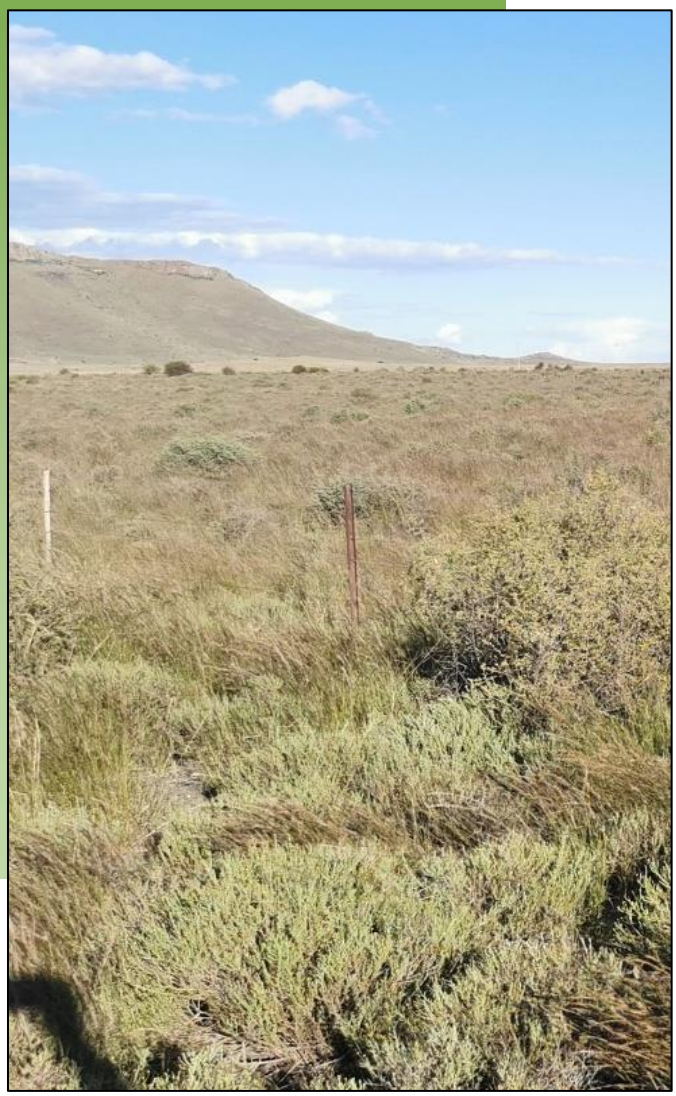

Terrestrial Biodiversity Assessment

Proposed Taaibos 400 kV Grid Connection

Date: 05/01/2023
Version: Draft
Author: J. Pote

Terrestrial Biodiversity Assessment

Proposed Taaibos 400 kV Grid Connection

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Draft Report

Revisions

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Table of Contents

Revisions ii
Table of Contents i
List of Figures iv
List of Tables vi
1 Introduction & Background 1
1.1 Background 1
1.2 Methodology and Approach 1
1.2.1 Site visit and Reporting 2
1.3 Purpose of Report 3
1.3.1 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes 3
1.3.2 Data sources and references 3
1.3.3 Assumptions, Uncertainties and Gaps in Knowledge 4
1.4 Project Description 5
1.4.1 Activity Location and Description 5
1.4.2 Aspects of the project that could potentially have Biodiversity related Impacts 7
1.4.3 Site Selection and layout planning process 8
2 Policy 9
2.1 Company Policy 9
2.2 Legislation Framework 9
2.3 Systematic Planning Frameworks Summary 15
2.3.1 National Environmental Screening Tool 18
2.3.2 Vegetation of Southern Africa 23
2.3.3 National Biodiversity Assessment (NBA, 2019) 24
2.3.4 Northern Cape Critical Biodiversity Areas (NC CBA, 2016) 25
2.3.5 Western Cape Biodiversity Spatial Plan (WC BSP, 2017) 27
2.3.6 Succulent Karoo Ecosystem Planning (SKEP, 2003) 28
2.3.7 Namakwa Bioregional Plan (2008) 29
2.3.8 Other Biodiversity Sector Plans 30
2.3.9 Protected areas 30
2.3.10 Key Biodiversity Areas 31
2.3.11 Rivers And Wetlands 32
2.3.12 Regional Planning Summary 33
3 Biodiversity Risk Identification and Assessment 35
3.1 Baseline Biodiversity Description 35
3.1.1 Site Locality 35
3.1.2 Topography and Drainage 36
3.1.3 Terrestrial Landscape Features (Habitat) 36
3.1.4 Aquatic Habitat 46
3.1.5 Present Ecological State 48
3.1.6 Flora 50
3.1.7 Fauna 51

3.1.8 Species of Special Concern occurring in the region 53
3.1.9 Alien Invasive Species 74
3.1.10 Terrestrial Vegetation Sensitivity Assessment 75
3.1.11 Critical Habitat 1
3.1.12 Other Important or Sensitive Habitat 1
3.1.13 No-Go Areas 2
3.1.14 Potential Development Footprints 2
3.2 Assessment of Risks and Impacts to Biodiversity 3
3.2.1 Criteria of assigning significance to potential impacts 3
3.2.2 Significance Rating 4
3.2.3 Significance Post Mitigation 5
3.2.4 Degree of Confidence 6
3.2.5 Summary of Impacts 6
3.2.6 Potential Terrestrial Biodiversity Impacts (Direct) 7
3.2.7 Potential Risks to Fauna Species of Conservation Concern 7
3.2.8 Assessment of Terrestrial Biodiversity Impacts 11
3.2.9 Decommissioning Phase 11
3.2.10 Impact Summary 1
3.2.11 Potential Terrestrial Biodiversity Impacts (Indirect) 1
3.2.12 Potential Terrestrial Biodiversity Impacts (Cumulative) 1
3.2.13 Terrestrial Biodiversity Impact Reversibility 1
3.2.14 Impacts and Risks to Irreplaceable Biodiversity Resources 1
3.2.15 Residual Risks and Uncertainties 1
3.3 Findings, Outcomes and Recommendations 1
3.3.1 Summary of Findings 1
3.3.2 Layout Recommendations 2
3.3.3 Recommendations 4
4 Management Programs 4
4.1 Site Preparation and Vegetation Clearing Plan 8
4.2 Rehabilitation and Landscaping Plan 8
4.3 Open Space Management/Conservation Plan 8
4.4 Maintenance Management Plan 8
5 Organizational Capacity and Competency 8
6 Emergency Preparedness and Response 9
7 Stakeholder Engagement 9
8 Monitoring and Review 9
9 Appendices 10
9.1 Appendix A: References 10
9.2 Appendix B: Flora and Fauna Species Lists 14
9.2.1 Flora 14
9.2.2 Fauna 19
9.3 Appendix C: Systematic Planning Frameworks 26
9.3.1 Vegetation of Southern Africa 26
9.3.2 National Biodiversity Assessment (NBA, 2019) 28
9.3.3 Northern Cape Critical Biodiversity Areas (NC CBA, 2016) 29

9.3.4 Western Cape Biodiversity Spatial Plan (WC BSP, 2017) 31
9.3.5 Best Practice Systematic Conservation Planning Guidelines 32
9.3.6 Succulent Karroo Ecosystem Plan (SKEP, 2003) 38
9.3.7 Namakwa Biodiversity Sector Plan (2008) 38
9.3.8 Other Biodiversity Sector Plans 39
9.3.9 Strategic Water Source Areas 39
9.3.10 Freshwater Ecosystem Priority Areas 40
9.3.11 Key Biodiversity Areas 41
9.4 Vegetation and Ecological Processes and Corridors 42
9.4.1 Critical Biodiversity Areas 42
9.4.2 Ecosystem Processes 42
9.4.3 Ecosystem Services 42
9.4.4 Ecological Support Areas 44
9.4.5 Critical/Important Terrestrial Habitats 44
9.4.6 Alien Invasive Species 45
9.5 Appendix D: Faunal Species of Conservation Concern Assessment 48
9.6 Appendix E: Abbreviations and Glossary 49
9.6.1 Abbreviations 49
9.6.2 Glossary 50
9.7 Annexure F: Biodiversity Environmental Management Plan 55
9.7.1 Protection of Flora and Fauna 55
9.7.2 Alien and Invasive Plan Management Plan 55
9.7.3 Fires 56
9.7.4 Soil Aspects 56
9.7.5 Dust 57
9.7.6 Infrastructural Requirements 57
9.7.7 Rehabilitation Plan 58
9.7.8 Monitoring and Reporting 60
9.7.9 Closure objectives and extent of alignment to pre-construction environment 60
9.8 Appendix G: General Impact Rating Scale 61
9.8.1 The Severity/ Beneficial Scale 61
9.8.2 Spatial and Temporal Scales 62
9.8.3 The Degree of Certainty and the Likelihood Scale 62
9.8.4 The Environmental Significance Scale 63
9.8.5 Absence of Data 63
9.9 Appendix H: Declaration, Specialist Profile and Registration 64
9.10 Appendix I: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity 87
9.11 Appendix J: Site Sensitivity Verification Report 100
9.11.1 Purpose of Report 100
9.11.2 Data sources and references 100
9.11.3 Site visit 101
9.11.4 Assumptions, Uncertainties and Gaps in Knowledge 101
9.11.5 Site and Activity Description 102
9.11.6 National Environmental Screening Tool 102

9.11.7 Findings, Outcomes and Recommendations 107
9.11.8 Conclusions 108

List of Figures

Figure 1: Locality Map (orange). 1
Figure 2: Overview of typical landscape, plains bisected by rocky hills (inselbergs) and Mesas. 5
Figure 3: Overview of typical landscape, plains bisected by rocky hills (inselbergs) and Mesas. 5
Figure 4: Typical rocky dolerite and sandstone scree slope on hillside. 5
Figure 5: Typical higher order watercourse after rainfall 5
Figure 6: Aerial Photo of project area (orange). 6
Figure 7: Terrestrial Biodiversity Sensitivity (Taaibos). 19
Figure 8: Plant Species Sensitivity (Taaibos) 19
Figure 9: Animal Species Sensitivity (Taaibos) 19
Figure 10: Aquatic Sensitivity (Taaibos). 19
Figure 11: Terrestrial Biodiversity Sensitivity (Taaibos grid). 20
Figure 12: Plant Species Sensitivity (Taaibos grid). 20
Figure 13: Animal Species Sensitivity (Taaibos grid). 20
Figure 14: Aquatic Sensitivity (Taaibos grid). 20
Figure 15: Terrestrial Biodiversity Sensitivity (Soutrivier). 20
Figure 16: Plant Species Sensitivity (Soutrivier). 20
Figure 17: Animal Species Sensitivity (Soutrivier). 21
Figure 18: Aquatic Sensitivity (Soutrivier). 21
Figure 19: Terrestrial Biodiversity Sensitivity (Soutrivier grid). 21
Figure 20: Plant Species Sensitivity (Soutrivier grid). 21
Figure 21: Animal Species Sensitivity (Soutrivier grid). 21
Figure 22: Aquatic Sensitivity (Soutrivier grid). 21
Figure 23: Vegetation of Southern Africa (National). 23
Figure 24: Provincial Regional Biodiversity Planning (Northern Cape and adjacent Western Cape along the southern boundary of Taaibos). 26
Figure 25: Succulent Karoo Ecosystem Planning. 29
Figure 26: Namakwa Regional Plan Critical Biodiversity Areas. 30
Figure 27: Protected Areas and NPAES in vicinity. 31
Figure 28 ; Rivers and Wetlands. 32
Figure 29: Aerial Photo of the site and surrounding area (west) - Orange. 35
Figure 30: Aerial Photo of the site and surrounding area (east) - Orange. 36
Figure 31: Aerial Photograph of the site with mapped vegetation (west) - Orange. 38
Figure 32: Aerial Photograph of the site with mapped vegetation (east) - Orange. 38
Figure 33: Typical Karroid vegetation (grassy form) 39
Figure 34: Typical Karroid vegetation (grassy form). 39
Figure 35: Typical Karroid vegetation (shrubby form). 39
Figure 36: Typical Karroid vegetation (shrubby form). 39
Figure 37: Typical sandstone and shale outcrops with scattered rock. 40
Figure 38: Typical sandstone and shale pavement outcrops. 40
Figure 39: Typical overhanging sandstone and shale outcrops on slopes and summit edges. 41
Figure 40: Typical overhanging sandstone and shale outcrops on slopes and summit edges. 41
Figure 41: Typical Dolerite outcrops on scattered Mesas (koppies). 41
Figure 42: Typical Dolerite outcrops on linear Inselbergs or ridges. 41

Figure 43: Higher altitude mountains peripheral to the site where typical Hardeveld vegetation occurs. 42
Figure 44: Higher altitude mountains peripheral to the site where typical Hardeveld vegetation occurs. 42
Figure 45: Elevated Meses and Inselbergs within the site having Hardeveld elements. 42
Figure 46: Elevated Meses and Inselbergs within the site having Hardeveld elements. 42
Figure 47: Typical watercourse with vegetated fringe sometimes including trees not typical of the landscape. 43
Figure 48: Typical watercourse with developed sedge reedbed. 43
Figure 49: Typical watercourse with vegetated fringe. 44
Figure 50: Typical minor drainage line with less pronounced vegetated fringe. 44
Figure 51: Typical alluvial area after rainfall with standing water for extended periods. 44
Figure 52: Typical alluvial area with sparse vegetation. 44
Figure 53: Typical alluvial area with sparse vegetation. 44
Figure 54: Typical alluvial area with sparse vegetation. 44
Figure 55: Typical alluvial area after rainfall with standing water for extended periods. 45
Figure 56: Typical alluvial area with sparse vegetation sometimes having distinct pan like properties. ... 45
Figure 57: Typical transformed area associated with a dwelling 45
Figure 58: Typical transformation associated with an unpaved gravel road. 45
Figure 59:. Typical watercourse with developed sedge reedbed. 46
Figure 60: Typical watercourse with vegetated fringe sometimes including trees not typical of the landscape. 46
Figure 61: Sandy banks on eroded watercourses provide habitat for burrowing faunal species and birds. 46
Figure 62: Watercourse provide water for an extended period in and arid area, critical for fauna. 46
Figure 63: Seasonal aquatic growth on river pools. 47
Figure 64: Seasonal aquatic growth on river pools. 47
Figure 65: Typical man-made dam with prolific riparian vegetation. 47
Figure 66: Typical man-made dam with less pronounced riparian vegetation. 47
Figure 67: Distribution records of Sensitive Species 945, Isolepis expallescens and Hereroa concava. 57
Figure 68: Distribution records of Bunolagus monticularis. 66
Figure 69: Distribution records of Felis nigripes. 68
Figure 70: Distribution records of Chersobius boulengeri. 70
Figure 71: Distribution records of Redunca fulvorufula fulvorufula. 72
Figure 72: Distribution records of Poecilogale albinucha. 73
Figure 73: Overall Sensitivity (west). 1
Figure 74: Overall Sensitivity (east). 2
Figure 75: Typical two-track type farm road. 2
Figure 76: Typical WEF constructed access road. 2
Figure 77: Pied Crow nest on Anti-climb fences. 9
Figure 78: Crow nests constructed entirely out of wire may become a fire hazard. 9
Figure 79: Pylon design that provide fewer opportunities for nesting sites. 9
Figure 80: Lagomorph remains under three different Martial Eagle nests. 10
Figure 81: South Africa Water Source Areas [Source: Nel, et al, 2013] 40
Figure 82: Terrestrial Biodiversity Sensitivity (Taaibos). 103
Figure 83: Plant Species Sensitivity (Taaibos). 103
Figure 84: Animal Species Sensitivity (Taaibos). 103
Figure 85: Aquatic Sensitivity (Taaibos). 103
Figure 86: Terrestrial Biodiversity Sensitivity (Taaibos grid). 103
Figure 87: Plant Species Sensitivity (Taaibos grid). 103
Figure 88: Animal Species Sensitivity (Taaibos grid). 104
Figure 89: Aquatic Sensitivity (Taaibos grid). 104
Figure 90: Terrestrial Biodiversity Sensitivity (Soutrivier). 104

Figure 91: Plant Species Sensitivity (Soutrivier). 104
Figure 92: Animal Species Sensitivity (Soutrivier). 104
Figure 93: Aquatic Sensitivity (Soutrivier). 104
Figure 94: Terrestrial Biodiversity Sensitivity (Soutrivier grid). 105
Figure 95: Plant Species Sensitivity (Soutrivier grid). 105
Figure 96: Animal Species Sensitivity (Soutrivier grid). 105
Figure 97: Aquatic Sensitivity (Soutrivier grid). 105
Figure 98: Map indicating Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) and Rivers and Wetlands. 107

List of Tables

Table 1: Summary of project component specification. 7
Table 2: Summary of Regional Planning Biodiversity features. 15
Table 3: Coverage and protection levels of vegetation units 25
Table 4: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2017). 27
Table 5: List of Protected Areas in vicinity of the site. 30
Table 6: Summary of Key Biodiversity and Ecological Indicators. 48
Table 7: Flora Species of Special Concern. 55
Table 8: Sensitive Species 945 (National Assessment, 2012) 58
Table 9: Isolepis expallescens (National Assessment, 2012) 59
Table 10: Hereroa concava (National Assessment, 2012) 61
Table 11: Fauna Species of Special Concern. 63
Table 12: Alien (exotic) invasive and other weed species and status. 74
Table 13: Vegetation community areas in Hectares. 76
Table 14: Potential Impacts to Terrestrial Biodiversity 7
Table 15 : Impact Assessment Summary (Refer to Sections 3.2.1 & 0 for methodology). 1
Table 16: Specific Mitigation Measures and Recommendations 4
Table 17: Specific Faunal Mitigation Recommendations 5
Table 18: Eastern Upper Karoo (Nku 4) species. 26
Table 19: Upper Karoo Hardeveld (Nku 2) species. 28
Table 20: Northern Cape CBA coverage. 30
Table 21: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2017) 31
Table 22: Summary of map categories shown in terrestrial CBA mapping, and their meanings. 33
Table 23: Map categories, definitions, and desired management objectives 35
Table 24: Legislation regarding invasive alien species. 45
Table 25: Terrestrial Biodiversity Features. 107

1 Introduction & Background

1.1 Background

Coastal and Environmental Services have been appointed by WKN Windcurrent as an independent Environmental Assessment Practitioner to undertake several environmental applications in terms of the National Environmental Management Act (Act 107 of 1998), for a Victoria West cluster of proposed Taaibos and Soutrivier Wind Energy Facilities (WEF's) including associated grid connection and other infrastructure within the Northern Cape province (Figure 1). As part of this application, terrestrial biodiversity assessments are required for each application. The application is being undertaken in several separate components and this specific report pertains to the Taaibos 400 kV grid connection application, including collector substation and overhead powerline (Figure 1, orange).

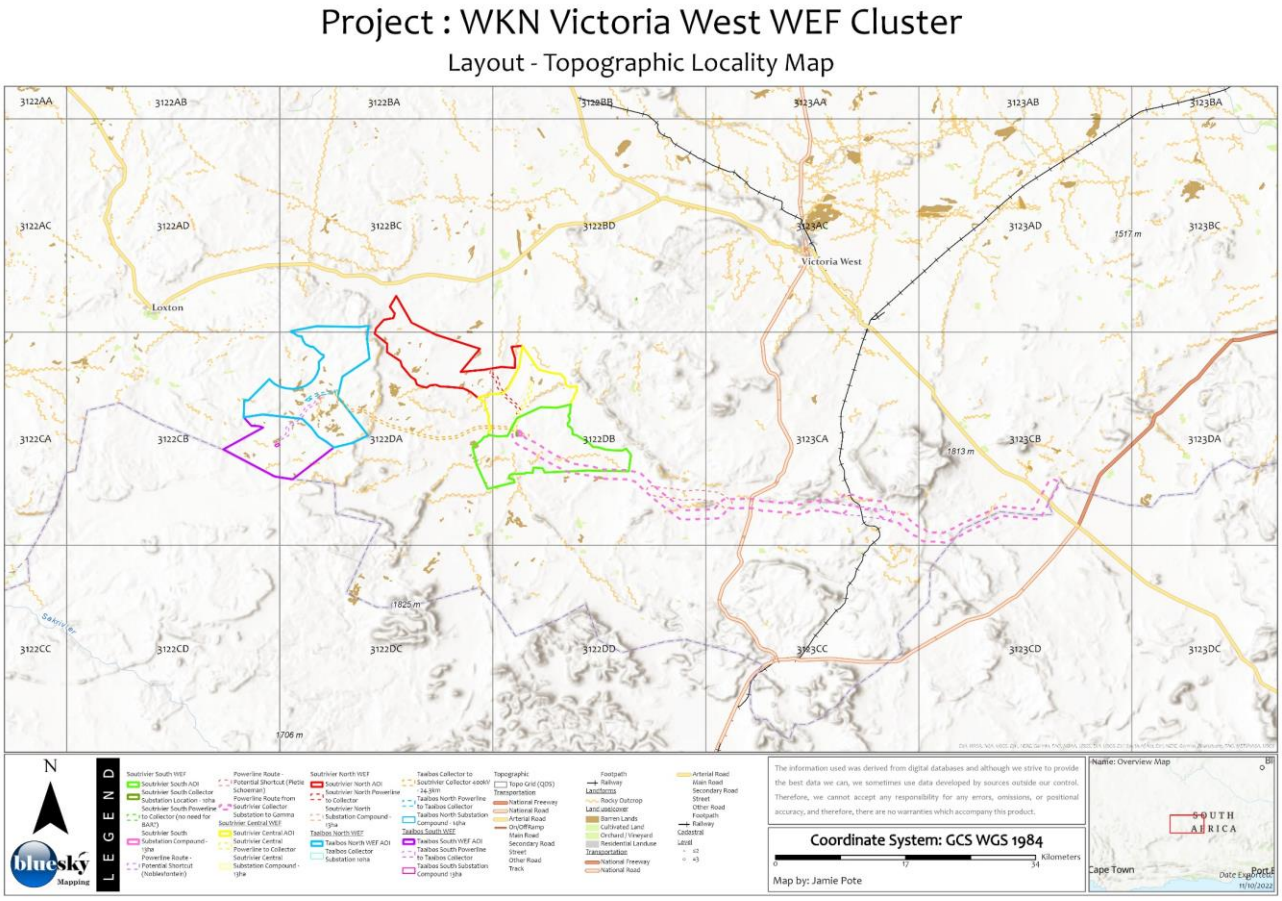


Figure 1: Locality Map (orange).

1.2 Methodology and Approach

The purpose of this specialist study is to meet the authorities' requirements for Terrestrial Biodiversity Assessment and plant species assessment for the proposals, as well as to guide sustainable and environmentally sound development, and, as a minimum will include the following:

1. A comprehensive desktop study and identify potential risks for a vegetation and flora assessment report relating to of the site and immediate surrounding area. This will include the relevant Regional Planning frameworks and review of previous studies.
2. A single site visit to assess the following:
   a. Verification of findings of previous specialists.

b. Broad level Field survey of vegetation, flora and habitats present (including any riparian vegetation or wetland vegetation).
c. Verify and update species list, identifying, highlighting, and locating *flora* species that are of Conservation Concern, Threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and any respective Provincial Ordinances. Mapping of any populations of such species observed during the site visit.
d. Mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and flora species of special concern, the outcome being a detailed sensitivity map ranked into high, medium, or low classes.
e. The proposed fee includes a single site visit only but depending on when the initial site visit is undertaken, additional follow-up visits in different seasons may be required, in order to meet the species assessment protocol requirements.

3. Detailed reporting will be comprised of a *Draft Terrestrial Biodiversity Assessment Report* (for public review and comment) and a *Final Terrestrial Biodiversity Assessment Report* for submission. The draft and final detailed reports will address the following (as per the gazetted Terrestrial Biodiversity Assessment Protocol):
   a. Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
   b. A detailed flora species list highlighting the various species of special concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds). Clearly indicate the need for any further permitting/licensing or detailed studies to specification of animal and plant species protocols.
   c. Faunal assessment will be compromised of a general fauna desktop assessment, as well as specific taxa specialist assessments, which would include on-site assessments as required and camera trapping. It is not anticipated that any methods requiring fauna capture will be followed.
   d. Description and assessment of the habitat units and site sensitivities ranked into high, medium, or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
   e. A habitat sensitivity map will be compiled, indicting the sensitivities as described above, inclusive of a riparian delineation for the aquatic report.
   f. A map indicating buffers to accommodate Regional Planning requirements (if required).
   g. Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
   h. A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
   i. Address any comments raised by IAP's or identified in the project in the final draft and final report.

1.2.1 Site visit and Reporting

Several site visits were undertaken in order to accommodate seasonal sampling. Site visit dates include the periods 24 February 2022 to 04 April 2022 (late summer) and 22 to 24 June 2022 (early Winter). The site falls within a summer rainfall area, however significant rainfall occurred during the 2021/2022 period and including significant unseasonal rainfall including autumn and winter rainfall. Good rainfalls occurred several weeks preceding and during both site visits. For the purposes of this report, based on favourable seasonal rainfall and on-site observations over multiple seasons, the site visit is deemed to be adequate.

The site visit and assessment were undertaken by Mr Jamie Pote, SACNASP registered ecological scientist with a BSc (Hons) degree in Botany and a BSc degree in Botany and Environmental Science, with nearly 20 years' experience undertaking ecological and biodiversity assessments. Additional faunal aspects were

undertaken by Christy Bragg (SACNASP), Alienor Brassine (SACNASP) and Zoe Woodgate (SACNASP) specifically relating to Riverine Rabbits, which were identified early in the processes to be of concern and potentially present. Alienor Brassine (SACNASP), has also contributed additional faunal reporting relating to other faunal species of conservation concern, inclusive of her extensive time on site undertaking camera trapping and bird monitoring. Faunal survey information is thus based on several sources including incidental camera trap records, observation by Jamie Pote and Alienor Brassine during site visits as well as some evidence from other persons parties in and around the site. Camera trapping undertaken primarily for Riverine Rabbit surveys also served a secondary purpose of providing general faunal records for a broader range of faunal species. Camera trapping was undertaken during the periods November 2021 - January 2022 and March 2022 – May 2022 for Taaibos, and September to November 2022 for Soutrivier.

1.3 Purpose of Report

1.3.1 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes

This report has been compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** 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 NEMA (GNR 320), **as gazetted on 20 March 2020.** This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.

In terms of 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 NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant species theme**, this report includes these flora species requirements.

In terms of 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 NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Animal species theme**, this report includes these fauna species requirements in conjunction with Christy Bragg (Riverine Rabbit) and Alienor Brassine (other fauna). The terrestrial biodiversity assessment also gives consideration of fauna, as per protocol requirements for terrestrial biodiversity reporting. Refer to attached separate reports, the key findings of which are assimilated into this report where relevant.

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development. Since the ecology of a landscape is a function of the relationships between living organisms, including humans, and their physical environment, this terrestrial biodiversity or ecological assessment report will consider not only vegetation but also flora and fauna as well as the physical environment in which they occur, which will determine the ecological processes that are affected within the site and immediate surrounds (area of influence).

Additional information pertaining to the various regional planning guidelines is provided in Section 9.3 Appendix C: Systematic Planning Frameworks for background purposes.

Refer also to Section 9.11: Appendix J: Site Sensitivity Verification Report.

1.3.2 Data sources and references

A comprehensive list of references, including data sources is provided in Section 9.1. Data sources that have been used in this report include the following:

- National (DFFE) Web Based Environmental Screening Tool (referred to as NEST in this report) – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinances and NEM:BA Threatened or Protected Species (ToPS) for Northern Cape and Western Cape (400 kV OHL only).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI).
- International Union for Conservation of Nature (IUCN) – Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- National Red Books and Lists – mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) – important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2010 & 2018) and South Africa Protected Area database (SAPAD, 2022) – protected area information.
- Northern Cape Critical Biodiversity Areas (NC CBA, 2016)
- Western Cape Biodiversity Spatial Plan (WC BSP, 2017)
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, Esri, Chief Surveyor General (http://csg.dla.gov.za).
- Cadastral and other topographical country data – Chief Surveyor General (http://csg.dla.gov.za).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

A Glossary and list of Abbreviations is provided in Section 9.6: Appendix E: Abbreviations and Glossary.

1.3.3 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- Any biodiversity surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the rainfall may vary depending in arid environments and unseasonal rainfall may affect composition and flowering times. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.
- No assessment has been made of aquatic processes relating to any wetlands, pans, and rivers/seeps and/or estuaries, or avifauna and bats outside of the scope of those having an influence on terrestrial biodiversity.

1.4 Project Description

1.4.1 Activity Location and Description

The proposed projects consists of two extensive areas, namely Taaibos North (~10 000 Ha) and Taaibos South (~6 000 Ha) to the west and Soutrivier North (~8 000 Ha), Soutrivier Central (~5 000 Ha) and Soutrivier South (~10 000 Ha) to the east (Figure 1), in an extensive low-lying area, surrounded by and intersected by several mountainous ranges (Figure 6). The site is situated to the south of the R63 road that connects Loxton in the west and Victoria West in the east, within the Northern Cape Province and the overall project area encompasses an area in the region of roughly 500 square kilometres (~50 000 Ha).

The area consists of extensive mudstone derived wide flat-bottomed sandy river valleys, surrounded by a series of sandstone hilly plateaus, and intersected by higher lying doleritic mesas and inselbergs (Figure 2 & Figure 3) providing a range of rocky habitat (Figure 4). Drainage of the area is complex, with an extensive network of drainage lines and watercourses intersecting the landscape (Figure 5), with the Taaibos site draining ultimately into the Brakrivier and Kleinbrakrivier towards the west and north. The southern portion of the Soutrivier site drains southwards into the Soutrivier, while the north drains northwards and westwards, also into the Brakrivier and Kleinbrakrivier.

Figure 2: Overview of typical landscape, plains bisected by rocky hills (inselbergs) and Mesas.

Figure 3: Overview of typical landscape, plains bisected by rocky hills (inselbergs) and Mesas.

Figure 4: Typical rocky dolerite and sandstone scree slope on hillside.

Figure 5: Typical higher order watercourse after rainfall

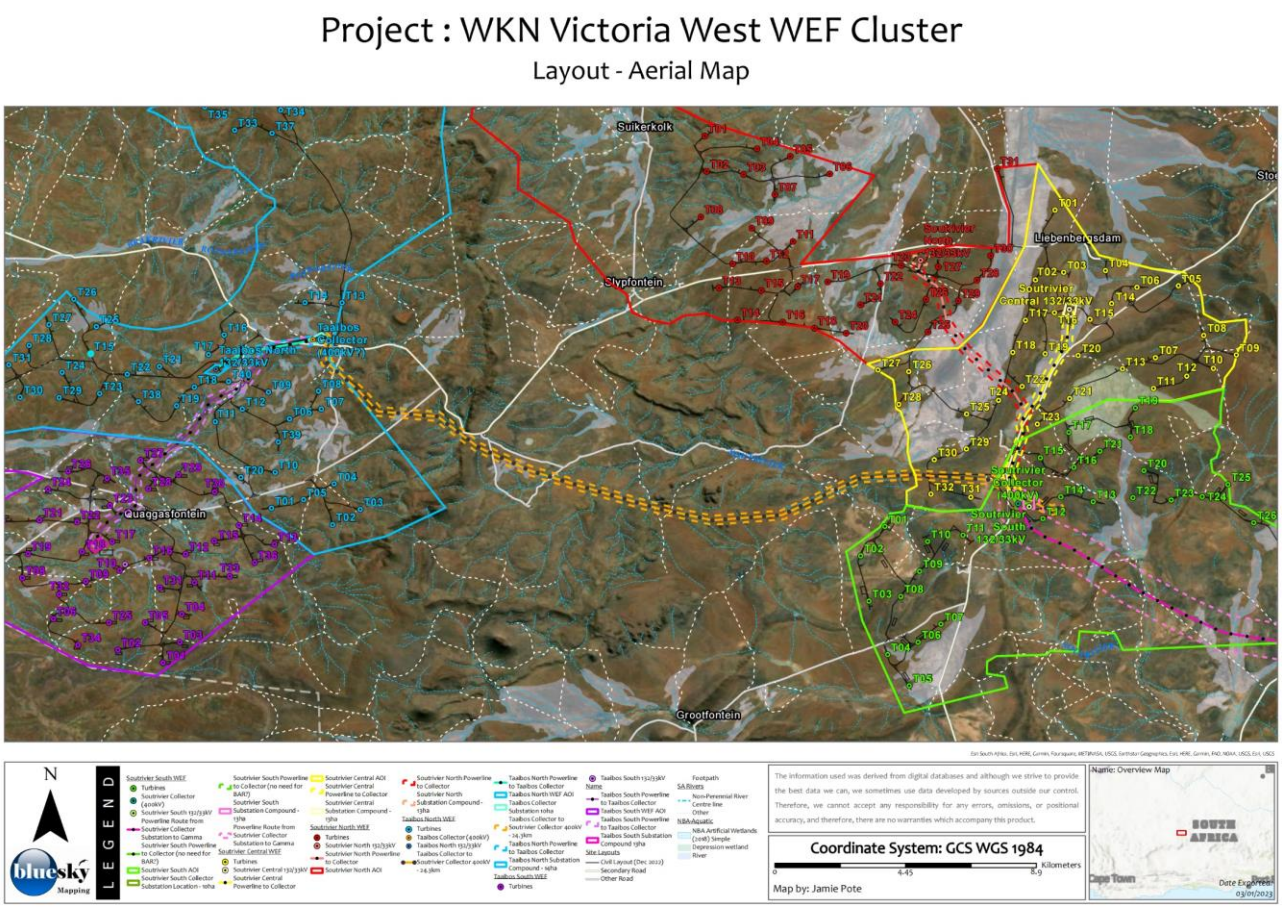


Figure 6: Aerial Photo of project area (orange).

