Southern Afrotropical Forest. Despite its wide, but disjunct, distribution, subpopulations in at least 53% of its range have been heavily exploited for the timber industry in the past and more recently bark for the traditional medical trade, rendering them extinct, near-extinct, rare, scarce, or fragmented. A minimum of 50% population reduction has been estimated in the last 240 years (generation length 80 years).	is unlikely that this species occurs within the project area.	
-	Sensitive species 998	EN	-	-	-	This species is not endemic to South Africa but occurs within the Free State, KwaZulu-Natal, Limpopo, and Mpumalanga Province. It is widespread across the eastern highveld. Its habitat includes drainage lines, forest margins, islands within wetlands and west and south facing mountain slopes. It is estimated that the population of this species has declined by more than 50% in the past 60 years due to harvesting for the medicinal plant trade and loss of suitable habitat.	Based on the known distribution and habitat requirements of this species, it is highly likely that this species occurs within the project area.	No
-	Sensitive species 1086	EN	Schedule 12	-	-	This species is endemic to the KwaZulu-Natal, Limpopo, and the Mpumalanga Provinces of South Africa. It has a very	This species has been recorded in KwaZulu-Natal Highland Thornveld – one	No



Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
						restricted range with an EOO of 122 km ² and fewer than five remaining locations are known which are declining due to the degradation of its habitat. It occurs in swampy areas and vleis in Grasslands (1500 – 2000 m).	of the vegetation types occurring within the project area. Based on the known distribution and habitat requirements of this species, it is possible that this species occurs within the project area.	
RHIZOPHORACEAE	<i>Cassipourea flanaganii</i>	EN	-	-	-	This species is endemic to South Africa and occurs in evergreen primary and secondary forest from coast to 900 m, also in Southern Mistbelt Forest, within the Eastern Cape and KwaZulu-Natal Provinces. A 50% population reduction is estimated for the past 100 years due to bark harvesting for the medicinal plant trade (Williams <i>et al.</i> , 2008).	Based on the known distribution of <i>C. flanaganii</i> , which occurs in forest below 900 m a.s.l, it is unlikely that this species is present on site as the project area is above 900 m from sea level.	No
AMARYLLIDACEAE	<i>Nerine platypetala</i>	VU	Schedule 12A	-	-	This species is endemic to South Africa and occurs within the KwaZulu-Natal and Mpumalanga Provinces from Wakkerstroom to Groenvlei. It is known from less than 10 locations (EOO<20 000 km ²). This species occurs in montane grassland, margins of permanently moist vleis and levees of riverbanks (Scott-Shaw and Victor, 2005).	Based on the known habitat type and distribution of this species it is possible that this species could occur on site.	No
IRIDACEAE	<i>Hesperantha gracilis</i>	VU	Schedule 12	-	-	This range restricted species is endemic to the KwaZulu-Natal Province and known from only three (3) localities (EOO 339 km ²). It is a habitat specialist and occurs on sandstone plateaus inland from Durban. Its major habitats include scarp	Although the proposed development is underlain by mudstones and sandstones of the Beaufort Group, based on the known distribution of this species	No



Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
						forest, hangs from moss cushions or patches of humus on dripping wet sandstone cliffs that are mostly inaccessible (Raimondo and von Staden, 2015).	and the lack of suitable habitat (scarp forest) it is unlikely that this species occurs within the project area.	
POLYGALACEAE	<i>Polygala praticola</i>	VU	-	-	-	According to Mtshali <i>et al.</i> , (2016), this species is endemic to the KwaZulu-Natal Province of South Africa. It occurs in a range of grasslands, including Northern KwaZulu-Natal Moist Grassland. It has an EOO of 19 466 km ² and the only five to ten locations are declining due to habitat loss and degradation.	This species has been recorded in Northern KwaZulu-Natal Moist Grassland – one of the vegetation types of the project area. Based on its known distribution and habitat requirements, it is highly likely that this species occurs within the project area.	No
-	Sensitive Species 1252	VU	Schedule 12	-	-	This species is not endemic to South Africa. It occurs in a broad range of habitats, particularly wooded and relatively mesic places such as moister bushveld areas, coastal bush, and wooded mountain kloofs. Its preferred habitat includes the vegetation of the site – Northern KwaZulu-Natal Moist Grassland. The overall decline of this species is estimated to be >30% over the past 90 years due to exploitation for the medicinal plant trade and commercial harvesting.	Based on the known distribution and habitat requirement of this species, it is possible that this species occurs within the more dense, wooded drainage lines of the project area.	No



Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
-	Sensitive species 1248	VU	-	-	-	This species occurs in from the Eastern Cape to Limpopo Province and is relatively widespread elsewhere in South Africa. It typically occurs at low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder scree, sometimes found scrambling at the margins of karroid, succulent bush in the Eastern Cape. Its major habitats include KwaZulu-Natal Highland Thornveld (one of the vegetation types occurring within the project area). The major threats to this species includes harvesting for medicinal plant trade and provincial authorities estimate at least a 30% population decline in the past 30 years.	This species has not been recorded within the surrounding or broader project area. Although the project area is at high altitude (1800masl), based on the known distribution and habitat requirements of this species, it is possible that this species could occur on site.	No
-	Sensitive species 851	VU	Schedule 12A	-	-	This species is not endemic to South Africa but occurs within the KwaZulu-Natal and Mpumalanga Provinces. Its habitat includes shallow vleis and marshes in high altitude montane grasslands, including Low Escarpment Moist Grassland (a vegetation type occurring within the project area). This species is expected to have a very narrow distribution range. Its EOO is possibly as small as 6244 km ² but due to taxonomic uncertainty this cannot be confirmed.	Based on the known distribution and habitat requirements, it is possible that this species occurs within the project area.	No
ROSACEAE	<i>Prunus africana</i>	VU	-	Schedule A	-	According to Williams <i>et al.</i> , (2008), this species is not endemic to South Africa. It is widespread in Africa, occurring in	Based on the known distribution and habitat requirements of this	No



Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
						evergreen forests near the coast, inland mistbelt forests, and Afromontane forests up to 2100 m. The major threat to this species is harvesting for the traditional medical trade. Tree densities in South African forests are low and is reported to be declining or scarce in at least 40% of the quarter degree squares it has been recorded in. Surveys indicate that subpopulations are small, with between 40 and 400 trees per quarter degree square. Based on this evidence, it is suspected that the South African population does not exceed 10,000 mature individuals.	species, it is possible that this species occurs within the dense, wooded drainage lines on site.	
ASPHODELACEAE	<i>Aloe modesta</i>	VU	Schedule 12	-	-	According to von Staden <i>et al.</i> , (2019), this species is endemic to the KwaZulu-Natal and Mpumalanga Province of South Africa. It occurs in scattered, isolated subpopulations across the Mpumalanga Highveld, from Dullstroom to Graskop and southwards to Barberton and Wakkerstroom. Its major habitats include seasonally moist, high altitude montane grasslands.	The habitat types occurring on site are not listed as one of the major habitats for this species (von Staden <i>et al.</i> , 2019). The site falls outside of the known distribution of this species and does not contain the preferred habitat. As such the likelihood of occurrence is low.	No
ASPHODELACEAE	<i>Aloe dominella</i>	NT	Schedule 12	-	-	According to Mtshali and von Staden (2018), this species is endemic to the Free State and KwaZulu-Natal provinces of South Africa. It has a restricted distribution range (EOO of 13 359 km ²) and it is only known from 15-26 locations. It occurs typically occurs on rocky	Based on the known distribution and habitat requirements of <i>A. dominella</i> , it is possible that this species occurs within the project area.	No



Family	Species	SA Red List	PNCO No. 15 of 1974	Protected Tree	NEMBA	Habitat, distribution, and population trend (SANBI Red List)	Probability of occurrence on site based on habitat requirements	Identified on site (Yes/No)
						outcrops in Grassland and Savanna but has also been recorded in open grassland and along road reserves. The major threat to this species is overgrazing.		
CURTISIACEAE	<i>Curtisia dentata</i>	NT	-	Schedule A	-	This species is not endemic to South Africa. It occurs in evergreen forests from the coast to 1800 m in the Eastern Cape, Free State, KwaZulu-Natal, Limpopo, and Mpumalanga Province. It is currently threatened due to bark harvesting for the medicinal plant trade. A population decline of approximately 20% is estimated for the past 120 years (Williams <i>et al.</i> , 2008).	Based on the known distribution and habitat requirements of <i>C. dentata</i> it is possible that this species occurs within the forest patches within the project area.	No



3.2.4 Alien Invasive Species

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.

The following alien and invasive species have been recorded in the broader project area (note, all species are alien, but vary in their invasive potential:

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

FAMILY	SPECIES	COMMON NAME	CARA	NEMBA
Amaranthaceae	<i>Gomphrena celosioides</i>	Prostrate Globe-Amaranth	-	-
Amaranthaceae	<i>Gomphrena serrata</i>	Gomphrena Weed	-	-
Asteraceae	<i>Cirsium vulgare</i>	Bull Thistle	Category 1	Category 1b
Asteraceae	<i>Craspedia variabilis</i>	Common Billy Buttons	-	-
Asteraceae	<i>Erigeron canadensis</i>	Horseweed	-	-
Asteraceae	<i>Acanthospermum australe</i>	Paraguayan Starburr	-	-
Asteraceae	<i>Hypochaeris radicata</i>	Common Cat's-Ear	-	-
Asteraceae	<i>Schkuhria pinnata</i>	Dwarf Marigold	-	-
Brassicaceae	<i>Lepidium sp.</i>	-	Category 1	Category 1b
Fabaceae	<i>Acacia dealbata</i>	Silver Wattle	Category 2	Category 2
Fabaceae	<i>Acacia mearnsii</i>	Black Wattle	Category 2	Category 2
Malvaceae	<i>Hibiscus trionum</i>	Flower-of-an-Hour	-	-
Onagraceae	<i>Oenothera stricta</i>	Fragrant Evening Primrose	-	-
Onagraceae	<i>Oenothera tetraptera</i>	Fourwing Evening Primrose	-	-
Plantaginaceae	<i>Plantago tomentosa</i>	Dwarf Plantain	-	-
Poaceae	<i>Paspalum dilatatum</i>	Dallis Grass	-	-
Poaceae	<i>Paspalum notatum</i>	Bahia Grass	-	-
Poaceae	<i>Cymbopogon pospischilii</i>	Narrowleaf Turpentine Grass	-	-
Rubiaceae	<i>Richardia brasiliensis</i>	Tropical Mexican Clover	-	-
Solanaceae	<i>Solanum sisymbriifolium</i>	Red Buffalo-bur	Category 2	-
Solanaceae	<i>Solanum sp.</i>	-	-	-
Verbenaceae	<i>Verbena litoralis</i>	Seashore Vervain	-	-



FAMILY	SPECIES	COMMON NAME	CARA	NEMBA
Verbenaceae	<i>Verbena rigida</i>	Slender Vervain	-	Category 1b

NEM:BA Category 1b: Invasive Species

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

Category 2 invasive species are regulated by area. A permit is required to import, possess, grow, breed, move, sell, buy, or accept as a gift any species listed under Category 2.

CARA Category 1: Declared weeds

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

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).



3.2.5 Description of Fauna and Faunal Species of Conservation Concern

The study area is primarily characterised by the Grassland biome (*refer to Section 3.4.1 above*), which supports a diverse array of fauna. This section provides a brief description of the herpetofauna and mammals, excluding bats, which may occur within the study area.

The following resources/databases were consulted to determine which species may occur within the study area:

- ADU's FrogMAP;
- ADU's ReptileMAP;
- ADU's MammalMAP;
- The DFFE screening report for the site;
- iNaturalist; and
- IUCN

The following sources were used to assess the Conservation/Threat Status of each species:

- *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland* (Minter *et al.*, 2004);
- *Red Listing the Amphibians of South Africa* (Measey, 2010);
- *Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research* (Measey, 2014);
- *Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland* (Minter *et al.*, 2014);
- *Red Data Book of Southern African Mammals: A Conservation Assessment* (EWT, 2016 & 2020 updates); and
- Red Data Species known to occur, or likely to occur, within the Amajuba District Municipality (EKZNW, 2014)

Herpetofauna

Herpetofauna include animals in the Classes *Amphibia* and *Reptilia*. KZN is home to approximately 62 amphibian species and 149 reptile species. Of these, approximately 70 species may occur within the wider project area.

Using the IUCN (2021) and ADU (2011) databases, a total of 24 amphibian and 46 reptile species potentially occurs within the wider project area. Of these, six amphibian and 12 reptile species are Endemic, and two amphibian and eight reptile species are Near Endemic. In addition, four reptiles are protected by the PNCO (Act No. 15 of 1974), namely Cape Terrapin (*Pelomedusa galeata*), Rock Monitor (*Varanus albigularis*), Water Monitor (*Varanus niloticus*) and Southern African Rock Python (*Python natalensis*). None of the frogs identified in this report are listed as Threatened in the Amajuba District Municipality BSP (EKZNW, 2014). However, according to the Red List of South African Frogs (SANBI 2014, Measey 2010 & 2014) and Reptiles (SANBI 2014), one species is Threatened, namely the Spotted Shovel-nosed Frog (*Hemisus guttatus*), which is listed as VU, and another species, namely Striped



Harlequin Snake (*Homoroselaps dorsalis*), is NT. The likelihood of occurrence of these two SCC within the project area is assessed in Table 3.5 below.

Please refer to Appendix 2 for all the amphibian and reptile species identified as potentially occurring within the study area, their level of endemism, as well as the relevant provincial legislation and CITES Listing pertaining to these species – SCC are highlighted in red. Any confirmed sightings were also included in this list.

During site investigations, six herpetofauna (1 frog, 1 lizard and 4 snakes) were observed incidentally (please refer to Appendix 2 for names of species). None of the species identified on site are listed as Threatened. It is important to note that the 2 x site visits were restricted to daylight hours where herpetofauna activity is limited, as many species are nocturnal. To obtain more representative estimates of species present within the project area, a combination of terrestrial sampling techniques (e.g., nocturnal surveys, acoustic surveys) is required.

Only two herpetofauna SCC were identified as potentially occurring within the project area and a concerted effort was made to assess the likelihood of occurrence of these species, using a visual encounter survey method based on area, where natural cover objects such as logs, rocks, leaf litter are searched. The portion of habitat within the project area where the Shovel-nosed Frog is possible to occur was not assessed thoroughly as conditions were unsafe at the site and the search was limited to daylight hours. The Striped Harlequin Snake was not observed on site during site investigations, but it has a high likelihood of occurrence within the project area due to the presence of suitable habitat (i.e., mountainous grassland). Certain reptile species like the Striped Harlequin Snake may be difficult to detect due to its secretive and partly fossorial nature and thus require more intense survey methods (e.g., an array of drift fencing, pitfall traps and funnel traps). However, due to time constraints this method could not be applied. This type of array typically requires a minimum of six days in action to be effective in obtaining representative species richness and/or abundance estimates.



Table 3.3: List of Herpetofauna SCC which may occur within the study area.

NAME	CONSERVATION STATUS	HABITAT (SANBI 2004 and 2014)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Spotted Shovel-nosed Frog (<i>Hemisus guttatus</i>)	Vulnerable	Inhabits grassland and savanna biomes, breeding in seasonal pans, swampy areas, and in pools near rivers. It nests in burrows in wet soil by temporary water, while tadpoles move to water to develop. Based on the known distribution of this species it is unlikely to occur within the broad study area, however its range does overlap with a very small portion of the north-eastern part of the study area. Site investigations revealed that this portion may meet some of the habitat requirements of this species (i.e., waterbodies in grassland habitat), but this portion of land is disturbed, experiences frequent foot traffic, and falls within the end of this species' range. As such, this species is considered to have a low probability of occurrence within the study area.	Low
Striped Harlequin Snake (<i>Homoroselaps dorsalis</i>)	Near Threatened	Rare and partly fossorial species sometimes inhabiting old termite mounds within moist savanna and grassland habitats. Most of its range is at semi-high altitudes but it can be found at low elevations. The known distribution of this species overlaps with the study area, and it has been recorded in the same QDS code as the study area (ADU, 2011). Moreover, most of the study area is characterised by this species preferred habitat (i.e., mountainous grassland). As such, this species is considered to have a high probability of occurrence within the study area.	High

Mammals

The ranges of 69 native mammal species overlap with the project area. The mammal species identified as potentially occurring within the project area have been assessed against the Regional Red List (2016 and subsequent updates), and it has been determined whether the species are endemic, near endemic or not endemic, or whether they are protected in terms of the PNCO (Appendix 3).



Three of the mammal species listed in this report are classified as threatened in the Amajuba District Municipality BSP (EKZNW, 2014), while eight are classified as threatened (5 VU, 3 EN) and six NT in terms of the South African Red list of Mammals (SANBI 2016 & 2020). Table 3.6 lists the mammal SCC; a more comprehensive mammal list for the project area can be found in Appendix 3 (SCC highlighted in red).

Furthermore, 19 species are protected by PNCO (Act No. 15 1974) and 13 by NEM:BA (2007). In addition, five (5) species are Endemic and five (5) are Near Endemic (please refer to Appendix 3 for species names).

During discussions with the various landowners on site, it was established that the following mammal species occur within the wider project area:

- Oribi
- Mountain Reedbuck
- Duiker
- Steenbok
- Meerkat
- Black-backed Jackal
- Chacma Baboon
- Vervet Monkey
- Kudu
- Eland

Based on spoor and other signs observed by landowners within the study area, it was established that the following additional mammal species occur within the study area:

- Aardvark
- Cape Porcupine
- *Pronolagus sp.* (i.e., Rabbit)
- African Savannah Hare

In addition, both Oribi and Mountain Reedbuck, including an Oribi lamb, were sighted during the bird monitoring on site. During CES site investigations, a Slender Mongoose and two antelope species, namely Kudu and Springbok, were observed incidentally on site. A high density of domestic cow and dog also were observed on site, which could act as competitors and/or predators to native animals within the project area.



Table 3.6. Mammal SCC which may occur within the study area.