The Total expected project footprint during construction and operation within each project areas, including percentage of total project area, is as follows:

PROJECT	PROJECT AREA	CONSTRUCTION AREA	PERCENT	OPERATIONAL AREA	PERCENT
Taaibos North	10 215 Ha	159.6 Ha	1.6 %	99.6 Ha	1.0 %
Taaibos South	5 995 Ha	138.6 Ha	2.3 %	84.6 Ha	1.4 %
Soutrivier North	8 278 Ha	121.9 Ha	1.5 %	74.7 Ha	0.9 %
Soutrivier Central	5 193 Ha	124.7 Ha	2.4 %	78.7 Ha	1.5 %
Soutrivier South	9 800 Ha	145.2 Ha	1.5 %	92.7 Ha	0.9 %
TOTAL	**39 481 Ha**	**690.0 Ha**	**1.7 %**	**430.3 Ha**	**1.1 %**

Note the total project footprint during construction will be less than 2 percent of the total project area, while the total project footprint during operational phase will be reduced to almost 1 % of the total project area after rehabilitation.

The application is being undertaken in several separate components and this specific report pertains to the Taaibos 400 kV grid connection application, which connects the proposed Taaibos WEF (refer to separate report) to the Soutrivier substation in the east. This collector substation will then be connected via a 400 kV grid connection to the Gamma Substation located near the intersection of the R63 and N1 roads, to the south-east of Victoria West and adjacent to the Western Cape province boundary (refer to separate application and terrestrial biodiversity assessment report).

The project specification is summarised in *Table 1*.

Table 1: Summary of project component specification.

FACILITY COMPONENT	CONSTRUCTION FOOTPRINT	FINAL FOOTPRINT AFTER REHABILITATION
Permanent Laydown Area	TOTAL 3000 m^2 x 40 turbines = 120 000 m^2 which equates to 12.0 **ha**	TOTAL 3000 m^2 x 40 turbines = 120 000 m^2 which equates to 12.0 **ha**
Temporary Laydown Area	TOTAL 3000 m^2 x 40 turbines = 120 000 m^2 which equates to 12.0 **ha**	TOTAL 0 m^2 x 40 turbines = 0 m^2 which equates to 0 **ha**
Turbine Foundation	TOTAL Up to 900 m^2 x 40 turbines = 36 000 m^2 which equates to **3.6 ha**	TOTAL Up to 900 m^2 x 40 turbines = 36 000 m^2 which equates to **3.6 ha**
WEF Substation	33/132kV Substation – 1.5 ha Offices and parking – 0.5 ha Permanent Laydown – 1 ha	33/132kV Substation – 1.5 ha Offices and parking – 0.5 ha Permanent Laydown – 1 ha
BESS	TOTAL 10 ha / 2700 MWh	TOTAL 10 ha / 2700 MWh
Temporary Laydown Area, Concrete Tower Manufacturing Facility and Construction Compound	10 ha clearance includes Temporary laydown Construction compound Concrete batching plant Crusher plant All to become area cleared for BESS (above) afterwards.	10 ha clearance includes Temporary laydown Construction compound Concrete batching plant Crusher plant All to become area cleared for BESS (above) afterwards.
Collector Substation	10 ha	10 ha
OHL	Monopole or lattice	
New Internal Access Roads (14 m construction, rehabilitated to 8 m during operation)	TOTAL (better estimate coming with civil layout) 40 000 m x 14 m = 560 000 m^2 which equates to 56.0 **ha**	TOTAL (better estimate coming with civil layout) 40 000 m x 8 m = 320 000 m^2 which equates to 32.0 **ha**
Upgraded Existing Internal Access Roads	TOTAL (better estimate coming with civil layout) 40 000 m x 14 m = 560 000 m^2 which equates to 56.0 **ha**	TOTAL (better estimate coming with civil layout) 40 000 m x 8 m = 320 000 m^2 which equates to 32.0 **ha**
TOTAL FOOTPRINT:	**159.6 ha *of clearing needed for the construction phase of the development of the proposed Taaibos 400 kV grid connection. WEF***	**99.6 ha *of clearing remaining during the post-construction operational phase (after rehabilitation) of the proposed Taaibos 400 kV grid connection***

1.4.2 Aspects of the project that could potentially have Biodiversity related Impacts

The key components of the project and their respective impacts upon terrestrial biodiversity and ecological processes include the following:

COMPONENT	POTENTIAL BIODIVERSITY AND ECOLOGICAL IMPACTS
Wind Energy Facility	
The construction of the proposed facility will require selective and localised clearing for WEF construction.	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct the WEF turbine and laydown areas and will be limited to the footprint area as well as any additional area for cut and fill requirements.
Substations, BESS & other infrastructure	
The construction of the proposed facility will require limited blanket clearing of the substation and BESS sites.	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct any substations and BESS facility and will be limited to the footprint area as well as any additional area for cut and fill requirements.

COMPONENT	POTENTIAL BIODIVERSITY AND ECOLOGICAL IMPACTS
Overhead Powerline	
The construction of the proposed facility will require selective clearing for pylon construction.	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct the pylons and will be limited to a minimal area where the pylon foundations will be constructed as well as a limited temporary work area surrounding this, which will likely self-rehabilitate to pre-construction conditions with 2 years.
Access roads	
The construction of the proposed facility will require selective clearing of vegetation along the access roads that will connect the WEF infrastructure footprints for construction and operation.	Access roads will be required to access the various WEF facilities during construction as well as during operations for maintenance purposes. It is likely that the road will be heavily used during construction phase after which traffic will be relatively light, dependant on maintenance needs. The road requirements of facilities can require substantial cut to accommodate the heavy construction vehicle requirements and are generally 8 m or less in width, in some cases 10 – 12 m to accommodate underground powerlines and other infrastructure. Powerline access roads are generally two-track type roads not requiring road construction unless topography requires such.

This specific report only refers to substations and OHL.

1.4.3 Site Selection and layout planning process

At the initial stage of the project, shortly after confirmation of appointment, the specialist team compiled a preliminary desktop sensitivity map, primarily based on aerial photography and technical expertise relating to interpretation of such imagery, for the purposes of guiding preliminary site layout preparation. Probably high sensitivity areas were identified to either avoid or approach with caution relating to WEF and OHL infrastructure positioning. At this time, it had already been identified that Riverine Rabbits were a potential high risk with suitable habitat present, at which point a separate Riverine Rabbit team of specialists were appointed to undertake independent studies. These are reported on in separate report, but key aspects are noted in this report.

At this point the first of a series of site visits was undertaken which served to ground-truth and verify the desktop, as one objective, but also to undertake standard site visit activities which included aspects such as looking for or identifying population of species of conservation concern, assessing the condition of the vegetation, identifying and mapping unique landscape features or important and critical habitat. One outcome of this first site visit was to provide a refined terrestrial biodiversity sensitivity map to the project development team in order to inform layout planning. Due to the scale of size of the project area, it is not physically possible to survey every square meter of the project area, however as much effort as possible is made to survey an area adequate to make an informed assessment of the site.

A preliminary project layout was then provided, at which point another two site visits are undertaken, in order to more comprehensively assess the site in general, and to enable seasonal surveys, but also to ground truth the preliminary layout. Based on the initial surveys, these follow-ups tend to focus on specific areas that are deemed to potentially have a higher sensitivity or risk, rather than verifying each and every position. At this point there may be layout revisions, which are followed by a final site visit to check any outstanding uncertainties and also to improve seasonal sampling. Specifically regarding this project, the seasonal site visits have included summer, winter and spring, which are deemed to be adequate for the purposes of the assessment required. This is further supplemented by the separate Riverine Rabbit assessment, which included three camera trapping exercises and other techniques as outlined in the respective report, as well as supplemental observations and findings made by the terrestrial biodiversity specialist team. A key outcome of the Riverine Rabbit assessment incudes a no-go buffer network which was used to also inform turbine placement, the first iteration being applied early in the layout planning. Concomitantly to this process, the layout was also aligned with the findings and sensitivities as identified by other specialist teams,

including but not limited to avifauna, aquatic, agricultural and noise, all having bearing in one way or another on terrestrial biodiversity, but being separate field, as well as others that may not have specific bearing on this reporting.

Rocky outcrops within the broader karroid vegetation landscape are not specifically mapped during this process but will be assessed in the respective sections. Where turbines (or other infrastructure) are situated in proximity to any smaller rocky outcrops that could have an elevated sensitivity (flora species and/or habitat for karoo padloper tortoise), specific recommended actions are made (Refer to **Error! Reference source not found.**) While outcrops and rocky hillslopes are widespread and a significant component of the project area, many are not suitable habitat for padloper tortoises and furthermore the actual project footprint may intersect with such areas at an even smaller scale. These residual areas can be easily surveyed further during final micro siting stage (pre-construction) to either avoid ro minimise impact. As outlined in the faunal species of conservation report, karoo padloper tortoises are considered to have a small home-range and quite specific rocky habitat and slope requirements, and if any such areas are identified during the micro-siting stage, those specific turbine positions can be moved accordingly.

The outcome of this multi-phased iterative processes is that the final layout that is assessed in this report is already significantly informed by a series of specialist fields and is thus quite robust and layout or risk is significantly reduced from what it could potentially be without such a process being applied. The impact assessment is thus likely to reflect this, as mitigation has already been applied significantly and impact before mitigation is thus actually based on an already mitigated layout scenario. Residual impacts would thus be mitigated through the implementation of further environmental management plan recommendations, which would be a condition of authorisation. Based on nearly 20 years' experience, it is also noted that once authorisation is issued and before the commencement of construction, the layout generally goes through further refinement, which includes a more thorough walkdown of turbine and other infrastructure positions as well as the OHL route, which is also usually applied through a condition of authorisation requirement.

2 Policy

2.1 Company Policy

No company policy is applicable to this assessment.

2.2 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on this report[1]:

Listing Notice 1 (GNR 327):

1. The development of facilities or infrastructure for the generation of electricity from a renewable resource where—
(i) the electricity output is more than 10 megawatts but less than 20 megawatts; or
(ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare;
excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs:
(a) within an urban area; or
(b) on existing infrastructure.

This listed activity will be triggered by the proposed associated WEF, but not by the grid connection component.

1 *The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list.*

2. The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where—
(i) the electricity output is more than 10 megawatts but less than 20 megawatts; or
(ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare.

This listed activity will not be triggered by the proposed associated WEF, being a renewable resource (see activity 1 above).

11. The development of facilities or infrastructure for the transmission and distribution of electricity—
(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or
(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.

This listed activity will be triggered by the proposed grid connection component, being above the minimum threshold.

12. The development of:
~~(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or~~
(ii) infrastructure or structures with a physical footprint of 100 square metres or more;

where such development occurs—
(a) within a watercourse;
~~(b) in front of a development setback; or~~
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —

excluding—
~~(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;~~
~~(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;~~
~~(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;~~
~~(dd) where such development occurs within an urban area;~~
~~(ee) where such development occurs within existing roads, road reserves or railway line reserves; or~~
~~(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.~~

This listed activity might be triggered, due to several watercourses being present where crossings are likely required that are likely to exceed the minimum threshold.

19. The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
but excluding where such infilling, depositing, dredging, excavation, removal or moving—
~~(a) will occur behind a development setback;~~
~~(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;~~
~~(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.~~
~~(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or~~
~~(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.~~

This listed activity will likely be triggered, due to several watercourses being present where crossings are likely required that are likely to exceed the minimum threshold.

24. The development of a road—
(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or
(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;
but excluding a road—

~~(a) which identified and included in activity 27 in Listing Notice 2 of 2014; or~~
~~(b) where the entire road falls within an urban area; or~~
~~(c) which is 1 kilometre or shorter.~~

This listed activity will likely not be triggered as access tracks along powerlines are expected to consist of jeep tracks only (2-track).

27. The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—
(i) the undertaking of a linear activity; or
~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

This listed activity will not be triggered as the OHL is linear and no substations are associated with this application.

Listing Notice 2 (GNR 325):
1. The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding ~~where such development of facilities or infrastructure is for photovoltaic installations and occurs:~~
~~(a) within an urban area; or (b) on existing infrastructure~~

This listed activity will be triggered by the proposed associated WEF, but not by the grid connection component.

2. The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.

This listed activity will not be triggered by the proposed associated WEF, being a renewable resource (see activity 2 above) but not by the grid connection component.

9. The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is:
~~(a) temporarily required to allow for maintenance of existing infrastructure;~~
~~(b) 2 kilometres or shorter in length;~~
~~(c) within an existing transmission line servitude; and~~
~~(d) will be removed within 18 months of the commencement of development.~~

This listed activity will be triggered by the proposed 400 kV OHL, which is above the minimum threshold.

15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—
(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

This listed activity will be triggered by the proposed associated WEF, but not for the associated powerlines, being linear activities, nor for the substations, being below the 20 Ha threshold.

Listing Notice 3 (GNR 324)[2]:

[2] Includes primarily Northern Cape Province, but a short portion of the proposed Soutrivier 400 kV grid connection passes along the NC/WC boundary and the 300 m assessment buffer extends into the Western Cape, hence will require consideration for that component only.

3. The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast or tower— (a) is to be placed on a site not previously used for this purpose; and (b) will exceed 15 metres in height—
g. Northern Cape
~~i. In an estuary;~~
ii. Outside urban areas:
~~(aa) A protected area identified in terms of NEMPAA, excluding conservancies;~~
(bb) National Protected Area Expansion Strategy Focus areas;
~~(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;~~
~~(dd) Sites or areas identified in terms of an international convention;~~
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
~~(ff) Core areas in biosphere reserves;~~
(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or
~~(hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or~~
~~iii. Inside urban areas:~~
~~(aa) Areas zoned for use as public open space; or~~
~~(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.~~
i. Western Cape
i. All areas outside urban areas;
~~ii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose, within urban areas; or~~
~~iii. Areas zoned for use as public open space or equivalent zoning within urban areas.~~

While masts will be erected for monitoring purposes associated with the WEF component, these will not be used for telecommunication, hence the activity will not be triggered.

4. The development of a road wider than 4 metres with a reserve less than 13,5 metres
g. Northern Cape
~~i. In an estuary;~~
ii. Outside urban areas:
(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;
(bb) National Protected Area Expansion Strategy Focus areas;
~~(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;~~
~~(dd) Sites or areas identified in terms of an international convention;~~
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
~~(ff) Core areas in biosphere reserves;~~
(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or
~~(hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or~~
~~iii. Inside urban areas:~~
~~(aa) Areas zoned for use as public open space;~~
~~(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or~~
~~(cc) Seawards of the development setback line or within urban protected areas.~~

i. Western Cape
~~i. Areas zoned for use as public open space or equivalent zoning;~~
ii. Areas outside urban areas;
~~(aa) Areas containing indigenous vegetation;~~

(bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or
iii. Inside urban areas:
(aa) Areas zoned for conservation use; or
(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.

This listed activity will not be triggered as the OHL jeep will not exceed 4 meters in width.

12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

g. Northern Cape

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;

ii. Within critical biodiversity areas identified in bioregional plans;

iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or

iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

This listed activity may be triggered for this specific application as more than 300 square meters of indigenous vegetation will require clearing from designated CBA areas for the powerline pylons and access roads as it traverses designated Critical Biodiversity Areas.

i. Western Cape

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;

ii. Within critical biodiversity areas identified in bioregional plans;

iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;

iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or

v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.

This listed activity will not be triggered for this specific application as it is outside of the Western Cape.

14. The development of -

(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or

(ii) infrastructure or structures with a physical footprint of 10 square metres or more;

where such development occurs -

(a) within a watercourse;

(b) in front of a development setback; or

(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;

excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.

g. Northern Cape

i. In an estuary;

ii. Outside urban areas:

(aa) A protected area identified in terms of NEMPAA, excluding conservancies;

(bb) National Protected Area Expansion Strategy Focus areas;

(cc) World Heritage Sites;

(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;

~~(ee) Sites or areas identified in terms of an international convention;~~
(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
~~(gg) Core areas in biosphere reserves;~~
(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;
~~(ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or~~
~~iii. Inside urban areas:~~
~~(aa) Areas zoned for use as public open space;~~
~~(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or~~
~~(cc) Areas seawards of the development setback line.~~

This listed activity may be triggered for this specific application as it is possible that it will require construction of structures with a physical footprint of more than 10 square meters within a watercourse or within 32 metres of a watercourse within a designated Critical Biodiversity Area.

i. Western Cape
i. Outside urban areas:
(aa) A protected area identified in terms of NEMPAA, excluding conservancies;
(bb) National Protected Area Expansion Strategy Focus areas;
~~(cc) World Heritage Sites;~~
~~(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;~~
~~(ee) Sites or areas listed in terms of an international convention;~~
(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
~~(gg) Core areas in biosphere reserves; or~~
~~(hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.~~

This listed activity will not be triggered for this specific application as it is outside of the Western Cape.

Implications:

- The proposed activity will exceed listing notice criteria limits for several listed activities as per Listing Notices 1, 2 & 3 as listed above, hence triggering the need for obtaining environmental authorisation. Due to the scale of the projects including 400 kV overhead powerline, a Full Scoping and EIA process will be required.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- NEMA: Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMA's) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
- Liability for any environmental damage, pollution, or ecological degradation: Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a

relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.

- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made. No specific public participation is undertaken as part of this assessment; however, it will be undertaken as part of the environmental application for which this report has been compiled. As part of that process, any comments raised in that process will be addressed as required. Where applicable, local persons, including landowners and residents, will be informally interviewed, where information pertaining to the terrestrial environment may provide value or information.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right *'to an environment that is not harmful to their health or well-being'*. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- National Forests Act 84 of 1998 with Amendments: Lists Protected trees, requiring permits for removal Department of Agriculture, Forestry and Fisheries). Section (3)(a) of the National Forests Act stipulate that '*natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social, or environmental benefits*'.
- Provincial Nature and Environmental Conservation Ordinances: Lists Protected species, requiring permits for removal including Northern Cape and Western Cape (only for 400 kV Gamma substation OHL, if it extends into he Western Cape)..
- The National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for 'the reserve', namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal.
- Sustainable Development Goals: Goal 15: Life on Land: Protect, restore, and *promote sustainable use of terrestrial ecosystems*, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. The approach, assessment methodology and recommendations contained within this report are in line with this sustainable development goal.

2.3 Systematic Planning Frameworks Summary

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 2), that included the following features:

- Critically Endangered, Endangered and Vulnerable Ecosystems.
- Critical Biodiversity Areas and Ecological Support Areas.
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers.
- Regional Planning Frameworks (Northern Cape Conservation Plan, Western Cape Biodiversity Spatial Plan).
- Protected Areas (and buffers) and Protected Area Expansion Strategy (PAES).
- Critical Habitat for endemic, protected and threatened species.

A summary of the key implications of the respective ecological receptors and indicators is provided in the sections below and further information is also provided in Section 9.3: Appendix C: Systematic Planning Frameworks.

Table 2: Summary of Regional Planning Biodiversity features.

FEATURE	DESCRIPTION	IMPLICATIONS/COMMENT
National Environmental Screening Tool (Terrestrial Biodiversity) [refer to **Figure 7** to **Figure 18**]	Very High & Low Terrestrial Biodiversity sensitivity Low & Medium Plant species sensitivity Medium & High Animal Species sensitivity Low & Very High Aquatic Sensitivity	CBA 1 & 2, ESA, FEPA sub-catchments, PAES. Animal & Plant species potentially present include Sensitive species 945 (plant), *Bunolagus monticularis* (mammal) & *Chersobius boulengeri* (reptile) - refer species assessment section). Birds are not evaluated in this report, being the subject of a sperate specialist assessment. River, Wetland & FEPA quinary catchment features potentially present. Aquatic processes are assessed in separate report.
National Vegetation Map (NVM, 2018) & National Biodiversity Assessment (2018) [refer to **Figure 23**]	<u>Site:</u> Eastern Upper Karoo (Nku 4) Upper Karoo Hardeveld (Nku 2) <u>Broader area</u> Bushmanland Vloere (AZi 5) Southern Karoo Riviere (AZi 6)	 Least Concern – predominant vegetation unit. Least Concern – present on rocky hills. Least Concern – elements may occur in riverine habitat. Least Concern – elements may occur in riverine habitat.
Critically Endangered and Endangered Ecosystems (NBA, 2018) [refer to **Figure 23**]	None	N/A
Vulnerable Ecosystems (NBA, 2018) [refer to **Figure 23]**	None	N/A
Northern Cape Conservation Plan (2016) [refer to **Figure 24**]	A larger proportion of the site area is designated CBA 2, with patches designated CBA 1 on the Taaibos site and more extensive CBA 1 areas on the Soutrivier site.	Development of CBA 1 area should be avoided as far as possible. It is likely that development within CBA 1 and 2 cannot be avoided.
Western Cape Biodiversity Spatial Plan (2017) [refer to **Figure 24**]	Only applicable to portion of Gamma substation 400 kV OHL. CBA 1 & 2 and ESA 1 & 2 are traversed.	OHL footprint is not likely to pose any significant risk to regional conservation targets or ecological processes
Regional Planning: Succulent Karoo Ecosystem Planning (SKEP, 2002) [refer to **Figure 25**]	SKEP expert layers indicate mammals (most likely Riverine Rabbit) and insects as being sensitive receptors within the sites or portions thereof.	SKEP does not provide specific information and further investigation will be required during the site assessment. SKEP is generally superseded by more recent bioregional planning, as the NC Bioregional Plan does incorporate SKEP aspects of importance.
Protected Areas (SAPAD, 2020) [Refer to **Figure 27**]	None directly affected, Namaqualand National Park in proximity to the south.	These protected areas nor any ecological processes associated with them are affected by the proposed development.
NPAES (2018) [Refer to **Figure 27**]	No National Protected Area Expansion Strategy areas overlap with portions of the sites; however, the screening tool does identify NPAES overlapping with portions of the site. Further investigations will be required to determine the source and implications of this data, which overlaps with portions of designated CBA 1 areas.	These areas should be avoided, as Biodiversity Offsets may be required by the respective authorities.
Strategic Water Source Areas (SWSA)	Not situated within any designated SWSA.	N/A
Freshwater Ecosystem Priority Areas (FEPA's) [refer to Figure 28]	The southern half of the Taaibos site is designated as a FEPA quinary catchment.	Refer to specific recommendation contained within the aquatic assessment. Specific risks associated with terrestrial biodiversity will primarily relate to ecological fragmentation and any alteration of water flows that could have localised and downstream ecological impacts to catchments.
Regional Hotspots & Regions of Endemism	Site is not in proximity to any designated hotspot areas, with Bokkeveld-Hantam-Roggeveld being the closest to the west.	No specific hotspot risks are identified for the sites. Several endemic species, as well as species having a limited distribution are known form the wider surrounding area and will be assessed accordingly during the site visit.

FEATURE	DESCRIPTION	IMPLICATIONS/COMMENT
Important Bird Areas (IBA's) [refer to **Figure 27**]	The site is not within or in proximity to any Important Bird Areas (IBA's).	The specific activity is unlikely to have any impact on designated IBA's, or ecological processes associated with IBA's. Avifaunal impacts will however be assessed as a separate Avifaunal Assessment.
Heritage Sites	The site is not located within or near any Heritage Sites.	The specific activity is unlikely to have any impact on designated World Heritage Sites or ecological processes associated with such sites.
Key Biodiversity Areas (KBA's) [refer to **Figure 27**]	The site is not located within or near any Key Biodiversity Areas.	The specific activity is unlikely to have any impact on designated Key Biodiversity Areas or ecological processes associated with such sites.
Marine/Coastal areas	None	N/A
RAMSAR sites	None	N/A
Within 32 m of Watercourses [refer to Figure 28]	The sites are traversed by numerous non-perennial watercourses, and it is likely that infrastructure (as a minimum) may occur within 32 m of such features.	Any crossings of watercourses should be kept to minimum. Specific aquatic assessment will be completed as a separate specialist report.
Within 100 m of Rivers [refer to Figure 28]	No perennial rivers are situated within the sites.	N/A
Within 500 m of Wetlands [refer to Figure 28]	Extensive wetland habitat is associated with the non-perennial watercourse, most prevalent during the rainy seasons.	Since this habitat is considered to be irreplaceable and potentially critical habitat for ecological processes and species such as the Riverine Rabbit, the terrestrial biodiversity assessment will designate such habitat as no-go area but will be assessed more comprehensively in the aquatic assessment. Infrastructure such as access roads and powerlines within this habitat, which is likely prone to seasonal flooding should be carefully sited and kept to minimum.
Estuaries	The site is outside of any estuarine functional zone.	N/A
Forest	No forest is present or in vicinity being an arid area.	N/A
Regional Hotspots & Regions of Endemism	Site is not within any Floristic Region Biodiversity hotspot.	Several species of conservation concern are identified and are assessed accordingly.
Surrounding Land Uses	Mostly agriculture (grazing) and mining.	Low to Moderate levels of disturbance are likely present in the surrounding landscape associated with agriculture and mining, but with extensive areas of intact or semi-intact vegetation. High levels of transformation are not prevalent as indicated by the low conservation status of the vegetation units. Overgrazing is often common in arid areas.
Critical Habitat for listed endemic/ protected species	Several endemic or other protected species are known from the broader area including populations of threatened species. There are a number of red listed species in the surrounding area and vegetation units that are known to have limited distributions. A single species Sensitive species 945 is identified in the DFFE screening tool and review of species information indicates that it is likely associated with the rocky hills and possibly rocky outcrops. Further investigation will be required during the site visit to clarify occurrence and distribution patterns. It is vital that this is undertaken before the end of summer to minimise uncertainty.	

Implications:

- Eastern Upper Karoo and Upper Karoo Hardeveld are not of conservation concern (Least Concern).
- Critical Biodiversity and Ecological Support Areas are identified in the most recent applicable conservation plans.
- Protected Areas, National Protected Area Expansion Strategy areas and IBA's are present in the vicinity of and/or within the site.
- Several minor watercourse crossings will likely be required.

2.3.1 National Environmental Screening Tool

The DFFE Screening Tool indicates the following:

- Terrestrial Biodiversity is *Very High* & Low
- Plant species sensitivity is Low & Medium
- Animal Species sensitivity is Medium & High
- Aquatic Sensitivity is Low & *Very High*

	Feature(s) in proximity (Taaibos)	**Feature(s) in proximity (Soutrivier)**	**Feature(s) in proximity (Soutrivier grid)**	**Feature(s) in proximity (Taaibos grid)**
Terrestrial Sensitivity				
Very High	CBA 1 & 2, ESA, FEPA Sub-catchments, and PAES.	CBA 1 & 2 and PAES.	CBA 1 & 2, ESA 1 & 2, FEPA Sub-catchments, PAES	CBA 1 & 2, FEPA Sub-catchments, PAES
High	None	None	None	None
Medium	None	None	None	None
Low	Present	Present	Present	Present
Plant Sensitivity				
Very High	None	None	None	None
High	None	None	None	None
Medium	None	Sensitive species 945	*Isolepis expallescens, Hereroa concava,* Sensitive species 945	None
Low	Present	Present	Present	Present
Animal Sensitivity				
Very High	None	None	None	None
High	*Neotis ludwigii* (bird)	*Neotis ludwigii* (bird), *Bunolagus monticularis* (mammal)	*Bunolagus monticularis* (mammal), *Neotis ludwigii, Aquila verreauxii* (birds)	*Bunolagus monticularis* (mammal),
Medium	*Neotis ludwigii, Aquila verreauxii* (birds) *Bunolagus monticularis* (mammal), *Chersobius boulengeri* (Reptile)	*Neotis ludwigii, Aquila verreauxii* (birds) *Bunolagus monticularis* (mammal), *Chersobius boulengeri* (Reptile)	*Neotis ludwigii, Aquila verreauxii* (birds) *Bunolagus monticularis* (mammal), *Chersobius boulengeri* (reptile)	*Bunolagus monticularis* (mammal), *Neotis ludwigii, Aquila verreauxii* (birds), *Chersobius boulengeri* (reptile)
Low	*None*	*None*	*None*	None
Aquatic Sensitivity				
Very High	Rivers, Wetlands & FEPA quinary catchments	Rivers & Wetlands.	Rivers, Wetlands, FEPA: quinary catchments	Rivers, Wetlands & FEPA quinary catchments
High	None	None	None	None
Medium	None	None	None	None
Low	Present	Present	Present	Present

Taaibos WEF & Collector Grid Connections

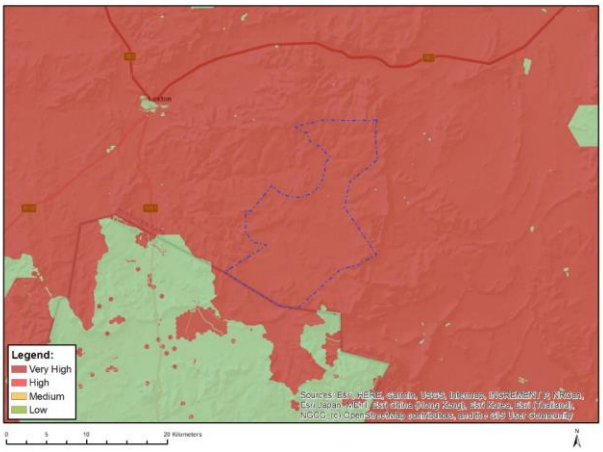


Figure 7: Terrestrial Biodiversity Sensitivity (Taaibos).

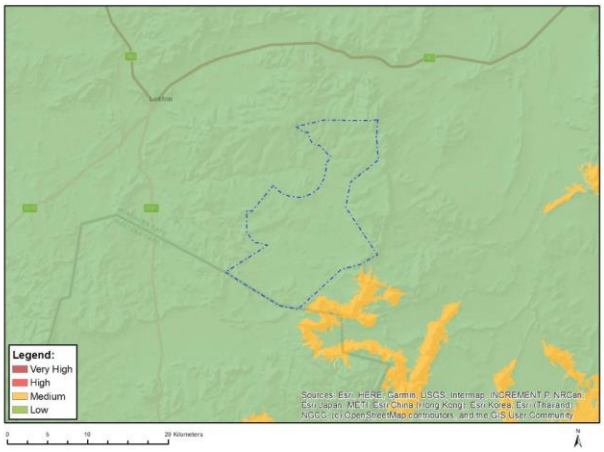


Figure 8: Plant Species Sensitivity (Taaibos).

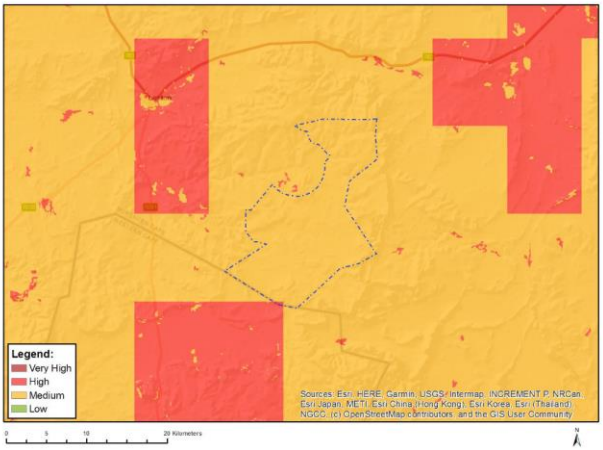


Figure 9: Animal Species Sensitivity (Taaibos).

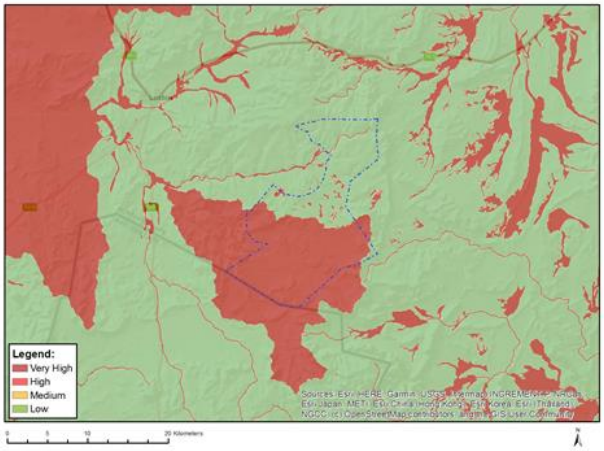


Figure 10: Aquatic Sensitivity (Taaibos).

Taaibos to Soutrivier 400 kV Grid Connection

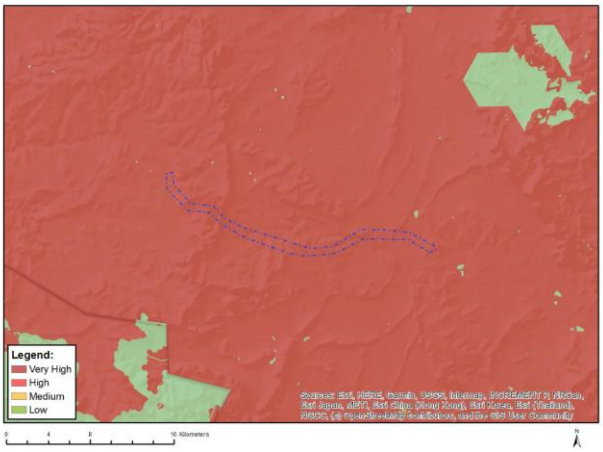


Figure 11: Terrestrial Biodiversity Sensitivity (Taaibos grid).

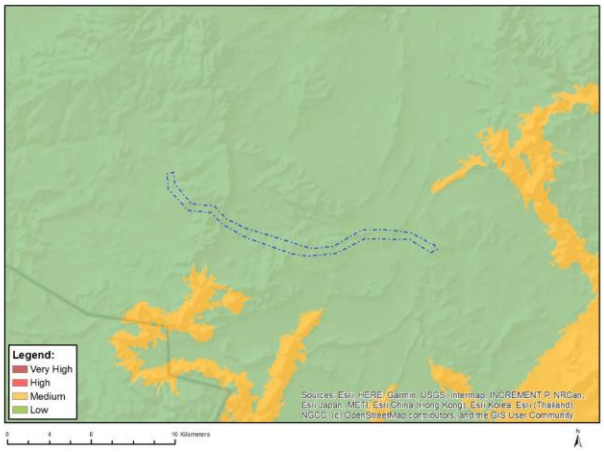


Figure 12: Plant Species Sensitivity (Taaibos grid).

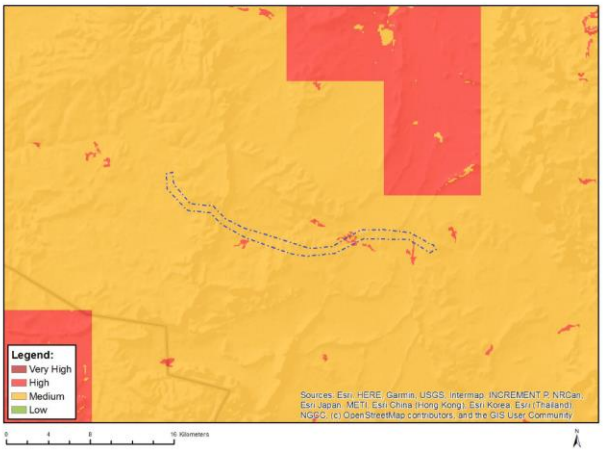


Figure 13: Animal Species Sensitivity (Taaibos grid).

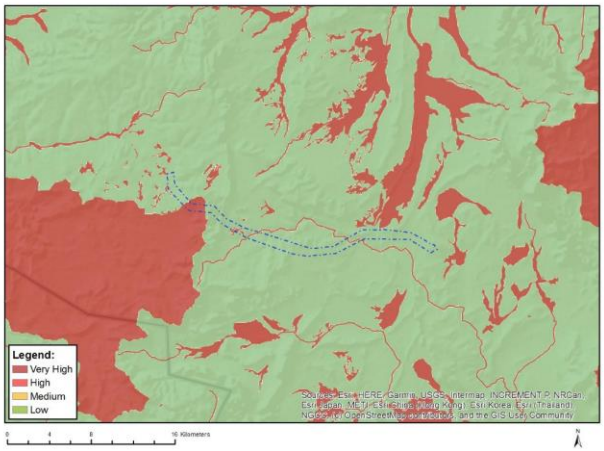


Figure 14: Aquatic Sensitivity (Taaibos grid).

Soutrivier WEF & Collector Grid Connections

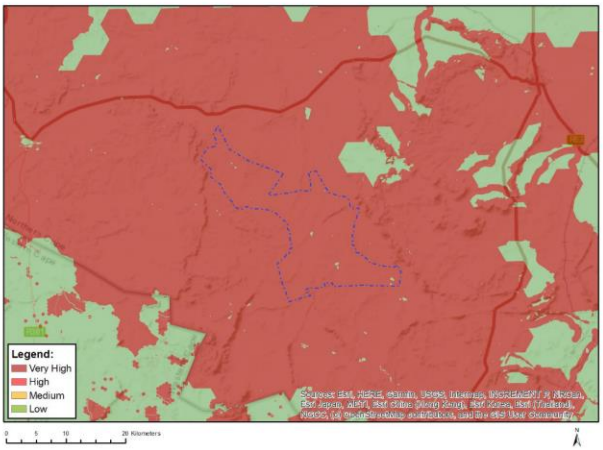


Figure 15: Terrestrial Biodiversity Sensitivity (Soutrivier).

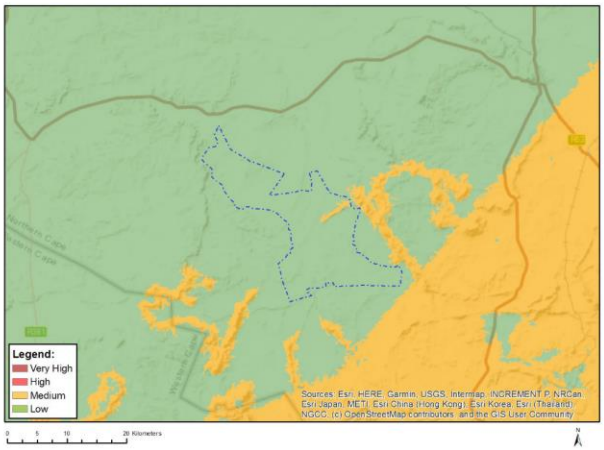


Figure 16: Plant Species Sensitivity (Soutrivier).

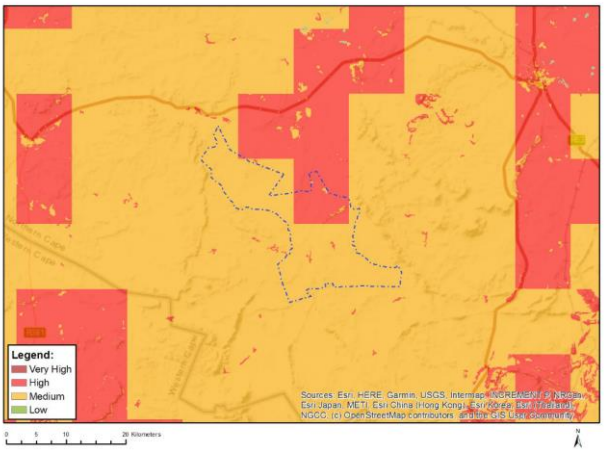


Figure 17: Animal Species Sensitivity (Soutrivier).

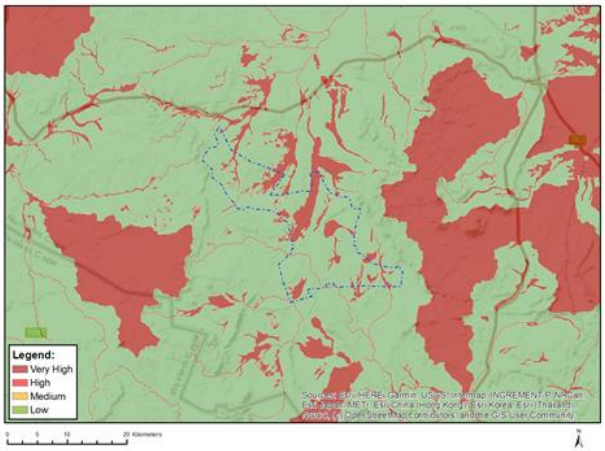


Figure 18: Aquatic Sensitivity (Soutrivier).

Soutrivier to Gamma 400 kV Grid Connection

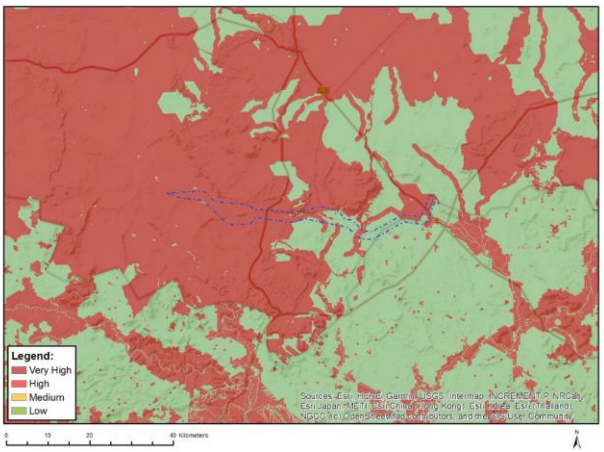


Figure 19: Terrestrial Biodiversity Sensitivity (Soutrivier grid).

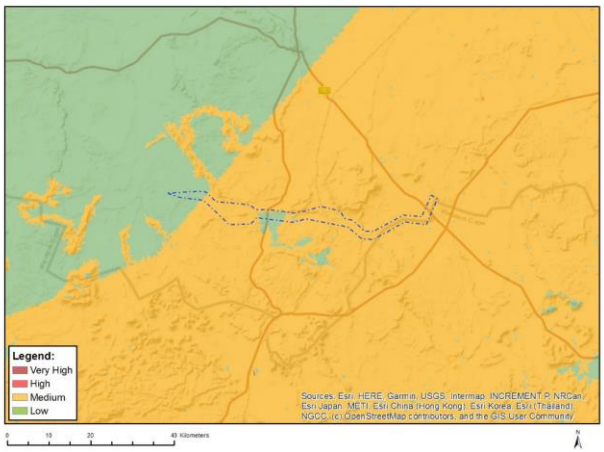


Figure 20: Plant Species Sensitivity (Soutrivier grid).

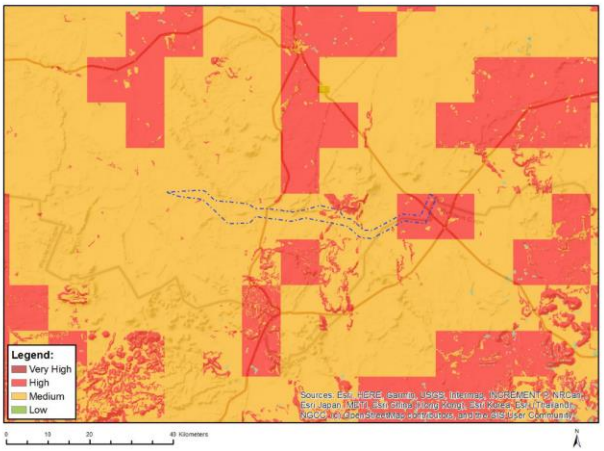


Figure 21: Animal Species Sensitivity (Soutrivier grid).

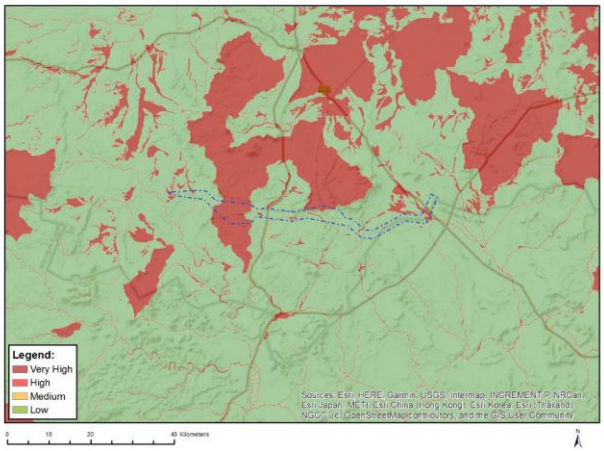


Figure 22: Aquatic Sensitivity (Soutrivier grid).

As apparent from the DFFE National Environmental Screening Tool, the following can be deducted:

1. The **Terrestrial Biodiversity Theme** is Very High, with Critical Biodiversity Area (CBA) 1 & 2, Ecological Support Area (ESA), National Protected Area Expansion Strategy areas and FEPA: quinary catchments covering most of the site and broader surrounding area.
2. The **Plant Species Theme** is Medium with a single species, namely *Sensitive species 945*, having a Rare (non-IUCN category) status possibly *occurring* in the vicinity of the site, requiring verification. Based on available information, this species appears to be associated with dolerite hills, generally more common to the south of the site but extending into the site as narrow hills or ridges. The species could also be found in rocky outcrops or outcrops on the slopes of hills but will require physical assessment on site. Two other species are modelled to possibly occur in the neighbouring area, potentially associated with the powerline route (*Isolepis expallescens* & *Hereroa concava*), but not specifically predicted to occur within the site boundary.
3. The **Animal Species Theme** is Medium with two possible terrestrial species identified, namely *the* Critically Endangered Riverine Rabbit *(Bunolagus monticularis*) and the Karoo Padloper (*Chersobius boulengeri*). A separate study is in progress relating to the Riverine Rabbit, which is usually associated with dry watercourses and associated surrounding riparian vegetation. The Karoo Padloper is likely to be more widespread and not necessarily associated with any habitat. Mitigation would most likely include search and rescue and speed control of vehicles. The black footed cat is also known to the west of Taaibos site with a confirmed sighting during the Riverine Rabbit camera trap survey, but not specifically predicted to occur within the site boundary.
4. The **Aquatic Theme** is Very High, due to the presence of numerous non-perennial watercourses and wetlands and a portion of Taaibos being within a FEPA quinary catchment. Such aquatic habitat is likely not suitable for construction of WEF footprints due to risk of seasonal flooding, however any infrastructure (such as road crossings) should be sited with due care to minimise impacts. A separate Aquatic Assessment will be conducted, however terrestrial ecological processes relating to fauna and flora will be considered in this reporting, as these seasonal features are an important ecological component of the landscape.

The site assessment will physically screen for the presence of these, and other possible species not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report. Avifaunal species are not specifically assessed as they are addressed in the separate Avifaunal report by the appropriate specialist.

NOTE: as per point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements:

> *'If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, **excluding linear activities** for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.'*

Based on the above reporting protocol condition, the grid connection 400 kV OHL component will to some extent fall into the above category, which implies that for a temporary linear activity, such as an overhead powerline, the screening tool designated high sensitivity should be reduced to a low sensitivity and only a complicated statement would be required. Remnant disturbance after completion of powerline construction will be nominal. This will not apply to linear but permanent access roads; however, as stipulated in the project description, the access roads will be cleared wider than required and the subsequent rehabilitated area would be returned to current state.

2.3.2 Vegetation of Southern Africa

The National Vegetation Map, as depicted in Figure 23 (see also Table 2), designates the project area to have predominantly Eastern Upper Karoo (NBA, 2019) with Upper Karoo Hardeveld associated with the doleritic mountainous areas in the surrounding areas, overlapping with portions of the site. Both units currently have a Least Concern status. The National Vegetation Map is not a fine scale mapping and discrepancies are expected. In this instance, Upper Karoo Hardeveld is more widespread than indicated and is found on higher lying koppies within the site, comprising areas too small to be represented on the National Vegetation Map. Eastern Upper Karoo is present on the extensive low-lying areas, having several distinguishable but overlapping communities, but generally comprised of a core suite of species. Elements of Bushmanland Vloere and Southern Karoo Riviere are represented in riparian areas, with Bushmanland Vloere in the northward draining areas at higher altitude (north-west areas) and Southern Karoo Riviere in the lower lying southward draining areas including around the proposed Soutrivier to Gamma substation OHL (south-east areas). Further information and on the communities are provided in the sections below and in Section 9.3: Appendix C: Systematic Planning Frameworks (as per Mucina & Rutherford, 2006). Several species are common to all or some vegetation units.

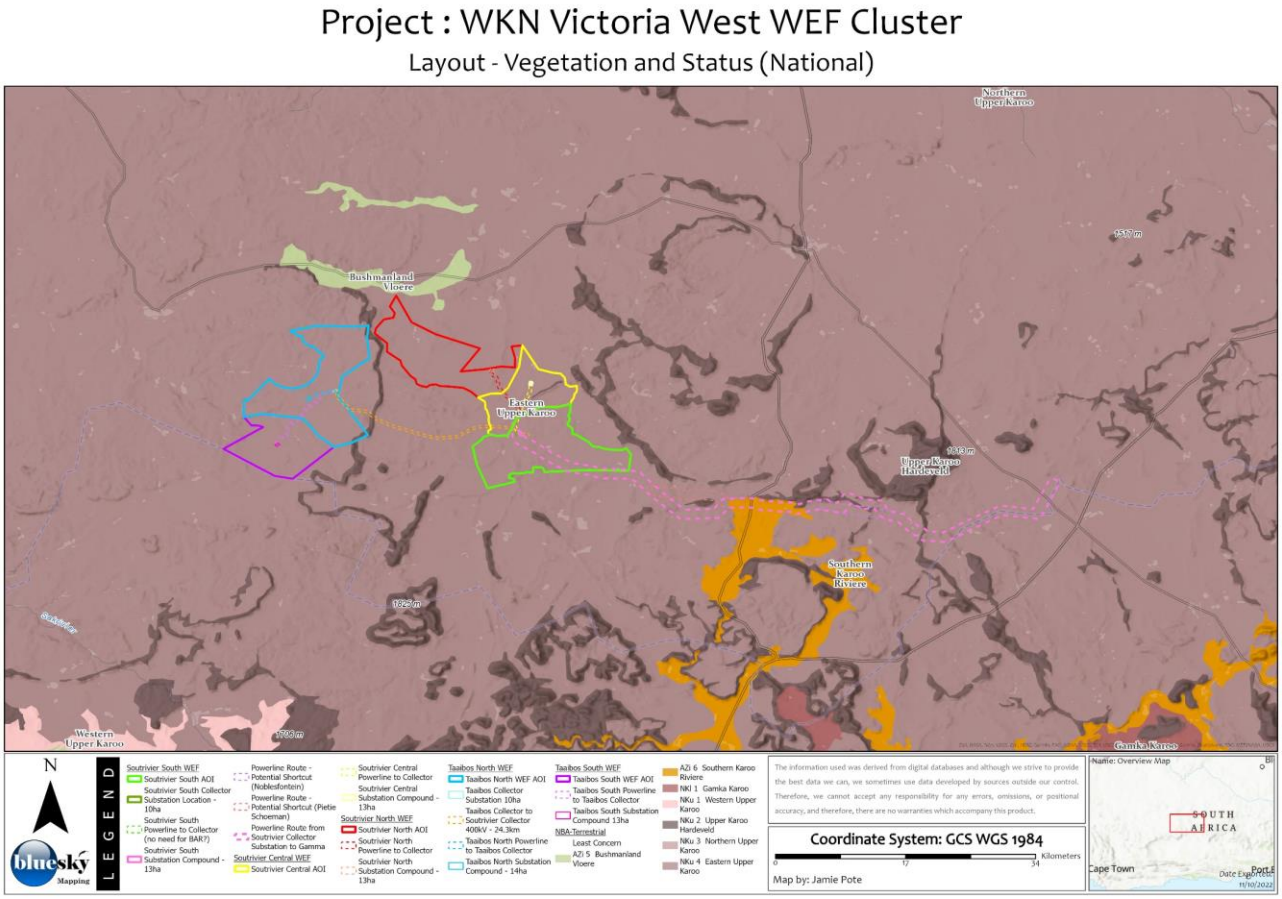


Figure 23: Vegetation of Southern Africa (National).

The project area is generally characterised by extensive low-lying flat-bottomed valleys tend to be grassier with slopes differentiated from the plains in that the vegetation tends to be woodier and at least on wetter aspect slopes and rockier slopes, containing a higher abundance of taller woody species. The grass component is largely similar to the plateau areas with some changes in abundance, with *Themeda triandra, Heteropogon contortus, Sporobolus fimbriatus* and *Digitaria eriantha* being especially prevalent. Typical occasional trees and shrubs include *Searsia erosa, Searsia ciliata, Euclea crispa, Colpoon compressum, Rhamnus prinoides, Diospyros austro-africana, Tarchonanthus minor, Maytenus undata, Euryops lateriflorus,*

Dicerothamnus rhinocerotis, Felicia filifolia and *Pentzia sphaerocephala*. Although the relative abundance of species of conservation concern within this habitat is relatively low, the slopes, usually comprising several steps or benches with rocky pavements and outcrops on the outer edge, are generally considered somewhat more sensitive on account of the slightly higher diversity of such areas as well as providing habitat for a range of smaller mammal and reptile species. The development footprint potential in this habitat is thus considered to be lower and although not considered a no-go area, should be avoided where possible. The minimum recommendation is to site roads back from the outcrop edges with the turbine and laydown area extending towards the edge (thus reducing overall impact to the outcrops/pavement edge). Specific case-by case assessments will be required in these instances.

A general description of the vegetation unit is provided in Section 9.3: Appendix C: Systematic Planning Frameworks (as per Mucina & Rutherford, 2006) as a reference point for the baseline vegetation composition.

The more mountainous and higher elevation areas (including along the western side of the Soutrivier site and the northern portion of the Taaibos site) have a distinctly cooler microclimate with a greater diversity of succulent and geophytic species noted. The plains of Eastern Upper Karoo are also interspersed with smaller mesas and inselbergs and although not having true Upper Karoo Hardeveld as described above, elements of this unit are distinctly present, giving it an intermediate composition and appearance.

Implications:

- Eastern Upper Karoo and Upper Karoo Hardeveld are not of conservation concern (Least Concern).
- The vegetation assessed on site is typical of the vegetation unit, refer to Section 3.1 for specific description.
- Several South Africa and Eastern Cape endemic species are recorded from the represented vegetation units, some having localised distributions and others are widespread. Refer to Sections 3.1.8 and 9.2.

2.3.3 National Biodiversity Assessment (NBA, 2019)

The National Biodiversity Assessment (NBA, 2019) is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005.

The status categorisation is based on a complex set of criteria, but for the purposes of this reporting, can be summarised as follows (NBA, 2019; IUCN RLE, 2017):

STATUS	DESCRIPTION
Least Concern	These ecosystems have lost only a small proportion (~more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).
Vulnerable	Vulnerable terrestrial ecosystems have lost some (~more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.
Endangered	Endangered terrestrial ecosystems have lost significant amounts (~less than 40 % remains) of their original natural habitat, so their functioning is compromised.

STATUS	DESCRIPTION
Critically Endangered	Critically Endangered terrestrial ecosystems have lost significant amounts (~less than 20 % remains) of their original natural habitat, and therefore considered to have an extremely high risk of collapse.

The outcome of the most recent National Biodiversity Assessment (2018) indicates that both Eastern Upper Karoo and Upper Karoo Hardeveld currently have a *Least Concern* conservation status, which indicates that more than 60 % of the unit remains, and that ecosystem functioning is not under imminent threat by loss of natural habitat. The Area of Occupancy (AOO) and the Extent of Occurrence (EOO) is indicated in Table 3 below. All units are currently poorly protected. There is a low level of utilization and transformation of these units due to minimal transformation in the broader, predominantly rural farming area. Overgrazing is cited as a main cause of ongoing degradation.

Table 3: Coverage and protection levels of vegetation units

Vegetation Unit	Cons Target	AOO	EOO	Protection Level (%)
Eastern Upper Karoo	21 %	737	100 898.5	Least Concern, Poorly Protected
Upper Karoo Hardeveld	21 %	608	97 559.3	Least Concern, Poorly Protected

Eastern Upper Karoo, where the majority of the project footprint will occur, is an extensive vegetation unit and the vegetation type has the largest mapped area of all vegetation units. The total project area (< 500 km^2) comprises less than 1 % of the total vegetation unit area and the actual project disturbance footprint (i.e. WEF turbine footprints, powerline, access roads, substations and other infrastructure) will an order of magnitude lower (i.e. approximately 10 km^2, which equates to approximately 0.01 % of the total national coverage of the vegetation unit.

Implications:

- Eastern Upper Karoo and Upper Karoo Hardeveld are not of conservation concern (Least Concern).
- Eastern Upper Karoo, where the majority of the footprint will occur, is an extensive vegetation unit and the vegetation type has the largest mapped area of all vegetation units.

2.3.4 Northern Cape Critical Biodiversity Areas (NC CBA, 2016)

The identification of Critical Biodiversity Areas for the Northern Cape (Figure 24) was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan (Desmet and Marsh, 2008), the Succulent Karoo Ecosystem Plan (Driver et al., 2003), national estuary priorities (Turpie et al., 2012), and the National Freshwater Ecosystem Priority Areas (Nel et al., 2011) were incorporated.

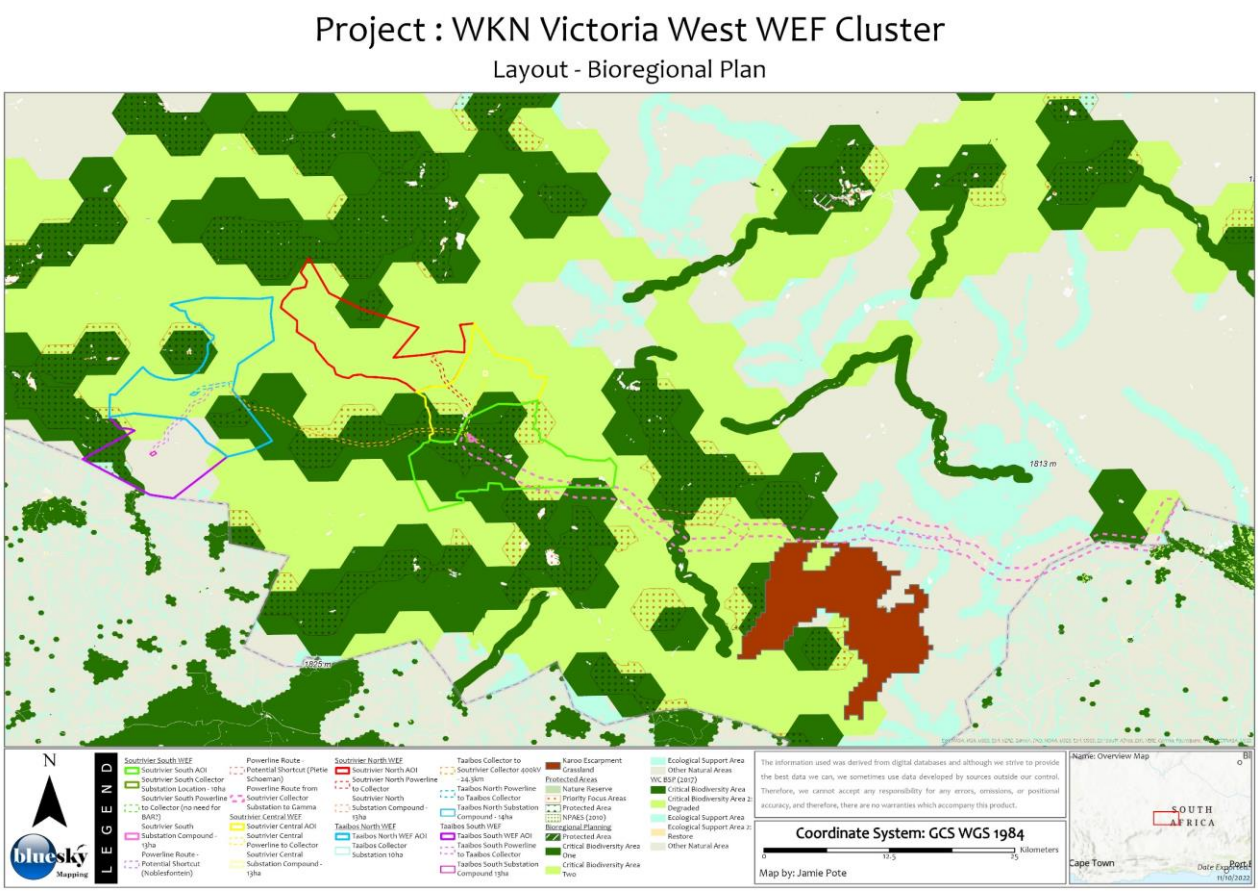


Figure 24: Provincial Regional Biodiversity Planning (Northern Cape and adjacent Western Cape along the southern boundary of Taaibos).

The project area intersects with Critical Biodiversity Area (CBA) 1 & 2 and Ecological Support Area (ESA) 1 designated areas as well as Other Natural Area. The specific component (Taaibos 400 kV OHL grid connection) is almost entirely within designated Critical Biodiversity Area.

Implications:

- The project area intersects with Critical Biodiversity Area (CBA) 1 & 2 and Ecological Support Area (ESA) 1 designated areas as well as Other Natural Area.
- CBA and ESA areas generally allow for limited linear infrastructure and the significance of such impacts to loss of habitat will likely be minimal because of the proposed activity.
- Fragmentation and loss of habitat within CBA and ESA, because of the development and associated infrastructure is likely to be minimal, as the footprint required for the powerline construction will be limited to pylon footprints and access roads, which will be negligible in relation to regional coverages.
- The impact to ecological processes associated with powerline construction are likely to be localised and not likely to be significant, as well as the fact that any disturbed areas, other than substations, are likely to rehabilitate to some extent within 2 years (as per terrestrial biodiversity reporting protocol).
- The proposed activity is unlikely to affect conservation targets and terrestrial ecological processes significantly, being the primary objective of designated CBA and ESA categories.

2.3.5 Western Cape Biodiversity Spatial Plan (WC BSP, 2017)

The proposed site is largely situated outside of the Western Cape, however a small portion of the proposed grid connection to Gamma substation will fall within the Western Cape province. The Western Cape BSP is thus included in reporting, however, is not relevant to this component of the larger project.

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

The CBA map (Figure 24) indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate areas that need to be safeguarded in order to meet national biodiversity thresholds; areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or important locations for biodiversity features or rare species. Critical Biodiversity Areas are present within the site or immediate vicinity. Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature.

Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) are present within the site or immediate vicinity. Table 21 provides a summary of defining criteria and recommended land uses of these designated classes.

Table 4: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2017).

CBA Map Category:	Defining Criteria
Protected Areas (Not present)	• Areas that are proclaimed as protected areas under national or provincial legislation. • Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.
Critical Biodiversity Areas 1 (CBA 1) (Not Present)	• Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. • Maintain in a natural or near natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.
Critical Biodiversity Areas 1 (CBA 2) (Not Present)	• Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. • Maintain in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.
Ecological Support Areas 1 (ESA 1) (Not Present)	• Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services. • Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.

CBA Map Category:	Defining Criteria
Ecological Support Areas 2 (ESA 2) (Not Present)	• Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services. • Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.
Other Natural Areas (ONA) (Not Present)	• Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem. • Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high-impact land uses.
No Natural Area Remaining (NNAR)	• Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still • provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action. • Manage in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high impact land uses.

This component of the project is outside of the Western Cape,.

Due to the arid nature of the area, watercourses are likely to serve as important ecological corridors, with a watercourse to the west and south of the site.

2.3.6 Succulent Karoo Ecosystem Planning (SKEP, 2003)

The Succulent Karoo stretches along the western side of South Africa and Namibia and is one of only two global hotspots that are entirely arid (Conservation International 2006). SKEP identifies four key planning domains considered to be of biodiversity importance, namely Namibia-Gariep along the Namibia border to the north, Namaqualand along the northern west coast, with Hantam-Tanqua-Roggeveld extending into the mountains of the Western Cape and the Southern Karoo extending further eastwards.

While the site is outside of these designated hotspot areas, as indicated in Figure 25, SKEP does identify two unspecified expert mapped areas that overlap with the site, including unspecified mammals and insects. The mammal sensitivity is most likely associated with Riverine Rabbit populations while the insect designation is unknown and is not carried further into the more recent systematic plans including the screening tool.

The natural vegetation of the Succulent Karoo provides a significant ecosystem service in the form of forage for livestock production. Livestock production has both monetary and social value. One threat to Biodiversity in the area is the less-than-ideal farming practices. Due to a lack of infrastructure, especially fencing, optimal farm management is not implemented. The main reason for this is that farms in the region have a low income because of the unfavourable and harsh environmental conditions. Farms in the region yield a low income because of the harsh environmental conditions and the unpalatable grazing. Additionally, the monetary value of the land is low and the cost of infrastructure so high that it is not financially viable for a farmer to invest too much in infrastructure as it will not be possible to recover these costs. There is willingness amongst farmers for improved farm management and infrastructure development; however, their financial means usually do not allow it (van der Merwe, 2008a). Although damage can happen fast, recovery in the Karoo is slow, because it depends upon unpredictable rainfall events (Esler et al. 2006).

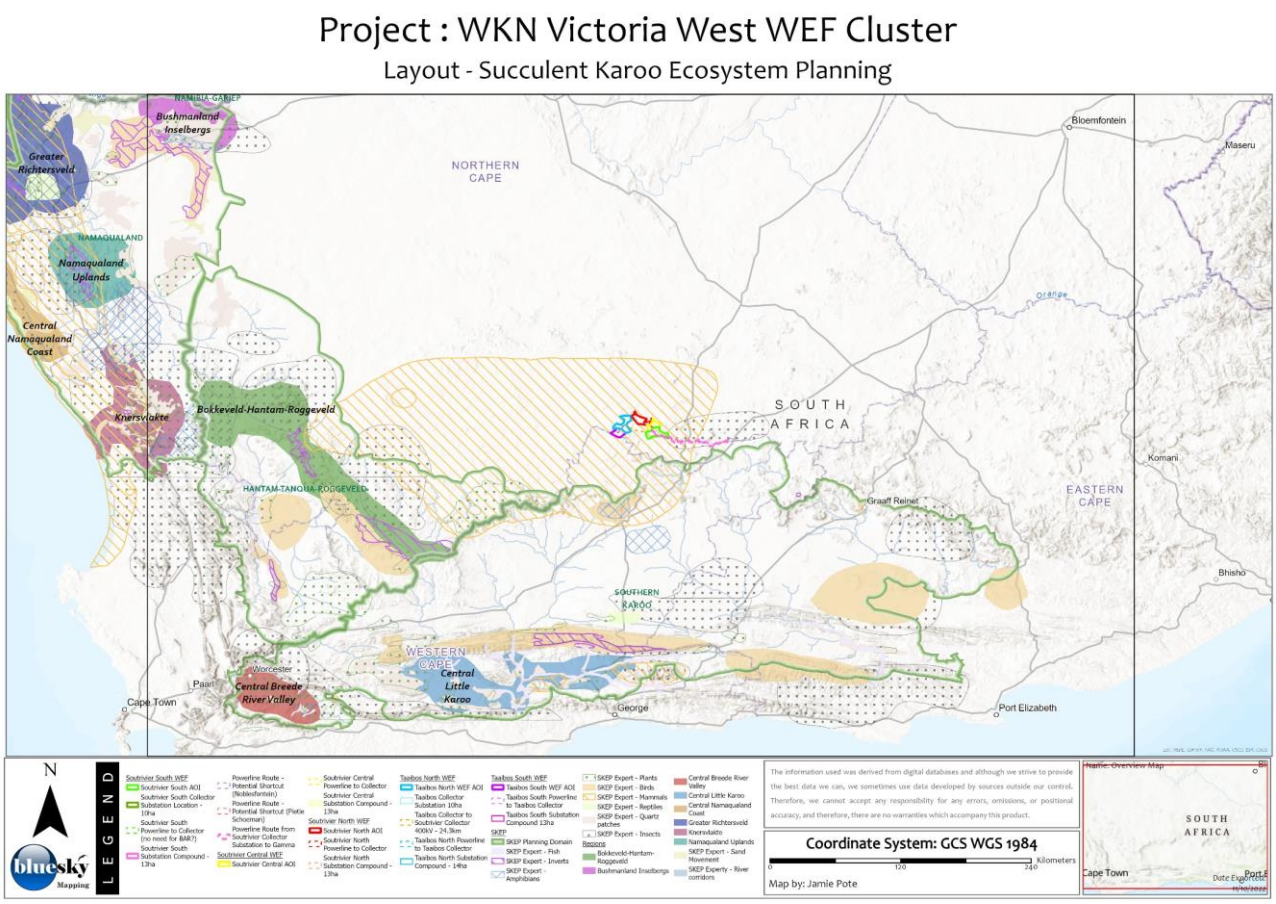


Figure 25: Succulent Karoo Ecosystem Planning.

A possible indirect impact of the powerline and associated WEF will be the ***diversification of income streams***, where the current landowners, currently dependant on grazing and tourism will on implementation receive remuneration from the WEF provider. This could result in a decreased dependence on livestock which could in theory have a positive impact on biodiversity where reliance on livestock grazing will be decreased, thus reducing grazing pressure on the vegetation. In addition, the provision of electricity to a currently constrained electrical network could also provide significant socio-economic benefits. These socio-economic benefits are currently not factored into conservation planning.

2.3.7 Namakwa Bioregional Plan (2008)

Located within the Succulent Karoo, one of only two semi-arid biodiversity hotspots in the world and exhibiting by far the highest plant diversity of any arid ecosystem. It covers both Succulent Karoo (winter rainfall) and Nama Karoo (summer rainfall) arid systems as well as a small part of the Mediterranean-climate Fynbos (and Renosterveld) in the extreme SW. Having both summer and winter rainfall arid zones means that it is an area containing an exceptional variety of biodiversity. The site is outside of the Namakwa Planning domain, although as is evident in Figure 26, some elements are in proximity at a landscape level to the west. This includes primarily Riverine Rabbit habitat, other ecological corridors, as well as unspecified critical sites, all outside of the project area.

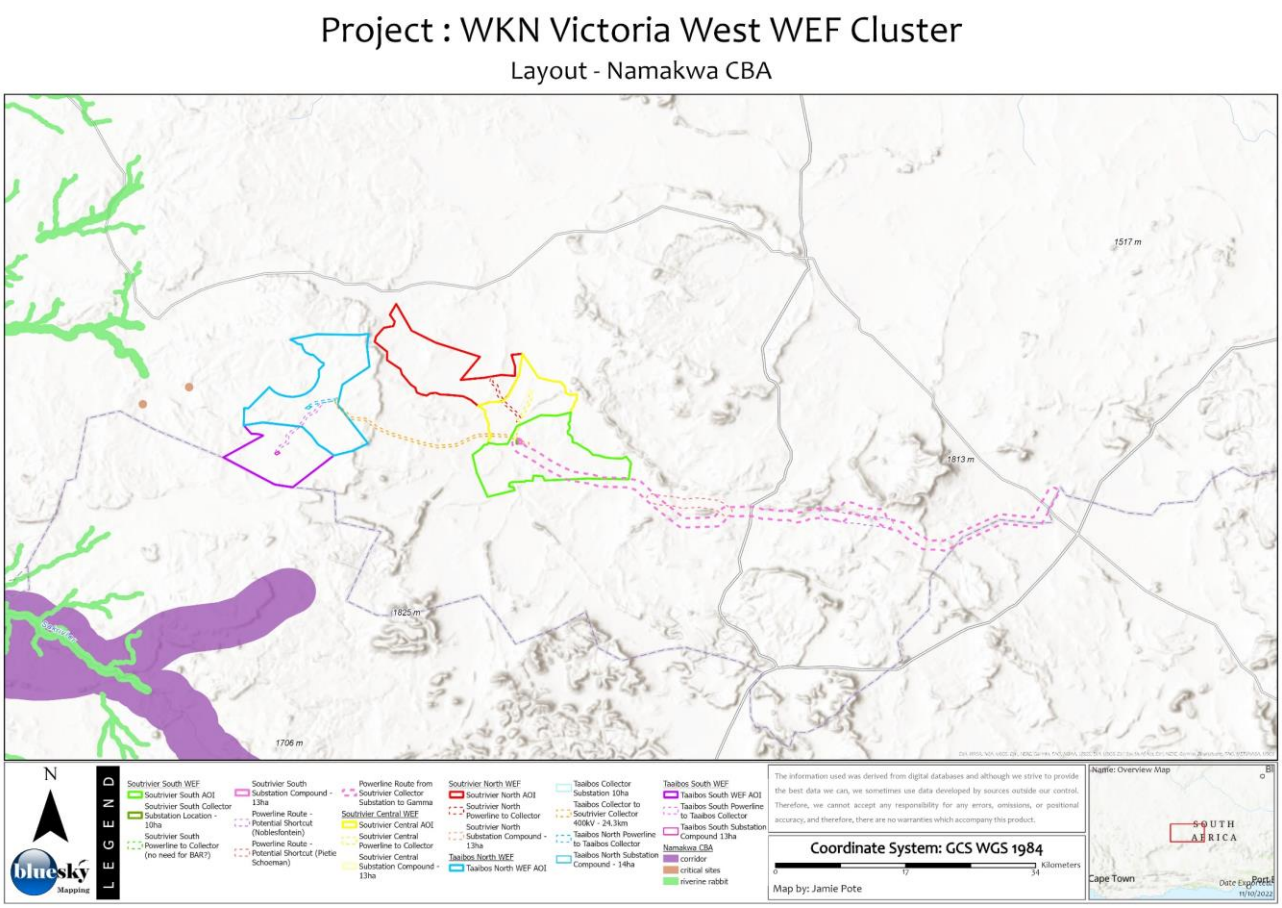


Figure 26: Namakwa Regional Plan Critical Biodiversity Areas.

The project is outside of the Namakwa Bioregional Plan planning domain.

2.3.8 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans.

2.3.9 Protected areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Figure 27, Table 5).

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

Table 5: List of Protected Areas in vicinity of the site.

NAME	DISTANCE
Victoria West Nature Reserve	28,9 km (NE)
Karoo National Park	53 km (S)
Mountain Zebra-Camdeboo Protected Environment	56 km (E)
Dr Appie van Heerden Nature Reserve	62 km (NW)
Steenbokkie Private Nature Reserve	70 km (S)

NAME	DISTANCE
High Karoo Park	72 km (E)
Platberg-Karoo Nature Conservancy (IBA)	88 km (NE)
Meerkat National Park	114 km (NW)

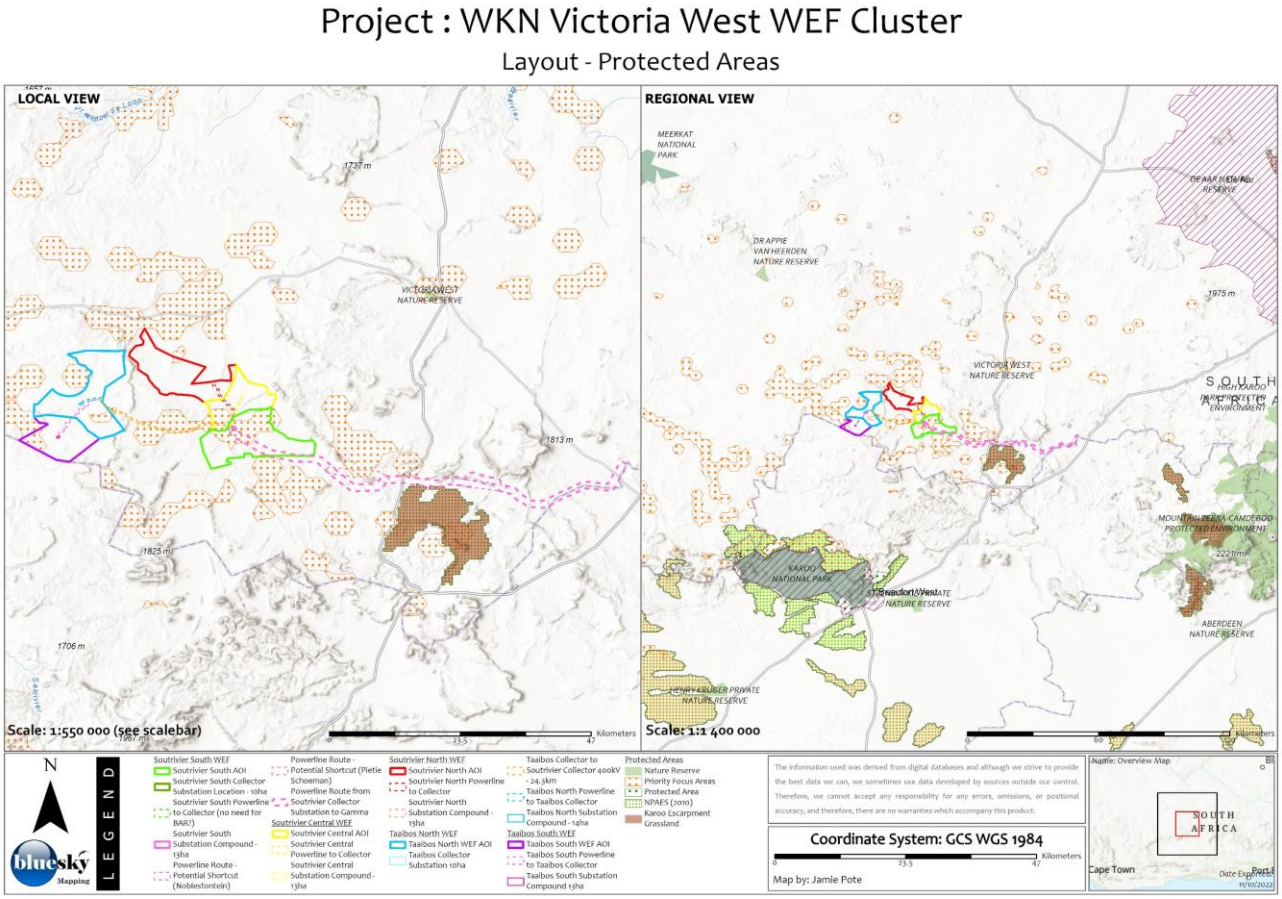


Figure 27: Protected Areas and NPAES in vicinity.

No protected areas nor any ecological processes associated with them are directly affected nor likely to be indirectly affected.

Implications:

- The activity will have no direct, indirect or cumulative impact on any protected environment.

2.3.10 Key Biodiversity Areas

Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment.

Implications:

- The proposed activity is situated outside of any *designated IBA's* and while the site may have occasional visits from transient bird or other faunal species known from nearby IBA's, no direct or indirect impact is anticipated. Refer to Avifaunal Assessment.

2.3.11 Rivers And Wetlands

The sites are bisected by an intricate network of drainage lines and watercourses, primarily non-perennial. As described above, the watercourse network (Figure 28) in the south-east corner of the general project area (area of influence) drains southwards into the Soutrivier, while the remainder of the site generally drains in a westerly and northerly direction in to the Brakrivier and Kleinbrakrivier ultimately joining with the Visrivier and Orange River far to the north-west. The Soutrivier drains southwards, becoming the Krom and ultimately the Gamtoos River in the Eastern Cape province to the south.

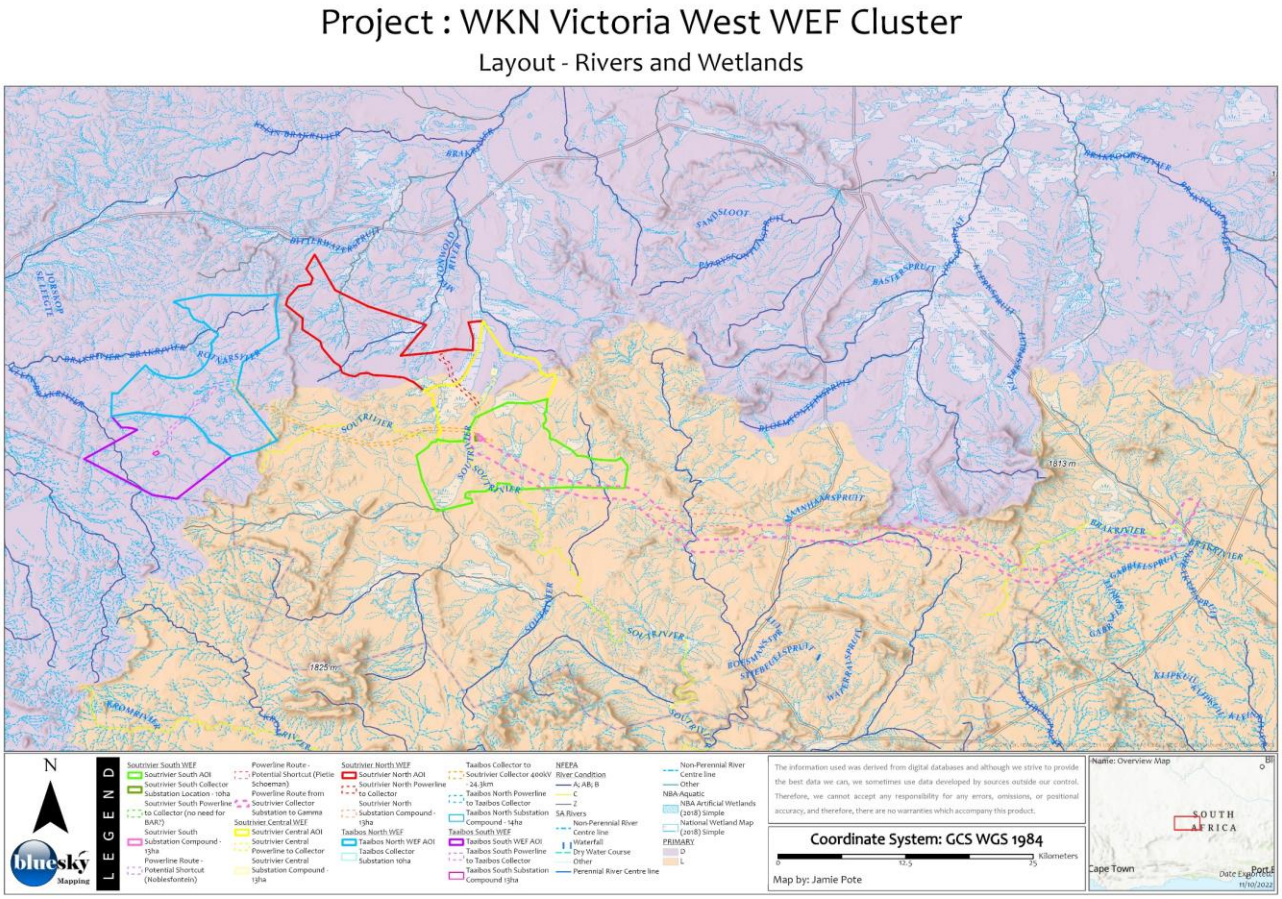


Figure 28 ; Rivers and Wetlands.

The watercourses are generally single narrow channels surrounded by extensive wetland/pan/seep areas that are seasonally inundated with standing water, some for short time periods, in the extensive flat-bottomed valleys. Within the site it is also noted that in some areas the extensive higher lying plateaus are often flat with extensive poorly vegetated pan-like areas noted to be present. Some of these are partially transformed for cultivation of grazing grasses. Refer to separate aquatic assessment for more comprehensive analysis.

Watercourses including rivers and drainage lines, as well as wetlands, pans and seep areas are an important and significant ecological component of the arid landscape, being an integral part of many of the faunal species' habitat.

Concerning terrestrial fauna and flora components associated with Freshwater Ecosystem Priority Areas, the project area abuts several watercourses, natural wetlands and artificial wetlands (dams), as per the National Biodiversity Assessment wetland map (NBA, 2019). The site assessment will include any wetland or riparian habitat that is not depicted in the national wetlands map (See Section 3.1.4: Aquatic Habitat).

Implications:

- The national wetland map indicates numerous wetlands within the project area. Refer to Section 3.1.4: Aquatic Habitat for site assessment findings.

Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or '*FEPAs*'.

The watercourses within the project are that have a designated NFEPA status (Brakrivier, Klein Brakrivier, Soutrivier, Meltonwold River & Kookfonteinspruit) are all Class B: Largely Natural.

Strategic Water Source Areas

Strategic water source areas (Figure 28) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

The project area is not situated within any Strategic Water Source Area, and the specific activity is unlikely to have an impact on any Strategic Water Source area, as it will not alter water flows.

Implications:

- There is unlikely to be any significant impacts to any critical water supply to downstream economies and urban centres because of development of this site, which is small in size and will not significantly affect water flow or catchment runoff.

2.3.12 Regional Planning Summary

In summary the Regional Planning risks and issues pertaining to the project area include the following, to be read in conjunction with respective sections and maps provided in the respective report sections:

1. **Critical Biodiversity Area 1 (CBA 1)** – CBA 1 designated areas are those that have been identified as priority areas to be retained in order to meet conservation targets. The land use guidelines for CBA 1 designated areas recommend no further development. The designation may not necessarily be based on

the condition of the habitat, species composition, ecological connectivity, or overall ecological value since it is largely based on a statistical analysis process.

2. **Critical Biodiversity Area 2 (CBA 2)** – As for above, however these areas are deemed to be degraded but deemed priority areas. The land use recommendations for CBA 2 designated areas are broadly speaking restore and maintain to meet conservation targets. Since available area within the site boundaries that is not categorised as CBA 1 or CBA 2 is limited and inadequate, the most suitable or least risky area for utilisation will be the CBA 2 designated areas.
3. **Aquatic CBA and/or Freshwater Ecosystem Priority Areas** – the southern portion of the Taaibos site is designated FEPA. Refer to aquatic assessment for recommendations, but terrestrial impact is unlikely to be a significant consideration in this area in comparison to other areas, as long as water flows are not substantially altered.
4. **National Protected Area Expansion Strategy Areas (NPAES)** – No National PAES areas overlay with the site, however the DFFE screening tool indicates PAES areas that overlap to some extent with the designated CBA 1. The source of this dataset is unknown at this stage and further investigation will be required during the detailed assessment stage.
5. **Dry Watercourses and Rivers** – These areas will largely not be suitable other than for road and powerline crossings as they would be subject to seasonal or occasional flooding, which would pose a risk to infrastructure. Also, the dry riverbeds provide potential habitat for the Riverine Rabbit and are furthermore deemed to be ecologically important regionally and could be considered critical habitat since the site is within an arid region and watercourses will be irreplaceable in particular for faunal species. Riparian areas are generally not a priority in terms of flora biodiversity and species of conservation concern but are important faunal habitat. Further recommendations will be provided in the sensitivity assessment below. As a minimum a 32 m buffer from the edge of all watercourses should be adhered to, other than for linear features such as road crossings.
6. **Rocky Dolerite Hills, Ridges, and Outcrops** – Rocky outcrops or pavements, rocky ridges and rocky hilltops and slopes potentially provide habitat for numerous geophytic and succulent plant species, possibly including *Sensitive Species 945*. They are often localised or in steep areas on or at the crest of hillslopes or benches. Micro siting of WEF footprints will likely be required, however the first step will be to survey and assess the outcrops occurring within the site to identify and understand the risks. The recommended approach would be to minimise footprint within these areas as far as possible but further recommendations are provided in the sensitivity assessment below.

The total project footprint will be a small proportion of the total project area (~50 000 Ha) and the approach followed in the assessment will be to try and locally mitigate impacts to CBA as far as possible and try to demonstrate that the loss of Critical Biodiversity Areas is not consequential to conservation targets. The implication and outcome will be subject to due process during the assessment and application process, so is an unknown at this stage.

The following can be summarised regarding the specific site and component (Taaibos grid connection including OHL):

1. Situated almost entirely within Critical Biodiversity Area with a short portion within Critical **Biodiversity Area 2**.
2. The 33/132 OHL route is largely within Karroid vegetation, but will traverse several low-lying watercourses with associated riparian vegetation and elevated Mesal (koppies) and mountainous areas having Hardeveld.
3. No alluvial areas of significance are present along the specific OHL route.

3 Biodiversity Risk Identification and Assessment

3.1 Baseline Biodiversity Description

3.1.1 Site Locality

The proposed Victoria West WEF cluster projects consist of two extensive areas, namely Taaibos to the west and Soutrivier to the east, in an extensive low-lying area, surrounded by and intersected by several mountainous ranges (*Figure 29*).

The project area is situated to the south of the R63 road that connects Loxton in the west and Victoria West in the east, within the Northern Cape Province and the overall project area covers an area more than 1 000 square kilometres.

The application is being undertaken in several separate components and this specific report pertains to the Taaibos 400 kV grid connection application, which connects the proposed Taaibos WEF (refer to separate report) to Soutrivier substation in the east. This substation will then connect via a 400 kV grid connection to the Gamma Substation located near the intersection of the R63 and N1 roads, to the south-east of Victoria West and adjacent to the Western Cape province boundary (refer to separate application and terrestrial biodiversity assessment report).

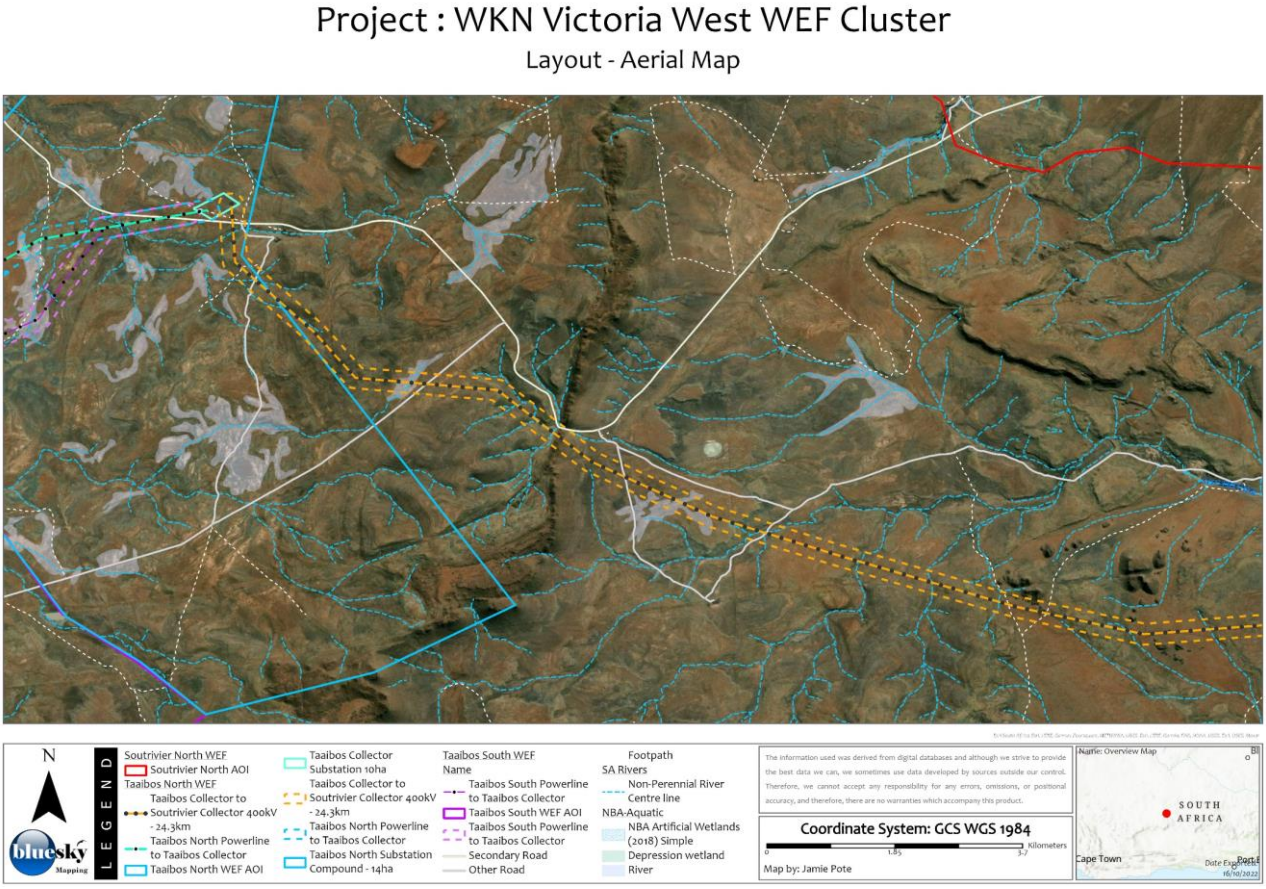


Figure 29: Aerial Photo of the site and surrounding area (west) - Orange.