NAME	CONSERVATION STATUS	HABITAT (EWT 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
<p>African Clawless Otter (<i>Aonyx capensis</i>)</p>	<p>Near Threatened</p>	<p>Occurs in forest, grassland, wetland (inland), and marine coastal areas and is predominantly aquatic - seldom found far from water. Based on the proximity of the nearest watercourse, this species is deemed to have a high probability of occurrence within the study area.</p>	<p>High</p>
<p>Spotted-necked Otter (<i>Hydrictis maculicollis</i>)</p>	<p>Vulnerable</p>	<p>Inhabits freshwater habitats where water is unsilted, unpolluted, and rich in small to medium sized fishes. Suitable habitat includes large lakes and open waters. Elsewhere, it is found in streams, rivers, and impoundments up to altitudes of 2,500m. Wherever it occurs, this species prefers shallow to deep waters. Human presence negatively influences spotted-necked otter, but human presence alone cannot explain the absence of spotted-necked otters in an area, because other habitat features such as presence or absence of vegetation cover along the banks also determine the occurrence of otters. In riparian and lacustrine habitats adequate vegetation in the form of long grass, reeds, dense bushes, overhanging trees, and large boulder piles are essential to provide cover during periods of inactivity and for denning. Based on its habitat requirements (i.e., pristine habitat with dense vegetation cover along unpolluted streams and/or rivers), this species is deemed to have a low probability of occurrence within the study area.</p>	<p>Low</p>



NAME	CONSERVATION STATUS	HABITAT (EWT 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Black-footed Cat (<i>Felis nigripes</i>)	Vulnerable	Inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover. They are predominantly ground dwellers and during the day use dens in termite mounds or made by other animals. As the affected areas contain this species preferred habitat, it is deemed to have a moderate probability of occurring within the study area.	Medium
Mountain Reedbuck (<i>Redunca fulvorufula fulvorufula</i>)	Endangered	Inhabits grass-covered ridges and hillsides in broken rocky country and high-altitude grasslands often with some tree or bush cover. They are predominantly grazers and eat the greenest, softest parts of grasses such as Red Grass (<i>Themeda triandra</i>) and Thatch Grass (<i>Hyparrhenia spp.</i>). This species tends to avoid very open areas with no cover and the availability of drinking water is crucial to their presence. As such, they are often associated with the lower slopes, making use of relatively moist, cool more southerly aspects. This species has been sighted within the study area.	Confirmed
Oribi (<i>Ourebia ourebi</i>)	Endangered	Prefers open grassland in good condition containing a mosaic of both short grass for feeding and long grass for feeding and shelter. Most of the population exists on private land and can be considered wild and free roaming. This species has been sighted within the study area.	Confirmed



NAME	CONSERVATION STATUS	HABITAT (EWT 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Grey Rhebok (<i>Pelea capreolus</i>)	Near Threatened	In the eastern extent of their distribution, this species is associated with rocky hills, grassy mountain slopes, and plateau grasslands. They require good grass cover within their home ranges for shelter and to hide from predators, but often use steep open areas with little cover when feeding. As the affected areas contain this species preferred habitat, it has a moderate chance of occurring within the study area.	Medium
Black Rhinoceros (<i>Diceros bicornis</i>)	Vulnerable	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.	Not Applicable
White Rhinoceros (<i>Ceratotherium simum</i>)	Near Threatened	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.	Not Applicable
African Striped Weasel (<i>Poecilogale albinucha</i>)	Near Threatened	Mainly found in savannah and grassland habitats, although it has been recorded in a wide range of other habitats including lowland rainforest, semidesert grassland, fynbos, and pine plantations. Based on its preferred habitat (i.e., grassland) and its wide environmental tolerances, this species is deemed to have a moderate probability of occurrence within the study area.	Medium
Brown Hyaena (<i>Parahyaena brunnea</i>)	Near Threatened	Favours rocky, mountainous areas with bush cover. The study area lacks the necessary bush cover and rocky areas this species prefers. In this regard, this species is deemed to have a low probability of occurrence within the study area.	Low



NAME	CONSERVATION STATUS	HABITAT (EWT 2016)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Vlei Rat (<i>Otomys auratus</i>)	Near Threatened	Associated with mesic grasslands and wetlands within alpine, montane, and sub-montane regions, typically occurring in dense vegetation near water. This species is associated with sedges and grasses adapted to densely vegetated wetlands with wet soils. Vlei rats are exclusively herbivorous, with a diet mainly comprised of grasses. Based on its habitat requirements (i.e., dense vegetation near water), this species is deemed to have a high probability of occurrence within the study area.	High
Leopard (<i>Panthera pardus</i>)	Vulnerable	This species has a wide range of habitat tolerances but prefers densely wooded and rocky areas. This species also has a highly varied diets, ranging from arthropods to large antelope. The study area lacks the necessary dense vegetation cover and rocky areas this species prefers. In this regard, this specie is deemed to have a low probability of occurrence within the study area.	Medium
White-tailed Rat (<i>Mystromys albicaudatus</i>)	Vulnerable	Habitat requirements need further investigation, but this species is often associated with calcrete soils within grasslands. The soils within the study area are clayey. As such, this species is deemed to have a low probability of occurrence within the study area.	Low
Makwassie Musk Shrew (<i>Crocidura maquassiensis</i>)	Vulnerable	Found mostly in rocky, mountain habitats, but may tolerate a wider range of habitats as it has been found in gardens, mixed bracken, and grassland alongside a river at 1,500 m and coastal forest. Based on its preferred habitat (i.e., grassland) and its wide environmental tolerances, this species is deemed to have a moderate probability of occurrence within the study area.	Medium



3.3 DETAILS ON THE RECEIVING ENVIRONMENT

3.3.1 Flora & Fauna

Flora

While National level vegetation maps have described broad vegetation types, local environmental conditions (e.g., rainfall, topography, temperature) can result in variations in plant species composition. As such, site surveys are critical for the verification of desktop findings and establishing the baseline ecological conditions of a site.

In line with the KZN Vegetation Map (2009), the site surveys confirmed the presence of KwaZulu-Natal Highland Thornveld (LC) and Low Escarpment Moist Grassland (LC), as well as the presence of wetland areas. However, at a finer scale, site surveys also revealed the presence of indigenous forest patches, most likely fragments of Eastern Mistbelt Forest (EN), within the Low Escarpment Moist Grassland vegetation type.

In terms of plant species, 168 species from 57 families were recorded within the entire Newcastle WEF Complex, all of which are classified as Least Concern. However, large stands of Black Wattle were also observed, as well as additional alien plant species such as *Gomphrena* spp., *Erigeron canadensis*, *Hypochoeris radicata*, *Oenothera* spp., *Plantago tomentosa*, *Paspalum* spp., *Richardia brasiliensis*, amongst others.

A brief description of the condition and plant species composition of each vegetation type within the MNWP area is provided below. This is supplemented by observations and findings from the site surveys.



Plate 3.1: KwaZulu-Natal Highland Thornveld within Mulilo Newcastle WEF.

KwaZulu-Natal Highland Thornveld (Plate 3.1) occurs within the flatter, low lying areas of the site at altitudes of approximately 1200 – 1300 m. Analysis of the SOTER SAF Soil Map



and Geology Map indicates that this vegetation type is associated with Rhodic Nitisols and Karoo Supergroup Rocks, respectively.

Characteristic plant species observed within KwaZulu-Natal Highland Thornveld include *Hyparrhenia hirta*, *Themeda triandra*, *Cymbopogon pospischilii*, *Eragrostis racemosa*, *Melinis repens*, *Paspalum dilatatum*, *Sporobolus africanus*, *Diheteropogon amplexans*, *Rhynchosia caribaea*, with scattered woody species such as *Diospyros lycioides*, *Searsia dentata*, *Gomphocarpus fruticosus*, *Euclea crispa*, and *Syzygium cordatum*. Common herbs observed include *Gladiolus crassifolius*, *G. ecklonii*, *Pellaea calomelanos*, *Stachys aethiopica*, *Helichrysum spp.*, *Ledebouria ovatifolia*, *Striga elegans*, *Cynium tubulosum*, and *Bonatea speciosa*, amongst others.

However, large Black Wattle stands, fallow lands, as well as line infrastructure such as gravel roads and/or cattle paths, were also present within this vegetation type. Considering these different land uses, approximately 510 out of 660 ha of this vegetation remains in a natural condition within the boundary of the MNWP.



Plate 3.2: Low Escarpment Moist Grassland within Mulilo Newcastle WEF.

Low Escarpment Moist Grassland (Plate 3.2) covers most of the project area. Analysis of the SOTER SAF Soil Map and Geology Map indicates that this vegetation type is associated with Lithic Leptosols underlain by rocks of the Karoo Supergroup.

This vegetation is dominated by *Themeda triandra*, *Hyparrhenia hirta*, *Trachypogon spicatus*, *Panicum ecklonii*, *Eragrostis curvula*, *E. chloromelas*, *Aristida congesta*, *A. junciformis*, *Digitaria monodactyla*, *Tristachya leucothrix*, *Helictotrichon turgidulum*, *Koeleria capensis*, amongst others. Scattered woody species such as *Searsia dentata*, *S. discolor*, *S. chirindensis*, *S. tomentosa*, *S. pyroides*, *Cussonia paniculate*, *C. spicata*, *Leucosidea sericea*, *Osteospermum moniliferum*, *Buddleja salviifolia* and *Seriphium plumosum* were recorded and common herbs observed include *Brunsvigia radulosa*, *Agapanthus sp.*, *Kniphofia sp.*, *Hilliardiella aristata*, *Gerbera piloselloides*, *Haplocarpha scaposa*, *Helichrysum spp.*, *Senecio madagascariensis*, and *Wahlenbergia undulata*, amongst others. *Drosera collinsiae* was



observed within damp areas on the mountain plateau. This species is an indicator of good water quality.

Patches of indigenous forest were observed and mapped within the Low Escarpment Moist Grassland, mainly within riverine areas. These patches have been delineated as no-go areas, with a 50 m buffer in place, and therefore the project layout will avoid these areas. Typical species recorded here include *Gymnosporia buxifolia*, *Diospyros lycioides*, *D. whyteana*, *Searsia pyroides*, *Myrsine africana*, *Celtis africana*, *Morella serrata*, *Podocarpus latifolius*, *Leucosidea sericea*, *Cussonia paniculata*, *Buddleja salviifolia*, *Plectranthus fruticosus*, *Scadoxus puniceus*, *Senecio deltoideus*, *Schizocarphus nervosus*, *Stephania abyssinica*, *Cheilanthes viridis*, amongst others.

However, large Black Wattle stands infest these areas. Other disturbances to grassland/forests within the project area include gravel roads, cattle paths, cultivated land (past), and fallow land which intersperse the landscape. Considering these current and past disturbances, approximately 1790 out of 2250 ha of this vegetation remains intact or semi-intact within the project area.

Fauna

All animal species identified in this report could potentially occur within the project area, including *H. guttatus* (VU). The range of this species extends into a small portion of the site and site investigations revealed that this portion of land may meet some of the habitat requirements of this species (i.e., wetlands in grassland habitat), but it falls within the end of this species' range and does not intersect with the current development footprint. As such, this species is unlikely to be encountered during the construction phase. Nevertheless, all wetlands identified by NFEPA (2011) and KZN Veg Map (2009) have had a 500 m buffer put in place upstream of the wetland, which should protect the habitat amphibian SCC from indirect impacts of the construction of the WEF.

No fauna SCC were observed during site investigations. However, plenty of Common River Frog (*Amietia delalandii*), which is considered Least Concern, were observed in temporary water bodies in the project area. Moreover, five snake species, namely Peter's Thread Snake (*Leptotyphlops scutifrons*), Puff Adder (*Bitis arietans*), Dusky-bellied Water Snake (*Lycodonomorphus laevisissimus*), Mole Snake (*Pseudaspis cana*), and Bibron's Blind Snake (*Afrotyphlops bibronii*), were observed in the project area. Two mammal SCC are stocked within the project area, namely Mountain Reedbuck (*Redunca fulvorufula fulvorufula*) and Oribi (*Ourebia ourebi*), which are both listed as Endangered. Other species observed within the broader project area, mostly by landowners, include Duiker, Steenbok, Meerkat, Slender Mongoose, Black-backed Jackal, Chacma Baboon, Vervet Monkey, Kudu, and Eland. Based on spoor and other signs, Aardvark, Cape Porcupine, Rabbit (*Pronolagus sp.*), and African Savannah Hare, are also present in the project area.

3.3.2 Current Land Use

Based on the site surveys undertaken, most of the areas delineated as forest or woodland, as well as wetlands, in the National Land Cover Map (2020) were covered by plantations of *Acacia mearnsii* (Black Wattle), which occur along the drainage lines of rivers. Analysis of historical imagery indicates that the Black Wattle was planted on site sometime after 1954.



However, these stands of Black Wattle have increased in size over the years. Currently, the extent of Black Wattle within the project area is estimated to be 511 ha. Landsat imagery also identified the presence of fallow lands (~13 ha), bare ground (~0,04), rural settlements (~0,1 ha), cultivated lands (~4 ha), and an artificial dam (~0,35 ha) within mapped grassland areas. Existing roads and/or paths were digitized as far as possible using satellite imagery and these were estimated to be approximately 16 ha in extent. Based on calculations of the above, the extent of modification of natural grassland is estimated to be around 544 ha. However, this may be higher as other features of habitat alteration within the area also include existing infrastructure such as fence lines and powerlines. Furthermore, naturally vegetated areas may experience ongoing disturbance in the form of livestock grazing, with some minor visible soil erosion, i.e., the formation of cattle paths. Please see Figure 3.9 below for the current land uses expected within the MNWP, which was supplemented with data from the National Land Cover Map (2020) and Google Earth Imagery (2022).

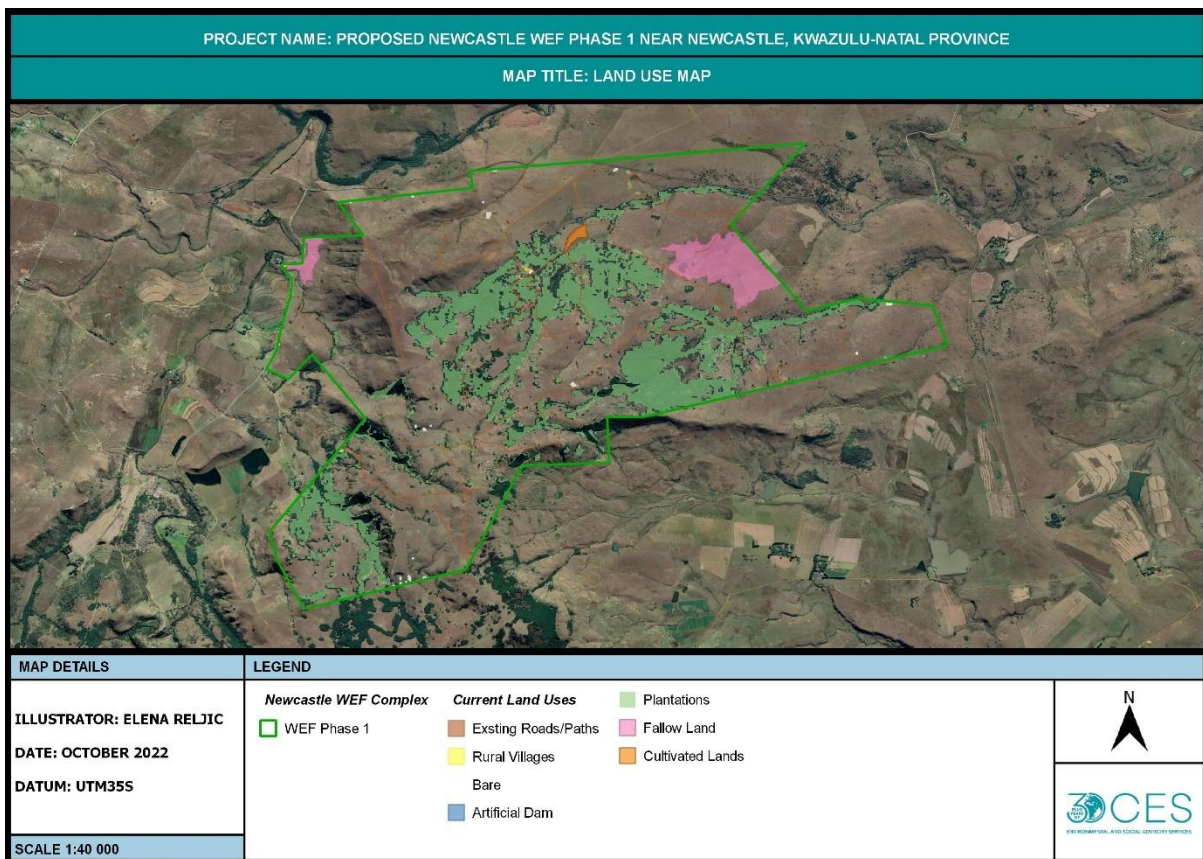


Figure 3.9: Land Use Map of Mulilo Newcastle WEF.



4 BIODIVERSITY AND ENVIRONMENTAL PLANNING AND POLICIES

The DFFE screening tool identified several biodiversity conservation planning tools that classify the area as sensitive. The plans, which are discussed in detail below, include:

1. Critical Biodiversity and Ecological Support Areas mapped in the KZN Biodiversity Sector Plan
2. Threatened Ecosystems
3. Strategic Water Source Area
4. Protected Area Expansion Strategy (2011)

4.1 KZN BIODIVERSITY SECTOR PLAN: CRITICAL BIODIVERSITY AND ECOLOGICAL SUPPORT AREAS

The Conservation Terms for the EKZNW Spatial Planning Products Document (2016) provides a map of important biodiversity areas within the KwaZulu-Natal Province, to guide sustainable development as well as focus conservation efforts within the province.

The aim of the Document is to provide stakeholders with a simplified guide to Systematic Conservation Assessment (SCA) and the development of the KwaZulu-Natal Biodiversity Plan (KZN BP). The KZN BP consists of two primary spatial layers, namely Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), but also includes the legislated Protected Areas, modified areas, and Natural Biodiversity Areas.

Critical Biodiversity Areas (CBAs) are defined as natural or near-natural features, habitats or landscapes that include terrestrial, aquatic, and marine areas that are considered critical for the following reasons:

- (i) Meeting national and provincial biodiversity targets and thresholds;
- (ii) Safeguarding areas required to ensure the persistence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
- (iii) Conserving important locations for biodiversity features or rare species. Conservation of these areas is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met.

The KZN BP CBAs are divided into two subcategories, namely Irreplaceable and Optimal CBAs. Irreplaceable CBAs are areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems. Optimal CBAs are areas that represent an optimised solution to meet the set biodiversity conservation targets while avoiding areas of conflict where the risk of biodiversity loss is high. This category is driven primarily by process but is also informed by expert input.



Unlike CBAs, ESAs may not be entirely natural but are still required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within and between CBAs. As illustrated in Figure 4.1 and Table 4.1, MNWP properties are mapped as CBA irreplaceable, CBA optimal and ESAs. It should be noted that none of the development components fall within a Landscape Corridor (EKZNW Landscape Corridors, 2016) or an ESA for Species (EKZNW ESA for Species, 2016).

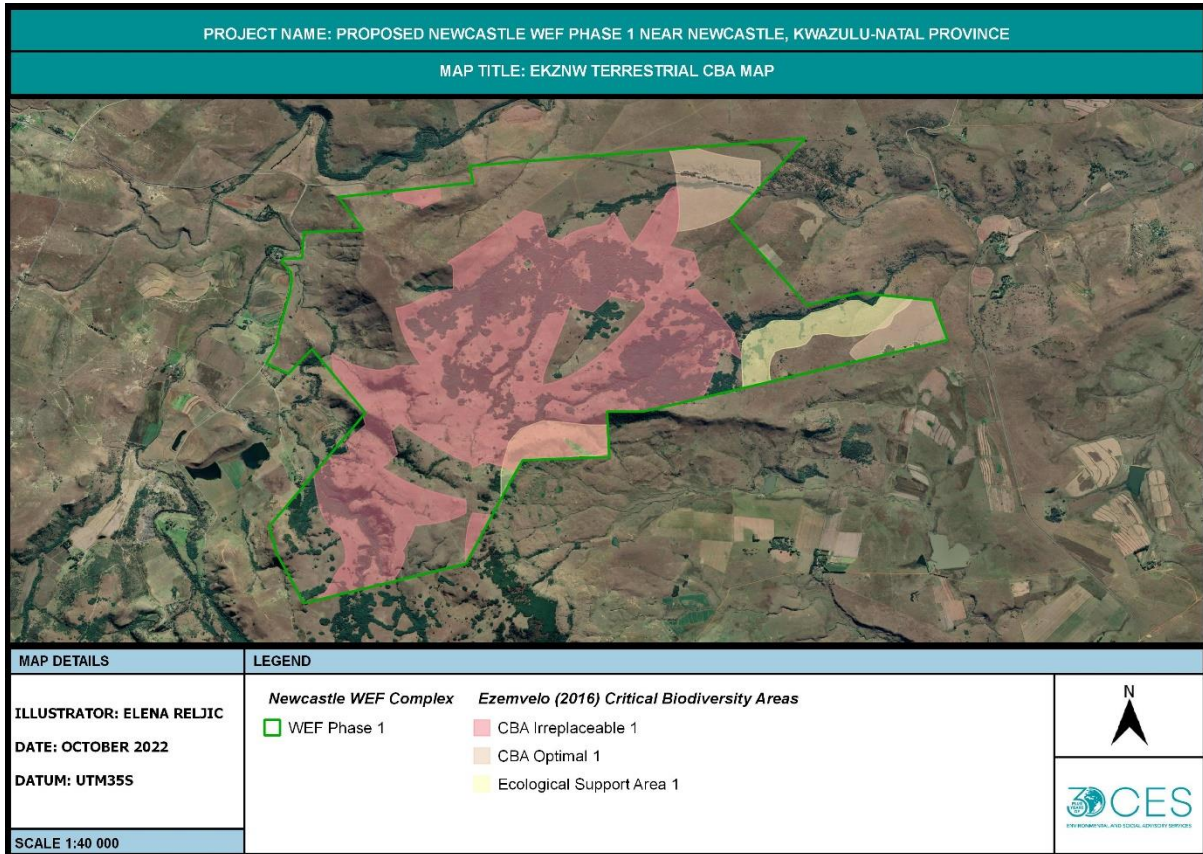


Figure 4.1: EKZNW (2016) Terrestrial CBAs within Mulilo Newcastle WEF.



Table 4.1: Terrestrial Biodiversity Priority areas affected by Mulilo Newcastle WEF.

Relevant Component of the proposed development	Category	Sensitivity Features	Desired Management Objective	Recommendation
Draft KNZ BP CBAs/ESAs (2016)				
MNWP	CBA: Irreplaceable	Areas which are required to meet biodiversity conservation targets, and where there are no alternative sites available.	Maintain in a natural state with limited to no biodiversity loss.	Approximately 69 % of CBA Irreplaceable (927 out of 1351 ha) has been degraded within MNWP because of alien invasive plantations, fallow land, etc. Development must avoid remaining areas classified as CBA: Irreplaceable and incorporate existing access roads as far as possible.
MNWP	CBA: Optimal	Areas that are the most optimal solution to meet the required biodiversity conservation targets while avoiding high-cost areas as much as possible.	Maintain in a natural state with limited to no biodiversity loss.	Less than 1 ha of CBA Optimal has been altered by human activities. Where feasible, development must avoid these areas.



Relevant Component of the proposed development	Category	Sensitivity Features	Desired Management Objective	Recommendation
MNWP	Terrestrial Ecological Support Areas (ESAs)	Functional but not necessarily entirely natural terrestrial land that is largely required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the Critical Biodiversity Areas. The area also contributes significantly to the maintenance of Ecological Infrastructure (EI).	Maintain ecosystem functionality and connectivity allowing for some loss of biodiversity.	Implement mitigation measures listed in the Terrestrial Biodiversity Impact Assessment Report and Environmental Management Programmes (EMPrs) for MNWP. Limit the development footprint to that which is strictly necessary for construction to ensure that ecological processes such as dispersal are maintained.



To interpret the Biodiversity Sector Plan (BSP), an understanding of the biodiversity features driving the CBA classification is required. In addition, it is important to confirm the presence of the biodiversity feature and the condition of the site (suitability of supporting the biodiversity feature).

This study used the biodiversity data supplied in accessible databases and the DFFE screening tool to:

- a) Ascertain which biodiversity features contributed towards the selection of a site as a CBA; and
- b) How the proposed development may impact on these features; and
- c) Through specialist input, determine the significance of the impact may be avoided.

From the screening report, a number of threatened bird species are present in the project area, resulting in a HIGH sensitivity report for the Faunal theme. It is probable that these biodiversity features were key drivers for CBA selection in the project area. Table 4.2 outlines the important biodiversity features in the project area, the type of impact that could be expected from the propose WEF and the significant of the impact on their persistence in the area.

Table 4.2 Biodiversity in the CBA, how it will be affected and significance of impact.

Taxonomic group/Species	Type of impact	Significance of impact
<p><u>Avifauna</u> Seven (7) threatened bird species occurring in the area were listed in the DFFE screening report as HIGH sensitivity. This suggests that birds were possibly the key biodiversity features driving the CBA classification.</p>	<p>Collision mortality Displacement</p>	<p>According to the Avifaunal Impact Assessment, the impact on avifauna will be low and can be mitigated. The activity will therefore not significantly impact on the biodiversity features driving the CBA classification and therefore should not compromise the objective of the CBA.</p>
<p><u>Amphibians/Mammals/ Reptiles/Invertebrates</u> Approximately 11 threatened faunal species (See Section 3.2.5) may occur in the project area.</p>	<p>Mortality Habitat loss Ecosystem fragmentation</p>	<p>The Biodiversity Impact Assessment (this report) has determined that the direct loss of habitat (post rehabilitation) is approximately 85ha. In the context of the threatened plant and animal species supported by the ecosystems (least threatened) and habitats over the large project area, the impact is relatively low and should not compromise the objective of the CBA. Impacts can be mitigated.</p>
<p><u>Plant species</u> Approximately 10 threatened plant species (See Section 3.2.3) may occur in the project area.</p>	<p>Clearing Ecosystem fragmentation</p>	



The condition of the site and its ability to support threatened biodiversity features within the project area was also considered. In terms of the Technical Guidelines for CBA maps (SANBI, 2017) a CBA must be in a natural or near-natural state. Areas that are not natural should not be classified as CBAs. Although the Biodiversity Sector Planning process uses best available data, it is not possible to map large areas to project level accuracy and it is not uncommon to detect mapping discrepancies. Where increased mapping and biodiversity information is available, it needs to be used to reassess the CBA map and interpret the appropriate recommended land-use guidelines.

Within the MNWP project area, approximately 69 % of CBA Irreplaceable (927 out of 1351 ha) has been degraded within the MNWP project area due to the presence of alien invasive plantations, fallow lands, cultivated land, rural villages, and existing roads and/or cattle paths. Conversely, less than 1 ha of CBA Optimal has been altered (Figure 4.6). As such, these areas should not be classified as CBAs and the associated land-use guidelines should not apply. A default position is that these areas should be considered as ESAs and treated as areas that still support ecological process.



Figure 4.2: Remaining CBAs within Mulilo Newcastle WEF.

The remainder of the natural areas mapped as CBAs are valid. Most of the turbines in the MNWP (18 out of 45 turbines) are located in these areas and a concerted effort should and can be made to move the turbines into adjacent and degraded areas (previously cultivated or covered by Black Wattle).



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 (2011), MNWP does not affect a threatened ecosystem.

SANBI (2021) recently updated the Red List of South Africa's Terrestrial Threatened Ecosystems (RLEs), and KwaZulu-Natal Highland Thornveld, Low Escarpment Moist Grassland and Southern Mistbelt Forest are classified as Least Concern in this assessment (**Error! Reference source not found.**).

However, Southern Mistbelt Forest, which is classified as Eastern Mistbelt Forest in the KZN Province, is considered Endangered in terms of the Amajuba District Municipality: BSP (2014). This vegetation type has a conservation target of 66.5%, but it has been only moderately protected (14%) and 32% has been modified (Ezemvelo KZN Wildlife, 2011).

Additional ecosystem types delineated by the Amajuba District Municipality: BSP (2014), that are not listed in the SA Veg Map (SANBI 2018), are also classified as Vulnerable, namely Freshwater Wetlands: Eastern Temperate Wetlands and Alluvial Wetlands: Temperate Alluvial Vegetation (Ezemvelo KZN Wildlife, 2014). Both ecosystem types have a conservation target of 24% but are hardly conserved or protected – 0.4% and 3.4% respectively, and a large percentage have been anthropogenically altered – 41.2% and 56.5%, respectively (Ezemvelo KZN Wildlife, 2011).

Assessing the MNWP against South Africa's Terrestrial Red List of Ecosystems (RLE) and the KZN Veg Map (2009), KwaZulu-Natal Highland Thornveld (LC), Low Escarpment Moist Grassland (LC), Freshwater Wetlands: Eastern Temperate Wetlands (VU) and Alluvial Wetlands: Temperate Alluvial Vegetation (VU) are expected to occur in MNWP (Figure 4.2). Although not delineated in the KZN Veg Map (2009), indigenous forest patches, likely to be remnants of Eastern Mistbelt Forest (EN), were observed in the project area during the site investigations. Therefore, based on provincial threat status of ecosystems, Mulilo Newcastle WEF is considered associated with three threatened ecosystems.

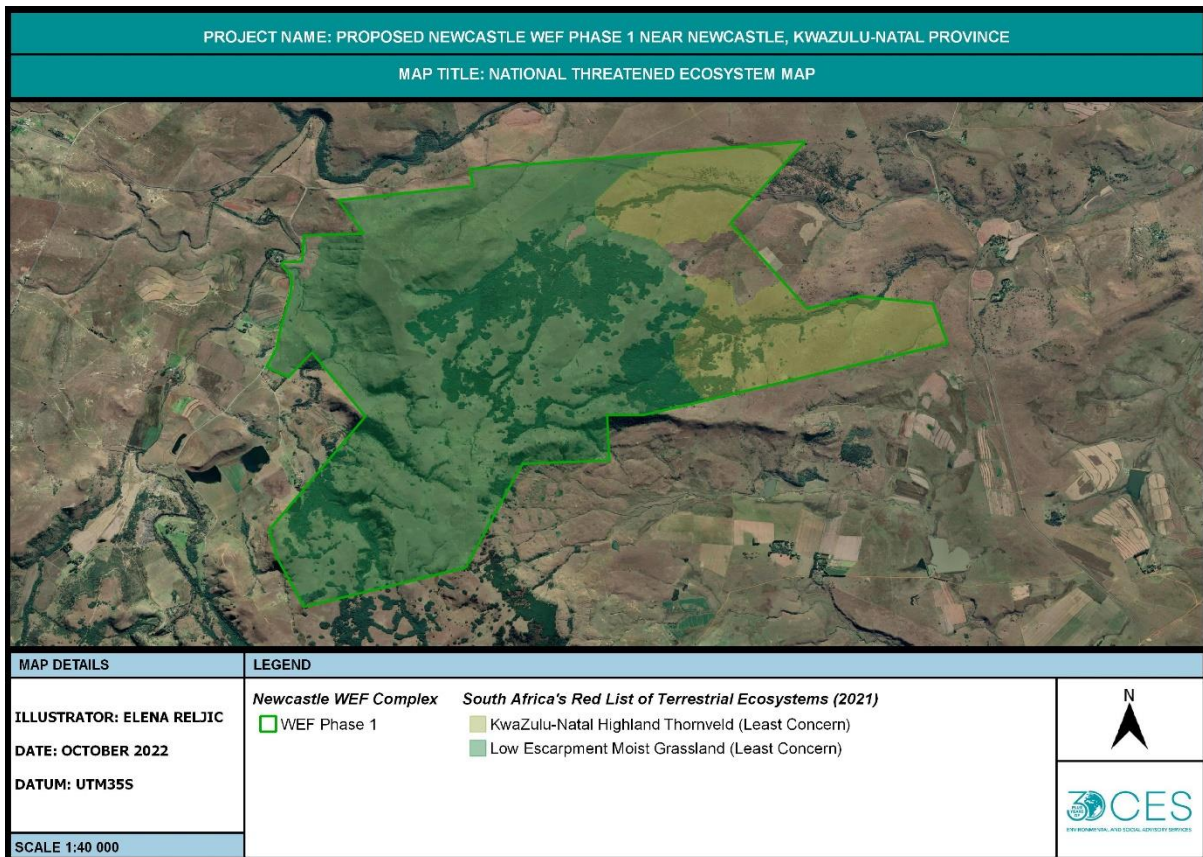


Figure 4.3: Remaining extent of National Threatened Ecosystems of Mulilo Newcastle WEF.

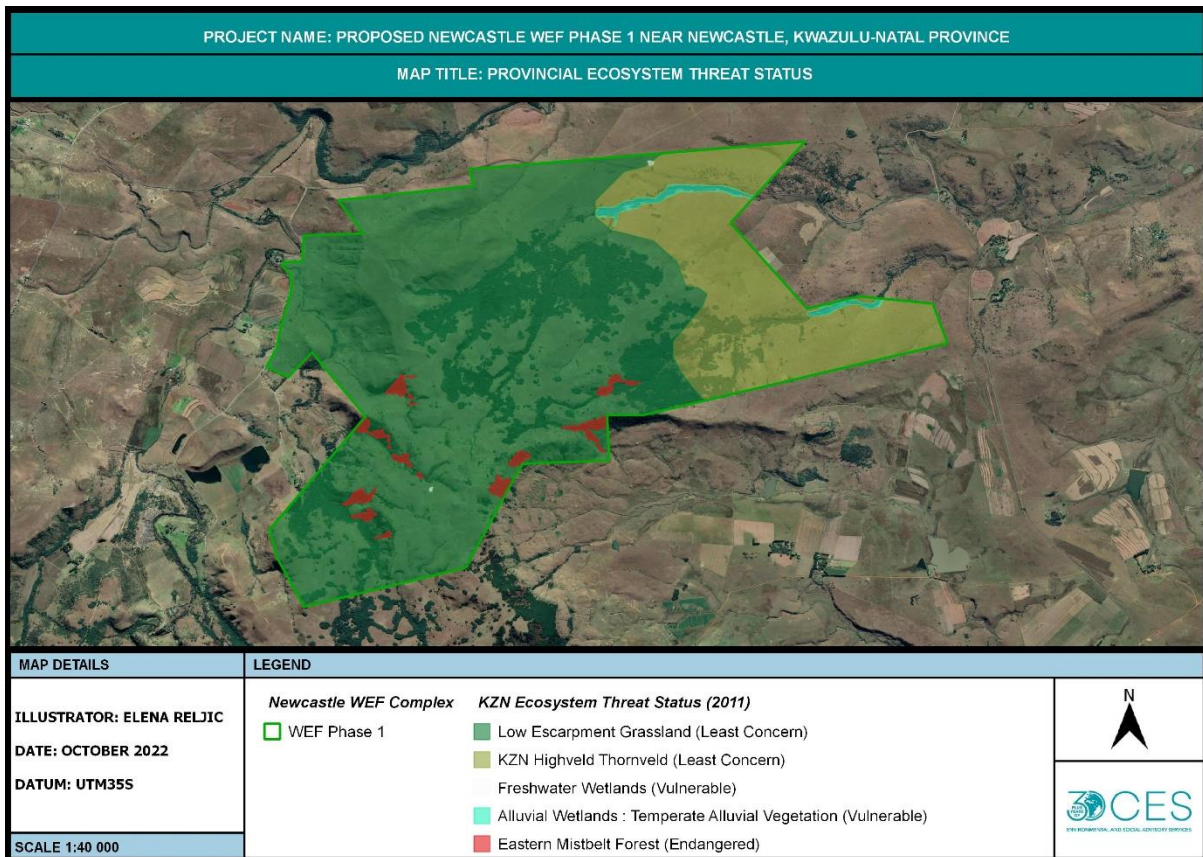


Figure 4.4: Provincial Threatened Ecosystem Map of Mulilo Newcastle WEF.

4.3 STRATEGIC WATER SOURCE AREAS & FRESHWATER ECOSYSTEM PRIORITY AREAS

The WWF and CSIR (2017) identified twenty-one (21) Strategic WSAs for surface water (SWSA-sw) which covered 8% of South Africa and supplied 50% of the mean annual runoff, expanding on the work of the National Freshwater Priority Areas (NFPEPA 2011), which identified high-water yield area and high groundwater recharge areas.

Strategic Water Source Areas (SWSAs) are defined as areas of land that either: (a) supply a disproportionate quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b). SWSAs are in high rainfall areas and contribute to sustained river flows, which are important for supporting people and communities who depend directly on rivers for their water, especially during the dry season and droughts. However, only 11% of SWSAs receive formal protection.

MNWP does not fall within a nationally important SWSAs but is located directly north of a SWSA (Figure 4.5). The substation and laydown areas which are in the southerly part of the MNWP could thus be significant sources of downstream water quality issues.



Additionally, FEPA (2011) wetlands and rivers are present in MNWP. The wetlands have been altered by human activities such as forestry and only represent a small portion (approximately 12 ha) of ecosystems present within the boundary of MNWP.

Wetlands are important Grassland Ecosystem Service Providers. Some of the services provided by these wetlands include provision of clean water and food for animals and people; retention of sediment and nutrients; provision of aquatic faunal habitat and thus the continuation of faunal populations, including amphibians, snakes, and waterbirds; and moderation of local climates. These wetlands are also an important source of grazing for agricultural livestock over dry periods (note: this can be unsustainable depending on the grazing regimes applied in the area). Freshwater wetlands are vitally important in preserving regional biodiversity and provide habitat for several Red Listed plants, including Sensitive species 998, Sensitive species 1086, *Nerine platypetala*, and Sensitive species 851 (refer to Table 3.2 in Section 3.2.3). As such, all wetlands identified by the provincial ecosystem map have had a 500 m buffer put in place.

An impact assessment addressing the hydrological features associated with the site has been undertaken and is not assessed in this report in great detail.

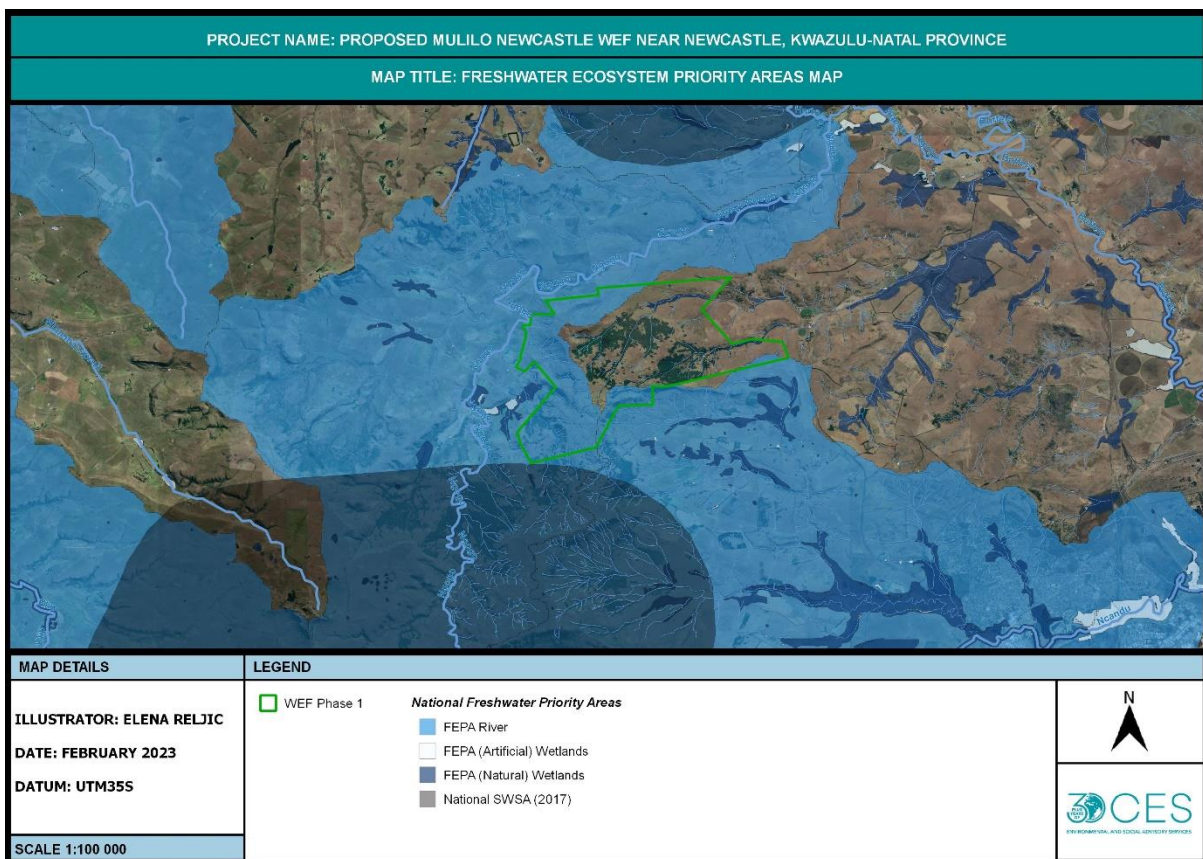


Figure 4.5: Freshwater Ecosystem Priority Areas Map of Mulilo Newcastle WEF.