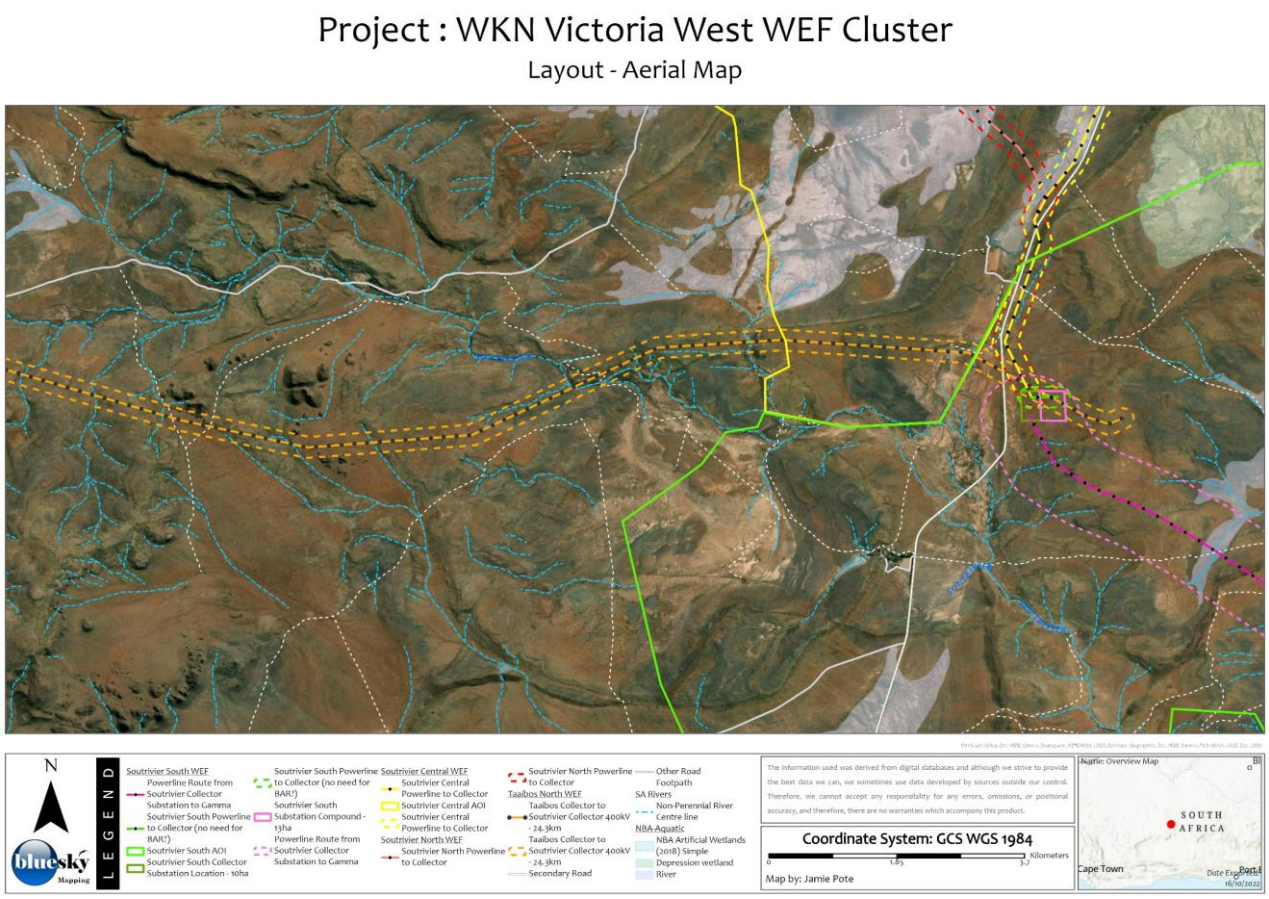


Figure 30: Aerial Photo of the site and surrounding area (east) - Orange.

3.1.2 Topography and Drainage

The project area falls within a flat and gently sloping plains incised by a network of perennial and non-perennial watercourses and interspersed with hills and rocky areas.

3.1.3 Terrestrial Landscape Features (Habitat)

Overview

Within the broad vegetation unit(s) expected on the site (Eastern Upper Karoo and Upper Karoo Hardeveld), several distinct communities can be differentiated (Figure 33 to Figure 58), although the species composition is largely similar across the communities, being distinguishable by significant differences in the respective dominance of these species and biophysical characteristics. In general, low lying (valley bottom) sandy areas are characterised by abundance of grasses such as *Aristida congesta, Aristida diffusa, Sporobolus fimbriatus, Stipagrostis ciliata, Chloris virgata, Digitaria eriantha, Fingerhuthia africana, Heteropogon contortus* and *Themeda triandra.* Several shrub and herbaceous species are present but are generally sparse, but these shrubs become abundant in rocky areas such as on slopes and rocky benches, with the grasses becoming sparse. These include *Eriocephalus ericoides, Chrysocoma ciliata, Diospyros austro-africana*, *Euclea crispa, Rhus spp., Grewia occidentalis, Gymnosporia polyacantha, Asparagus suaveolens, Euryops empetrifolius, Felicia filifolia* and several *Helichrysum spp.*

While trees are not common it is noted that small (usually 2 – 3 meters) trees including *Diospyros austro-africana, Euclea crispa subsp. ovata* and *Rhus spp.* do occur, predominantly around watercourses (riparian) but also scattered across the landscape, sometimes associated with low hills. Such scattered trees, being sparse are likely to provide roosting and nesting sites for a range of species. Numerous other species including geophytic and succulent species are represented within the landscape, but composition varies across the

landscape and also with altitude and substrate. Several common species are found to have a widespread distribution across the area, but others were noted to be localised often comprising a few individuals. Such species are not common and although specific identification is not complete at this preliminary stage, they are not expected to pose any significant risk to the project. Should any be found to be of elevated conservation concern, they may or may not overlap with a few turbine footprints, which may require some adjustment to layouts but is unlikely to pose a risk at a project level.

A series of overview photographs of each of the communities and/or features representative of the site are provided in Figure 33 to Figure 66. Generally, the landscape is comprised of a series of elevated plateaus across the site that have stepped or benched slopes merging the flat bottomlands that are drained by a complex network of watercourses. Surrounding the watercourses, where flatter conditions permit, extensive sandy alluvial pans are present with low vegetation cover. These areas appear to have standing water present for limited periods after rainfall, hence they function to some extent as wetlands/pans. In addition, the upland plateaus are sometimes also flat to slightly bowl-shaped and also have alluvial pans present. The aquatic assessment will assess the aquatic sensitivity further, however in terms of terrestrial biodiversity, these alluvial pan areas will serve as important habitat for faunal species, in particular after rainfall for the short period while water is present. The broader landscape is further intersected by numerous dolerite dykes, some of which form linear narrow inselberg ridges as well as single or clustered mesas (koppies). Most of these koppies tend to have large boulders on the top and it was noted that most have evidence of habitation by the Rock Hyrax/Dassie (*Procavia* sp.) and Red Rock Rabbit (*Pronolagus* sp.), neither being under threat. Vegetation on these koppies is notably infested with several weed species of the type having sticky seeds, most likely spread by the rabbit and rock hyrax. Vegetation is an intermediate type between Eastern Upper Karoo and Upper Karoo Hardeveld. The more extensive and elevated dolerite areas have more typical Upper Karoo Hardeveld, most being in the area surrounding the site, but extending into the site on the northern boundary of the Taaibos site and the eastern edge of the Soutrivier site. These steep mountainous areas are likely not suitable for the proposed activity.

While composition is somewhat uniform in term of species composition, there is variation across the site dependant on elevation and substrate. In general, the hills and slopes are rockier while the bottomland plains and flatter plateaus and have deeper sandy soils. Where vegetation is sparse, it is usually an indicator of temporary standing water after rainfall, giving such areas alluvial pan characteristics. While the aquatic specialist will define the aquatic processes and value, such areas are none the less important as water source areas for fauna so any impacts should be kept to the minimum as far as possible.

The following habitats have been differentiated in the vegetation mapping, which are described in more detail below (component in bold are present on this specific component (Taaibos 400 kV OHL):

1. **Karroid** – present on slopes and valleys having sandstone and mudstone derived, mostly sandy soils, most prominent vegetation community within the project area. Can be differentiated into a grassy and shrubby form at opposite end of a spectrum.
2. **Hardeveld** – present on elevated Doleritic mountaintops, some elements extend into lower Dolerite koppies or Mesas.
3. **Alluvial** – poorly vegetated areas occurring in flat poorly drained areas, lower lying and in upper plateaus.
4. **Riverine** – riparian and vegetation band surrounding watercourses where lower zone vegetation tends to be poorly developed and upper zone more vigorous compared to surrounding vegetation matrix.
5. **Wetland/Pan** defined wetland or pans on flat poorly drained areas.
6. **Dam** – man made impoundments or artificial wetlands.
7. **Cultivated/Transformed** – areas used currently or historically for crops and/or other hardened surfaces (roads, residences, etc.).

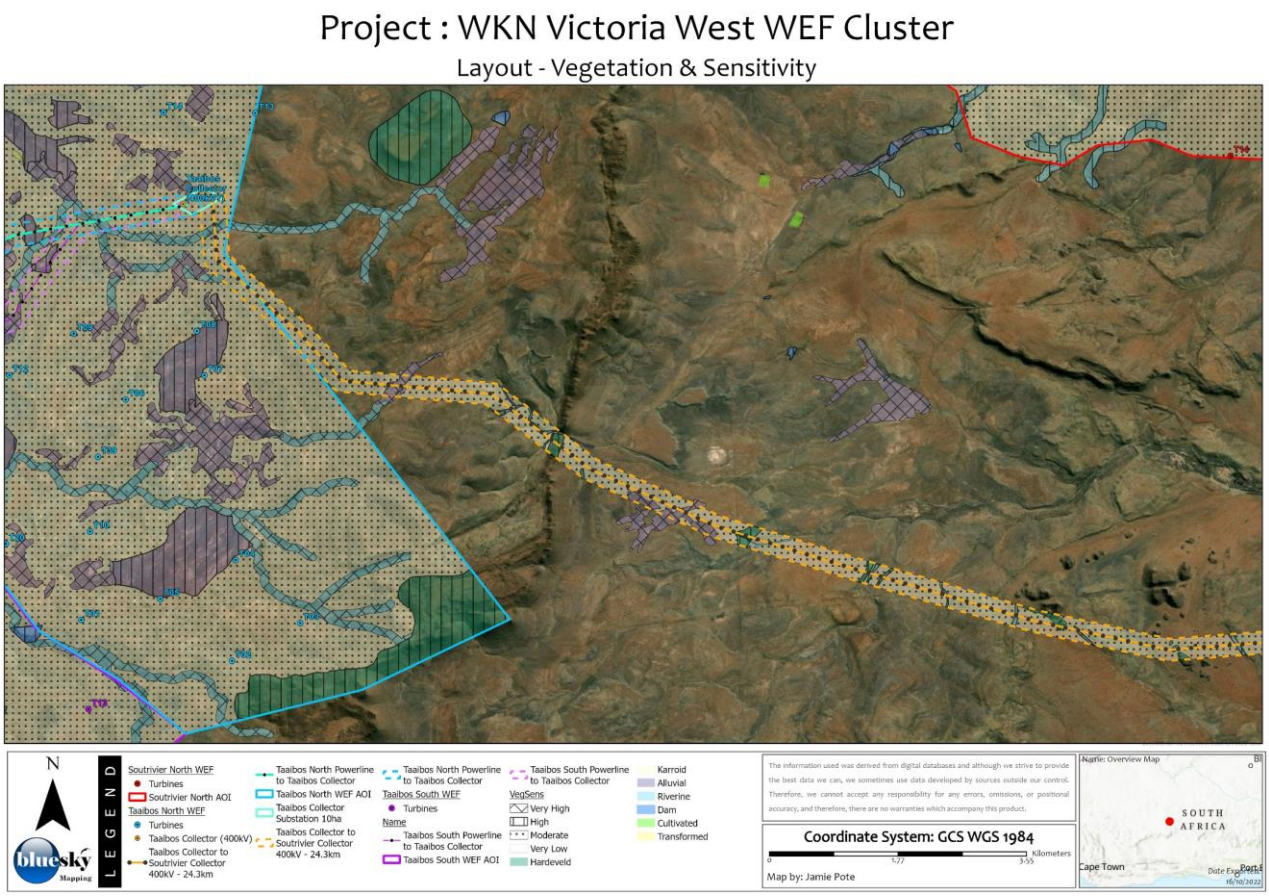


Figure 31: Aerial Photograph of the site with mapped vegetation (west) - Orange.

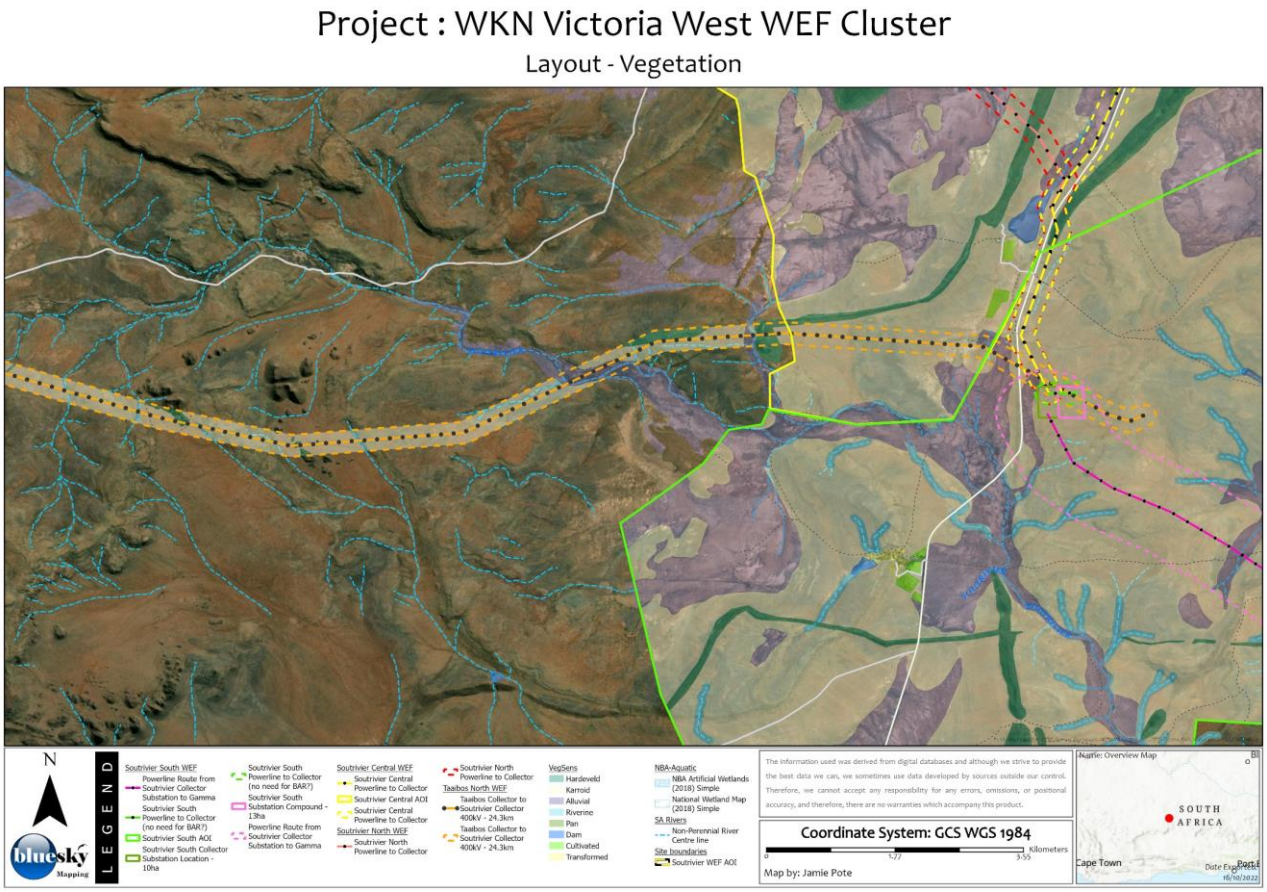


Figure 32: Aerial Photograph of the site with mapped vegetation (east) - Orange.

The specific site and component (Taaibos 400 kV grid connection including OHL and substations) overlaps primarily with Karroid vegetation. Several watercourses are traversed by the OHL but minimal alluvial areas. It also traverses several mountainous areas and across patches of Mesas (koppies) where there is an elevated ecological sensitivity. Final positioning must avoid having pylons directly within or on these features as far as possible. The 400 kV OHL pylons must be placed outside of Riparian and Alluvial areas and the specific substation footprint must be sited to avoid any prominent rocky outcrops, as far as possible.

Karroid

The main vegetation community within the site, which corresponds to and is typical of the broad Eastern Upper Karoo vegetation unit and comprises most of the project area, encompassing an estimated 60 % of the landscape. Comprised of several overlapping communities at opposite ends of a spectrum, mostly based on biophysical properties, from a grassier form in sandy areas (the valleys and on the flatter plateaus) to a shrubby form dominated by dwarf microphyllous shrubs, in rockier areas (generally on slopes and rockier areas on the plateaus but also in lower lying areas), where poor and shallow soils tend to be less favourable for vigorous grass growth.

These communities tend to consist of the same widespread species, but the relative proportion of each differs (i.e., grass species tend to be dominant in the sandy areas, whereas shrub, herbs and small trees dominate in the rockier areas, but shrubs and grasses are still present in the respective units). Relative grass and shrub composition is also influence by land-use, specifically grazing. These communities are not differentiated in the mapping as they tend to represent opposite ends of a spectrum. The specific communities that are differentiated below (Rocky Outcrops, Hardeveld, Riverine, Alluvial & Pans) are generally all variations of this unit but with some differences in terms of flora structure and composition which also have implications in terms of faunal habitat.

Figure 33: Typical Karroid vegetation (grassy form).

Figure 34: Typical Karroid vegetation (grassy form).

Figure 35: Typical Karroid vegetation (shrubby form).

Figure 36: Typical Karroid vegetation (shrubby form).

In the grassier community, the Karoid community is represented by a dominant grass component including the typical 'white' grasses, including *Aristida adscensionis*, *Aristida congesta, Aristida diffusa, Eragrostis chloromelas, Eragrostis curvula, Eragrostis lehmanniana, Eragrostis obtusa, Cynodon incompletus, Enneapogon desvauxii, Sporobolus fimbriatus* and *Tragus koelerioides*. Shrubs and herbs are present and comprised the same species as indicated below for the shrubby community, but in a low proportion.
The shrubby community is generally dominated by herbaceous species including *Chrysocoma ciliata, Eriocephalus ericoides, Pentzia incana, Felicia muricata, Gnidia polycephala, Helichrysum lucilioides, Rosenia humilis* and *Ruschia intricata,* with shrubs and small trees including *Lycium cinereum, Lycium pumilum, Searsia erosa, Searsia ciliata, Euclea crispa, Colpoon compressum, Rhamnus prinoides, Diospyros austro-africana, Tarchonanthus minor* and *Maytenus undata.* The typical suite of regional grasses are present but are generally sparse.

Succulent and geophytic species are also common such as *Drosanthemum lique* and *Trichodiadema barbatum* but also sparse and scattered including *Moraea pallida, Moraea polystachya, Syringodea bifucata, Syringodea concolor, Psilocaulon coriarium, Tridentea jucunda, Tridentea virescens, , Boophone disticha, Aloe broomii, Adromischus humilis, Albuca setosa, Drimia intricata, Lachenalia aurioliae* as well as numerous other species. These succulents and geophytic species also tend to be more prolific in rocky outcrops as described below.

This Karroid vegetation community is found on the lower lying valleys, on hilly slopes between the lowlands and the upland plateaus as well as on the plateaus and are the most favourable area for turbine footprint placement for several reasons, being found to occur in a widespread area, being somewhat uniform in composition, generally not having any significant populations of flora species of elevated conservation concern or faunal species of conservation concern that occur in dense populations. The conservation status of the unit is also considered to be of *Least Concern* and being such a widespread and uniform vegetation unit, considerable natural and near natural areas surround the site, providing plentiful suitable habitat to accommodate ecological process requirements and to meet conservation targets.

Rocky Outcrops

Generally comprising the shrubbier vegetation form as described above dominated by herbaceous species with a sparse grass component which are present but significantly less abundant and usually comprising an occasional tuft or clump in cracks and crevices where soil has accumulated.

Figure 37: Typical sandstone and shale outcrops with scattered rock.

Figure 38: Typical sandstone and shale pavement outcrops.

Figure 39: Typical overhanging sandstone and shale outcrops on slopes and summit edges.

Figure 40: Typical overhanging sandstone and shale outcrops on slopes and summit edges.

Figure 41: Typical Dolerite outcrops on scattered Mesas (koppies).

Figure 42: Typical Dolerite outcrops on linear Inselbergs or ridges.

The succulent and geophytic species found in the broader vegetation unit described above are also significantly more common in rocky outcrop areas and include the species *Moraea pallida, Moraea polystachya, Syringodea bifucata, Syringodea concolor, Psilocaulon coriarium, Tridentea jucunda, Tridentea virescens, Boophone disticha, Aloe broomii, Adromischus humilis, Albuca setosa, Drimia intricata, Lachenalia aurioliae* as well as numerous other species as indicated in the species list.

These outcrops also provide a range of faunal habitat and refuges scattered across the more uniform Karroid landscape. The preferred habitat for the Karoo Padloper tortoise includes the dolerite outcrops which will provide shelter but is expected to extend into the sandstone and shale outcrops.

The hilly slopes between the lowlands and the upland plateaus are generally comprised of a series of benches or steps with rocky pavements towards the outer edge of the bench, becoming an outcrop skirt around the edge nearer the summit. While not of elevated conservation concern, several (occasional) succulent and geophytic species are found to occur sporadically indicating across the site, indicating the potential risk for the presence of a species of elevated conservation concern, none of which were confirmed to be present during multiple seasonal surveys. As such, while the slopes, benches and plateaus are most likely the most favourable area for turbine footprints, the recommendation is to keep access roads back from the edge (i.e., away from the rocky pavements and outcrops) but having the turbines extending towards the edge. This will need ot be refined once actual footprints are designed and contour information is available. While not considered critical habitat for any specific flora or fauna species, the advised approach would be to minimise any loss as far as possible. Where any footprints or portions of footprints including turbines, substations,

pylons or access roads are situated where they overlap with such outcrops, all efforts should be made to shift to minimise loss of outcrops, in particular the outcrops that provide cracks and crevices that would serve as habitat for faunal species, including reptiles and in particular the karoo Padloper tortoise.

Hardeveld

True Hardeveld vegetation is present on the high-lying doleritic mountain ridges that surround the site and intrude in several places as indicated on the maps provided. The site is intersected by numerous small doleritic mesas (koppies) and inselbergs (ridges) that are often topped with small dolerite boulders. The vegetation found here, while still having elements of the karroid vegetation (Eastern Upper Karoo), also shares some elements of the Upper Karoo Hardeveld, although the cooler slopes on the elevated mountains typical for the unit tend to have a higher species diversity and more aligned with Upper Karoo Hardeveld than those found to occur on the site. The dolerite hills within the site, tend to also have a slightly more developed woody component and have several species present that are not typically found in the surrounding lowlands. Grasses and shrubs tend to occupy more or less equal compositions in these areas, possibly due to slightly cooler temperatures and slightly moister conditions possibly elevated by occasional mist or low cloud.

Figure 43: Higher altitude mountains peripheral to the site where typical Hardeveld vegetation occurs.

Figure 44: Higher altitude mountains peripheral to the site where typical Hardeveld vegetation occurs.

Figure 45: Elevated Meses and Inselbergs within the site having Hardeveld elements.

Figure 46: Elevated Meses and Inselbergs within the site having Hardeveld elements.

Typical species include the typical grasses *Aristida adscensionis, Aristida congesta, Aristida diffusa, Cenchrus ciliaris, Enneapogon desvauxii, Eragrostis lehmanniana, Sporobolus fimbriatus* and *Stipagrostis obtusa, with the herbaceous component comprising a diverse range of species but including Dianthus caespitosus, Lepidium africanum, Pelargonium minimum, Sutera pinnatifida, Lycium cinereum, Cadaba aphylla, Diospyros austro-africana, Ehretia rigida, Rhus burchellii, Aloe broomii, Faucaria bosscheana, Pachypodium*

succulentum, Zygophyllum flexuosum, Albuca setosa, Cheilanthes bergiana, Drimia intricata and *Oxalis depressa.*

These topographic features are associated with eroded dolerite dykes that bisect the landscape, and the resulting elevated mesas (koppies) and inselbergs (hilly ridges) tend to be steep and/or small in area, most being unsuitable to the proposed activity anyway. The elevated Mesas and inselbergs cover a significantly lower proportion of the area compared to the surrounding Karroid vegetation mosaic and although not having an elevated conservation status, they are deemed to have elevated sensitivity due to the niche habitat they provide, including flora species of conservation concern as well as are preferred habitat for faunal species such as the Karoo Padloper tortoise. Slope is also likely to constrain use for positioning turbines, importantly as a larger cut and fill footprint would be required to obtain the levels required.

Riverine

A lusher riverine vegetation is generally found on the banks surrounding watercourses and rivers, usually confined to valleys or up the sides of hills. This Riverine designation extends to include sporadic patches of typical riparian vegetation including clumps of sedges and reeds and occasional reedbeds, usually where occasional pools are present surrounded by an outer fringe of shrubby vegetation sometimes with small trees. Watercourses are generally skirted by a band of shrubby vegetation with occasional clumps of sedges and reeds, varying in width depending on the size of the watercourse. In lieu of there being a sperate aquatic assessment this report does not differentiate between upper and lower zone riparian vegetation, as it is deemed to function as a unified semi-aquatic community. Contiguous bands of trees and vegetation on the banks of watercourses is likely to provide a niche habitat for several faunal, including bird, species.

Smaller channels were noted in the karroid areas as well which cannot be easily delineated from aerial photos, so this will need to be addressed once the preliminary layout is available. Riverine areas would typically not be suited for large scale infrastructure (such as turbines and laydown areas) other than road crossings and powerlines. Furthermore, being an arid region and the ecological value of aquatic features and general lusher growth in riverine areas they will be more important for a diverse range of faunal species including amphibians which would generally be excluded from the surrounding drier karoid habitat.

Figure 47: Typical watercourse with vegetated fringe sometimes including trees not typical of the landscape.

Figure 48: Typical watercourse with developed sedge reedbed.

Figure 49: Typical watercourse with vegetated fringe.

Figure 50: Typical minor drainage line with less pronounced vegetated fringe.

Alluvial Areas

Extensive alluvial (sandy) areas that are subject to seasonal flooding after rainfall, in some areas this would be in the form of surface wash into watercourses, but an extensive proportion of the site is covered by alluvial deposits in flat areas that likely form temporary pans for short time-periods after rainfall. These conditions will likely stimulate a proliferation of invertebrate activity, and they are noted to have prolific bird activity after rainy periods. Although generally sparsely vegetated the extended wet conditions are likely to promote a longer growth period for vegetation and will thus also serve as an extended grazing and browsing source for mammals and other fauna.

Figure 51: Typical alluvial area after rainfall with standing water for extended periods.

Figure 52: Typical alluvial area with sparse vegetation.

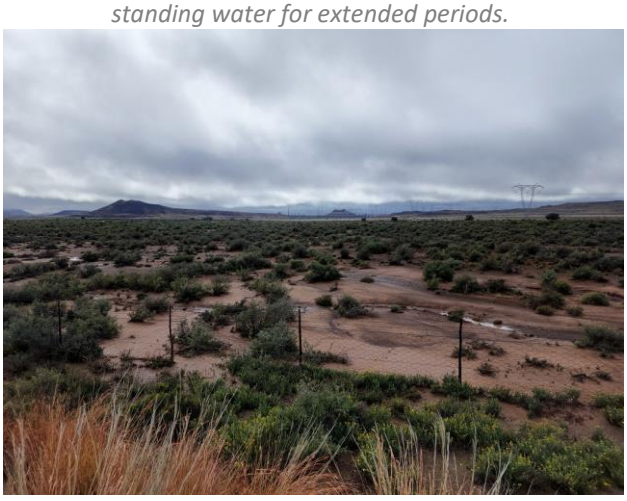


Figure 53: Typical alluvial area with sparse vegetation.

Figure 54: Typical alluvial area with sparse vegetation.

Figure 55: Typical alluvial area after rainfall with standing water for extended periods.

Figure 56: Typical alluvial area with sparse vegetation sometimes having distinct pan like properties.

The vegetation cover tends to be sparse in these areas, making them clearly visible, having the same composition as the surrounding grassy karroid vegetation form. The lack of vegetation is an indication of the seasonal flooding and may also be subject to accumulated salts. Some areas were noted to have planted rows of grass (Smuts finger grass, *Digitaria eriantha*), most likely attempts by landowners to either promote grass cover or to supplement grazing in these bare areas.

While comprising over 30 % of the site area, these alluvial areas are locally important as they are likely to serve a faunal population form a wider area that the actual project area. These areas would thus to some extent be deemed irreplaceable in terms of ecological significance due to their faunal and general ecological importance in the landscape. In some instances, the sandy soil may be indicative of loss of vegetation cover, possibly due to overgrazing and accumulation of windblown sand, so any infrastructure that is required in these areas would likely require a case-by-case assessment to determine suitability.

Cultivated & Transformed

Includes all cultivated areas (lands) and other transformed areas including dwellings and residences, roads and other infrastructure. Roads and tracks have not been delineated in the vegetation mapping.

Figure 57: Typical transformed area associated with a dwelling

Figure 58: Typical transformation associated with an unpaved gravel road.

Unlikely to be affected, although cultivated areas are given a low ecological sensitivity and occupy a small proportion of the total area, the availability of suitable land for cultivation is low. Also, if they are used for infrastructure (other than temporary laydown or construction areas), the landowners would likely need to clear other intact areas to compensate, which would result in an indirect impact.

3.1.4 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. Perennial, non-perennial watercourses, alluvial areas and wetlands/dams are present in the wider area. Infrastructure associated with the activity will traverse several watercourses, often having denser woody tree and shrub vegetation compared to the surrounding landscape. The alluvial areas tend to have a sparse vegetation cover and are likely susceptible to soil blown sand erosion if significantly disturbed.

A separate aquatic assessment will assess the risks and impacts to the aquatic systems and aquatic processes separately, however for the purposes of this report, the vegetation and faunal components of aquatic habitat have been considered in terms of ecological and biodiversity aspects.

Non-Perennial Watercourses and Rivers

Seasonal non perennial drainage lines, watercourses and rivers serve an irreplaceable function in the arid landscape, providing a water source for extended periods and serving as feeding grounds for a proliferation of fauna and avifaunal after significant rainfall. They also support extended growth period of vegetation in the adjacent terrestrial landscape.

Figure 59:. Typical watercourse with developed sedge reedbed.

Figure 60: Typical watercourse with vegetated fringe sometimes including trees not typical of the landscape.

Figure 61: Sandy banks on eroded watercourses provide habitat for burrowing faunal species and birds.

Figure 62: Watercourse provide water for an extended period in and arid area, critical for fauna.

Figure 63: Seasonal aquatic growth on river pools.

Figure 64: Seasonal aquatic growth on river pools.

All watercourses should be avoided with an appropriate buffer, as determined by the aquatic specialists for any infrastructure other than where crossings are required for linear infrastructure, including roads and powerlines. Any crossings must limit loss off vegetation as far as possible in order to limit risks to terrestrial processes and habitat in riparian vegetation. This may result in wider buffers being required around watercourses that have a broad vegetation fringe. Specific crossing sites may require further consideration and positioning during the walkdown period before preparation of final plans for commencement of construction to ensure mitigations are applied correctly.

Wetlands, Pans and Dams (Artificial Wetlands)

Aquatic features that meet the requirements as per the definition of wetlands and are seasonally inundated with water. In most cases these natural pans tend to be modified to a greater or lesser extent to increase water holding capacity, hence have been converted to dam.

Man-made water storage impoundments, some of which may be present in wetland/pan/riverine areas. These are constructed features and although secondary now play an important ecological role, providing a water source for faunal species as well as habitat for a range of faunal species (amphibians, birds, mammals).

Figure 65: Typical man-made dam with prolific riparian vegetation.

Figure 66: Typical man-made dam with less pronounced riparian vegetation.

Any wetlands or pans must be avoided, as they have a critical function, as for any aquatic features in terms of supporting fauna. Not typically important habitat for any flora species of conservation concern. Unlikely to be affected by the proposed activities, but care to be taken in road and footprint planning to avoid these features, which although artificial, now have a specific associated faunal community and are also

irreplaceable as a water source within a broader ecologically modified landscape. In particular with fencing being common on farms, there is likely an association between fauna and specific dams as a water source.

Some areas are also present that do not classify as wetlands/riparian areas but do however experience episodic flows via paths that create areas that hold water for short periods of time after a rainfall event. Although not of ecological importance, these paths contribute to the hydrological functioning of the areas drainage systems at large. These areas also have the ability to temporarily support some faunal species, especially birds and insects.

3.1.5 Present Ecological State

Table 6 provides a comprehensive description and assessment of biodiversity and ecological indicators for the provides a comprehensive description and assessment of biodiversity and ecological indicators for the site. In summary, the following general observations can be noted regarding the site:

- Alien invasion is low to very low within the site.
- Erosion and erosion risk is generally low across the site, but low lying valleys with deeper sands are susceptible, especially around watercourses. The poorly vegetated alluvial areas are likely also susceptible to wind blown sand erosion if disturbed.
- The Karroid vegetation on site has varying levels of degradation, mostly near-pristine to pristine (natural to near natural), however extensive historical and ongoing grazing is prevalent in natural areas.