4.4 PROTECTED AREAS AND PROTECTED AREA EXPANSION STRATEGY AREAS



The National Protected Areas Expansion Strategy (NPAES, 2010) 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 ecosystem functions. The NPAES sets targets for expanding South Africa’s protected area network, placing emphasis on those ecosystems that are least protected. MNWP is located within the Moist Escarpment Grasslands NPAES Focus Area (2010).

The MNWP does not occur within 10 km of any protected or conservation area (Figure 4.4 (South African Protected/Conservation Areas Database (SAPAD and SACAD) 2022, Q3).

Additionally, the MNWP occurs within 1 km of an Important Bird Area (IBA, 2015) (Figure 4.4).

According to provincially designated conservation areas, the proposed WEF is situated within 5 km of the KZN Berg [Landscape] Corridor (Figure 4.5).

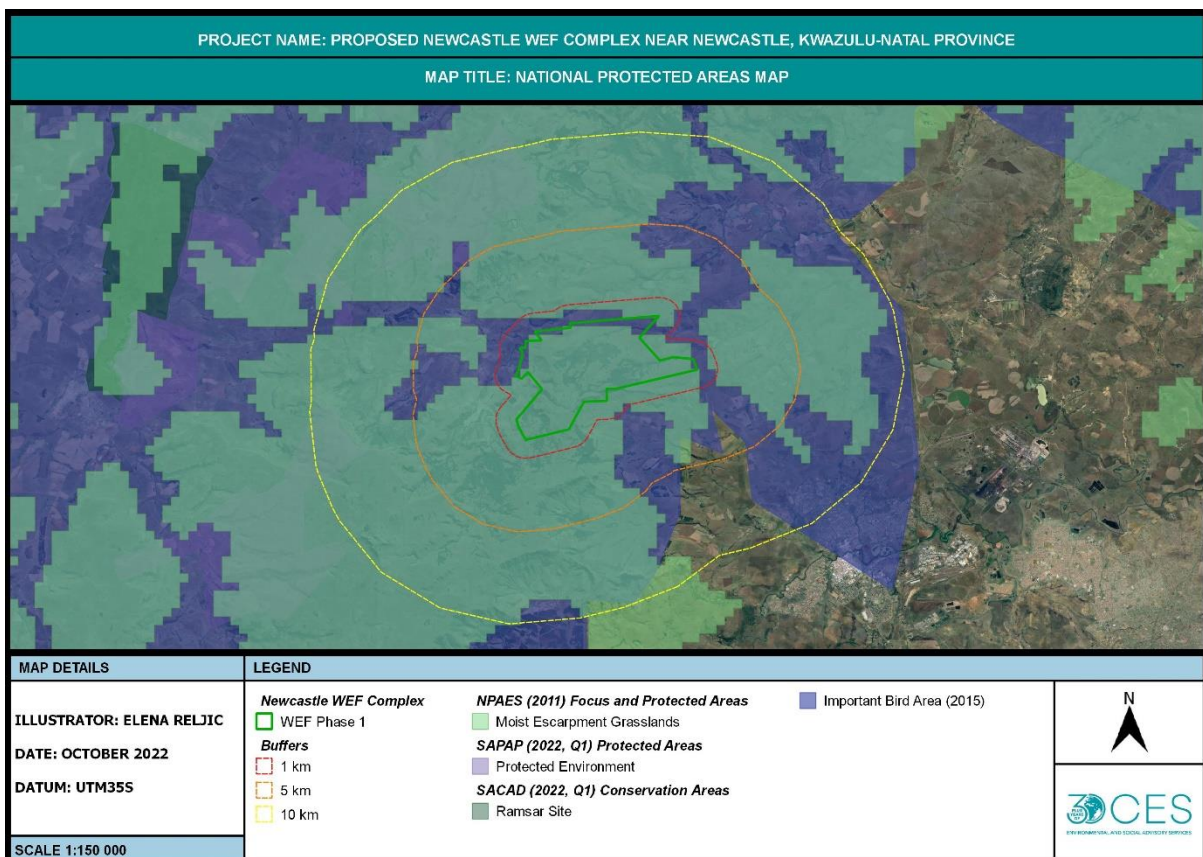


Figure 4.6: National Protected and Conservation Areas surrounding Mulilo Newcastle WEF.

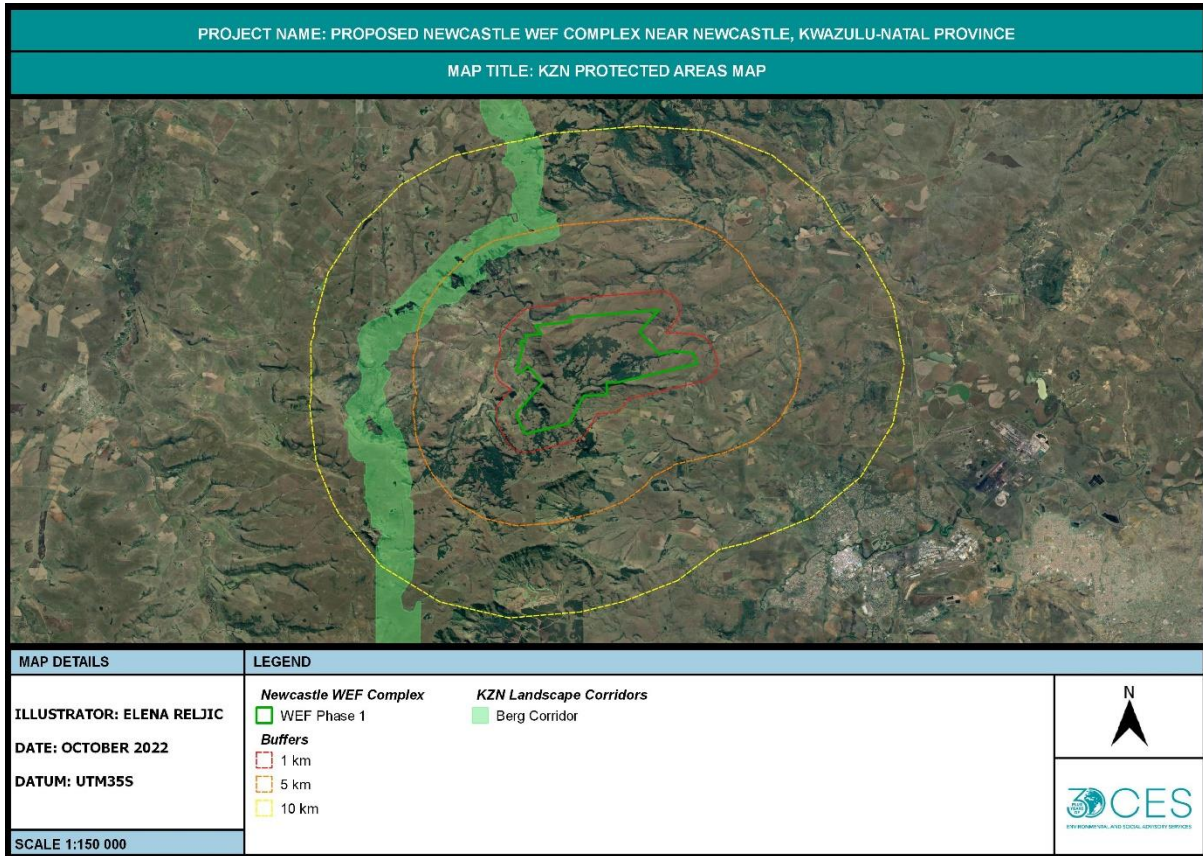


Figure 4.7: Provincial Conservation Areas surrounding Mulilo Newcastle WEF.

4.5 DISCUSSION

When assessing a proposed development in the context of the various planning tools, such as the Biodiversity Sector Plan (CBA map), it is necessary to reflect on two aspects that inform how the planning tool needs to be applied. The first is the consideration of the biodiversity/ecosystem/habitat feature(s) that are driving the classification and how the proposed project may impact on these features, and the second consideration is the actual condition of the site.

The proposed Mulilo Newcastle WEF development in its current layout is assessed against the various biodiversity/environmental planning tools as follows:



Biodiversity/Environmental Plan	Mapping classification	Aligned/Compliant	Can impact be avoided by implementing management/mitigation measures
KZN Biodiversity Sector Plans	CBA Irreplaceable areas in natural condition	No. The biodiversity features represented by all the threatened species occurring in the project area, for which the CBA map was developed to protect, have been assessed. Although the impact on these features has been deemed to be low. The integrity of the CBA and its purpose are therefore not being impacted and the project may therefore be deemed to not be in conflict with the conservation objectives.	It is recommended that turbines and WEF infrastructure are relocated outside of CBA irreplaceable areas that are in a natural condition. Currently 18 out of the 45 proposed turbines are located within natural CBA. The impact on loss of CBA will be reduced by moving turbines to non-CBA sites. In addition, the feasibility of moving the IPP substation and O&M building complex needs to be considered to avoid the CBA.
	CBA Irreplaceable areas in degraded condition	Yes. These areas are technically not contributing towards the conservation of biodiversity features.	It is recommended that where possible, turbines and WEF infrastructure is constructed in these areas. In addition, removal of alien invasive tree species within the affected properties would be



			considered a significant gain for the ecosystem.
Threatened Ecosystems	Vulnerable Ecosystems	Yes, all wetland systems areas have been avoided and a 500 m buffer applied.	Not applicable, impact has been avoided.
	Endangered Ecosystems	Yes, all forest areas have been avoided and a 50 m buffer applied.	
Strategic Water Source Areas	Surface Strategic Water Source Area	Yes. No turbines or WEF infrastructure is placed within the SWSA, although it is located downstream from a SWSA and may impact the stream condition which delivers water to important water use centres downstream. The impact of the proposed development is somewhat mitigated by the small footprints of the turbines, which are spread out over a large area, however the substation and laydown areas could be significant sources of downstream water quality issues.	The removal of alien invasive tree species within the affected properties would be considered a significant gain for the SWSA and could offset residual impacts of the development.
Protected Area Expansion Strategy	Moist Escarpment Grasslands NPAES Focus Area	No. The tool has identified this area as desirable for long-term conservation.	There is no mitigation suggested.



5 SITE SENSITIVITY

The Species Environmental Assessment Guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of MNWP of the project area. The habitats and the SCC in MNWP were assessed based on their conservation importance, functional integrity, and receptor resilience (**Error! Reference source not found.**). 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 5.1: Criteria for establishing Site Ecological importance and description of criteria.

Criteria	Description
Conservation Importance (CI)	<i>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.</i>
Functional Integrity (FI)	<i>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.</i>
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	<i>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.</i>
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	



provides a summary of how each vegetation type was assessed.



Table 5.2: Evaluation of Site Ecological Importance (SEI) of habitat and SCC.

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
KwaZulu-Natal Highland Thornveld	Medium	Low	Low	Low	MEDIUM
	<p>According to the KZN vegetation map, the historical extent of this vegetation type within MNWP is approximately 510 ha. However, based on satellite imagery and the NLC map, as well as from observations during the site surveys, approximately 150 ha of this vegetation type has been altered within MNWP due to the presence of <i>A. mearnsii</i> (Black Wattle) stands and other land uses</p>	<p>Approximately 150 out of 510 ha of this vegetation type has been altered within MNWP. This is mostly due to the establishment of <i>A. mearnsii</i> populations, as well as other land uses such as gravel roads, villages, a dam, and fallow lands. These areas have little to no rehabilitation potential. As such, the FI for this site is rated low.</p>		<p>This vegetation type occurs on rich, moist, well-drained soil, i.e., mesic. Mesic grasslands in South Africa comprise simple, short-statured, single-layered herbaceous communities of tussock perennial grasses and long-lived perennial forbs with large below-ground storage reserves (Carbutt & Kirkman 2022). Revegetating after disturbance is generally easy with grasses. Perennial grasses are better to use because they are denser, offer greater coverage, and are longer lived than annuals (Carbutt & Kirkman 2022). However, restoring vegetation types such as this via seeding would be difficult as South Africa's mesic tufted grasses (e.g., <i>T. triandra</i>) are not easily propagated from seed (Carbutt & Kirkman 2022). Revegetating with grass plugs may help with propagation of mesic grasses, but this method is management intensive and relatively expensive. A more appropriate method of revegetating post-development would be to use grass sods as they provide a quicker form of cover if sufficient volumes of material are used. However, this method can be labour intensive in the beginning. Long ignored in the restoration of South Africa's mesic grasslands, is the use of forbs, which constitute over 80% of the species richness in mesic grasslands (Carbutt & Kirkman 2022). This generally results in restored mesic grasslands falling short of previous biodiversity levels. Moreover, bush encroachment (i.e., Black Wattle stands) disturb the soil environment, which can hinder grassland restoration efforts. In this context, KwaZulu-Natal Highland Thornveld is expected to recovery slowly (>15 years) without active management and is unlikely to fully recover its</p>	



Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	(See Section 3.3.2). However, >50% of this receptor still contains natural habitat with potential to support SCC. As such, the CI for this site is rated medium.			native biodiversity. As such, the receptor resilience for this vegetation type is considered low.	
Low Escarpment Moist Grassland	Medium	Low	Low	Low	MEDIUM
	According to the KZN vegetation map, the historical extent of this vegetation type within MNWP is approximately 1790 ha. However, based on satellite imagery and the NLC map, as well as from	Approximately 460 out of 1790 ha of this vegetation type has been altered within MNWP. This is mostly due to the establishment of <i>A. mearnsii</i> populations, as well as other land uses such as gravel roads, villages, a dam, and fallow lands. These areas have little to no rehabilitation		This vegetation type occurs on rich, moist, well-drained soil, i.e., mesic. Mesic grasslands in South Africa comprise simple, short-statured, single-layered herbaceous communities of tussock perennial grasses and long-lived perennial forbs with large below-ground storage reserves (Carbutt 2022). Revegetating after disturbance is generally easy with grasses. Perennial grasses are better to use because they are denser, offer greater coverage, and are longer lived than annuals (Carbutt 2022). However, restoring vegetation types such as this via seeding would be difficult as South Africa's mesic tufted grasses (e.g., <i>T. triandra</i>) are not easily propagated from seed (Carbutt 2022). Revegetating with grass plugs may help with prorogation of mesic grasses, but this method is management intensive and relatively expensive. A more appropriate method of revegetating post-development would be to use grass sods as they provide a	



Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	<p>observations during the site surveys, approximately 460 ha of this vegetation type has been altered within MNWP due to the presence of <i>A. mearnsii</i> (Black Wattle) stands and other land uses (See Section 3.3.2). However, >50% of this receptor still contains natural habitat with potential to support SCC. As such, the CI for this site is rated medium.</p>	<p>potential. As such, the FI for this site is rated low.</p>		<p>quicker form of coverage if sufficient volumes of material are used. However, this method can be labour intensive in the beginning. Long ignored in the restoration of South Africa's mesic grasslands, is the use of forbs, which constitute over 80% of the species richness in mesic grasslands (Carbutt 2022). This generally results in restored grasslands falling short of previous biodiversity levels because they lack forbs. Moreover, bush encroachment (i.e., Black Wattle stands) disturbs the soil environment, which can hinder grassland restoration efforts. In this context, Low Escarpment Moist Grassland is expected to recovery slowly (>15 years) without active management and is unlikely to fully recover its native biodiversity. As such, the receptor resilience for this vegetation type is considered low.</p>	
	N/A	N/A	N/A	N/A	N/A



Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Freshwater Wetlands: Eastern Temperate Wetlands	N/A	N/A		The SEI assessment of aquatic environments in MNWP falls outside of the scope of the Terrestrial Biodiversity Assessment for the proposed project. A separate Aquatic Biodiversity Impact Assessment has been conducted for the proposed project and thus only the SEI associated with the terrestrial environment have been assessed in this report.	
Alluvial Wetlands: Temperate Alluvial Vegetation	N/A	N/A	N/A	N/A	N/A
	N/A	N/A		The SEI assessment of aquatic environments in MNWP falls outside of the scope of the Terrestrial Biodiversity Assessment for the proposed project. A separate Aquatic Biodiversity Impact Assessment has been conducted for the proposed project and thus only the SEI associated with the terrestrial environment have been assessed in this report.	
Eastern Mistbelt Forest	High	Low	Medium	Low	HIGH
	Small area (>0.01% but <0.1% of the total ecosystem extent) of natural habitat of EN ecosystem type.	Small (approximately 4 ha) area. As such the FI for this site is rated low.		In the primary stage of succession Eastern Mistbelt Forest, i.e., Southern Mistbelt Forest in the Grassland Biome, is dominated by yellowwood species, while the understorey comprises small flowering plants and ferns. These forest patches show a mix of coarse-grained, canopy gap/disturbance-driven dynamics and fine-grained, regeneration characteristics (Mucina & Geldenhuys 2006). Seeding pioneer tree species such as <i>Vachellia karoo</i> (Van Aarde & Wassenaar 1999) has been shown to be an effective method for restoring forest because they (a) have small fruit/seeds that well-dispersed and long-lived, while forest tree species have relatively large fruits/seeds only dispersed by specialist animals such as birds and mammals, (b) are self-senescent and/or shade intolerant and therefore unable to establish under their own canopies, and (c) can facilitate the establishment of primary forest tree species by	



Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
				<p>enhancing local environmental conditions (Geldenhuys <i>et al.</i> 2017). However, this method does require some active management such as fire exclusion, and the grazing of cattle in the understorey can suppress tree regeneration. Depending on the scale of disturbance, it can take several decades before forests regain their old-growth species composition, especially after large-scale disturbances (e.g., mining, logging etc.), and depending on the condition of the landscape matrix. Within the proposed WEF Complex, the receptor resilience of indigenous forest patches is considered Low.</p>	

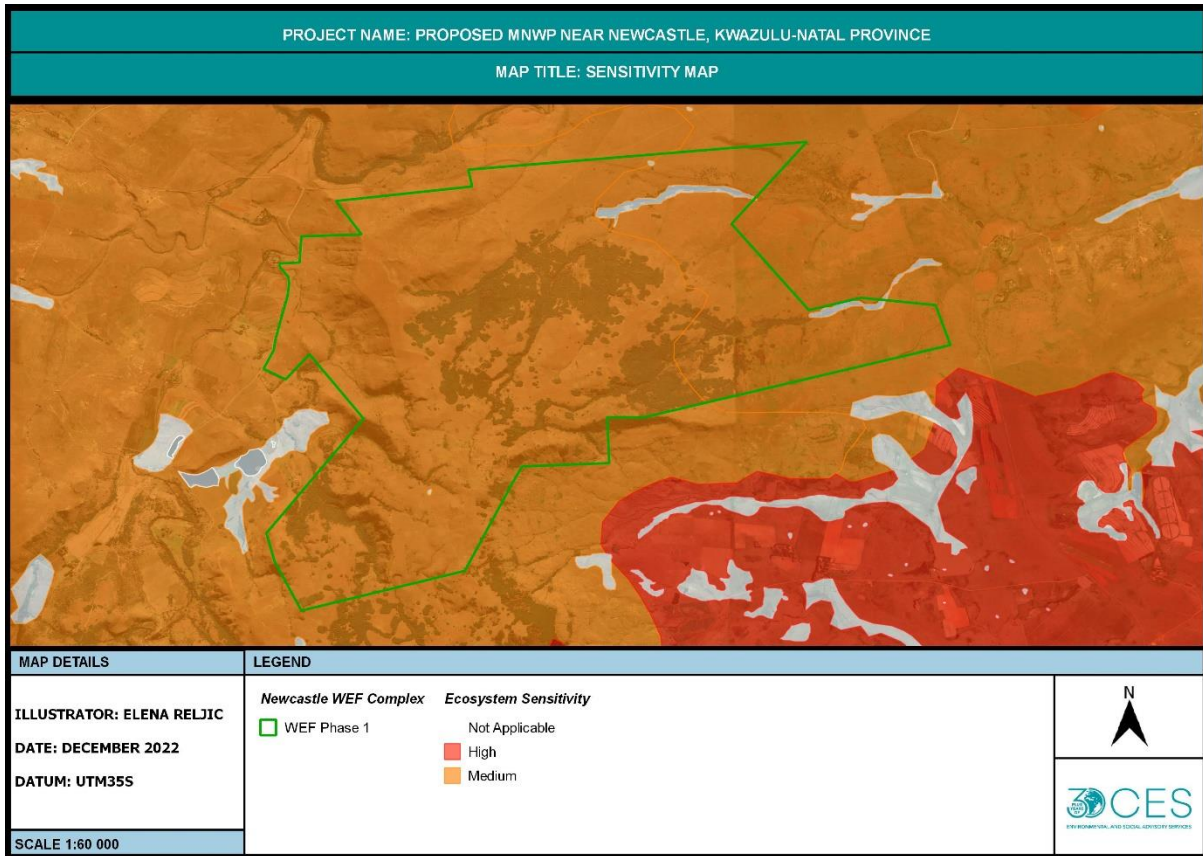


Figure 4.5: Sensitivity map of the Mulilo Newcastle WEF.

In terms of the Species Environmental Assessment Guideline (SANBI, 2020), the following guidelines apply to areas with an SEI of HIGH or MEDIUM:

SEI	Interpretation in relation to proposed development activities
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.



6 IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information to assess the impacts of the proposed Mulilo Newcastle WEF on the terrestrial biodiversity of the area at the appropriate spatial and temporal scales. The impacts identified and described in Section 6.1 below have been assessed in terms of the criteria described in Appendix 4 of this report.



6.1 IMPACT ASSESSMENT

Table 5.1: Assessment of impacts associated with the Mulilo Newcastle WEF.

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
CONSTRUCTION PHASE														



<p>Loss of Low Escarpment Moist Grassland (LC)</p>	<p>MNWP Alternative</p>	<p>The clearing of approximately 56 ha of vegetation for the construction of MNWP will result in the direct loss of Low Escarpment Moist Grassland (LC). Approximately 90% of the historical extent (1742.3 km²) of this vegetation type remains (SANBI, 2021). It should be noted that approximately 1790 ha of this vegetation type remains within MNWP. Approximately 460 ha has been altered due to the presence of Back Wattle stands and other land uses (See Section 3.3.2).</p>	<p>Negative</p>	<p>Direct</p>	<p>Moderate</p>	<p>Localised</p>	<p>Permanent</p>	<p>Definite</p>	<p>Reversible</p>	<p>Resource will be partly lost</p>	<p>Achievable</p>	<p>Moderate (-)</p>	<ul style="list-style-type: none"> • The clearance of approximately 56 ha of vegetation must be strictly limited to that which is necessary for the construction of turbine hard stands, roads, pylons, and other project related infrastructure. • Laydown areas, substations and BESS must be located within previously disturbed areas, such as previously cultivated lands or areas impacted by Black Wattle. • Any impacted areas outside of the development footprint must be rehabilitated using indigenous plant species commonly occurring within Low Escarpment Moist Grassland in line with an approved Rehabilitation Management Plan. • Permits for the removal of plant species protected in terms of the Natal Nature Conservation Ordinance (No. 15 of 1974) must be obtained prior to vegetation clearance. • The footprint of turbine hardstands, pylons, roads, and other project related infrastructure must be micro-sited prior to construction. Should populations of threatened SCC be identified during micro-siting, the design 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													and placement of the project components should be amended to avoid these populations. <ul style="list-style-type: none"> • Otherwise, a permit needs to be obtained to remove any plant SCC. 	



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Approximately 460 ha of Low Escarpment Moist Grassland (LC) has been altered within MNWP due to alien invasive plantations, amongst other anthropogenic activities. The additional loss of 56 ha vegetation associated with the construction of MNWP will therefore have a moderate cumulative impact.	Negative	Cumulative	Moderate	Study Area	Permanent	Definite	Irreversible	Resource will be lost	N/A	Moderate (-)	Where practical and feasible, place turbines and associated infrastructure in areas that are already to minimise cumulative loss of natural ecosystems and therefore import water source and biodiversity areas. Further mitigation could involve eradicating alien invasive species from the properties; however it is difficult to implement mitigation measures as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, this could be negotiated with the landowner.	N/A
	No-Go	If MNWP does not go ahead, the current impacts associated with the infestation of invasive alien species will continue. As such, the No-go Alternative is classified as low negative.	Negative	No-go	Slight	Study Area	Long-term	Definite	Irreversible	Resource has been lost	N/A	Low (-)	• N/A	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of KwaZulu-Natal Highland Thornveld (LC)	MNWP Alternative	The clearing of approximately 3 ha of vegetation for the construction of MNWP will result in the direct loss of KwaZulu-Natal Highland Thornveld (LC). Approximately 63% of the historical extent (5227.5 km ²) of this vegetation type remains (SANBI, 2021). It should be noted that approximately 510 ha of this vegetation type remains within MNWP. Approximately 150 ha of vegetation has been altered due to the presence of Black Wattle stands, fallow lands, and existing roads/paths (see Section 3.3.2).	Negative	Direct	Moderate	Localised	Permanent	Definite	Reversible	Resource will be partly lost	Achievable	Moderate (-)	<ul style="list-style-type: none"> As above. 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Approximately 150 ha of KwaZulu-Natal Highland Thornveld has been lost within MNWP due to alien invasive plantations, and fallow lands. The additional loss of 3 ha vegetation associated with the construction of MNWP will therefore have a moderate cumulative impact.	Negative	Cumulative	Moderate	Localised	Permanent	Definite	Irreversible	Resource will be lost	N/A	Low (-)	<p>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.</p> <p>However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.</p>	N/A
	No-Go	If MNWP does not go ahead, the current impacts associated with the infestation of invasive alien species will continue. As such, the No-go Alternative is classified as low negative.	Negative	No-go	Slight	Study Area	Long-term	Definite	Irreversible	Resource has been lost	N/A	Low (-)	<ul style="list-style-type: none"> N/A 	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Southern Mistbelt Forest (LC)	MNWP Alternative	The patches of isolated native forest within Mulilo Newcastle WEF have been delineated and declared no-go areas. These patches of forest provide several ecosystem services and important habitat for several plant and animal SCC. Moreover, all natural forest patches are protected in terms of the National Forest Act of 1998. Should construction activities encroach on these delineated areas, the impact associated with the loss of forest habitat would be high. However, if the recommended mitigation measures and buffers are implemented, the impact on these areas would be low.	Negative	Direct	Severe	Localised	Permanent	Possible	Irreversible	Resource may be lost	Achievable	High (-)	<ul style="list-style-type: none"> All forest patches have been delineated and declared no-go areas. A minimum of a 50 m no-go buffer must be established around all forest patches. Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. 	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Alien invasive plantations have already replaced indigenous forest within certain areas of MNWP. However, there will be no additional loss of forest associated with the construction of MNWP of the proposed Newcastle WEF as they have been delineated as no-go areas.	Negative	Cumulative	High	Study Area	Permanent	Definite	Irreversible	Resource will be lost	N/A	N/A	All forest patches have been delineated and declared no-go areas. Therefore, there is no cumulative impact associated with the proposed development.	N/A
	No-Go	If MNWP does not go ahead, the current impacts associated with the infestation of invasive alien species will continue. As such, the No-go Alternative is classified as low negative.	Negative	No-go	Slight	Study Area	Long-term	Definite	Irreversible	Resource has been lost	N/A	Low (-)	<ul style="list-style-type: none"> N/A 	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Plant SCC	MNWP Alternative	The clearance of vegetation could result in the loss of plant SCC, particularly species that are protected in terms of the PNCO. It is therefore recommended that the footprint of turbine hardstands, pylons, roads, and other project related infrastructure is micro-sited prior to construction. Should any populations of threatened SCC be identified, the design and placement of project components should be amended to avoid these populations. Provided the recommended mitigation measures are implemented, this impact can be reduced to low negative.	Negative	Direct	Moderate	Localised	Permanent	Possible	Irreversible	Resource may be lost	Achievable	Moderate (-)	<ul style="list-style-type: none"> The footprint of turbine hardstands, pylons, roads, and other project related infrastructure must be micro-sited prior to construction. Should populations of threatened SCC (CR and EN) be identified during micro-siting, the design and placement of the project components should be amended to avoid these populations. Permits for the removal of plant species protected in terms of the Natal Nature Conservation Ordinance (No. 15 of 1974) must be obtained prior to vegetation clearance. Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the development footprint. 	Low (-)



	Cumulative	<p>SCC have likely already been lost because of the existing activities and developments in the broader area. As such, the loss of SCC associated with MNWP will likely contribute to the cumulative loss of 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.</p>	Negative	Direct	Moderate	Localised	Permanent	Possible	Irreversible	Resource may be lost	Achievable	<p>Moderate (-)</p>	<ul style="list-style-type: none"> As above 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	The No-go alternative will not require the clearance of vegetation and will therefore not result in the loss of plant SCC. The no-go alternative is therefore negligible.					N/A					Negligible	<ul style="list-style-type: none"> N/A 	N/A



<p>Disturbance and/or death of herpetofauna and/or loss of habitats</p>	<p>MNWP Alternative</p>	<p>During the construction phase, construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil, and the movement of construction vehicles) could result in wildlife mortalities through road kills or accidental killing, and/or cause the displacement of herpetofauna via increased noise or air pollution. Additionally, the loss of vegetation/soil due to clearance will result in the direct loss of faunal habitat, which will directly, and indirectly, impact on amphibians and reptiles adapted to their ground dwelling habitats. Reptiles also face a high risk of being poached in the wild, and the increase in individuals associated with the construction of the proposed development could create reptile poaching opportunities. As such, this impact is rated moderate negative.</p>	<p>Negative</p>	<p>Direct</p>	<p>Moderate</p>	<p>Study Area</p>	<p>Short-term</p>	<p>Probable</p>	<p>Reversible</p>	<p>Resource will be partly lost</p>	<p>Achievable</p>	<p>Moderate (-)</p>	<ul style="list-style-type: none"> • It is illegal to remove or kill amphibians and reptiles within the study area listed as either Schedule I or II on the PNCO unless the relevant permit is acquired. • All construction staff must be educated with regards to wildlife conservation, and all staff employed by the developer must ensure that any amphibians or reptiles encountered during construction of the proposed development are not harmed or killed. • Amphibians and reptiles encountered must be allowed to move away from the construction area. In the event they need to be translocated, amphibians must be released in the same catchment areas while reptiles must be relocated to directly adjacent areas of the proposed development. No amphibian or reptile species may be removed off site without proper authorisation from the relevant authority. • A rescue plan must be developed to protect reptiles which could fall into construction pits. • The appointed ECO should be trained in snake handling and removal 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													of the wet and rainy season. <ul style="list-style-type: none"> All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas. 	



	Cumulative	<p>The proposed development will likely exacerbate current impacts (e.g., roads, farms, plantations, and houses) on amphibians and reptiles within the study area and may exacerbate the loss of protected reptile species through increased poaching opportunities. Moreover, amphibians and reptiles are relatively poor dispersers and are slower to move away from construction areas, increasing their risk to impacts. Therefore, the cumulative impact is rated moderate negative.</p>	Negative	Direct	Moderate	Study Area	Short-term	Probable	Reversible	Resource will be partly lost	Achievable	<p>Moderate (-)</p>	<p>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.</p> <p>However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.</p>	N/A
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION		
	No-go	The No-go alternative will not require construction activities associated with the proposed development to take place and therefore will not result in any additional disturbance and/or death to amphibian or reptile species. The no-go alternative therefore is negligible.	N/A										<ul style="list-style-type: none"> N/A 	Negligible		N/A



<p>Disturbance and/or death of mammals and/or loss of habitats</p>	<p>MNWP Alternative</p>	<p>Construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil and the movement of construction vehicles) could result in wildlife mortalities through road kills or accidental killing, and/or cause the displacement of mammals via increased noise or air pollution. Additionally, the loss of vegetation/soil due to clearance will result in the direct loss of faunal habitat, which will directly, and indirectly, impact on small sedentary species adapted to their ground dwelling habitats. Larger more agile species such as antelope are likely to disperse to more suitable habitats away from construction areas. As such, this impact is rated slight negative.</p>	<p>Negative</p>	<p>Direct</p>	<p>Low</p>	<p>Study Area</p>	<p>Short-term</p>	<p>May Occur</p>	<p>Reversible</p>	<p>Resources will partly be lost</p>	<p>Achievable</p>	<p>Low (-)</p>	<ul style="list-style-type: none"> It is illegal to remove or kill mammals within the study area listed as either Schedule I or II on the PNCO unless the relevant permit is acquired. All construction staff must be educated with regards to wildlife conservation, and all staff employed by the developer must ensure that any mammals encountered during construction of the proposed development are not harmed or killed. Any mammals encountered must be allowed to move away from the construction area. No mammal may be removed off site without proper authorisation from the relevant authority. Any mammal species that may die due to construction activities associated with the proposed development must be recorded (e.g., photographed and GPS coordinates taken) and reported to the appointed ECO and relevant authorities (i.e., EWT). Where needed, the carcass should be donated to SANBI. Speed restrictions (40 km per hour is recommended) must be implemented to reduce the chance of road 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													kills, as well as to reduce the amount of dust caused by vehicle movement along the roads. <ul style="list-style-type: none"> • The construction of turbine handstands on rocky outcrops and/or permanent waterbodies must be avoided. • All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas. 	



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	The addition of the proposed development may exacerbate current impacts on mammals within the study area due to existing developments (e.g., roads, farms, plantations, and houses), and could exacerbate the loss of protected mammal species through increased poaching opportunities. However, mammals are relatively agile and can move away from construction areas to more suitable habitat. Therefore, the cumulative impact is rated slight negative.	Negative	Direct	Low	Study Area	Short-term	May Occur	Reversible	Resources will partly be lost	Achievable	Low (-)	<p>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.</p> <p>However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.</p>	N/A
	No-go	The no-go alternative will not require construction activities associated with the proposed development to take place and therefore will not result in any additional disturbance and/or death to mammal species. The no-go alternative therefore is negligible.	N/A									Negligible	<ul style="list-style-type: none"> N/A 	N/A



<p>Disturbance and/or loss of Herpetofauna SCC</p>	<p>MNWP Alternative</p>	<p>Construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil and the movement of construction vehicles) could result in the loss of herpetofauna SCC through increased road kills or accidental killing, and/or cause the displacement of herpetofauna SCC via increased noise or air pollution. Two herpetofauna SCC have been identified in this report, namely the Spotted Shovel-nosed Frog, which is restricted to MNWP of the proposed development, and the Striped Harlequin Snake. Neither have been recorded nor observed within study area, but the Striped Harlequin Snake is expected to have a high chance of occurrence within the study area (refer to Section 3.4.1). The Spotted Shovel-nosed frog on the other hand is expected to have a low chance of occurrence within the study area, and the current development footprint does not</p>	<p>Negative</p>	<p>Direct</p>	<p>Low</p>	<p>Localised</p>	<p>Permanent</p>	<p>May Occur</p>	<p>Reversible</p>	<p>Resources will partly be lost</p>	<p>Achievable</p>	<p>Low (-)</p>	<ul style="list-style-type: none"> • A Search and Rescue Operation should be undertaken for protected amphibian and reptile species. • It is illegal to remove or kill any of the amphibians and reptiles within the study area that are listed as either Schedule I or II on the PNCO. Not all areas can be avoided, but it is recommended that construction staff are educated with regards to wildlife conservation and that all staff employed by the developer ensure that any amphibians or reptiles encountered are not harmed or killed. • Amphibians or reptiles encountered must be allowed to move away from the construction area. In the event they need to be translocated, amphibians must be released in the same catchment area while reptiles must be relocated to directly adjacent areas of the proposed development. No amphibians or reptiles may be removed off site without proper authorisation from the relevant authority. • Where possible, amphibian or reptile SCC observed on site must be recorded (photographed, 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		extend into its current range. As such, this impact is rated as slight negative.												
	Cumulative	Herpetofauna SCC likely have been disturbed and/or lost due to existing developments and activities within the study area, and the potential loss of herpetofauna SCC associated with the construction of the proposed development may contribute to the overall cumulative loss of SCC within the broader study area. As such, this impact is rated as slight negative.	Negative	Cumulative	Low	Study Area	Permanent	May Occur	Reversible	Resources will partly be lost	Achievable	Low (-)	<ul style="list-style-type: none"> GPS coordinates taken) and loaded onto iNaturalist by the appointed ECO. The construction of turbine handstands on permanent waterbodies must be avoided. A 500 m no-go buffer must be established around all wetlands. 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	The no-go alternative will not require the clearance of vegetation/soil and therefore will not result in the potential loss of herpetofauna SCC. The no-go alternative therefore is negligible.					N/A					Negligible	<ul style="list-style-type: none"> N/A 	N/A



<p>Disturbance and/or loss of Mammal SCC</p>	<p>MNWP Alternative</p>	<p>During the construction phase, construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil and the movement of construction vehicles) could result in the disturbance and/or loss of mammal SCC through increased road kills or accidental killing, and/or cause the displacement of mammal SCC via increased noise or air pollution. Several mammal SCC, including antelope, have been recorded or are likely to occur within the study area (refer to Section 3.4.2). Additionally, some mammal SCC may face the risk of being hunted, baited, or trapped by construction staff. However, many of the mammal SCC identified in this report, if not all, are able to move away from construction areas to more suitable habitats. As such, this impact is rated as slight negative.</p>	<p>Negative</p>	<p>Direct</p>	<p>Low</p>	<p>Localised</p>	<p>Permanent</p>	<p>May Occur</p>	<p>Reversible</p>	<p>Resources will partly be lost</p>	<p>Achievable</p>	<p>Low (-)</p>	<ul style="list-style-type: none"> • Mammal SCC encountered must be allowed to move away from the construction area. No mammal SCC may be removed off site without proper authorisation from the relevant authority. • All individuals, including construction workers must sign a register prior to accessing the construction area. • Construction workers must not be housed on site. • It is illegal to remove or kill any of the mammals within the study area that are listed as ether Schedule I or II on the PNCO. Not all areas can be avoided, but it is recommended that construction staff are educated with regards to wildlife conservation and that all staff employed by the developer ensure that any mammals encountered are not harmed or killed. • No hunting, baiting, or trapping of mammals shall be allowed within the affected properties or surrounding properties by construction staff. • The appointed ECO should inquire and undertake an overview inspection of the site for the evidence of snares during the construction 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													phase. <ul style="list-style-type: none"> Where possible, mammal SCC observed on site must be recorded (photographed, GPS coordinates taken) and loaded onto iNaturalist by the appointed ECO. 	
	Cumulative	Mammal SCC likely have been lost due to existing developments and activities within the study area, and the potential loss of mammal SCC associated with construction of the proposed development may contribute to the overall cumulative loss of SCC within the broader study area. As such, this impact is rated as slight negative.	Negative	Cumulative	Low	Study Area	Permanent	May Occur	Reversible	Resources will partly be lost	Achievable	Low (-)	<ul style="list-style-type: none"> As above 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	The no-go alternative will not require the clearance of vegetation/soil and therefore will not result in the potential loss of mammal SCC. If the proposed development is not approved, mammal SCC are still likely to be disturbed and/or killed due to other activities taking place in the study area such as farming and forestry. The no-go alternative therefore is rated slight negative.				N/A						Negligible	<ul style="list-style-type: none"> N/A 	N/A