Table 6: Summary of Key Biodiversity and Ecological Indicators.

ASPECT	DESCRIPTION
LANDSCAPE AND COMMUNITY DESCRIPTION	
Aspect, Slope, Topography	Undulating hilly landscape incised by non-perennial watercourse and bisected by hills and scattered Mesas.
Substrate	Moderate to shallow rocky soils
Vegetation units	Karroid grassland and shrubland
Total Ground Cover (%)	< 80 %
Tree Height (m) – Median (alien species)	< 5 m
Tree Cover (%) Aerial	< 20 %
Shrub Cover (%)	> 20 %
Herbaceous Cover (%)	
Grass Cover (%)	> 20 %
Bare soil/rock (%) and disturbed	> 20 %
TERRESTRIAL LANDSCAPE FEATURES	
Forest	No Forest is present
Thicket	No Thicket is present
Grassland	Karoid Vegetation but with a well-developed but sparse grassland component in areas
Fynbos/Grassy Fynbos	No Fynbos is present
Riparian	Riparian vegetation is limited to sparse clumps along watercourses and where standing water is persistent. Riverine vegetation along margins of watercourses tends to be more lush compared to surrounding landscape.
Wetland	Wetland habitat is present on site, in the form of small man made dams as well as extensive alluvial pan areas.
Estuaries	No estuaries are present
Dunes/Coastal	No coastal/dune habitat is present
Rocky Outcrop Habitat	Rocky outcrops are prevalent in various forms including rocky pavements and outcrops – Dolerite, Sandstone and Mudstone/Shale.

ASPECT	DESCRIPTION
Fauna Nesting Sites	Several nesting sites recorded in Avifaunal survey and recorded during site visit.
Fauna Feeding Grounds	The Karoid vegetation provides suitable habitat for a range of faunal species including birds.
Ecotones	Distinct ecotones are not well developed.
Ecological Corridors	Watercourses are likely important corridors as well as hill ridges.
Evolutionary Processes	None of significance within terrestrial environment
Transformed (housing)	Minimal, occasional dwellings on farmland.
Transformed (other)	Minimal, occasional small cultivated patches where soil and water adequate.
Degraded (modified)	Minimal but variable grazing is noted, some areas overgrazing is more prevalent than others.
Secondary vegetation	
DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION	
Human disturbances	Human disturbance is Low to moderate, primarily grazing land.
Habitat fragmentation	Fragmentation is low in the surrounding area other than occasional district roads and fences.
Invasive Alien Plants	Generally low, occasional areas where more prevalent, such as Prickly Pear clumps and occasional weeds. Weed infestations noted on tops of koppies (Mesas), most likely associated with Hyrax (Dassie) dens.
Other degradation	Rubble and other rubbish is generally absent.
Remaining intact habitat:	Intact habitat is extensive in the surrounding landscape and within the site (Karroid grassy shrubland).
Grazing (livestock)	Surrounding area and the site is used extensively for livestock (primarily sheep and goats) and wildlife grazing.
Hunting	Likely present in surrounding rural landscape
Conservation (passive)	General the area does contribute to passive conservation, having low population density and mozaic of natural to near natural vegetation. Not considered to be of significant importance locally or regionally, however several species of concern are noted to be present (i.e. Riverine Rabbit).
Recreational (sport)	None
Other	None
PATTERNS OF BIODIVERSITY	
Flora	Flora diversity is moderate to low due to the presence of two similar units, generally comprised of a limited suite of species with localised occasional occurrence of species not widespread. Rocky outcrops do have a suite of succulent species present, but not as prolific as other areas.
Fauna	Fauna diversity is moderate.
Species of Conservation Concern	A few species are potentially found in the region and vegetation units, none of significance were recorded within the site that would be negatively affected, other than several widespread but protected species, where permits would be required.
ECOLOGICAL PROCESSES	
Gene dispersal barriers	Roads, settlements, agriculture, low fragmentation
Gene dispersal corridors	Extensive non perennial watercourse valleys likely provide corridors for movement of a suite of fauna as well as along and between rocky ridges and Mesas. Notable movement between low lying watercourses and higher lying rocky areas, in particular birds which tend to move across the landscape.
Aeolian (dune) processes	None
Climatic gradients	Climatic gradients are absent.
Rivers and Drainage Lines (Riparian Vegetation)	Poorly vegetated drainage lines (non-perennial watercourses) will provide ecological corridors in proximity to and within the site.
Refuges (outcrops/islands)	Rocky and other refuges are present and relatively common.
Fire	Karroid vegetation is generally not susceptible to fire
Ecotones/Tension zones	Ecotones are currently not well developed due to reasonable uniform vegetation.
Erosion	Erosion is generally low within the broader site but is present along watercourses where deeper sandy soils are present, and erosion dongas can occur.
ECOLOGICAL SERVICES	
Carbon storage	Sparse karroid vegetation is considered a low carbon accumulator.
Provisioning Services	Livestock grazing: Grazing is prevalent in the area with low grazing capacity.

ASPECT	DESCRIPTION
	Timber (Building materials): Woodlands for timber are not prevalent. Fuelwood: Woodlands for firewood are not prevalent, occasional trees may be harvested for informal use. Food: None known Fibre: None known Medicinal plants: Various species in the surrounding area have medicinal properties and are most likely harvested informally.
Other (ornamentals)	None known
CONSERVATION IMPORTANCE	
Current Distribution (extent)	Vegetation unit has a widespread regional distribution covering an extensive area outside of the site footprint, considered the largest vegetation unit. More than 60 % is considered to be still intact.
Red Listed Species and other Species of Conservation Concern	A few species are potentially found in the region and vegetation units, none of significance were recorded within the site, other than several widespread but protected species.
Habitat for SSC	Several species of conservation concern are known from the general area, as well as the vegetation unit that is present including several fauna species (i.e. Riverine Rabbit) but tending to occur in localised areas or habitat.
Relative Conservation importance	The site has an overall low to moderate significance regionally as the vegetation has a locally widespread distribution. Specific faunal species such as the Riverine Rabbit are present, which elevates the conservation value of certain landscape components (such as Riverine/watercourse areas).
OTHER SENSITIVITIES	
Conservation importance	Generally Low to Moderate but with localised species populations (i.e. Riverine Rabbit).
Topography	Extensive alluvial areas likely to have seasonal importance, Rocky outcrops and Dolerite hills likely to provide additional habitat to a suite of more specialised species.
Wetlands	Wetlands and alluvial pans as well as a network of non-perennial watercourses are prevalent in the broader area.
Rehabilitation potential	Rehabilitation potential is low to moderate due to arid nature of the region and water scarcity. Disturbed areas generally slow top recover after significant disturbance.
Community structure	Community structure is relatively simple with growth forms comprising grasses, herbs and low shrubs with occasional trees, usually less than 2-3 meters..

In summary, the site is located within a sparsely populated rural area. The vegetation is widespread and generally not significantly transformed, hence the status is not elevated and not presently under any threat. The site is identified as having corridors of Critical Biodiversity Area and Ecological Support Area, which suggests that connectivity to the surrounding landscape and ecological processes are of some importance. Several range-restricted endemic species with elevated conservation status are present in the surrounding area and the vegetation types. The site assessment has physically screened for the presence of these, and other possible species not identified in the screening tool and will be addressed in the respective sections below.

3.1.6 Flora

Several endemic and range restricted species are known from the surrounding area. None are likely to be present. Note, there is a residual very-low possibility that these species could be present, and cannot be discounted without extensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, as well as the level of degradation of the site, the risk of a species suffering any significant loss is low.

3.1.7 Fauna

The habitats and microhabitats present on the project site are not unique and are widespread in the general area, notably the vegetation unit is the most widespread and has the largest area of all units in South Africa. The local impact associated with the activity and footprint would generally be of low significance for most widespread faunal species if mitigation measures are adhered to. There are however several species that are considered to have an elevated conservation status that are either confirmed to be present, ort likely to be present. These will be addressed in subsequent sections of this report and in a separate Riverine Rabbit and Faunal Species of Conservation Concern report.

The findings of the faunal Species of Conservation Concern report have been integrated into this report and the original report is also attached as a separate appendix.

The area as a whole provides significant and important faunal habitat for a range of species, but at the same time biophysical conditions are such that biodiversity tends to be lower than other areas.

Mammals

An anticipated that approximately 56 mammal species are likely to occur in the region. Several large mammal species are confirmed to be present, including antelope such as Springbok (*Antidorcas marsupialis*), Gemsbok (*Oryx gazella*), Steenbok (*Raphicerus campestris*), Bush Duiker (*Sylvicapra grimmia*), Kudu (*Tragelaphus strepsiceros*) and Southern Mountain Reedbuck (*Redunca fulvorufula fulvorufula*), which has an Endangered status, are present. Large carnivore species include Black-backed Jackal (*Canis mesomelas*), Caracal (*Caracal caracal*), African Wildcat (*Felis lybica*), Bat-eared Fox (*Otocyon megalotis*), Aardwolf (*Proteles cristata*), Cape Fox (*Vulpes chama*) and Black-footed Cat (*Felis nigripes*) which has a Vulnerable status. Such species are highly mobile and are highly likely to move away from disturbance during construction and with extensive intact habitat available in the broader surrounding area are unlikely to be significantly negatively affected by the development. During operations, these faunal species will likely move freely around the site with little to no expected disturbance above current baseline levels in livestock grazing area.

Smaller mammals within the habitat are also generally mobile and likely to be transient to the area. As with all construction sites there is a latent risk that there will be some accidental mortalities. Generally, these small mammals are mobile and will vacate the area once construction commences. This risk is unlikely to exceed current baseline risks associated with the nearby mine area and agriculture related disturbance. Confirmed species include Water Mongoose (*Atilax paludinosus*), Cape Dune Mole-rat (*Bathyergus suillus*), Yellow Mongoose (*Cynictis penicillata*), Common Genet (*Genetta genetta*), Cape Gray Mongoose (*Herpestes pulverulentus*), Striped Polecat (*Ictonyx striatus*), African Striped Weasel (*Poecilogale albinucha*), Cape Rock Hyrax (*Procavia capensis*), Meerkat (*Suricata suricatta*) and Riverine Rabbit (*Bunolagus monticularis*), which has a Critically Endangered status.

Burrowing small mammal species confirmed as present include Aardvark (*Orycteropus afer*), Porcupine (*Hystrix africaeaustralis*), Ground Squirrel (*Xerus inauris*) and Springhare (*Pedetes capensis*).

The risk of flagged and confirmed fauna species of special concern being impacted significantly has been assessed in a separate report, the findings summarised in in later sections of this report.:

A faunal search and rescue is recommended as a precaution before commencement for the site footprint, in particular for mostly for the smaller, less mobile mammal species.

Avifauna and Bats

At least 95 bird species are known from the broader area, however these will not be assessed in this terrestrial biodiversity assessment report. Refer to the separate avifauna and bat assessment reports for detailed assessments. In terms of this terrestrial biodiversity reporting, incidental information is provided as well as assessment relating to several specific avifaunal aspects that have terrestrial biodiversity implications in particular relating to faunal species of conservation concern. See Section **Error! Reference source not found.**: **Error! Reference source not found.**.

Reptiles

An anticipated approximately 34 reptile species are likely to occur in the region. Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. The abundance of rocky outcrop habitat will provide significant suitable reptile habitat. Confirmed species include *Psammobates tentorius tentorius*) Karoo Tent Tortoise, *Stigmochelys pardalis* (Leopard Tortoise) and *Chersobius boulengeri* (Karoo Padloper), which has an Endangered status. The Karoo Padloper tortoise (*Chersobius boulengeri)*, although not confirmed to be present has been observed in the surrounding area and is thus highly likely to be present. Refer to subsequent sections of this report and faunal species of conservation concern assessment report. It is anticipated that potential impacts can be mitigated during micro-siting before construction as well as a preconstruction search and rescue, with specific implementation guidelines. Other reptiles likely to occur include *Agama atra* (Southern Rock Agama), *Gerrhosaurus typicus* (Karoo Plated Lizard), *Karusasaurus polyzonus* (Karoo Girdled Lizard), *Naja nivea* (Cape Cobra), *Pedioplanis laticeps* (Karoo Sand Lizard), *Pedioplanis lineoocellata pulchella* (Common Sand Lizard), *Pelomedusa galeata* (South African Marsh Terrapin) in farm dams, *Pseudocordylus microlepidotus* (Cape Crag Lizard) *Trachylepis capensis* (Cape Skink) and *Trachylepis sulcata sulcata* (Western Rock Skink).

A faunal search and rescue, inclusive of reptiles must be conducted before commencement. Particular attention to rocky outcrop areas is advised. Furthermore, should any reptiles, in particular snakes be found during constructions, a retile handler should be on called.

Amphibians

Several amphibian species, none being of conservation concern, are prevalent in the aquatic habitat within the site which include semi-permanent farm dams, as well as more seasonal rivers and wetland alluvial pan areas. Regionally only around 7 species are anticipated to occur, a contributor to this is most likely the arid nature of the area, although this does not necessarily preclude amphibians from being present. Since the actual project footprint will largely be within covers terrestrial habitat and aquatic habitat will be excluded, amphibians are not anticipated to incur any risk of significance. Frog species include *Amietia fuscigula* (Cape River Frog), *Amietia poyntoni* (Poynton's River Frog), *Cacosternum boettgeri* (Common Caco), *Vandijkophrynus gariepensis gariepensis* (Karoo Toad) and in farm dams and reservoirs the Common Platanna (*Xenopus laevis*).

Invertebrates

No insects flagged as having an elevated conservation status are known from the site or broader area and are not anticipated to be of significant risk, even though the site is likely to serve as habitat for an abundance of seasonal insects. Baboon Spiders and Scorpions are generally common in the arid environment and specifically the region. These species are protected in terms of the Threatened or Protected Species programme and permits would be required. No other invertebrates of conservation concern are expected to occur.

Crustaceans, namely Triops, fairy shrimps and clam shrimps were observed in temporary waterbodies after good rains. These are likely an important food source for birds during these wet periods and comprise an important biodiversity component.

It is advisable to include the Baboon Spiders and Scorpions in the faunal search and rescue process.

3.1.8 Species of Special Concern occurring in the region

Several endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, but cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, with vegetation clearing only required for site development, as well as the level of degradation, the risk of a species suffering any significant population loss is low. There is always a residual risk to species for any activity.

Red Listed, Endemic and Protected Flora

As per Table 7, the site falls within the broader distribution range of Vulnerable, Endangered or Critically Endangered flora species. Due to the minimal footprint within an extensive area, these species are unlikely to be significantly affected by the proposed activity, further collaborated by the fact that none were found to be present during extensive seasonal surveys.

Due to the likely prevalence of many species belonging to various broadly protected groups, such as the Aizoaceae, Crassulaceae, Iridaceae, Asphodelaceae and Amarylidaceae, protected in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) being present, permits will be required as well as a pre-commencement flora search and rescue. There is a residual risk of a species of conservation concern being present but not recorded due to

the extensive area of the site and prevalence of localised populations or individuals; however, regional information and site visit suggests that the likelihood of this is not high, in particular for species having an elevated conservation status. It is recommended that the species list be updated throughout the project implementation, including in particular during any site walkdowns.

During the site visits it was found that a rather well-defined suite of species are present within the vegetation unit, varying in dominance depending on the specific biophysical conditions and respective plant communities. Several widespread and common protected species, as indicated above are present which are found widely within the site (Table 7). In addition, fewer common species were also found to occur, usually a few individuals scattered but sparse broadly across the site. While such species tended to be associated with specific habitat types (such as rocky outcrops), none were found to be associated with any specific areas (i.e. having a localised distribution) and based on the distribution of such species, being sparse, it is not anticipated that there will be significant influence on the project footprints, and pre-construction search and rescue will likely deal adequately with such species.

Since the project footprint is surrounded by extensive outlying areas of natural habitat, any disturbance as a direct result of the activity during the construction phase is unlikely to pose a significant negative impact to flora species at a population level.

Table 7: Flora Species of Special Concern.

SCIENTIFIC NAME	FAMILY	STATUS[3]	COMMENT/PRESENCE[4]
Adromischus fallax	Crassulaceae	RARE, PNCO	NKu2, Succulent Herbs
Adromischus humilis	Crassulaceae	LC, PNCO	NKu2, Succulent Herbs
Aizoon schellenbergii	Aizoaceae	LC, PNCO	AZi5, Low Shrubs
Albuca setosa	Hyacinthaceae	LC, PNCO	NKu2, Geophytic Herbs
All species	Aizoaceae	NC, WC	All species require permits
All species	Amarylidaceae	NC, WC	All species require permits
All species	Asphodelaceae	NC, WC	All species require permits
All species	Crassulaceae	NC, WC	All species require permits
All species	Iridaceae	NC, WC	All species require permits
Aloe broomii	Asphodelaceae	LC, PNCO	NKu2, Succulent Shrubs
Aloe chlorantha	Asphodelaceae	NT, PNCO	NKu2, Succulent Shrubs
Amaranthus dinteri subsp. dinteri	Amaranthaceae	NE	AZi5, Herbs
Amphiglossa callunoides	Asteraceae	VU	AZi6, Succulent Shrubs
Anisodontea malvastroides	Malvaceae	RARE	NKu2, Tall Shrub
Asplenium cordatum	Aspleniaceae	LC, PNCO	NKu2, Geophytic Herbs
Boophone disticha	Amaryllidaceae	LC, PNCO	NKu2, Geophytic Herbs
Chasmatophyllum rouxii	Aizoaceae	DDD, PNCO	NKu4, Succulent Shrubs
Crassula barbata subsp. broomii	Crassulaceae	DDT, PNCO	NKu2, Succulent Shrubs
Crinum variabile	Amaryllidaceae	LC, PNCO	AZi5, Geophytic Herb
Delosperma robustum	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Drimia intricata	Hyacinthaceae	LC, PNCO	NKu2, Geophytic Herbs
Drosanthemum lique	Aizoaceae	LC, PNCO	NKu2, AZi6, Succulent Shrubs

[3] **IUCN** - Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**), Least Concern (**LC**); **End** – Endemic; **PNCO** – Northern Cape & Western Cape Provincial Nature Conservation Ordinance; **Ex**, Exotic/Invasive/Weed; **NFA** – National Forest Act; **ToPS** – Threatened or Protected Species.
[4] **NKu2** - Upper Karoo Hardeveld, **NKu4** - Eastern Upper Karoo, **AZi5** - Bushmanland Vloere & **AZi6** - Southern Karoo Riviere.

SCIENTIFIC NAME	FAMILY	STATUS[3]	COMMENT/PRESENCE[4]
Faucaria bosscheana	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Hereroa concava	Aizoaceae	NEST (M), VU B1ab(iii)	*Hereroa concava* is a rare and poorly known species with a restricted distribution range. Its extent of occurrence (EOO), calculated from herbarium specimen records, is 12 151 km², but is very uncertain. It is known from three to five locations but is possibly overlooked. It is suspected to be declining due to ongoing habitat loss and degradation. Known range is outside of project footprint. **Not recorded.**
Hertia cluytiifolia	Asteraceae	DDD	NKu4, Succulent Shrubs
Isolepis expallescens	Cyperaceae	NEST (M), VU D2	AZi6, Graminoid. A range-restricted habitat specialist (EOO 102 km²), known from three locations and potentially threatened by habitat loss and degradation due to overgrazing and shale gas extraction. There are very few records of this species, scattered over a wide area. The most recent collection, dating from 1988 indicate that it is common in the Karoo National Park. Its abundance elsewhere is not known. Known range is outside of project footprint. **Not recorded.**
Lachenalia aurioliae	Hyacinthaceae	LC, PNCO	NKu2, Geophytic Herbs
Lotononis azureoides	Fabaceae	RARE	NKu2, Low Shrubs
Lotononis minima	Fabaceae	DDT	AZi5, Herbs
Malephora uitenhagensis	Aizoaceae	LC, PNCO	AZi6, Succulent Shrubs
Moraea pallida	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Moraea polystachya	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Ornithogalum paucifolium subsp. karooparkense	Hyacinthaceae	DDT, PNCO	NKu2, Geophytic Herbs
Oxalis depressa	Oxalidaceae	LC, PNCO	NKu2, Geophytic Herbs
Phymaspermum scoparium	Asteraceae	DDD	NKu4, Tall Shrub
Plinthus karooicus	Aizoaceae	LC, PNCO	NKu4, NKu2, Low Shrubs
Psilocaulon coriarium	Aizoaceae	LC, PNCO	NKu4, Succulent Herbs
Rabiea albinota	Aizoaceae	LC, PNCO	NKu4, Succulent Shrubs
Ruschia intricata	Aizoaceae	LC, PNCO	NKu4, Succulent Shrubs
Salsola arborea	Chenopodiaceae	NE	AZi6, Succulent Shrubs
Sceletium expansum	Aizoaceae	VU, PNCO	NKu2, Succulent Shrubs
Selago persimilis	Scrophulariaceae	DDD	NKu4, Low Shrubs
Selago walpersii	Scrophulariaceae	DDT	NKu4, Low Shrubs
Sensitive Species 945	-	NEST (M), Rare (non-IUCN designation), PNCO	NKu2, Geophytic Herbs. Most likely habitat is rocky outcrops and pavements, rocky ridges, and hills, in particular rocky edges. Species has a Rare (non-IUCN category) status, and any significant population should be

SCIENTIFIC NAME	FAMILY	STATUS[3]	COMMENT/PRESENCE[4]
			avoided. There are currently no severe threats to this species. **Not recorded.**
Stomatium suaveolens	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Syringodea bifucata	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Syringodea concolor	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Tetragonia arbuscula	Aizoaceae	LC, PNCO	NKu2, Low Shrubs
Trichodiadema barbatum	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Tridentea virescens	Apocynaceae	RARE	NKu4, Succulent Herbs

Listed species (Table 7) were flagged from various database sources, including the National Environmental Screening Tool (NEST), as occurring in the region and having an elevated status. All were cross-checked for distribution overlay and were actively screened for presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. Sensitive species names have not been included.

A pre-commencement flora search and rescue procedure is likely to be required before commencement.

National Environmental Screening Tool Listed Flora (Plant) Species

National Environmental Screening Tool (NEST) species include *Sensitive Species 945, Isolepis expallescens* and *Hereroa concava* (Table 7). None are confirmed to be present. Further information and risk assessment for each of these flora species is provided below.

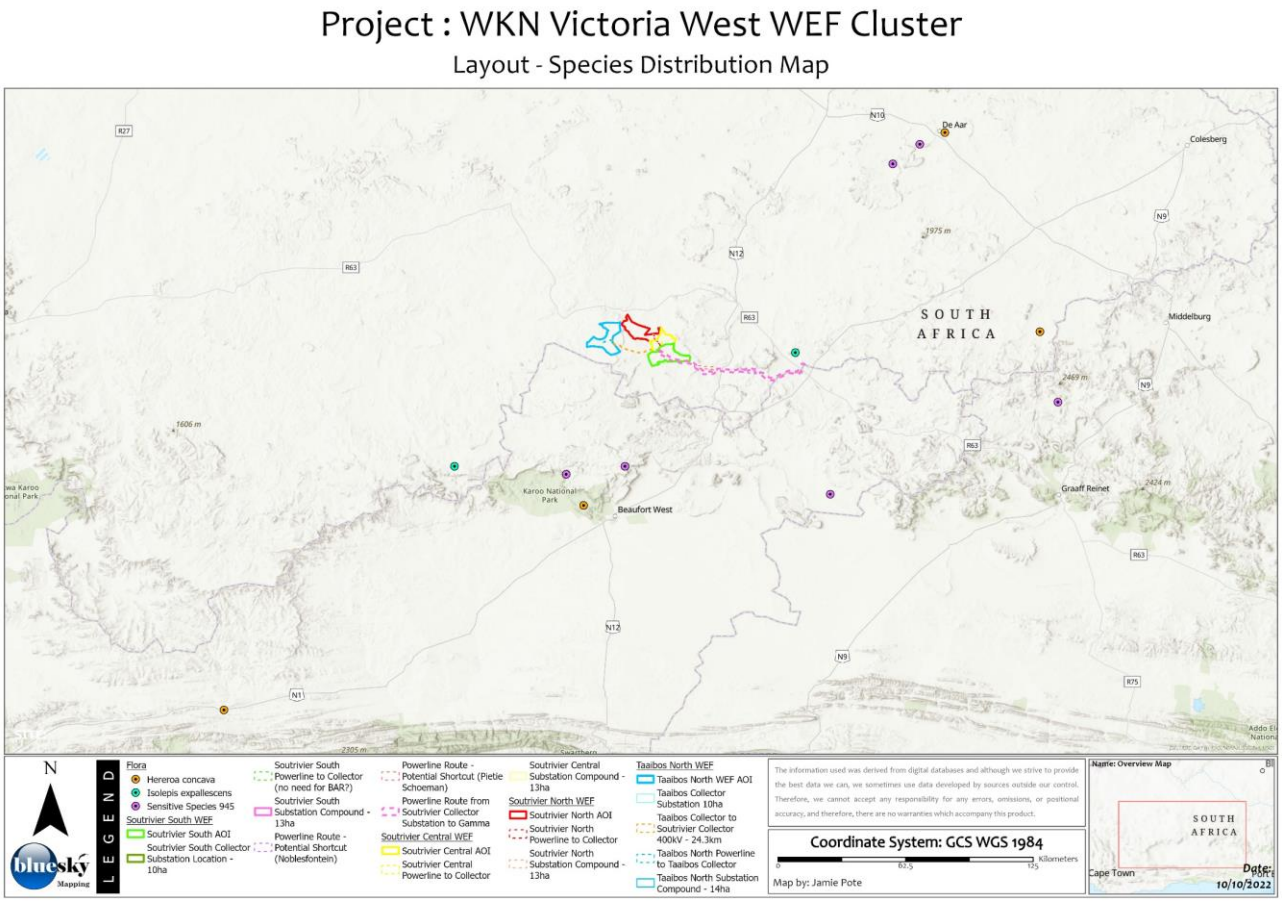


Figure 67: Distribution records of Sensitive Species 945, Isolepis expallescens and Hereroa concava.

Sensitive Species 945

Sensitive Species 945 is known to occur in the Sneeuberg, Agter-Sneeuberg and Nuweveld Mountains and is known from only a few records, scattered over a wide area on summits of rocky dolerite ridges. It is rare, and easily overlooked, as it is cryptic when it is not flowering, and flowers, which appear in late summer, lasts only a few days. Refer to *Figure 67* for distribution map of known records and *Table 8* for further species assessment information).

Table 8: Sensitive Species 945 (National Assessment, 2012)

Taxonomy		
Scientific Name	Sensitive Species 945	
Family	Amaryllidaceae	
National Status		
Status and Criteria	**Rare**	
Assessment Date	2016/11/01	
Assessor(s)	D.A. Snijman & D. Raimondo	
Justification	A relatively widespread, but rare species, typically occurring in small subpopulations. It is not currently threatened.	
Distribution		
Endemism	South African endemic	
Provincial distribution	Eastern Cape, Western Cape	
Range	Sneeuberg, Agter-Sneeuberg and Nuweveld Mountains	
Estimated Geographic Area of Occurrence (SEAG, 2020[5])	3.75 square km	
Total Site Area	50 000 Ha (500 square kilometres) – site is significantly larger than AOO.	
Approximate suitable habitat	Not confirmed to be present. Approximately 2 520.26 Ha (25.2 square kilometres) of borderline suitable habitat, mostly excluded from development area other than possible powerline pylons. **Low Risk.**	
Habitat and Ecology		
Major system	Terrestrial	
Major habitats	Nama Karoo	
Description	Summits of rocky dolerite ridges	
Threats		
There are currently no severe threats to this species. However, its distribution range falls within an area earmarked for shale gas extraction. It is not certain what the impact of gas extraction and associated infrastructure development on its habitat is likely to be, but dolerite intrusions tend to have low to no gas deposits, and it could possibly be spared from future habitat loss and degradation.		
Population		
Known from only a few records, scattered over a wide area. It is rare, and easily overlooked, as it is cryptic when it is not flowering, and flowers, which appear in late summer, lasts only a few days. Subpopulations are typically small, occurring in subpopulations consisting of 20 or fewer plants.		
Population trend	Stable	
Assessment History		
Taxon assessed	**Status and Criteria**	**Citation/Red List version**
-	Rare	Raimondo et al. (2009)
Bibliography		
Bolus, H. and MacOwan, P. 1881. Novitates capensis: descriptions of new plants from the Cape of Good Hope: . Journal of the Linnean Society 18:396-397.		

[5] SAEG: South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.

Craib, C. 2002. from the eastern Great Karoo and species nova from southern Namaqualand. Herbertia 56:101-104.
Magee, A.R. and Boatwright, J.S. (eds). In prep. Plants of the Karoo: A Conspectus of the Nama-Karoo and Adjacent Summer-Rainfall Regions of the Northern and Western Cape Provinces. Strelitzia.
Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.
Snijman, D.A. 2013. Plants of the Greater Cape Floristic Region 2: The extra Cape flora. Strelitzia 30. South African National Biodiversity Institute, Pretoria.

Reference

- Snijman, D.A. & Raimondo, D. 2016. . National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/10/11.

The species was not recorded during site visits including searching in most suitable habitats, i.e. Dolerite ridges. The dolerite ridges of most suitable habitat are excluded from the WEF footprint and eh most likely risk area would be related to powerlines that cross mountainous ridges in a few places. It would be feasible to microsite any pylons should it be found that a small population does occur during the walkdown stages. As per the National Biodiversity Assessment (2019) the current status is Rare and has an Occupied Area of approximately 3.75 square km (Species Environmental Assessment Guideline, 2020). The species is currently not considered to be under any threat by any activity, other than being within an area where shale fracking has been proposed.

Isolepis expallescens

Isolepis expallescens is known A range-restricted habitat specialist (EOO 102 km²), known from three locations and potentially threatened by habitat loss and degradation due to overgrazing and shale gas extraction. Occurring on Nuweveld Mountains between Fraserburg and Victoria West and is known to occur in damp areas along stream channels. Refer to *Figure 67* for distribution map of known records and *Table 9* for further species assessment information).

Table 9: Isolepis expallescens (National Assessment, 2012)

Taxonomy	
Scientific Name	*Isolepis expallescens Kunth*
Family	Cyperaceae
National Status	
Status and Criteria	**Vulnerable D2**
Assessment Date	2016/11/11
Assessor(s)	A.M. Muasya & D. Raimondo
Justification	A range-restricted habitat specialist (EOO 102 km²), known from three locations and potentially threatened by habitat loss and degradation due to overgrazing and shale gas extraction.
Distribution	
Endemism	South African endemic
Provincial distribution	Northern Cape
Range	Nuweveld Mountains between Fraserburg and Victoria West.
Estimated Geographic Area of Occurrence (SEAG, 2020[6])	No recent data

[6] SAEG: South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.

Total Site Area	50 000 Ha (500 square kilometres) – site is likely significantly larger than AOO for species.	
Approximate suitable habitat	Not confirmed to be present. Borderline suitable habitat is present, mostly excluded from development area, being around watercourses, other than possible powerline crossings. **Low Risk.**	
Habitat and Ecology		
Major system	Terrestrial	
Major habitats	Eastern Upper Karoo, Gamka Karoo	
Description	Damp areas along stream channels.	
Threats		
It is potentially threatened by habitat degradation, particularly erosion, as a result of overstocking of rangelands. Its distribution range also falls within an area earmarked for shale gas extraction, which is likely to lead to extensive habitat loss and degradation, should large-scale gas extraction plans proceed.		
Population		
This species is known from only three collections, but its distribution range is botanically very poorly explored. It is a localized habitat specialist, and current records indicate that it is endemic to the Nuweveld Mountains.		
Population trend	Stable	
Assessment History		
Taxon assessed	**Status and Criteria**	**Citation/Red List version**
Isolepis expallescens Kunth	VU D2	2017.1
Isolepis expallescens Kunth	Least Concern	Raimondo et al. (2009)
Bibliography		
• Magee, A.R. and Boatwright, J.S. (eds). In prep. Plants of the Karoo: A Conspectus of the Nama-Karoo and Adjacent Summer-Rainfall Regions of the Northern and Western Cape Provinces. Strelitzia. • Muasya, A.M. and Simpson, D.A. 2002. A monograph of the genus Isolepis R.Br. (Cyperaceae). Kew Bulletin 57(2):257-362. • Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.		
Reference		
• Muasya, M. & Raimondo, D. 2016. Isolepis expallescens Kunth. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/10/11		

The species was not recorded during site visits including searching in most suitable habitats, i.e. damp patches along rivers and watercourses. The watercourses and rivers of most suitable habitat are excluded from the WEF footprint and are also likely to be spanned by any grid connection. The only latent risk might be access road crossings, but these will be minimal and along he powerline route where the species is most likely to occur, access to any pylons will most likely be via existing access track, in particular near watercourses. It would be feasible to microsite any pylons or powerline access roads should it be found that a small population does occur during the walkdown stages. As per the National Biodiversity Assessment (2019) the current status is *Vulnerable* and has an unknown Occupied Area (Species Environmental Assessment Guideline, 2020). The species is currently not considered to be under any threat by any specific activity other than land degradation, which is generally associated with overgrazing.