<p>Compliance, compatibility, alignment with biodiversity and environmental planning tools</p>	<p>MNWP Alternative</p>	<p>The construction of Mulilo Newcastle WEF will result in the loss of 85ha classified as a CBA: Irreplaceable, a CBA: Optimal; and an ESA (Ezemvelo, 2016). The classification of these areas was driven by achieving conservation targets for multiple biodiversity features, predominantly avifauna. For the following reasons the loss of CBAs in the project area are deemed MODERATE:</p> <ul style="list-style-type: none"> • A large area of CBA in the project area is degraded. • The total area to be lost is relatively small over a large area. • The biodiversity features that are driving the CBA classification will not be significantly affected (according to the Avifaunal Impact Assessment). <p>Construction within these areas would therefore affect national conservation targets.</p>	<p>Negative</p>	<p>Direct</p>	<p>Moderate</p>	<p>Localised</p>	<p>Permanent</p>	<p>Definite</p>	<p>Irreversible</p>	<p>Resource will be lost</p>	<p>Difficult</p>	<p>Moderate (-)</p>	<ul style="list-style-type: none"> • Where possible, infrastructure should be placed outside of areas classified as CBA: Irreplaceable. • Plantations of alien and invasive trees throughout the properties associated with the WEF should be eradicated to ensure a net gain in terms of biodiversity, ecosystem function and natural condition. • Laydown areas must be located within previously disturbed areas and/or outside of CBAs. • Existing roads must be utilised as far as practically and feasibly possible. • The footprint of turbine hardstands, pylons, roads, and other project related infrastructure must be micro-sited prior to construction. Should populations of threatened SCC (excluding birds and bats) be identified during micro-siting, the design and placement of the project components should be amended to avoid these populations. If this is not possible, permits for the removal and translocation of these populations must be obtained. Should translocation of threatened SCC be required, 	<p>Low (-)</p>
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POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													threatened SCC must be translocated within the same habitat type by a qualified specialist.	
	Cumulative	Portions of CBAs and ESAs have already been lost within the region due to other developments. The construction of the Mulilo WEF and Grid Connection will contribute to the cumulative loss of areas classified as CBA: Irreplaceable, CBA: Optimal and ESA which could affect national conservation targets.	Negative	Direct	Moderate	Localised	Permanent	Definite	Irreversible	Resource will be lost	N/A	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 for the direct impacts.	N/A
	No-go	The No-go alternative will not result in the loss of areas classified as CBA and ESA. However, it should be noted that the current impacts such as grazing, and the infestation of alien plant species will continue.	N/A									Negligible	• N/A	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disruption of Ecosystem Function and Process	MNWP Alternative	Grasslands are considered important water production landscapes and provide various ecosystem services such as soil formation, climate regulation and erosion prevention, etc. (SANBI, 2013). Construction within this ecosystem could result in the disruption of ecological drivers and the subsequent disruption of ecosystem function and process.	Negative	Direct	Moderate	Study Area	Long-Term	Probable	Reversible	Resource may be lost	Difficult	Moderate (-)	<ul style="list-style-type: none"> Register as a member of the local Fire Protection Association and ensure that sufficient provision is made for seasonal fires with respect to infrastructure design and fire breaks. The clearance of vegetation must be strictly limited to that which is necessary for the construction of turbine hard stands, roads, pylons, and other project related infrastructure. Laydown areas should be located within previously disturbed areas. Any impacted areas outside of the development footprint must be rehabilitated using indigenous plant species commonly occurring within vegetation types of the project area. Existing access roads should be utilised. 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Disruption of ecosystem function and process due to habitat degradation and/or fragmentation has already occurred within MNWP due to (1) existing infrastructure such as fences and roads, (2) current minor disturbances such as cultivated land and rural settlement, (3) past minor disturbances such as an artificial dam and fallow lands, and (4) major disturbance such as alien invasive plantations. The development footprint of MNWP is expected to be about 147 ha in extent and considering the extent of remaining intact habitat (approximately 2325 ha) surrounding the development footprint, the cumulative impact associated with MNWP and associated infrastructure is therefore classified as moderate.	Negative	Direct	Moderate	Study Area	Long-Term	Probable	Reversible	Resource may be lost	N/A	Moderate (-)	<p>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.</p> <p>However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.</p>	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	Under the no-go alternative, habitat degradation and/or fragmentation will continue to occur because of infestation of invasive alien plant species such as <i>Acacia mearnsii</i> . This will continue to occur if left unchecked. Under the no-go alternative the impact is therefore low negative.	Negative	No-go	Slight	Study Area	Long-Term	Definite	Reversible	Resource may be lost	N/A	Low (-)	<ul style="list-style-type: none"> N/A 	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establishment of Alien Plant Species	MNWP 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 and could pose a threat to surrounding ecosystems. Alien invasive species already present on site such as <i>Acacia mearnsii</i> , <i>A. dealbata</i> , <i>Cirsium vulgare</i> , <i>Solanum</i> spp., amongst others, can become quickly established and invasive.	Negative	Direct	Moderate	Study Area	Long-Term	Possible	Reversible	Resource may be lost	Achievable	Moderate (-)	<ul style="list-style-type: none"> The site must be checked regularly for the presence of alien invasive species. All alien invasive species that establish because of the proposed development must be removed and disposed of as per the Working for Water Guidelines. An Alien Invasive Management Plan must be compiled and implemented for MNWP of the proposed Newcastle WEF Complex. 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Scattered alien invasive species have already established in the surrounding area. Therefore, should the construction of the proposed Newcastle WEF and Grid Connection lead to the further establishment of alien invasive species in the project area, the invasion by alien species could be exacerbated. The cumulative impact associated therewith has therefore been classified as moderate.	Negative	Cumulative	Moderate	Study Area	Long-Term	Possible	Reversible	Resource may be lost	N/A	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 for the direct impacts.	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	Alien Plant Species such as <i>Acacia mearnsii</i> , <i>A. dealbata</i> , <i>Cirsium vulgare</i> , <i>Solanum</i> spp., amongst others have already established within the project area. Under the no-go alternative these species are likely to continue multiplying if left unchecked. The current no-go alternative is thus rated as moderate negative due to the extent of <i>A. mearnsii</i> stands.	Negative	No-go	Moderate	Study Area	Long-Term	Possible	Reversible	Resource may be lost	N/A	Moderate (-)	<ul style="list-style-type: none"> N/A 	N/A
OPERATIONAL PHASE														



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establishment of Alien Plant Species	MNWP Alternative	Failure to rehabilitate and monitor the establishment of Alien Plant Species during the Construction (and Operation Phase) could lead to the further spread and infestation of Alien Plant Species during the Operational Phase.	Negative	Direct	Severe	Study Area	Long-Term	Possible	Reversible	Resource may be lost	Achievable	High (-)	<ul style="list-style-type: none"> The site must be checked regularly for the presence of alien invasive species. When alien invasive species are found, immediate action must be taken to remove them. 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. An Alien Invasive Management Plan must be compiled and implemented during the Operational Phase. 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Alien Plant Species such as <i>Acacia mearnsii</i> , <i>A.dealbata</i> , <i>Cirsium vulgare</i> , <i>Solanum spp.</i> , amongst others, have already established in the surrounding area. Therefore, should the operation of the proposed Newcastle WEF and Grid Connection lead to the further establishment of alien invasive species in the project area, the invasion by alien species could be exacerbated.	Negative	Cumulative	Severe	Study Area	Long-Term	Possible	Reversible	Resource may be lost	Achievable	High (-)	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above.	N/A
	No-Go	Alien Invasive Plant Species have already established within the project area. Under the no-go alternative these species are likely to continue multiplying if left unchecked. The current no-go alternative is therefore classified as High.	Negative	No-go	Severe	Study Area	Long-Term	Definite	Reversible	Resource may be lost	Achievable	High (-)	• N/A	N/A



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disturbance and/or death of faunal species	MNWP Alternative	During the operational phase, noise and light pollution associated with the operation and maintenance of the proposed development are likely to disturb faunal populations utilising the affected areas. WEFs release low frequency sound (or infrasound), inaudible by humans, but which can interrupt communication between larger mammal species. Additionally, operational activities such as vehicular movement and noise are likely to disturb faunal species and could result in the movement of faunal species away from the affected areas and/or the loss of faunal species. Slow-moving species such as tortoises and snakes are particularly susceptible to road kills. As such, this impact is rated moderate negative.	Negative	Direct	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	Achievable	Moderate (-)	<ul style="list-style-type: none"> Regular maintenance and checks of the infrastructure must be undertaken. The mitigation measures specified in the Noise Impact Assessment conducted for MNWP WEF must be implemented and adhered to during the operational phase of the proposed development. External lighting should be avoided where possible. However, if required, lighting should be down lighting and low wattage. Minimise access to the site. All individuals must sign a register prior to accessing the proposed development site. Speed restrictions (40 km per hour is recommended) must be implemented to reduce the chance of road kills, as well as to reduce the amount of dust caused by vehicle movement along the roads. 	Low (-)



POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Operational activities associated with the proposed development such as vehicular movement and noise are likely to increase the disturbance of faunal species caused by existing developments and activities within the project area. As such, this impact is rated moderate negative.	Negative	Cumulative	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	Achievable	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 for the direct impacts.	Low (-)
	No-go	Existing developments and activities will continue to disturb faunal species within the project area, even in the absence of the proposed development. The no-go alternative therefore is rated low negative.	Negative	Existing	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	Achievable	Moderate (-)	<ul style="list-style-type: none"> N/A 	N/A

DECOMMISSIONING PHASE

It is unlikely that the Mulilo Newcastle WEF will be decommissioned soon if constructed and operational. However, should the infrastructure be decommissioned in the long-term, the impacts associated with the decommissioning phase would be like those described for the construction phase of the proposed development, and most of the mitigation measures stipulated for the construction phase would therefore be relevant. The decommissioning phase EMP must include additional decommissioning phase recommendations and mitigation measures relating to the ecological environment based on case studies of WEF decommissioning and it must consider the relevant legislation, policies and guidelines at the time of decommissioning.



7 IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSION AND DISCUSSION

The DFFE Screening Report identified the Terrestrial Biodiversity Theme for the MNWP as VERY HIGH. Similarly, and based on findings from the Terrestrial Biodiversity Assessment, which included a desktop assessment and site investigations, the overall SEI for the proposed development is considered MEDIUM, except in areas mapped as Eastern Mistbelt Forest (VU; Ezemvelo KZN Wildlife 2014) which were classified as HIGH. These results are based on the methodology outlined in the Species Environmental Assessment Guideline (SANBI 2020) 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).

The Mulilo Newcastle WEF is expected to result in direct and localised loss of indigenous (terrestrial) vegetation, specifically that of KwaZulu-Natal Highland Thornveld and Low Escarpment Moist Grassland. While both vegetation types are classified as Least Concern (SANBI 2021) they have been assigned medium sensitivity rating based on site sensitivity assessment. Aquatic vegetation including Alluvial Wetlands: Temperate Alluvial Vegetation and Freshwater Wetlands: Eastern Temperate Wetlands may be impacted by the proposed development activities, but this has been addressed in the **Aquatic Impact Assessment** and has not been considered further in this report.

It should be noted that although the SA Veg Map (SANBI 2018) and KZN Veg map (Ezemvelo KZN Wildlife (2009) show that Mistbelt Forest only occurs in MNWP 2, site surveying revealed that indigenous forest patches (high sensitivity) also occur in Mulillo Newcastle WEF.

For a high SEI rating, the following guidelines must be applied:

“Avoidance mitigation wherever possible. Minimisation mitigation - changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.”

Impacts associated with high sensitivity areas must be avoided, and where these can't be avoided, they must be offset. Mistbelt Forest is naturally fragmented, however together, these forest patches operate as one ecological unit. Further fragmentation, i.e., due to the proposed development, would most likely disrupt important ecological processes such as dispersal, especially for threatened species reliant on Mistbelt Forest for their survival (e.g., Cape Parrot). Therefore, these patches within the MNWP boundary are considered no-go areas.

In terms of a medium SEI rating, the following applies:



“Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.”

The ecologically sensitive areas identified for the proposed project form part of a mosaic of grassland and forest habitat mapped as CBA irreplaceable within the Moist Escarpment Grasslands (NPAES 2010). In South Africa, moist or mesic grasslands are important biodiversity areas, and support high plant and animal species diversity (SANBI, 2013). Because of their high diversity, mesic grasslands also provide diverse ecological services and functions, which (a) contribute to the continued existence of terrestrial plant and faunal populations, including threatened species, (b) improve the livelihoods of people, and (c) support economic growth (Carbutt & Kirkman 2022). Despite this, they are highly transformed, and continue to be transformed by human activities such as afforestation, mining, and agriculture, and yet remain poorly conserved (SANBI 2013). For example, only 1% of Northern KZN Moist Grassland (VU) is protected and approximately 42.99% of it is transformed (Ezemvelo KZN Wildlife, 2011). It is important to highlight that while major and minor disturbances were observed on site, including Black Wattle stands and cattle grazing, a common species found across the different grassland types within the project area was *Themeda triandra*, which is a keystone species indicative of healthy, biodiverse grasslands (Snyman *et al.* 2013). Based on the relatively poor conservation status of mesic Grasslands in South Africa and the many anthropogenic pressures they face, it is imperative that the **proposed WEF, where feasible, should be limited to areas where the least amount of intact indigenous vegetation will be impacted by the development footprint(s)**. This is discussed in Section 7.4 and is necessary to ensure the preservation of specific habitat conditions necessary for the continued persistence of several grassland specialist species.

Compared with large-scale disturbances such as mining or logging, which clear large extents of vegetation, the placement of wind turbines and associated infrastructure (e.g., roads and pylons) can be compared to a small-scale disturbance because the loss of vegetation is localised. However, in terms of the fauna, roads and hardstands, the proposed WEF can fragment ground dwelling faunal species that are less mobile and/or grassland specialists. Currently, the landscape matrix consists of a mix of semi-pristine and degraded grassland and forest habitats, some of which are threatened and/or poorly protected in KZN. In this context, the loss and/or fragmentation of indigenous vegetation within key vegetation types may contribute to the cumulative loss of ecological structure and function within Critical Biodiversity Areas (CBA irreplaceable) and the Moist Escarpment Grassland NPAES Focus Area (2010). It is important then, from a Terrestrial Biodiversity perspective, that the proposed development take into consideration these factors when deciding on the development footprint(s), to maintain ecosystem function across the matrix (see Section 7.4).

To achieve this, the specialist(s) and developer(s) involved in the proposed project must follow the mitigation hierarchy and work together to avoid, and then reduce the impacts of the proposed WEF and its associated infrastructure occurring in the CBAs and other sensitive areas mapped in this report. If EA is granted, impacts associated with the construction phase of the proposed development must be mitigated through (1) a micro-siting assessment before construction activities take place to ground truth the vegetation and assess options for moving turbines out CBAs, and where populations of threatened SCC are found, infrastructure must be relocated to avoid destroying populations of threatened SCC, and (2) rehabilitating vegetation.



Overall, a total of 13 negative impacts on Terrestrial Biodiversity were identified for the proposed development. Prior to mitigation, two of these impacts are considered High, eight are considered Moderate, and three Low. If mitigation measures however are implemented, all the identified impacts in this report can be reduced to Low (Figure 6.1). In the likely event that impact associated with the loss of CBA cannot be mitigated to low (currently moderate impact), a biodiversity offset needs to be considered.

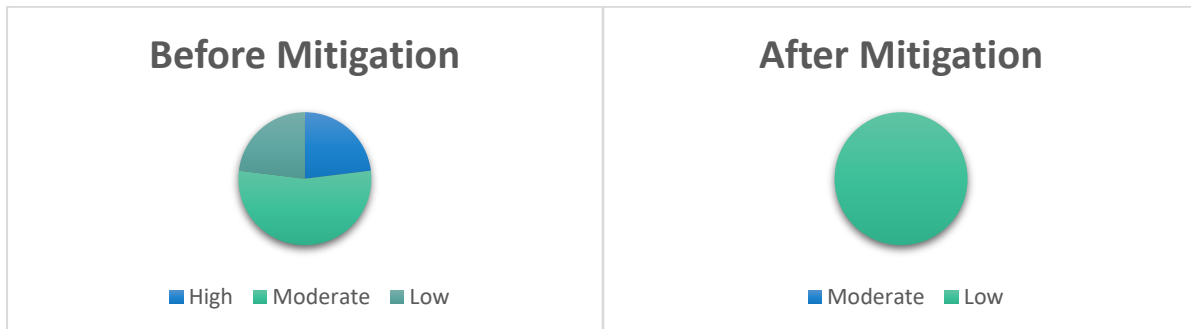


Figure 6.1: Pie charts comparing impacts on Terrestrial Biodiversity prior to and after implementation of mitigation measures.

7.2 CONDITIONS OF EMPR, EA AND MONITORING

All management/mitigation measures and recommendations identified in **Section 4.5, 5 and 6** of this report for the impacts associated with the proposed development must be incorporated into the EMPr and implemented during the relevant phases associated with the proposed Newcastle WEF Complex. Specific mitigation measures and recommendations that should be incorporated into the EA (if granted) include:

- All necessary permitting and authorisations pertaining to Terrestrial Biodiversity in the region (i.e., flora and fauna) 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.
- Ground truthing of the site, specifically within the development footprint(s), must be conducted by an experienced botanist, prior to vegetation clearance, to ensure that turbines are moved outside of CBAs and that no populations of restricted range species will be lost. If it is found that there are populations that will be affected, then infrastructure associated with the proposed development (e.g., roads, turbine hardstands, pylons, etc.) must be moved to avoid these areas.
- A comprehensive Search and Rescue for fauna and flora should be conducted prior to vegetation clearance.
- All SCC 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 to mitigate the unnecessary loss of topsoil and runoff.
- The Alien Invasive Vegetation Management Plan compiled for the proposed Newcastle WEF Complex and associated grid infrastructure must be implemented and adhered to during all phases of the proposed development.



- A comprehensive Rehabilitation Plan should be compiled and implemented. Only indigenous plant species typical of the local vegetation should be used for rehabilitation purposes.
- Lay down areas must not be located within any watercourses or drainage lines.

7.3 TERRESTRIAL BIODIVERSITY STATEMENT AND OPINION OF THE SPECIALIST

Based on the findings presented above, it is expected that the proposed WEF activities will have a moderate negative impact on terrestrial biodiversity in the area, particularly in terms of the loss of sensitive vegetation and/or CBA areas. While VU and EN ecosystems present in the project area were designated as no-go areas for development with a buffer zone in place, the other ecosystem types in the area, namely Low Escarpment Moist Grassland and KwaZulu-Natal Highland Thornveld (both LC), were both identified as having medium ecological sensitivity. To minimise the direct and cumulative loss of these moderately sensitive ecosystems, which serve as important biodiversity areas, turbines and associated infrastructure should be placed, where feasibly and practically possible, in previously degraded areas. The extent of land degradation within each vegetation type was mapped to assist in selecting an improved layout. For example, the IPP Substation, O&M Building Complex and Laydown Areas are all in areas identified as natural grassland. We recommend moving said footprints to fallow land or to clearings of alien vegetation. Having said that, eradicating alien invasive species from the affected areas would further mitigate the loss of sensitive vegetation due to the proposed development.

Of particular concern is the likely loss of land classified as CBA irreplaceable. The remaining extent of land currently classified as CBA Irreplaceable was mapped within the project area. When evaluating this map against the proposed WEF Layout, most of the turbines, as well as internal access roads, are positioned in CBA Irreplaceable areas. A concerted effort should be made to move the turbines and/or roads to degraded areas (previously cultivated/covered by Black Wattle).



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APPENDIX 1: LIST OF PLANTS



Table A.1 Plant species occurring within the broader project area.

PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
INDIGENOUS PLANT SPECIES								
	Acanthaceae	<i>Dyschoriste setiger</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Agapanthaceae	<i>Agapanthus sp.</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Aizoaceae	<i>Delosperma sp.</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland
	Amaryllidaceae	<i>Scadoxus puniceus</i>	LC	Schedule 12	-	-	S2 S3 S6	Forest Patch within Low Escarpment Moist Grassland
	Amaryllidaceae	<i>Brunsvigia radulosa</i>	LC	Schedule 12	-	-	S5 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Anacardiaceae	<i>Searsia dentata</i>	LC	-	-	-	S4; S2; S3	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland
	Anacardiaceae	<i>Searsia discolor</i>	LC	-	-	-	S2; S3 S5 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Anacardiaceae	<i>Searsia sp.</i>	Unknown	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Anacardiaceae	<i>Searsia chirindensis</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Anacardiaceae	<i>Searsia tomentosa</i>	LC	-	-	-	S5 S7	Low Escarpment Moist Grassland
	Anacardiaceae	<i>Searsia pyroides</i>	LC	-	-	-	S2 S5 S6	Low Escarpment Moist Grassland Forest Patch





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Anemiaceae	<i>Anemia caffrorum</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland
	Annonaceae	<i>Kniphofia sp.</i>	Unknown	-	-	-	S3	Low Escarpment Moist Grassland




PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Apiaceae	<i>Centella asiatica</i>	LC	-	-	-	S2; S3 S5 S6 S10 S11	Low Escarpment Moist Grassland Forest Patch Northern KwaZulu-Natal Moist Grassland
	Araceae	<i>Zantedeschia sp</i>	LC	Schedule 12	-	-	S3	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	LC	Unprotected Species (Schedule 10)	-	-	S3 S6	Low Escarpment Moist Grassland Forest Patch
	Apocynaceae	<i>Gomphocarpus fruticosus</i>	LC	Schedule 12	-	-	S4	KwaZulu-Natal Highland Thornveld





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Araliaceae	<i>Cussonia paniculata</i>	LC	Schedule 12	-	-	S2; S3 S7	Low Escarpment Moist Grassland Forest Patch






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Araliaceae	<i>Cussonia spicata</i>	LC	Schedule 12	-	-	S6	Low Escarpment Moist Grassland
	Asphodelaceae	<i>Trachyandra asperata</i>	LC	Schedule 12	-	-	S4 S11	KwaZulu-Natal Highland Thornveld




PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asphodelaceae	<i>Aloe maculata</i>	LC	Schedule 12	-	-	S4; S2; S3	KwaZulu-Natal Highland Thornveld Low Escarpment Moist Grassland
	Asteraceae	<i>Athrixia phylicoides</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Berkheya setifera</i>	LC	-	-	-	S4; S2 S7 S6	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland Forest Patch
	Asteraceae	<i>Berkheya radula</i>	LC	-	-	-	S2 S7	Low Escarpment Moist Grassland
	Asteraceae	<i>Dicoma anomala</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Felicia muricata</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland
	Asteraceae	<i>Gerbera ambigua</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Gerbera pilosellooides</i>	LC	-	-	-	S3 S7 S10	Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland
	Asteraceae	<i>Gerbera sp.</i>	LC	-	-	-	S2 S3	Low Escarpment Moist Grassland
	Asteraceae	<i>Hilliardiella aristata</i>	LC	-	-	-	S3 S5 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Haplocarpha scaposa</i>	LC	-	-	-	S4 S3 S5 S11	KwaZulu-Natal Highland Thornveld Low Escarpment Moist Grassland
	Asteraceae	<i>Helichrysum rugulosum</i>	LC	-	-	-	S4; S2 S11	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Helichrysum cymosum</i>	LC	-	-	-	S3 S7	Low Escarpment Moist Grassland
	Asteraceae	<i>Helichrysum arenarium</i>	LC	-	-	-	S5 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Helichrysum adenocarpum</i>	LC	-	-	-	S3 S5	Low Escarpment Moist Grassland
	Asteraceae	<i>Helichrysum nudifolium</i>	LC	-	-	-	S7 S11	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Helichrysum sp.</i>	LC	-	-	-	S7 S10	Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland
	Asteraceae	<i>Felicia sp.</i>	LC	-	-	-	S4; S2	KwaZulu-Natal Highland Thornveld Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Osteospermum moniliferum</i>	LC	-	-	-	S2 S7 S6	Low Escarpment Moist Grassland Forest Patch
	Asteraceae	<i>Plecostachys serpyllifolia</i>	LC	-	-	-	• S3	• Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Seriphium plumosum</i>	LC	-	-	-	<ul style="list-style-type: none"> • S2 • S3 • S10 	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland • Northern KwaZulu-Natal Moist Grassland
	Asteraceae	<i>Senecio madagascariensis</i>	LC	-	-	-	<ul style="list-style-type: none"> • S2 • S3 • S7 	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Senecio deltoideus</i>	LC	-	-	-	• S7	• Forest Patch within Low Escarpment Moist Grassland
	Asteraceae	<i>Schistostephium sp.</i>	LC	-	-	-	• S6	• Forest Patch within Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Asteraceae	<i>Unidentified sp.</i>	Unknown	-	-	-	• S3	• Low Escarpment Moist Grassland
	Asteraceae	<i>Unidentified sp.</i>	Unknown	-	-	-	• S11	• Low Escarpment Moist Grassland
	Brassicaceae	<i>Heliophila rigidiuscula</i>	LC	-	-	-	• S2	• Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Caryophyllaceae	<i>Silene burchellii</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland
	Caryophyllaceae	<i>Dianthus sp.</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland
	Campanulaceae	<i>Wahlenbergia undulata</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Campanulaceae	<i>Wahlenbergia procumbens</i>	LC	-	-	-	S11	Low Escarpment Moist Grassland
	-	Unidentified	-	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Celastraceae	<i>Gymnosporia buxifolia</i>	LC	-	-	-	S2; S3 S6	Forest Patch within Low Escarpment Moist Grassland
	Chrysobalanaceae	<i>Parinari capensis</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland
	Commelinaceae	<i>Commelina africana</i>	LC	-	-	-	S3 S6 S10	Low Escarpment Moist Grassland Forest Patch Northern KwaZulu-






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
								Natal Moist Grassland
	Convolvulaceae	<i>Ipomoea crassipes</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland
	Convolvulaceae	<i>Ipomoea sp.</i>	LC	-	-	-	S11	Low Escarpment Moist Grassland
	Crassulaceae	<i>Crassula setulosa</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Crassulaceae	<i>Crassula dependens</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland
	Crassulaceae	<i>Crassula alba</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Cyperaceae	<i>Cyperus congestus</i>	LC	-	-	-	S4 S6	KwaZulu-Natal Highland Thornveld Forest Patch within Low Escarpment Moist Grassland
	Cyperaceae	<i>Cyperus brevifolius</i>	LC	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland
	Cyperaceae	<i>Cyperus sp.</i>	LC	-	-	-	S3 S10	Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Cyperaceae	<i>Cyperus sp.</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland
	Cyperaceae	<i>Unidentified</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland
	Cyperaceae	<i>Fimbristylis dichotoma</i>	LC	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Cyperaceae	<i>Cyperus alternifolius</i>	LC	-	-	-	S6	Forest patch within Low Escarpment Moist Grassland
	Cyperaceae	<i>Schoenoplectus sp.</i>	LC	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Dipsacaceae	<i>Scabiosa columbaria</i>	LC	-	-	-	S4; S2 S6	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland
	Droseraceae	<i>Drosera collinsiae</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Ebenaceae	<i>Euclea crispa</i>	LC	-	-	-	S4 S2 S5 S6	<ul style="list-style-type: none"> • KwaZulu-Natal Highland Thornveld • Low Escarpment Moist Grassland • Forest Patch
	Ebenaceae	<i>Diospyros lycioides</i>	LC	-	-	-	S4 S2 South of S6 S7 S10	<ul style="list-style-type: none"> • KwaZulu-Natal Highland Thornveld • Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Ebenaceae	<i>Diospyros whyteana</i>	LC	-	-	-	S2 S6	<ul style="list-style-type: none"> Forest Patch within Low Escarpment Moist Grassland
	Euphorbiaceae	<i>Euphorbia clavarioides</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Euphorbiaceae	<i>Euphorbia pulvinata</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland
	Euphorbiaceae	<i>Clutia pulchella</i>	LC	-	-	-	S5 S3	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Fabaceae	<i>Eriosema cordatum</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Fabaceae	cf <i>Podalyria burchellii</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Fabaceae	<i>Pearsonia sessilifolia</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland
	Fabaceae	<i>Rhynchosia caribaea</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Fabaceae	<i>Tephrosia sp.</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Fabaceae	<i>Vachellia sp.</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Fabaceae	<i>Leobordea sp.</i>	LC	-	-	-	S5	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland
	Fabaceae	<i>Zornia capensis</i>	LC	-	-	-	S10	<ul style="list-style-type: none"> • Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Geraniaceae	<i>Monsonia angustifolia</i>	LC	-	-	-	S3	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland
	Geraniaceae	<i>Pelargonium luridum</i>	LC	-	-	-	S4 S2 S3 S5 S7 S10 S11	<ul style="list-style-type: none"> • KwaZulu-Natal Highland Thornveld • Low Escarpment Moist Grassland • Northern KwaZulu-Natal Moist Grassland




PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Geraniaceae	<i>Pelargonium alchemilloides</i>	LC	-	-	-	S6	• Low Escarpment Moist Grassland
	Gentianaceae	<i>Exochaenium grande</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Hyacinthaceae	<i>Drimia elata</i>	DDT	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Hyacinthaceae	<i>Ledebouria ovatifolia</i>		-	-	-	S4; S3 S7	KwaZulu-Natal Highland Thornveld Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Hyacinthaceae	<i>Ledebouria cf sandersonii</i>		-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Hyacinthaceae	<i>Schizocarpus nervosus</i>	LC	-	-	-	S2 S6 S7	Low Escarpment Moist Grassland Forest Patch
	Gentianaceae	<i>Sebaea natalensis</i>	Unknown	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Hyacinthaceae	<i>Eucomis humilis</i>	LC	-	-	-	S3 S7	Low Escarpment Moist Grassland
	Hypoxidaceae	<i>Hypoxis hemerocallidea</i>	LC	-	-	-	S2; S3 S7 S10	Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Iridaceae	<i>Aristea ecklonii</i>	LC	Schedule 12	-	-	S3 S7	Low Escarpment Moist Grassland
	Iridaceae	<i>Aristea torulosa</i>	LC	Schedule 12	-	-	S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Iridaceae	<i>Gladiolus ecklonii</i>	LC	Schedule 12	-	-	S4	<ul style="list-style-type: none"> • KwaZulu-Natal Highland Thornveld
	Iridaceae	<i>Unidentified sp.</i>	Unknown	Schedule 12	Unknown	Unknown	S4 S2 S3 S11	<ul style="list-style-type: none"> • KwaZulu-Natal Highland Thornveld • Low Escarpment Moist Grassland




PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Iridaceae	<i>Gladiolus crassifolius</i>	LC	Schedule 12	-	-	S4; S2	<ul style="list-style-type: none"> • KwaZulu-Natal Highland Thornveld • Low Escarpment Moist Grassland
	Lamiaceae	<i>Syncolostemon sp.</i>	Unknown	-	-	-	S5 S7	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Lamiaceae	<i>Coleus calycinus</i>	LC	-	-	-	S2 S3	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland
	Lamiaceae	<i>Rabdosiella calycina</i>	LC	-	-	-	S2	<ul style="list-style-type: none"> • Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Lamiaceae	<i>Stachys aethiopica</i>	LC	-	-	-	S4	• KwaZulu-Natal Highland Thornveld
	Lamiaceae	cf <i>Salvia sp.</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Lamiaceae	<i>Plectranthus grallatus</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland
	Lamiaceae	<i>Teucrium trifidum</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Linaceae	<i>Linum thunbergii</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland
	Lobeliaceae	<i>Monopsis decipiens</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland
	Lobeliaceae	<i>Lobelia flaccida</i>	LC	-	-	-	S2 S10	Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Lobeliaceae	<i>Cyphia elata</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland
	Malvaceae	<i>Corchorus confusus</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Malvaceae	<i>Hermannia depressa</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Menispermaceae	<i>Stephania abyssinica</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland
	Melianthaceae	<i>Greyia sutherlandii</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Molluginaceae	<i>Psammotropha mucronata</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland
	Myrsinaceae	<i>Myrsine africana</i>	LC	-	-	-	S5 S6	Forest Patch within Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Thymelaeaceae	<i>Dais cotinifolia</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Myricaceae	<i>Morella serrata</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Orchidaceae	<i>Bonatea speciosa</i>	LC	Schedule 12	-	-	S4	KwaZulu-Natal Highland Thornveld
	Orchidaceae	<i>Satyrium longicauda</i>	LC	Schedule 12	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Orobanchaceae	<i>Cycnium tubulosum</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Orobanchaceae	<i>Striga elegans</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Orobanchaceae	<i>Striga bilabiata</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Oxalidaceae	<i>Oxalis smithiana</i>	LC	-	-	-	S6	Forest Patch within Low Escarpment Moist Grassland
	Oxalidaceae	<i>Oxalis sp.</i>	LC	-	-	-	S2 S3 S7 S10	Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland
	Poaceae	<i>Andropogon eucomus</i>	LC	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Alloteropsis semialata</i>	LC	-	-	-	S2 S3	Low Escarpment Moist Grassland
	Poaceae	<i>Aristida congesta</i>	LC	-	-	-	S4 S3	KwaZulu-Natal Highland Thornveld Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Aristida cf junciformis</i>	LC	-	-	-	S2 S5	Low Escarpment Moist Grassland
	Poaceae	<i>Cynodon dactylon</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Diheteropogon filifolius</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland
	Poaceae	<i>Digitaria monodactyla</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Helictotrichon turgidulum</i>	LC	-	-	-	S5 S6	Low Escarpment Moist Grassland Forest Patch
	Poaceae	<i>Hyparrhenia hirta</i>	LC	-	-	-	S4; S2 S10	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Eragrostis capensis</i>	LC	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland
	Poaceae	<i>Eragrostis curvula</i>	LC	-	-	-	S2 S3 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Eragrostis racemosa</i>	LC	-	-	-	S4 S10	KwaZulu-Natal Highland Thornveld Northern KwaZulu-Natal Moist Grassland
	Poaceae	<i>Eragrostis chloromelas</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Eragrostis plana</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland
	Poaceae	<i>Pennisetum thunbergii</i>	LC	-	-	-	S3	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Themeda triandra</i>	LC	-	-	-	S4; S2; S5 S7	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland
	Poaceae	<i>Tristachya leucothrix</i>	LC	-	-	-	S3 S5 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Hyparrhenia tamba</i>	LC	-	-	-	S2 S11	Low Escarpment Moist Grassland
	Poaceae	<i>Melinis repens</i>	LC	-	-	-	S4 S2 S3 S7	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland
	Poaceae	<i>Koeleria capensis</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Sporobolus africanus</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld
	Poaceae	<i>Diheteropogon amplexans</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland


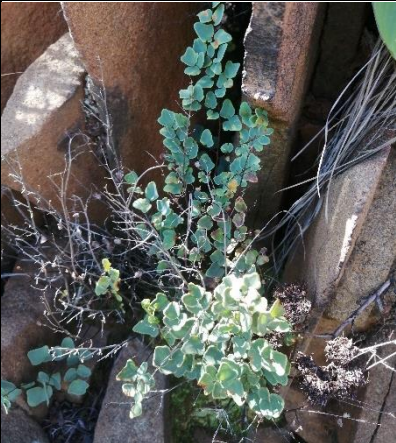


PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Panicum ecklonii</i>	LC	-	-	-	S5 S11	Low Escarpment Moist Grassland
	Poaceae	<i>Trachypogon spicatus</i>	LC	-	-	-	S2 S5 S7	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Poaceae	<i>Cymbopogon caesius</i>	LC	-	-	-	S6	Low Escarpment Moist Grassland
	Podocarpaceae	<i>Podocarpus latifolius</i>	LC	-	Schedule A	-	S6 S7	Forest Patch within Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Pteridaceae	<i>Cheilanthes viridis</i>	LC	-	-	-	S4 S6 S7 S10	KwaZulu-Natal Highland Thornveld Forest Patch Low Escarpment Moist Grassland Northern KwaZulu-Natal Moist Grassland
	Pteridaceae	<i>Pellaea calomelanos</i>	LC	-	-	-	S4; S3 S7	KwaZulu-Natal Highland Thornveld; Low Escarpment Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECTED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Rosaceae	<i>Rubus ludwigii</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland
	Rosaceae	<i>Rubus rigidus</i>	LC	-	-	-	S5	Low Escarpment Moist Grassland





PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Rosaceae	<i>Leucosidea sericea</i>	LC	-	-	-	S3 S5 S6	Low Escarpment Moist Grassland Forest Patch
	Rubiaceae	<i>Nenax sp.</i>	LC	-	-	-	S10	Northern KwaZulu-Natal Moist Grassland






PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Rubiaceae	<i>Pentanisia angustifolia</i>	LC	-	-	-	S2	Low Escarpment Moist Grassland
	Selaginellaceae	<i>Selaginella dregei</i>	LC	-	-	-	S7	Low Escarpment Moist Grassland
	Scrophulariaceae	<i>Selago densiflora</i>	LC	-	-	-	S2 S5 S11	Low Escarpment Moist Grassland




PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Scrophulariaceae	<i>Buddleja salviifolia</i>	LC	-	-	-	S2; S3 S5 S6 S7	Low Escarpment Moist Grassland Forest Patch
	Scrophulariaceae	<i>Selago sp.</i>	LC	-	-	-	S4	KwaZulu-Natal Highland Thornveld



PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Scrophulariaceae	<i>Chaenostoma sp.</i>	LC	-	-	-	S2 S6	Forest Patch
	Scrophulariaceae	<i>Chaenostoma caeruleum</i>	LC	-	-	-	S3 S5	Low Escarpment Moist Grassland
		Unidentified sp	LC	-	-	-	S2	Forest Patch



PHOTOGRAPH	FAMILY	SPECIES	SA RED DATA LIST	KZN	PROTECT ED TREES	NEMBA	SAMPLING SITE	Vegetation Type
	Verbenaceae	<i>Lantana rugosa</i>	LC	-	-	-	S2; S3	Low Escarpment Moist Grassland



APPENDIX 2: LIST OF HERPETOFAUNA

Table A.2: Herpetofauna which may occur within the project area.