Hereroa concava

Hereroa concava is known to occur sheltered among shrubs on flats and plateaus with shale outcrops in a small area in the Great Karoo between Beaufort West, Richmond and De Aar. Most likely threats include shale gas fracking. . Its extent of occurrence (EOO), calculated from herbarium specimen records, is 12 151 km², but is very uncertain. It is known from three to five locations but is possibly overlooked. It is suspected to be declining due to ongoing habitat loss and degradation. Refer to *Figure 67* for distribution map of known records and *Table 10* for further species assessment information).

Table 10: Hereroa concava (National Assessment, 2012)

Taxonomy	
Scientific Name	*Hereroa concava*
Family	Aizoaceae
National Status	
Status and Criteria	**Vulnerable B1ab(iii)**
Assessment Date	2020/02/06
Assessor(s)	D. Raimondo & L. von Staden
Justification	A rare and poorly known species with a restricted distribution range. Its extent of occurrence (EOO), calculated from herbarium specimen records, is 12 151 km², but is very uncertain. It is known from three to five locations but is possibly overlooked. It is suspected to be declining due to ongoing habitat loss and degradation.
Distribution	
Endemism	South African endemic
Provincial distribution	Northern Cape, Western Cape
Range	Due to taxonomic uncertainty, this species' distribution range is not well known. It appears to be endemic to a small area in the Great Karoo between Beaufort West, Richmond and De Aar.
Estimated Geographic Area of Occurrence (SEAG, 2020[7])	No recent data
Total Site Area	50 000 Ha (500 square kilometres) – site is likely significantly larger than AOO for species.
Approximate suitable habitat	Not confirmed to be present during assessment. Current risks include fracking and Uranium mining, WEF and OHL ar unlikely to pose any significant risk due to limited footprint. All footprints will be further assessed during final walkdown procedure, and layout changes can be made if necessary. Species within the Aizoaceae family are generally amenable to successful relocation. **Low Risk.**
Habitat and Ecology	
Major system	Terrestrial
Major habitats	Eastern Upper Karoo, Upper Karoo Hardeveld
Description	Plants occur sheltered among shrubs on flats and plateaus with shale outcrops.
Threats	
A large proportion of this species' known range falls within an area earmarked for shale gas fracking, which is likely to cause significant population decline if it is to go ahead. A Strategic Environmental Impact Assessment submitted to South Africa's Department of Environment Affairs in 2016 cautioned against the authorisation of shale gas fracking, based on the very high infrastructure costs associated with fracking as well as multiple secondary negative impacts both to biodiversity and other economic activities in the region. Furthermore, subsequent geological studies found that gas deposits are not as substantial as originally suspected due to the very old age of the Karoo shale formations, and the effect of widespread dolerite intrusions that resulted in much of the gas being lost. At present, future development scenarios are too uncertain to estimate the potential extent of the impact on the population but it is unlikely that shale gas fracking will proceed in the near future. In addition, this species' preferred habitat around Beaufort West is being lost to Uranium mining. Large parts of karoo vegetation is undergoing ongoing degradation due to a combination of severe overgrazing and prolonged droughts. This species is likely impacted by overgrazing outside protected areas, but field surveys are needed to confirm this.	
Population	

[7] SAEG: South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.

There are very few records of this species, scattered over a wide area. The most recent collection, dating from 1988 indicate that it is common in the Karoo National Park. Its abundance elsewhere is not known. It may be overlooked due to taxonomic uncertainty in Hereroa, and also because its range is botanically poorly explored. A continuing decline is inferred from ongoing habitat loss and degradation.		
Population trend	Decreasing	
Hereroa is urgently in need of taxonomic revision (Chesselet et al. 1995). Species are poorly known and difficult to identify with certainty.		
Assessment History		
Taxon assessed	**Status and Criteria**	**Citation/Red List version**
Hereroa concava L.Bolus	Data Deficient	Raimondo et al. (2009)
Bibliography		
• Chesselet, P., Mössmer, M. and Smith, G.F. 1995. Research priorities in the succulent plant family Mesembryanthemaceae Fenzl. South African Journal of Science 91:197-209. • Magee, A.R. and Boatwright, J.S. (eds). In prep. Plants of the Karoo: A Conspectus of the Nama-Karoo and Adjacent Summer-Rainfall Regions of the Northern and Western Cape Provinces. Strelitzia. Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.		
Reference		
• Raimondo, D. & von Staden, L. 2020. Hereroa concava L.Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/10/11		

The species was not recorded during site visits including searching in most suitable habitats, i.e. Dolerite ridges. The dolerite ridges of most suitable habitat are excluded from the WEF footprint and eh most likely risk area would be related to powerlines that cross mountainous ridges in a few places. It would be feasible to microsite any pylons should it be found that a small population does occur during the walkdown stages. As per the National Biodiversity Assessment (2019) the current status is *Vulnerable* and has an unknown Occupied Area (Species Environmental Assessment Guideline, 2020). The species is currently not considered to be under any threat by any activity, other than proposed shale gas fracking and Uranium mining.

Red Listed and Protected Fauna

Due to the nature of the activity, faunal species are likely to be affected. Extensive similar suitable undisturbed habitat is present surrounding the site including areas within the project area that will not be affected, which will provide alternative suitable habitat for more mobile species. Table 11 lists species having an elevated conservation status or are listed in terms of the National Environmental Screening Tool.

Since the project footprint is surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity during the construction phase is unlikely to pose a significant negative impact to faunal species.

Listed species (Table 7) were flagged from various database sources, including the National environmental Screening Tool, as occurring in the region and having an elevated status. All were cross-checked for distribution overlay and were actively screened for presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. Sensitive species names have not been included.

As per Table 7, a single Critically Endangered faunal species the **Riverine Rabbit** is identified by the DFFE screening tool as potentially occurring, based on known records and modelled distribution. A separate faunal study is being undertaken to clarify this and the findings will be incorporated into subsequent terrestrial biodiversity reporting. An Endangered reptile the **Karoo Padloper** is also likely to be present, as it is widespread in the area, as well as the Vulnerable **Black Footed Cat,** which although not identified in the DFFE

screening tool within the site boundary is considered to require further investigation and a single record has been made in the initial camera trapping process as part of the preliminary Riverine Rabbit study. These species as well as other species are not well understood, and this project may provide an opportunity for long-term faunal monitoring during the pre-construction, construction and operational phases in consultation with respective groups such as the EWT. Refer to separate riverine rabbit and faunal species of conservation concern reports. The key findings of this Riverine Rabbit report include the following:

1. No-Go buffers have been delineated around the important riverine habitat and should be considered as turbine exclusion areas. Site by site assessment may be required in specific instances where turbines are proposed in proximity to this buffer.

Table 11: Fauna Species of Special Concern.

SCIENTIFIC NAME	COMMON NAME	STATUS[8]	COMMENT/PRESENCE
MAMMALS			
Bunolagus monticularis	Riverine Rabbit	CR, NEST (H, M)	Usually confined to dry riverbeds areas having riparian shrubby vegetation or on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo. **PRESENT. Separate study has been conducted. Refer to Riverine Rabbit reporting.**
Damaliscus pygargus pygargus	Bontebok	VU (2016)	Not present
Equus quagga	Plains Zebra	NT (IUCN, 2016)	Not present
Equus zebra	Mountain Zebra	VU (2018)	Not present
Felis nigripes	Black-footed Cat	VU, ToPS, CITIES 1	Camera trap record confirmed presence near the western edge of the Taaibos site. Approximately 1.5 km from a DFFE designated high sensitivity area (outside project footprint). **Refer to Faunal SCC reporting.**
Panthera pardus	Leopard	VU (2016)	Possibility of occurrence unlikely but it is possible that leopard may occur in the large mountain ranges east of Taaibos and Soutrivier.
Parotomys littledalei	Littledale's Whistling Rat	NT (2016)	Patchy distribution possible within the greater surrounding area containing bushy covered areas.
Pelea capreolus	Vaal Rhebok	NT (2016)	Not observed on site but present in the general area particularly higher-lying areas.
Poecilogale albinucha	African Striped Weasel	NT (2016)	Present

[8] **IUCN** - Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**), Least Concern (**LC**); **NotThr** – Not Threatened [not an IUCN category]; **End** – Endemic; PNCO – Northern Cape & Western Cape Provincial Nature Conservation Ordinance; **Ex**, Exotic/Invasive; ToPS – Threatened or Protected Species.

SCIENTIFIC NAME	COMMON NAME	STATUS[8]	COMMENT/PRESENCE
Redunca fulvorufula fulvorufula	Southern Mountain Reedbuck	EN (2016)	Present East of Taaibos site and possible occurrence in rocky hills in the north-eastern region of the Soutrivier site
BIRDS[9]			
Anthropoides paradiseus	Blue Crane	Global: VU; BLSA: NT	Present, Refer to separate avifaunal assessment.
Anthus crenatus	African Rock Pipit	Global: LC; BLSA: NT	Refer to separate avifaunal assessment.
Aquila verreauxii	Verreaux Eagle	NEST (H,M), Global: LC; BLSA: VU	Present, Refer to separate avifaunal assessment.
Ciconia nigra	Black Stork	Global: LC; BLSA: VU	Refer to separate avifaunal assessment.
Eupodotis vigorsii	Karoo Korhaan	Global: LC; BLSA: NT	Present, Refer to separate avifaunal assessment.
Gyps africanus	White-backed Vulture	Global: CR; BLSA: CR	Refer to separate avifaunal assessment.
Neotis ludwigii	Ludwigs Bustard	NEST (H,M), Global: EN; BLSA: EN	Present, Refer to separate avifaunal assessment.
Polemaetus bellicosus	Martial Eagle	Global: VU; BLSA: EN	Refer to separate avifaunal assessment.
Sagittarius serpentarius	Secretarybird	Global: VU; BLSA: VU	Present, Refer to separate avifaunal assessment.
Spizocorys sclateri	Sclater's Lark	Global: NT; BLSA: NT	Refer to separate avifaunal assessment.
REPTILES			
Chersobius boulengeri	Karoo Padloper	NEST (H,M), EN, ToPS	Present, Widespread distribution and likely to occur sporadically throughout the site. Although not confirmed to be present, this species is expected to be found throughout the broader area as it has been recorded in the surrounding area. **Refer to Faunal SCC reporting.**
Psammobates tentorius tentorius	Karoo Tent Tortoise	NotThr	Present
Psammobates tentorius trimeni	Namaqua Tent Tortoise	NotThr	Likely Present
Psammobates tentorius verroxii	Verrox's Tent Tortoise	NotThr	Likely Present
AMPHIBIANS			
None of concern			Higher risk areas include riparian and watercourse areas which will be indicated as areas to avoid. None of concern recorded or likely present.
INVERTEBRATES			
BUTTERFLIES			

[9] **BLSA** – Birdlife South Africa

SCIENTIFIC NAME	COMMON NAME	STATUS[8]	COMMENT/PRESENCE
Acanthovalva focularia		NotThr [not an IUCN category]	Possibly Present
Chiasmia observata		NotThr [not an IUCN category]	Possibly Present
SCORPIONS			
Opistophthalmus sp.		ToPS	Likely Present
BABOON SPIDERS			
Harpactira namaquensis		ToPS	Likely Present

A fauna search and rescue is likely to be required before project commencement.

National Environmental Screening Tool Listed Fauna (Animal) Species

National Environmental Screening Tool (NEST) species (Table 11) include Riverine Rabbit (*Bunolagus monticularis*) & Karoo Dwarf tortoise (*Chersobius boulengeri*). Furthermore, during camera trapping for the Riverine Rabbit study, a Black Footed Cat (*Felis nigripes*) was confirmed to be present. The Southern Mountain Reedbuck (*Redunca fulvorufula fulvorufula*; Endangered), which although also not identified by the screening tool within the site boundary, was confirmed present during field surveying, recorded east of the Taaibos site and a possible sighting in the north-eastern region of the Soutrivier site, thus it could potentially be present on both the Taaibos and Soutrivier sites. Further information and risk assessment for each of these flora species is provided below.

Bunolagus monticularis (Riverine Rabbit)

The Riverine Rabbit is a species particularly confined to dry riparian and alluvial areas with shrubby vegetation throughout the Central Karoo. Individuals were recorded on the Taaibos site (with the use of a camera trap), whereas previous sightings also indicate their potential presence on the Soutrivier site. As a result of the niche habitat in which these animals are found, they are unlikely to reside in higher lying areas where the turbines are likely to be placed. The generation of turbine noise would thus be the main concern regarding this species, as a precautionary measure suitable buffers should be implemented to ensure that any subpopulations present are not hindered or negatively impacted. *Separate study has been conducted - Refer to separate Riverine Rabbit reporting.*

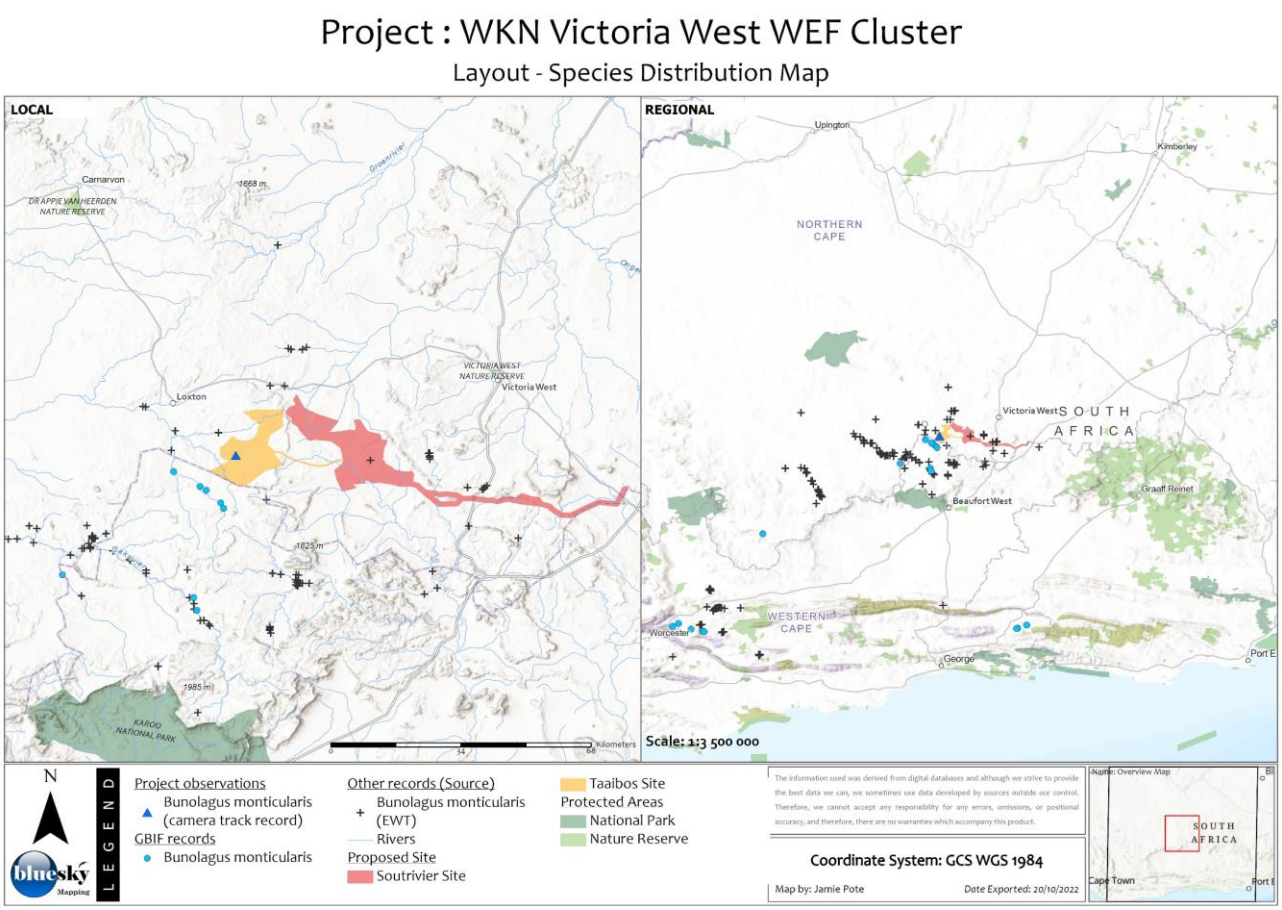


Figure 68: Distribution records of Bunolagus monticularis.

Taxonomy	
Scientific Name	*Bunolagus monticularis*
Family	Leporidae
National Status	
Status and Criteria	**Critically Endangered C2a(i)**
Assessment Date	2016/05/31
Assessor(s)	Collins, K., Bragg, C. & Birss, C.
Justification	The Riverine Rabbit is endemic to the semi-arid central Karoo region of South Africa (estimated extent of occurrence (EOO) is 54,227 km² and area of occupancy (AOO) is 2,943 km²). Recent population estimates of 157-207 mature individuals indicate an alarmingly small species population size, with no subpopulation having > 50 mature individuals.
Distribution	
Endemism	South African endemic
Provincial distribution	Northern Cape & Western Cape Province
Range	Central Karoo region of South Africa (refer to *Figure 68*). It is associated with the dense, discontinuous vegetation fringing the seasonal rivers.
Estimated Geographic Area of Occurrence (SEAG, 2020[10])	54,227 km²
Total Site Area	
Approximate suitable habitat	
Habitat and Ecology	
Major system	Terrestrial

Major habitats	Upper Karoo Bioregion
Description	Dense riparian growth along the seasonal rivers in the central Karoo, more specifically in riverine vegetation on alluvial soils adjacent to seasonal rivers.
Threats	
Ongoing habitat degradation and fragmentation due to detrimental land-use practices and new emerging habitat-transforming land uses, such as climate change and energy development. Over the last century, ca 40-60% of the fertile alluvial floodplains and riparian habitat has been lost as a result of cultivation and livestock farming. Other threats to the species include hunting and accidental mortality in traps set for 'pest' animals on farmlands.	
Population	
There are an estimated 12 subpopulations, three in the southern population and nine in the northern population. Subpopulations are isolated from each other by jackal-proof fencing and severe land transformation through agricultural practices. All these subpopulations are estimated to contain less than 50 mature individuals.	
Population trend	Decreasing
Bibliography	
• Ahlmann, V., Collins, K. and Seal, U.S. 2000. Riverine Rabbit (Bunolagus monticularis): A population and habitat viability assessment workshop. Conservation breeding specialist group (SSC/IUCN), Apple Valley, MN. • Collins, K., Ahlmann, V., Matthee, C., Taylor, P.J., Keith, M. and van Jaarsveld, A. 2003. Bunolagus monticularis. Available at: www.redlist.org. • Duthie, A.G. 1989. The ecology of the riverine rabbit (Bunolagus monticularis). Thesis, University of Pretoria.	
Reference	
• Collins, K., Bragg, C. & Birss, C. 2019. Bunolagus monticularis. The IUCN Red List of Threatened Species 2019: e.T3326A45176532. http://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T3326A45176532. Accessed on 2022/10/12	

Felis nigripes (Black Footed Cat)

The Black Footed Cat is a species that is endemic to the Karoo and Kalahari. Populations are low in density and distribution is patchy and mostly restricted to open arid habitats with low vegetation cover and high prey abundance. The presence of broken termite mounds also serves as resting and breeding centres. An individual was recorded on the Taaibos site during the Riverine Rabbit camera trap survey. As a result, it can be assumed that subpopulations are present within the site footprint. Overall, the development is unlikely to have a significant impact on the species, given that precautionary measures are taken to avoid disturbance in the vicinity of any potential burrows/dens, including confirmation during site walkdown. *Refer to separate Faunal SCC reporting for additional information.*

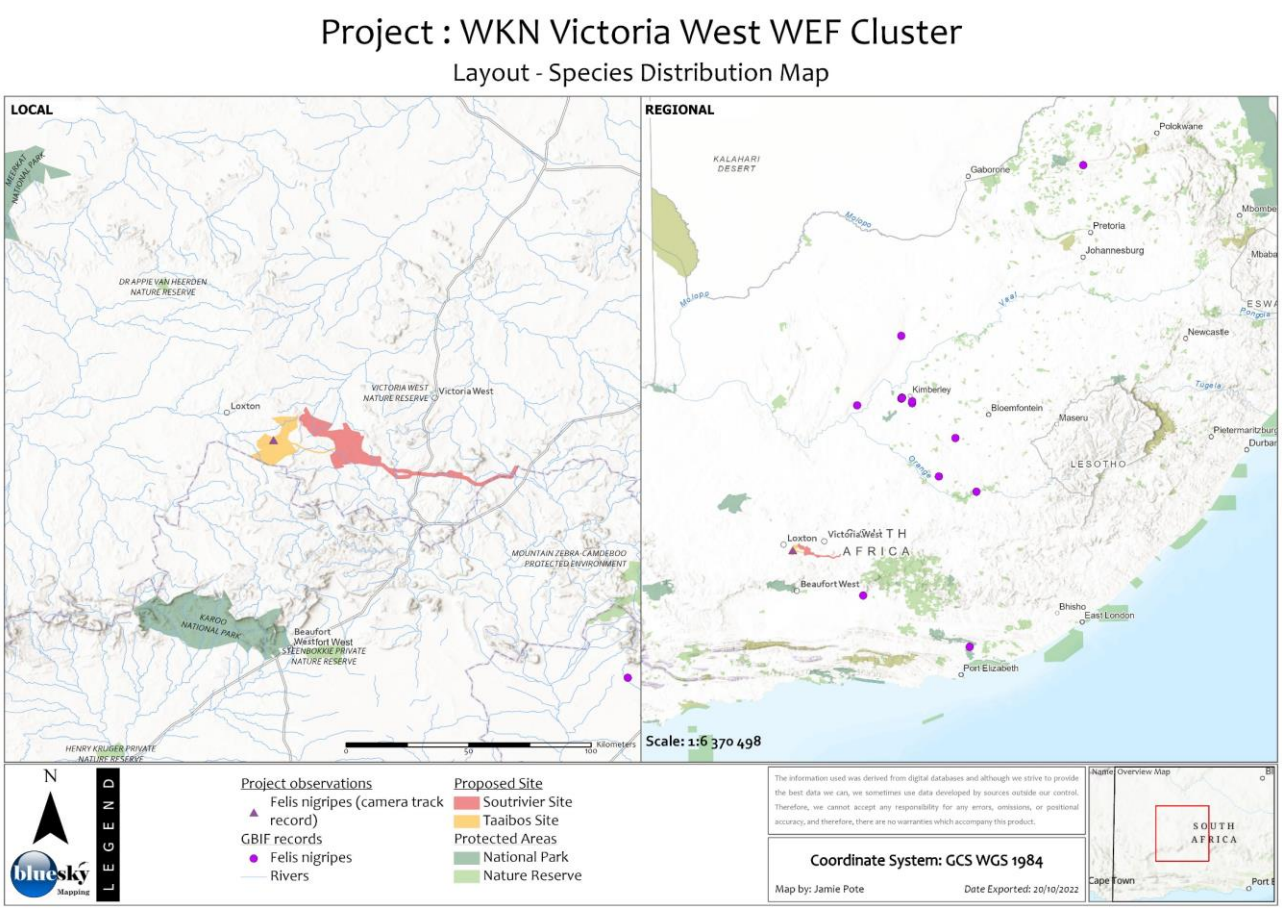


Figure 69: Distribution records of Felis nigripes.

Taxonomy	
Scientific Name	*Felis nigripes*
Family	Felidae
National Status	
Status and Criteria	**Vulnerable C2a(i)**
Assessment Date	2016/02/5
Assessor(s)	Sliwa, A., Wilson, B., Küsters, M. & Tordiffe, A.
Justification	Black-footed Cats are known to occur at low densities, and it is difficult to establish population sizes. The stronghold of the species is suspected to be in the central Karoo region of South Africa where highest densities are reached, whereas other regions are suspected to have medium or low densities. We list this species as Vulnerable C2a(i), as population size is estimated to be fewer than 10,000 mature individuals, where no subpopulation is suspected to be more than 1,000 mature individuals, and there is an inferred continuing decline.
Distribution	
Endemism	African Endemic (Botswana, Namibia, South Africa)
Provincial distribution	Northern Cape & Western Cape Province
Range	Endemic to the arid grasslands, dwarf shrub, and savannah of the Karoo and Kalahari in southern Africa (refer to *Figure 69*).
Estimated Geographic Area of Occurrence (SEAG, 2020[11])	930,000 km²
Total Site Area	
Approximate suitable habitat	
Habitat and Ecology	

Major system	Terrestrial
Major habitats	Savannah, Grasslands and Karoo regions
Description	Dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m above sea level.
Threats	
Intraguild predation, diseases, declining Springhare populations and unsuitable farming practices.	
Population	
No subpopulation is suspected to have more than 1,000 mature individuals. a cluster within an area of 1,963 km² or 2,500 km² would yield subpopulation sizes of 334 and 425 individuals (using 0.17 cats / km²) respectively.	
Population trend	Decreasing
Bibliography	
• Wilson, B., Sliwa, A. and Drouilley, M. 2016. A Conservation Assessment of Felis nigripes. In: M.F. Child, D. Raimondo, E. Do Linh San, L. Roxburgh and H. Davies-Mostert (eds), The Red List of Mammals of South Africa, Swaziland and Lesotho, South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.	
Reference	
• Sliwa, A., Wilson, B., Küsters, M. & Tordiffe, A. 2016. Felis nigripes. The IUCN Red List of Threatened Species 2016: e.T8542A50652196. http://dx.doi.org/10.2305/IUCN.UK.20161.RLTS.T8542A50652196.en	

Chersobius boulengeri (Karoo Padloper or Karoo Dwarf Tortoise)

The Karoo Dwarf Tortoise more commonly known as the Karoo Padloper is a South African endemic occurring from Bruintjieshoogte in the Eastern Cape to Touwsrivier in the Western Cape throughout the Succulent and Nama Karoo Biomes. It is a habitat specialist restricted to rocky outcrops, dolerite ridges and sandstone areas. It primarily shelters under rocks and crevices in vegetated areas.

Although the presence of this species has severely declined in the past few years, there is still a possibility of occurrence within the site footprints of both Taaibos and Soutrivier. The nature of the Karoo Dwarf Tortoise is mainly that of a sedentary reptile with a small home range (roughly 1 Ha) and even smaller daily displacement (roughly 30 m). As a result, precautionary measures should be taken by mapping suitable habitats as very high in sensitivity and essentially no-go zones, which has been undertaken in the assessment.

The potential impacts that Wind Energy Facilities have on the Karoo Dwarf tortoise are relatively unknown. Similar species in arid habitats have been studied and it has been shown that the introduction of wind turbines does not significantly alter the survivorship of resident tortoises. It has even been documented that long-term survival of tortoises has increased in areas that have WEFs. This is mostly as a result of the addition of roads that act as habitat modifiers, forming artificial rain catchment zones that in return increase the availability of vegetation and resources. The ecology of the Karoo Dwarf tortoise does however differ from the common tortoises found in South Africa and its habitat requirements need to be fully understood in order to define acceptable no-go zones.

An additional cause of concern for the survival of this species includes the encouragement of the proliferation of corvids [12]in the general area. The site footprints of both Taaibos and Soutrivier are generally devoid of trees that can form potential nest and perch sites; however, the introduction of overhead lines will now introduce new nesting and perching sites, thus special consideration needs to be taken where these OHLs are placed to ensure that there is a minimal chance of corvid proliferation. *Specific Recommendations are applicable, refer to separate faunal SCC reporting.*

[12] a bird of the crow family.

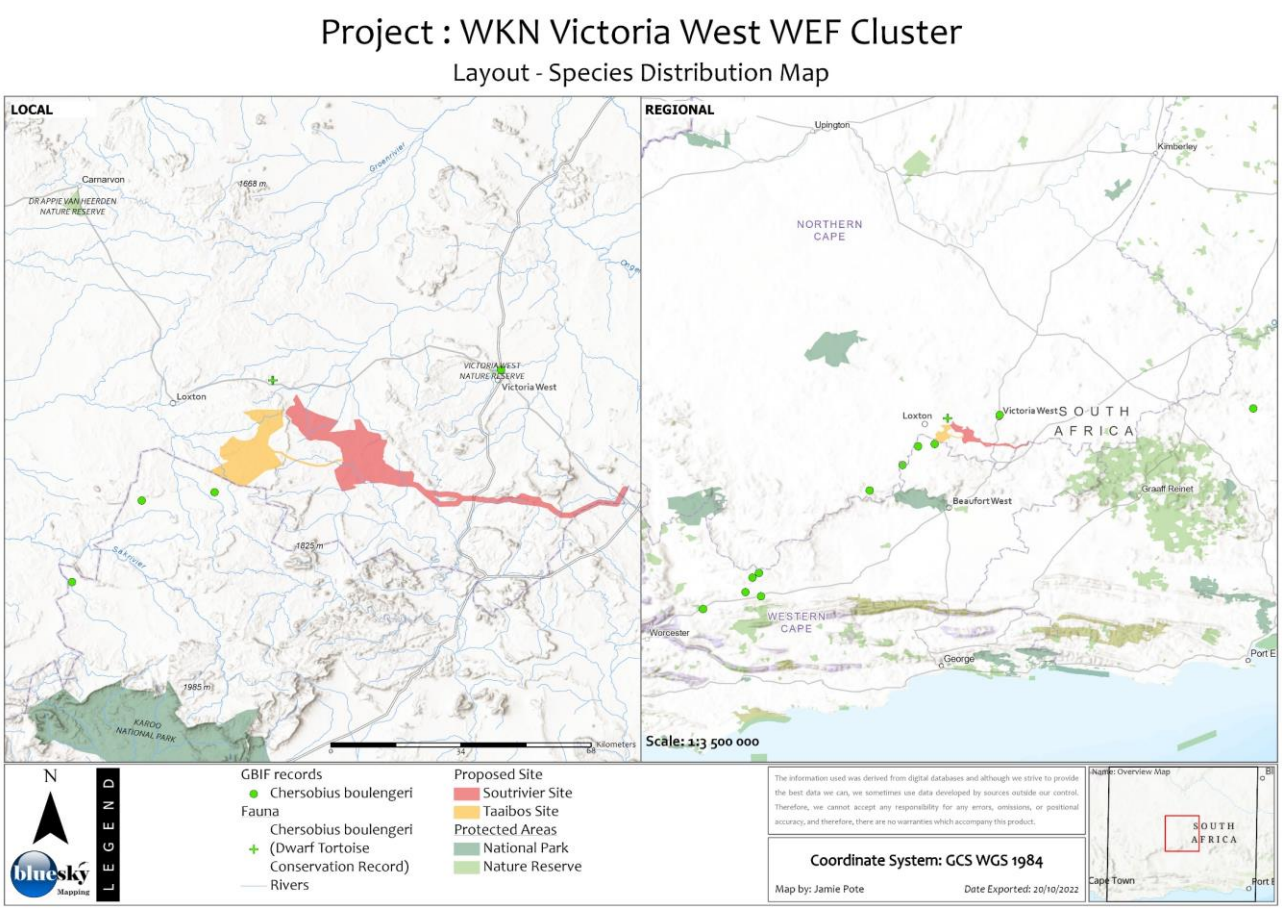


Figure 70: Distribution records of Chersobius boulengeri.

Taxonomy	
Scientific Name	*Chersobius boulengeri*
Family	Testudinidae
National Status	
Status and Criteria	**Endangered A4**
Assessment Date	2017/06/13
Assessor(s)	Hofmeyr, M.D., Loehr, V.J.T., Baard, E.H.W. & Juvik, J.O.
Justification	C. boulengeri is assessed as Endangered under criterion A4ace, based on an estimate of a reduction in population size of approximately 30% over the past 25 years (one generation), and a projected reduction of at least another 30% over the next 50 years (two generations), for a total reduction over three generations of approximately 60%.
Distribution	
Endemism	South African Endemic
Provincial distribution	Eastern Cape Province, Northern Cape Province, Western Cape
Range	Occurring from Bruintjieshoogte in the Eastern Cape to Touwsrivier in the Western Cape; the range in the Northern Cape extends north of Williston in the northwest and beyond Vosburg in the northeast (refer to *Figure 70*).
Estimated Geographic Area of Occurrence (SEAG, 2020[13])	135 090 km²
Total Site Area	
Approximate suitable habitat	
Habitat and Ecology	
Major system	Terrestrial

Major habitats	Succulent and Nama Karoo Biomes
Description	Occurs in association with dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes, and peripherally in the Albany Thicket biome in the southeast, at altitudes of approximately 800 to 1,500 m. Occurs in dwarf shrubland that often contains succulent and grassy elements. The tortoises usually take shelter under rocks in vegetated areas or in rock crevices
Threats	
The main past and current threat to *Chersobius boulengeri* appears to be habitat degradation. Drought and agricultural overgrazing also threaten the species' habitat. Crows and baboons pose another threat because, due to the small size of the species, these predators can exploit adult tortoises. A serious new threat involves shale gas exploration, which would require substantial infrastructure to support the drilling and operation of wells and largescale extraction sites.	
Population	
Chersobius boulengeri is a habitat specialist and population densities are low. Populations are isolated on rocky outcrops with specialized vegetation. The results of search efforts indicate that many populations have disappeared and that population numbers have declined significantly.	
Population trend	Decreasing
Bibliography	
• Boycott, R.C. and Bourquin, O. 2000. The Southern African Tortoise Book: A Guide to Southern African Tortoises, Terrapins and Turtles. O. Borquin, Hilton, South Africa. • Greig, J.C. and Burdett, P.D. 1976. Patterns in the distribution of southern African terrestrial tortoises (Cryptodira: Testudinidae). Zoologica Africana 11(2): 249-273. • Hofmeyr, M.D. and Baard, E.H.W. 2014. Homopus boulengeri Duerden, 1906. In: M.F, Bates, W.R. Branch, A.M. Bauer, M. Burger, J. Marais, G.J. Alexander and M.S. de Villiers (eds), Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland, pp. 73. South African Biodiversity Institute, Pretoria.	
Reference	
• Hofmeyr, M.D., Loehr, V.J.T., Baard, E.H.W. & Juvik, J.O. 2018. Chersobius boulengeri. The IUCN Red List of Threatened Species 2018: e.T170521A115656360. http://dx.doi.org/10.2305/IUCN.UK.20182.RLTS.T170521A115656360.en	

Redunca fulvorufula fulvorufula (Southern Mountain Reedbuck)

The Southern Mountain Reedbuck is a subspecies of the Mountain Reedbuck. It is a habitat specialist with patchy distribution across South Africa. The species is known to avoid open areas rather taking cover in grassy and bushy areas on rocky hillsides. It is however water dependant, thus venturing onto flat plains to feed and drink.

The species is potentially present on both Taaibos and Soutrivier, however it is unlikely that a local population would be significantly affected as their preferred habitat is considered as no-go areas (dolerite koppies). *Specific Recommendations are applicable, refer to separate faunal SCC reporting.*

Taxonomy	
Scientific Name	*Redunca fulvorufula*
Family	Bovidae
National Status	
Status and Criteria	**Endangered A2ad**
Assessment Date	2016/08/16
Assessor(s)	IUCN SSC Antelope Specialist Group
Justification	Recent evidence has emerged that the South African population underwent a decline of 61-73% in the last three generations (15 years). This is by far the largest of the three populations and results in an overall decline of 55% in three generations.
Distribution	
Endemism	African Endemic
Provincial distribution	Eastern Cape, Free State, North West, Limpopo, Mpumalanga, KZN
Range	The Mountain Reedbuck (*Redunca fulvorufula*) occurs in three disjunct and widely separated populations in West, East and southern Africa (*Figure 71*).

Estimated Geographic Area of Occurrence (SEAG, 2020[14])	km²
Total Site Area	
Approximate suitable habitat	
Habitat and Ecology	
Major system	Terrestrial
Major habitats	
Description	Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover), from 1,500-5,000 m (East 1999, Avenant 2013). They are predominantly grazers, and water is an important habitat requirement
Threats	
The main threats to Mountain Reedbuck include the expansion of human settlement, poaching, widespread disturbance by cattle herders and their livestock, and hunting by dogs.	
Population	
Population trend	Decreasing
Bibliography	
Reference	

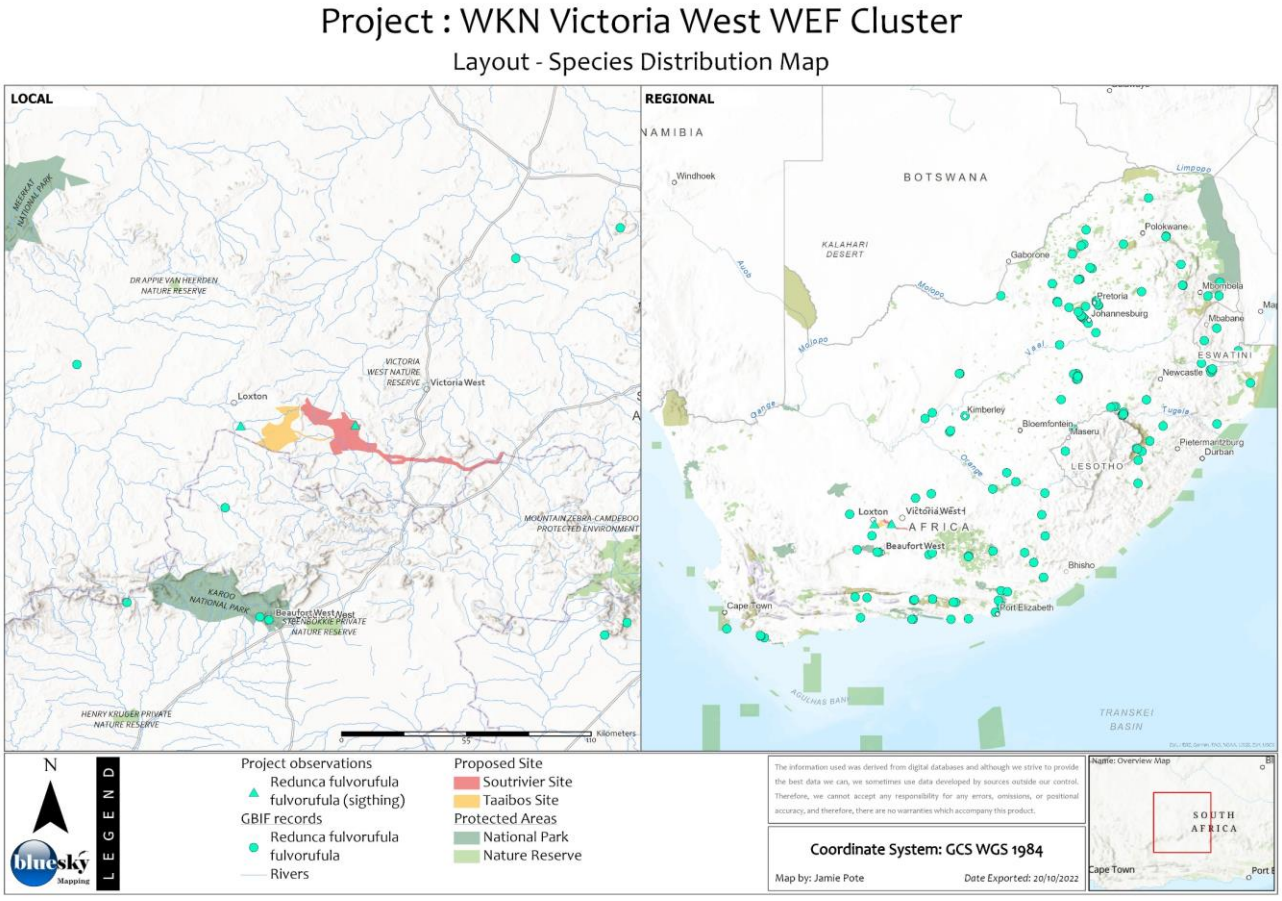


Figure 71: Distribution records of Redunca fulvorufula fulvorufula.

Poecilogale albinucha (African Striped Weasel)

The African Striped Weasel occurs across South Africa with no specific habitat requirements. It does however occur at low population densities and is considered to Near Threatened regionally. Individuals were identified during a camera trap survey of Taaibos. The main concern regarding the development would include the sound effects of the wind

turbines interfering with the auditory cues for communication as well as alarm calls. *Specific recommendations are applicable, refer to separate faunal SCC reporting.*

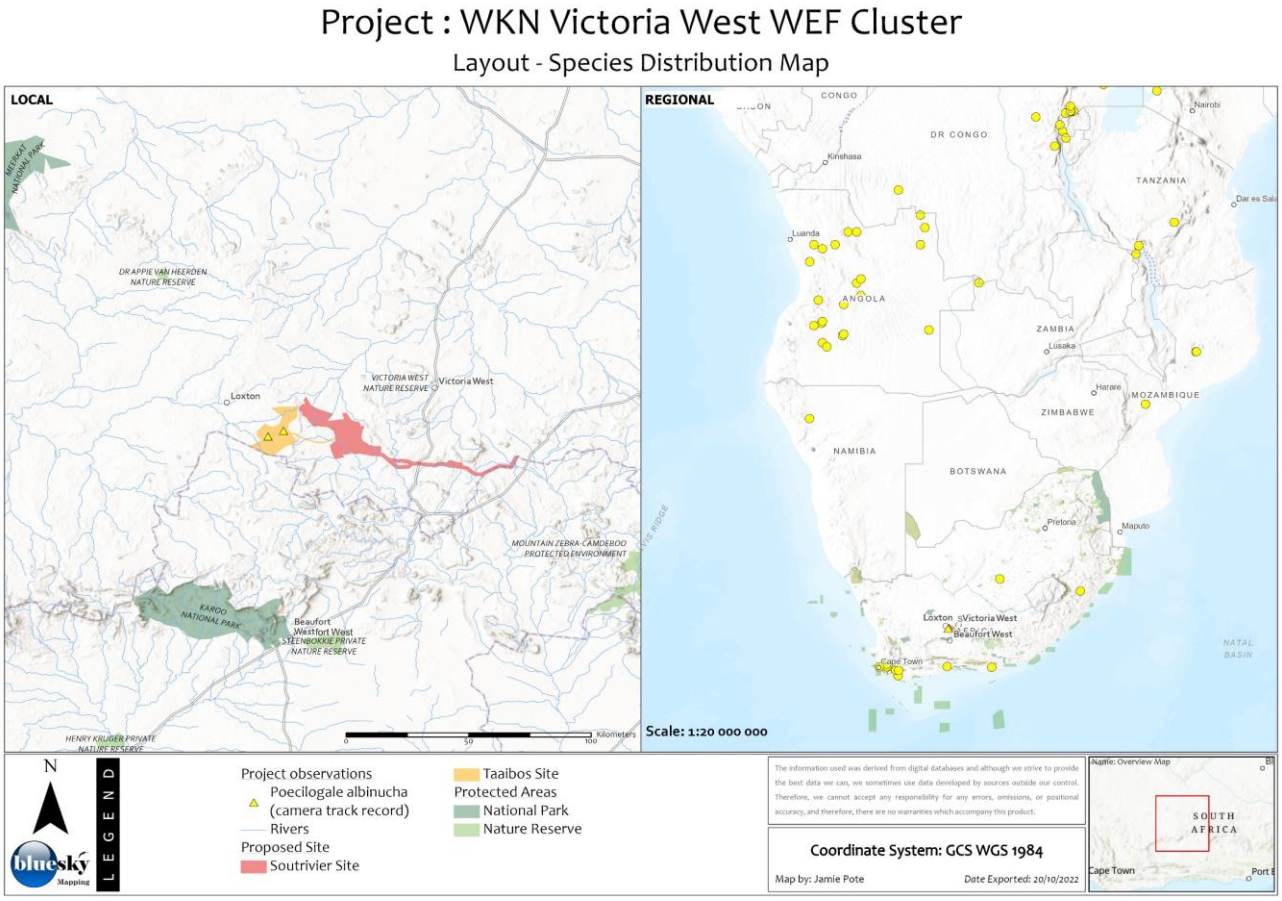


Figure 72: Distribution records of Poecilogale albinucha.

Additional information and assessment of risks associated with fauna, in particular the mammals will be provided including a separate Riverine Rabbit and faunal species of conservation concern assessment report.

The findings of the faunal Species of Conservation Concern report have been integrated into this report and the original report is also attached as a separate appendix.

The larger mammal species are unlikely to be significantly affected as they are generally mobile, and the site is surrounded by large areas of intact areas that would provide suitable alternative habitat. Less common species would include Bat-eared fox, Cape fox, Aardwolf, Striped polecat, and Aardvark. Bird and bat risks and impacts are not considered in this specialist component, as they will be assessed in separate avifaunal and bat assessments.

In addition to the species mentioned above, the Leopard, the Brown Hyena, and the Grey Rhebok (Vaal Rhebok) were also flagged as species of special concern that are potentially present on the Taaibos/Soutrivier sites and/or surrounding landscape.

The Leopard (*Panthera pardus*) is listed as Vulnerable and thus considered a species of special concern. Although not recorded during the faunal survey, there is a possibility that leopard may still occur within the large mountain ranges east of both Taaibos and Soutrivier. The likelihood of the turbines having a significant impact on them are however very unlikely.

The Brown Hyena (*Hyaena brunnea*) is also listed as Near Threatened. It is known to occur in the broader area but was not identified during the latest site visit. This however does not exclude its potential presence on both Taaibos and Soutrivier.

The Grey Rhebok, also known as the Vaal Rhebok (*Palea capreolus*) is listed as Near threatened. It is known to occur in rocky grassland habitats with a patchy but widespread distribution pattern. This species has also not been observed onsite, but it is present in the general area, particularly in higher-lying areas.

3.1.9 Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Several exotic invasive and other weed species were noted within the site, ranging from a few scattered individuals to denser infestations, in particular Prickly Pear. The dense localised infestations of Prickly Pear can have a noticeable and definite impact to the habitat present and are a significant source of degradation. A weed management programme, as part of the construction contract including an after-care period will be required, until such time as natural vegetation has become adequately re-established. A two year after-care period is recommended. A list of species is included in Table 12. Some species listed are not within the site but may be introduced during construction from the adjacent area.

Table 12: Alien (exotic) invasive and other weed species and status.

SCIENTIFIC NAME	COMMON NAME	FAMILY	STATUS[15]	PRESENCE
Agave sisalana	Sisal		CARA 2	Present, few individuals
Argemone mexicana	*Mexican Poppy*	Asteraceae	CARA 1b	Present, few individuals
Cirsium vulgare	Scotch Thistle	Asteraceae	CARA 1b	Present, few individuals
Datura spp.	Thorn Apple	Solanaceae	CARA 1b	Present, few individuals
Eucalyptus spp	Gum tree	Myrtaceae	CARA 1b	Present, few individuals
Jacaranda mimosifolia	Jacaranda	Bignoniaceae	Not listed in EC	Present, few individuals
Melia azedarach	Syringa	Meliaceae	CARA 1b	Present, few individuals
Opuntia ficus-indica	Prickly Pear	Cactaceae	CARA 1b	Present, few individuals, can be present in larger clumps.
Opuntia aurantiaca	Jointed Cactus	Cactaceae	CARA 1b	Present, few individuals
Pennisetum clandestinum	Kikuyu	Poaceae	CARA 1b	Present, few individuals
Solanum mauritianum	Bugweed	Solanaceae	CARA 1b	Present, few individuals
Solanum sisymbriifolium	Wild tomato	Solanaceae	CARA 1b	Present, few individuals
Salix babylonica	Willow	Salicaceae	Not listed	Present, few individuals, sometimes along larger watercourses.

Eradication protocol

The act required the removal of these species, being the responsibility of the landowner, as described in Section 9.4.6: Alien Invasive Species. It is likely that the disturbed areas will be prone to alien infestation after construction is completed and follow up maintenance period will be required.

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the EMP, and a detailed action plan compiled and implemented by the ECO. All removed trees must either be removed from site or disposed of at a registered waste disposal facility. Alternatively, the plant material can be mulched using a woodchipper on site. And seed-bearing material is to be disposed of at a registered landfill.

3.1.10 Terrestrial Vegetation Sensitivity Assessment

An overall Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

- relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.
- presence, diversity and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status – indicated as vulnerability of the area because of loss.

Intactness

Three basic classes are differentiated as follows:

[15] CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016). Refer to Section 2.2 & Table 24 for detailed procedures and requirements.

- **Low**: > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered or endemic with highly localised distribution.
- **Moderate**: 25 – 75 % of original vegetation has been removed/lost; and or presence of species of special concern but not having high conservation status or high levels of endemicity or highly localised distributions.
- **High**: < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemicity and or high conservation status (endangered or critically endangered).

Intactness for the site is generally Moderate to High.

Alien Invasion

Three classes are differentiated as follows:

- **Low**: no or few scattered individuals.
- **Moderate**: individual clumps of invasives present but cover less than 50% or original area.
- **High**: dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is Low.

Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

INTACTNESS	INVASION		
	LOW	MODERATE	HIGH
High	Pristine	Near Pristine	Moderately Degraded
Moderate	Near Pristine	Moderately Degraded	Severely Degraded
Low	Moderately Degraded	Severely Degraded	Transformed

Degradation for the site is Moderate to Low (~Pristine to Near Pristine) for natural areas.

Overall Sensitivity score

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Severely degraded/ Transformed	Very Low	Low	Moderate	Moderate – High
Moderately degraded	Low	Moderate	High	High
Ecologically Pristine or near Pristine	Moderate	Moderate – High	High	Very High (No-Go area)

REFER TO Figure 73 FOR OVERALL SENSITIVITY MAP.

Table 13 provides the approximate areas of each of the vegetation communities.

Table 13: Vegetation community areas in Hectares.

VEGETATION COMMUNITY	AREA (HA)	PERCENT (%)	SENSITIVITY
Karroid (Grassy and Shrubby)	~ 27 694.33	57	Moderate
Alluvial Areas (seasonal flooding)	~ 14 893.05	31	Very High/High

VEGETATION COMMUNITY	AREA (HA)	PERCENT (%)	SENSITIVITY
Riverine (along watercourses)	~ 2 838.52	6	Very High
Hardeveld (Mesas and Inselbergs)	~ 2 520.26	5	High/Very High
Man-made Dams (Artificial wetlands)	~ 408.66	1	Very High
Cultivated (Lands & Old Lands)	~ 293.26	1	Very Low
Transformed (dwellings & roads)	~ 42.64	< 1	Very Low
Alluvial Pans (Seasonal)	~ 5.64	< 1	Very High
TOTAL	**48 696.33**	**100 %**	

The site sensitivity can be summarised as follows:

- Areas scoring an overall LOW sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. Low and Very Low sensitivity areas include all areas that would be considered transformed and include cultivated lands, old lands, dwellings and other structures as well as other agricultural infrastructure.
- Areas scoring an overall MODERATE sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. Moderate sensitivity areas include intact areas of Eastern Upper Karroo (karroid) vegetation, that are not considered specialised habitats. Within this broad habitat several more specialist habitats are noted, some of which will require specific delineation and assessment during the layout assessment site visit, once the preliminary plan is in available. It is not expected that this will significantly affect overall turbine layout after the preliminary site survey, but some minor position adjustments may be applicable.
- Areas scoring an overall HIGH sensitivity include those areas having intact vegetation and deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are considered to be vulnerable and/or have confirmed presence of species of conservation concern. High sensitivity terrestrial areas on site include dolerite mesas (koppies) & inselbergs (ridges), as well as peripheral alluvial areas that were mapped over and above those designated in the National Biodiversity Assessment (NBA, 2018) aquatic dataset. These high sensitivity alluvial areas should be avoided as far as possible and specific footprints will likely require specific case-by-case assessment to determine if alluvial pans or not, in which case a very high sensitivity may be applicable. Similarly, footprints in all other high sensitivity areas should kept to a minimum and specific case-by-case assessment will be required for any footprints.
- Areas scoring an overall VERY HIGH sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat for any faunal species that is endangered or critically endangered. Very High sensitivity terrestrial vegetation areas include the primary riverine and alluvial pan areas (as designated by the NBA aquatic dataset) and river channels as well as wetlands and pans. Such areas shou be considered no go areas, unless for crossings and linear activities. Linear activities (i.e. access roads) should not bisect any wetlands/pans/alluvial areas unless no alternative is possible for technical reasons. Each instance would require specific assessment to ascertain feasibility, impact and possible mitigation.

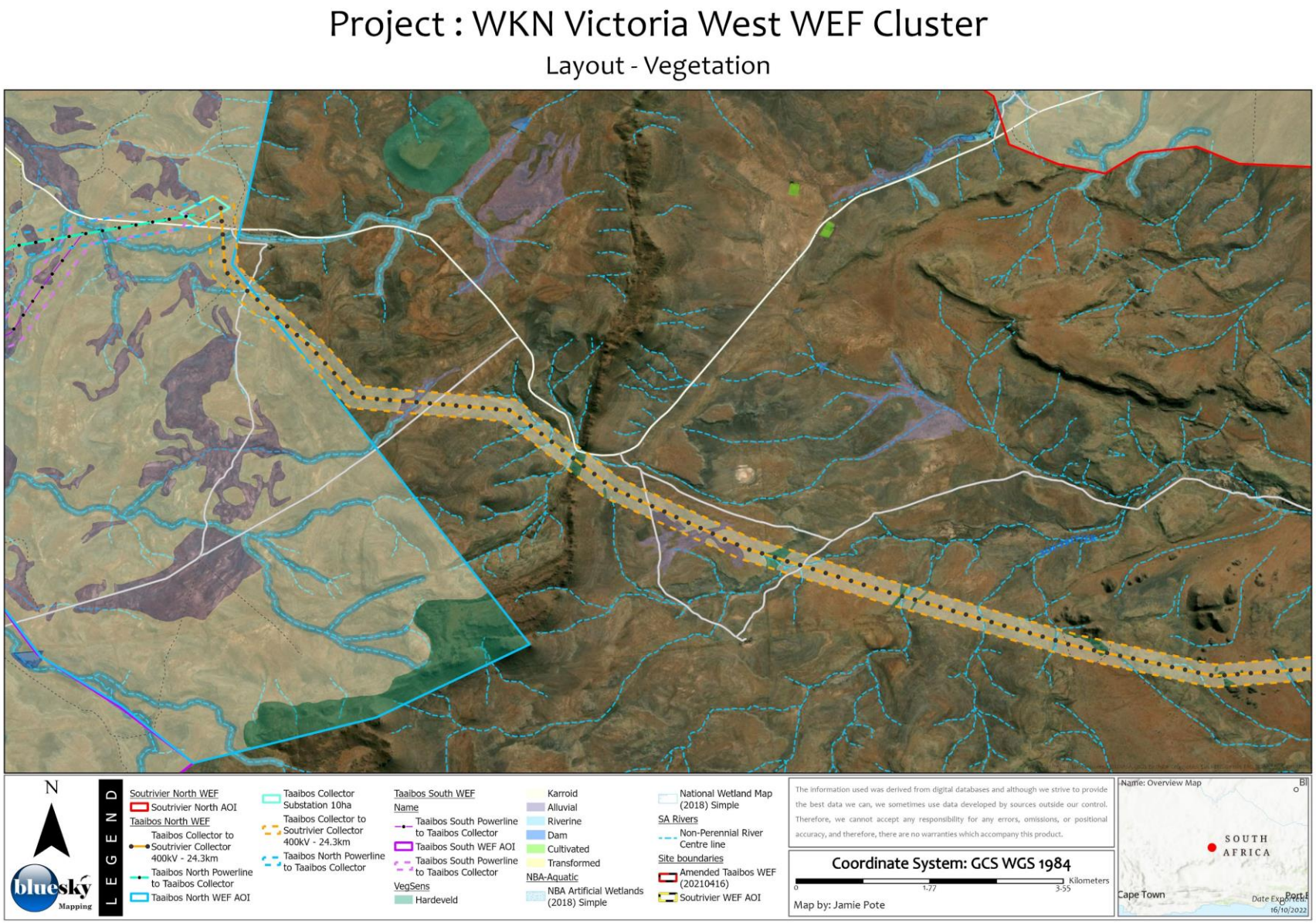


Figure 73: Overall Sensitivity (west).

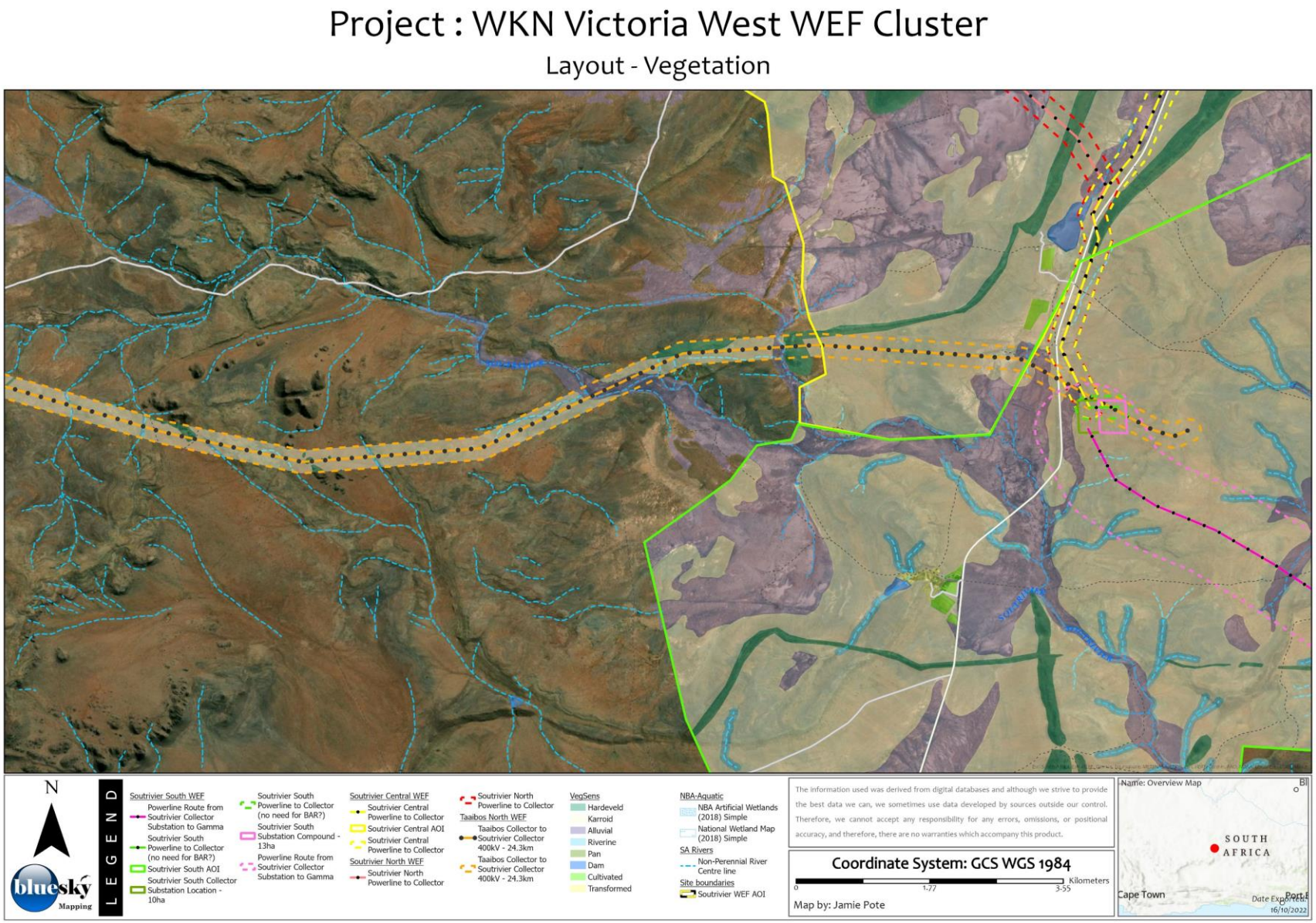


Figure 74: Overall Sensitivity (east).

The Karroid and Alluvial vegetation communities are the most common and are effectively the same vegetation unit but are biophysically and functionally different. The less common intact types (Hardeveld, Riverine & Pans) would have an inherent sensitivity due to their scarcity, while the Alluvial areas, while common, have elevated sensitivity due to ecological importance in an arid area. Karroid areas would be deemed to be the preferred area for and footprints in other areas should be kept to the minimum.

3.1.11 Critical Habitat

The following Critical Habitat features have been identified within the site:

1. Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
    - No Endangered or Critically Endangered Flora species were recorded. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
    - No other Endangered Mammals, Reptiles, Amphibians, or Invertebrates are known to be present on the site or will be affected (other than temporary displacement during construction).
2. Criterion 2: Habitat for Endemic or restricted-range species
    - Several range restricted flora species are potentially present in the surrounding area and vegetation types, none of which were confirmed to be present.
3. Criterion 3: Habitat for Migratory or congregatory species
    - No such terrestrial habitat will be directly or indirectly affected.
4. Criterion 4: Habitat for Highly threatened and/or unique ecosystems
    - No such terrestrial habitat will be directly or indirectly affected.
5. Criterion 5: Habitat for Key evolutionary processes
    - No such terrestrial habitat will be directly or indirectly affected.

3.1.12 Other Important or Sensitive Habitat

Special Habitats include areas that are rare within a region, or which support important species, ecosystems, or ecological processes. Species of Special Concern refers to red data species and important habitats include the locations where these species are known to occur. The following are generally considered to be important habitats, some of which none are present within the site or project area as indicated.

Feature	Desired State
Rocky Outcrops	Rocky outcrop habitat is present and common.
Wetland/aquatic habitat	Wetlands and alluvial areas are present and common.
Grassland	Karoo Escarpment Grassland is flagged slightly to the south of the 400 kV Soutrivier to Gamma substation overhead powerline and is not anticipated to be affected.
Colonies or Populations of Threatened or Protected Species	Colonies or populations of threatened or protected species are present or in proximity to the activity that may be directly or indirectly affected, including the Riverine Rabbit. Refer to Avifaunal and faunal reporting.
Priority Estuaries	No Estuaries present.
Forest	No forest is present.
Fynbos	No Fynbos is present.

3.1.13 No-Go Areas

Several recommended No-Go areas have been identified. In general, footprints in ***very high sensitivity areas must be avoided***, in ***high sensitivity areas should be avoided*** and/or minimised as far as possible. Moderate to Low sensitivity areas, which includes the remainder of the natural vegetation, should be used as far as possible. While the general approach in these areas is to utilise transformed areas (such as farmlands), however this may not necessarily be the most sustainable approach as in these arid areas, land available or suitable for agriculture is generally very limited and loss thereof could potentially result in landowners having to find other natural areas as replacement, which may be less suited to the purpose. Very low sensitivity areas would however be most suited for short term use, such as laydown areas and site camp infrastructure, where it will be relatively easy to return to its previous state on completion of the construction phase.

Should any significant populations of Species of Conservation