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
AMPHIBIA (Amphibians) (SANBI 2004, Measey 2010 & 2014, IUCN 2021, ECNECO 1974)								
African Clawed Frog	<i>Xenopus laevis</i>	Least Concern	No	-	-	-	Both	-
Boettger's Dainty Frog	<i>Cacosternum boettgeri</i>	Least Concern	No	-	-	-	Both	-
Common River Frog	<i>Amietia delalandii</i>	Least Concern	No	-	-	X	Both	X
Raucous Toad	<i>Bufo rangeri</i>	Least Concern	Yes	-	-	X	Both	-
Poynton's River Frog	<i>Amietia poyntoni</i>	Least Concern	No	-	-	-	Both	-
Plaintive Rain Frog	<i>Breviceps verrucosus</i>	Least Concern	Near	-	-	-	Both	-
Mozambique Rain Frog	<i>Breviceps mossambicus</i>	Least Concern	No	-	-	-	Both	-
Senegal Land Frog	<i>Kassina senegalensis</i>	Least Concern	No	-	-	-	Both	-
Natal Sand Frog	<i>Tomopterna natalensis</i>	Least Concern	Near	-	-	-	Both	-
Tandy's Sand Frog	<i>Tomopterna tandyi</i>	Least Concern	No	-	-	-	Both	-
Catequero Bullfrog	<i>Tomopterna cryptotis</i>	Least Concern	No	-	-	-	Both	-



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Grassland Ridged Frog	<i>Ptychadena porosissima</i>	Least Concern	No	-	-	-	Both	-
Painted Reed Frog	<i>Hyperolius marmoratus</i>	Least Concern	No	-	-	X	Both	-
Natal Ghost Frog	<i>Heleophryne natalensis</i>	Least Concern	Yes	-	-	-	Both	-
Natal Dwarf Puddle Frog	<i>Phrynobatrachus natalensis</i>	Least Concern	No	-	-	-	Both	-
Clicking Stream Frog	<i>Strongylopus grayii</i>	Least Concern	Yes	-	-	-	Both	-
Striped Stream Frog	<i>Strongylopus fasciatus</i>	Least Concern	No	-	-	-	Both	-
Weale's Frog	<i>Semnodactylus wealii</i>	Least Concern	Yes	-	-	-	Both	-
Tandy's Sand Frog	<i>Tomopterna tandyi</i>	Least Concern	No	-	-	-	Both	-
Spotted Shovel-nosed Frog	<i>Hemisus guttatus</i>	Vulnerable	Yes	-	-	-	MNWP	-
Karoo Toad	<i>Bufo gariepensis</i>	Least Concern	Yes	-	-	-	Both	-
African Red Toad	<i>Schismaderma carens</i>	Least Concern	No	-	-	-	Both	-
Guttural Toad	<i>Sclerophrys gutturalis</i>	Least Concern	No	-	-	-	Both	-
Cape Terrapin	<i>Pelomedusa galeata</i>	Least Concern	No	-	Schedule 7	-	Both	-
LACERTILIA (Lizards) (SANBI 2014)								





COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Southern Rock Agama	<i>Agama atra</i>	Least Concern	Near	-	-	-	Both	X
Ground Agama	<i>Agama aculeata</i>	Least Concern	No	-	-	-	Both	-
Variable Skink	<i>Trachylepis varia</i>	Least Concern	No	-	-	-	Both	-
Wahlberg's Snake-eyed Skink	<i>Afroablepharus wahlbergi</i>	Least Concern	No	-	-	-	Both	-
Thin-tailed Legless Skink	<i>Acontias gracilicauda</i>	Least Concern	Yes	-	-	-	Both	-
Cape Skink	<i>Trachylepis capensis</i>	Least Concern	No	-	-	-	Both	-
Highveld Crag Lizard	<i>Pseudocordylus melanotus</i>	Least Concern	Yes	-	-	-	Both	-
Burchell's Sand Lizard	<i>Pedioplanis burchelli</i>	Least Concern	Yes	-	-	-	Both	-
Yellow-throated Plated Lizard	<i>Gerrhosaurus flavigularis</i>	Least Concern	No	-	-	-	Both	-
Delalande's Sandveld Lizard	<i>Nucras lalandii</i>	Least Concern	Yes	-	-	-	Both	-
Common African Flap-necked Chameleon	<i>Chamaeleo dilepis</i>	Least Concern	No	-	-	-	Both	-
Van Son's Gecko	<i>Pachydactylus vansoni</i>	Least Concern	Near	-	-	-	Both	-
Spotted Thick-toed Gecko	<i>Pachydactylus maculatus</i>	Least Concern	Near	-	-	-	Both	-



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Common Girdled Lizard	<i>Cordylus vittifer</i>	Least Concern	Near		-	-	Both	-
Rock Monitor	<i>Varanus albigularis</i>	Least Concern	No	Appendix II	Schedule 7	-	Both	-
Red-sided Skink	<i>Trachylepis homalocephala</i>	Least Concern	Yes	-	-	-	Both	-
Water Monitor	<i>Varanus niloticus</i>	Least Concern	No	Appendix II	Schedule 7	-	Both	-
Speckled Rock Skink	<i>Trachylepis punctatissima</i>	Least Concern	No	-	-	-	Both	-
SERPENTES (Snakes) (SANBI 2014)								
Rhombic Egg Eater	<i>Dasypeltis scabra</i>	Least Concern	No	-	-	-	Both	-
Sundevall's Garter Snake	<i>Elapsoidea sundevallii</i>	Least Concern	No	-	-	-	Both	-
Black-headed Centipede-eater	<i>Aparallactus capensis</i>	Least Concern	No	-	-	-	Both	-
Red-lipped Herald Snake	<i>Crotaphopeltis hotamboeia</i>	Least Concern	No	-	-	-	Both	-
Yellow-bellied House Snake	<i>Lamprophis fuscus</i>	Least Concern	Yes	-	-	-	Both	-
Aurora Snake	<i>Lamprophis aurora</i>	Least Concern	Yes	-	-	-	Both	-
Spotted Rock Snake	<i>Lamprophis guttatus</i>	Least Concern	Near	-	-	-	Both	-
Rinkhals	<i>Hemachatus haemachatus</i>	Least Concern	Near	-	-	-	Both	-
Puff adder	<i>Bitis bitis</i>	Least Concern	No	-	-	-	Both	X





COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
								
Common Slug Eater	<i>Duberria lutrix</i>	Least Concern	Yes	-	-	-	Both	-
Montane Grass Snake	<i>Psammophis crucifer</i>	Least Concern	Near	-	-	-	Both	-
Short-snouted Grass Snake	<i>Psammophis brevirostris</i>	Least Concern	No	-	-	-	Both	-
Mole Snake	<i>Pseudaspis cana</i>	Least Concern	No	-	-	-	Both	X 




COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Spotted Grass Snake	<i>Psammophylax rhombeatus</i>	Least Concern	No	-	-	-	Both	-
Eastern Natal Green Snake	<i>Philothamnus natalensis</i>	Least Concern	Yes	-	-	-	Both	-
Southeastern Green Snake	<i>Philothamnus hoplogaster</i>	Least Concern	No	-	-	-	Both	-
Rhombic Night Adder	<i>Causus rhombeatus</i>	Least Concern	No	-	-	-	Both	-
Brown House Snake	<i>Boaedon capensis</i>	Least Concern	No	-	-	-	Both	-
Cape Wolf Snake	<i>Lycophidion capense</i>	Least Concern	No	-	-	-	Both	-
Spotted Harlequin Snake	<i>Homoroselaps lacteus</i>	Least Concern	Yes	-	-	-	Both	-
Striped Harlequin Snake	<i>Homoroselaps dorsalis</i>	Near Threatened	Yes	-	-	-	Both	-
Peter's Thread Snake	<i>Leptotyphlops scutifrons</i>	Least Concern	No	-	-	-	Both	X



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
								
Bibron's Blind Snake	<i>Afrotyphlops bibronii</i>	Least Concern	Near	-	-	-	Both	X 
Common Brown Water Snake	<i>Lycodonomorphus rufulus</i>	Least Concern	No	-	-	-	Both	-



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	PNCO KZN	QDS CODE 2729DB (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Dusky-bellied Water Snake	<i>Lycodonomorphus laevisissimus</i>	Least Concern	No	-	-	-	Both	X 
Olive Ground Snake	<i>Lycodonomorphus inornatus</i>	Least Concern	Yes	-	-	-	Both	-
Southern African Rock Python	<i>Python natalensis</i>	Least Concern	No	Appendix II	Schedule 7	-	Both	-



APPENDIX 3: LIST OF MAMMALS

Table A.3: Mammal species which may occur within the project area.

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENEMIC	TOPS LISTING (2007)	PNCO KZN	QDS CODE (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
CARNIVORA								
Striped Polecat	<i>Ictonyx striatus</i>	Least Concern	No	-	-	-	Both	-
Aardwolf	<i>Proteles cristata</i>	Least Concern	No	-	-	-	Both	-
Black-backed Jackal	<i>Canis mesomelas</i>	Least Concern	No	-	-	-	Both	X
Yellow Mongoose	<i>Cynictis penicillata</i>	Least Concern	No	-	-	-	Both	-
Common Slender Mongoose	<i>Herpestes sanguineus</i>	Least Concern	No	-	-	-	Both	X
Cape Fox	<i>Vulpes Chama</i>	Least Concern	No	Protected	-	-	Both	-
African Clawless Otter	<i>Aonyx capensis</i>	Near Threatened	No	Protected	-	-	Both	-
Spotted-necked Otter	<i>Hydrictis maculicollis</i>	Vulnerable	No	Protected	-	-	Both	-
Cape Grey Mongoose	<i>Herpestes pulverulenta</i>	Least Concern	Near	-	-	-	Both	-
White-tailed Mongoose	<i>Ichneumia albicauda</i>	Least Concern	No	-	-	-	Both	-
Meerkat	<i>Suricata suricatta</i>	Least Concern	No	-	-	-	Both	X
Caracal	<i>Caracal caracal</i>	Least Concern	No	-	-	-	Both	-
African Wildcat	<i>Felis silvestris</i>	Least Concern	No	-	-	-	Both	-
African Striped Weasel	<i>Poecilogale albinucha</i>	Near Threatened	No	-	-	-	Both	-



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISTING (2007)	PNCO KZN	QDS CODE (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Leopard	<i>Panthera pardus</i>	Vulnerable	No	Vulnerable	Schedule 3	-	Both	-
Serval	<i>Leptailurus serval</i>	Near Threatened	No	Protected	-	-	Both	-
Southern Small-spotted Genet	<i>Genetta genetta</i>	Least Concern	No	-	-	-	Both	-
Water Mongoose	<i>Atilax paludinosus</i>	Least Concern	No	-	-	-	Both	-
Black-footed Cat	<i>Felis nigripes</i>	Vulnerable	No	Protected	-	-	Both	-
Brown Hyaena	<i>Parahyaena brunnea</i>	Near Threatened	No	Protected	-	-	Both	-
Honey Badger	<i>Mellivora capensis</i>	Least Concern	No	Protected	-	-	Both	-
PERISSODACTYLA								
Black Rhinoceros	<i>Diceros bicornis</i>	Endangered	No	Endangered	Schedule 3	-	Both	-
White Rhinoceros	<i>Ceratotherium simum</i>	Near Threatened	Near	Protected	Schedule 3	-	Both	-
Plains Zebra	<i>Equus quagga</i>	Least Concern	No	-	-	-		-
ARTIODACTYLA								
Mountain Reedbuck	<i>Redunca fulvorufula fulvorufula</i>	Endangered	Near	-	Schedule 2	-	Both	X
Southern Reedbuck	<i>Redunca arundinum</i>	Least Concern	No	Protected	Schedule 2	-	Both	-
Grey Rhebok	<i>Pelea capreolus</i>	Near Threatened	Yes	-	Schedule 2	-	Both	-
Common Eland	<i>Tragelaphus oryx</i>	Least Concern	No	-	Schedule 2	-	Both	X
Common Duiker	<i>Sylvicapra grimmia</i>	Least Concern	No	-	Schedule 1	-	Both	X



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISTING (2007)	PNCO KZN	QDS CODE (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Black Wildebeest	<i>Connochaetes gnou</i>	Least Concern	Yes	Protected	Schedule 2	-	Both	-
Common Wildebeest	<i>Connochaetes taurinus</i>	Least Concern	No	-	Schedule 2	-	Both	-
Klipspringer	<i>Oreotragus oreotragus</i>	Least Concern	No	-	Schedule 3	-	Both	-
Springbok	<i>Antidorcas marsupialis</i>	Least Concern	No	-	Schedule 3	-	Both	X
African Buffalo	<i>Syncerus caffer</i>	Least Concern	No	-	Schedule 2	-	Both	-
Bushbuck	<i>Tragelaphus sylvaticus</i>	Least Concern	No	-	Schedule 1, Male; Schedule 2, female	-	Both	-
Oribi	<i>Ourebia ourebi</i>	Endangered	Near	Endangered	Schedule 2	-	Both	X
Hartebeest	<i>Alcelaphus buselaphus</i>	Least Concern	No	-	Schedule 2	-	Both	-
Steenbok	<i>Raphicerus campestris</i>	Least Concern	No	-	Schedule 2	-	Both	X
Blesbok	<i>Damaliscus pygargus</i>	Least Concern	No	-	Schedule 3	-	Both	-
PRIMATES								
Chacma Baboon	<i>Papio ursinus</i>	Least Concern	No	-	-	-	Both	X
Vervet Monkey	<i>Chlorocebus pygerythrus</i>	Least Concern	No	-	-	-	Both	X
HYRACOIDEA								
Rock Hyrax	<i>Procavia capensis</i>	Least Concern	No	-	-	-	Both	-
RODENTIA								



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENEMIC	TOPS LISTING (2007)	PNCO KZN	QDS CODE (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
Cape Porcupine	<i>Hystrix africaeaustralis</i>	Least Concern	No	-	-	-	Both	X
Natal Molerat	<i>Cryptomys natalensis</i>	Least Concern	No	-	-	-	Both	-
Cape Mole Rat	<i>Georychus capensis</i>	Least Concern	Yes	-	-	-	Both	-
Mesic Four-striped Grass Mouse	<i>Rhabdomys dilectus</i>	Least Concern	No	-	-	-	Both	-
Sloggett's Vlei Rat	<i>Otomys sloggetti</i>	Least Concern	No	-	-	-	Both	-
Angoni Vlei Rat	<i>Otomys angoniensis</i>	Least Concern	No	-	-	-	Both	-
Vlei Rat	<i>Otomys auratus</i>	Near Threatened	No	-	-	-	Both	-
Woodland Doormouse	<i>Graphiurus murinus</i>	Least Concern	No	-	-	-	Both	-
Namaqua Rock Mouse	<i>Micaelamys namaquensis</i>	Least Concern	No	-	-	-	Both	-
Highveld Gerbil	<i>Gerbilliscus brantsii</i>	Least Concern	No	-	-	-	Both	-
Fat Mouse	<i>Steatomys pratensis</i>	Least Concern	No	-	-	-	Both	-
Krebs's Fat Mouse	<i>Steatomys krebsii</i>	Least Concern	No	-	-	-	Both	-
Cane Rat	<i>Thryonomys swinderianus</i>	Least Concern	No	-	-	-	Both	-
Natal Multimammate Mouse	<i>Mastomys natalensis</i>	Least Concern	No	-	-	-	Both	-
White-tailed Rat	<i>Mystromys albicaudatus</i>	Vulnerable	No	-	-	-	Both	-
Gray Climbing Mouse	<i>Dendromus melanotis</i>	Least Concern	No	-	-	-	Both	-



COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISTING (2007)	PNCO KZN	QDS CODE (ADU, 2011)	WEF PHASE (MNWP, MNWP 2, BOTH)	CONFIRMED SIGHTINGS
LAGOMORPHA								
Hewitt's Red Rock Hare	<i>Pronolagus saundersiae</i>	Least Concern	Yes	-	-	-	Both	-
Natal Red Rock Hare	<i>Pronolagus crassicaudatus</i>	Least Concern	Near	-	-	-	Both	-
African Savanna Hare	<i>Lepus victoriae</i>	Least Concern	No	-	-	-	Both	X
AFROSORICIDA								
Hottentot Golden Mole	<i>Amblysomus hottentotus</i>	Least Concern	Yes	-	-	-	Both	-
Sclater's Golden Mole	<i>Chlorotalpa sclateri</i>	Least Concern	No	-	-	-	Both	-
TUBULIDENTATA								
Aardvark	<i>Orycteropus afer</i>	Least Concern	No	-	Schedule 2	-	Both	X
SORICIDAE								
Least Dwarf Shrew	<i>Suncus infinitesimus</i>	Least Concern	No	-	-	-	Both	-
Forest Shrew	<i>Myosorex varius</i>	Least Concern	No	-	-	-	Both	-
Reddish-gray Musk Shrew	<i>Crocidura cyanea</i>	Least Concern	No	-	-	-	Both	-
Makwassie Musk Shrew	<i>Crocidura maquassiensis</i>	Vulnerable	No	-	-	-	Both	-
MACROSCOLIDIDAE								
Eastern Rock Sengi	<i>Elephantulus myurus</i>	Least Concern	No	-	-	-	Both	-



APPENDIX 4: IMPACT RATING SCALE

CES has developed the following impact rating methodology which has been developed in line with the Terrestrial Biodiversity Protocol, as well as the content requirements of Appendix 6 and the impact ratings required in Appendix 1 and 3 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- **Nature:** negative or positive impact on the environment.
- **Type:** direct, indirect and/or cumulative effect of impact on the environment.
- **Significance:** The criteria in Table A.1 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (**Error! Reference source not found.** A.1).
- **Consequence:** the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- **Extent:** the spatial scale defines the physical extent of the impact.
- **Duration:** the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- **Probability:** the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- **Reversibility:** The degree to which an environment can be returned to its original/partially original state.
- **Irreplaceable loss:** The degree of irreplaceable loss which an impact may cause, e.g. loss of non-regenerative vegetation or removal of rocky habitat or destruction of wetland.
- **Mitigation potential:** The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in **Error! Reference source not found.** A.1 below. 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 A.4: Impact rating criteria.

CRITERIA	CATEGORIES	DESCRIPTION
Overall nature	Negative	Beneficial/positive impact.
	Positive	Detrimental/negative impact.
Type	Direct	Direct interaction of an activity with the environment.
	Indirect	Impacts on the environment that are not a direct result of the project or activity.



CRITERIA	CATEGORIES		DESCRIPTION
	Cumulative		Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	Short term		Less than 5 years.
	Medium term		Between 5-20 years.
	Long term		More than 20 years.
	Permanent		Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	Localised		Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
	Study area		The proposed site and its immediate environments.
	Municipal		Impacts affect the municipality, or any towns within the municipality.
	Regional		Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
	National		Impacts affect the entire country.
Consequence	Slight		Slight impacts or benefits on the affected system(s) or party(ies).
	Moderate		Moderate impacts or benefits on the affected system(s) or party(ies).
	Severe/Beneficial		Severe impacts or benefits on the affected system(s) or party(ies).
Probability	Definite		More than 90% sure of a particular fact. Should have substantial supportive data.
	Probable		Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
	Possible		Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
	Unsure		Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
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 may 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 difficulty 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.
Impact Significance	Low negative	Low positive	Largely of HIGH mitigation potential, after considering the other criteria.
	Moderate negative	Moderate positive	Largely of MODERATE or partial mitigation potential after considering the other criteria.
	High negative	High positive	Largely of LOW mitigation potential after considering the other criteria.



APPENDIX 5: CURRICULUM VITAE OF ECOLOGICAL TEAM



APPENDIX 6: SPECIALIST DECLARATIONS
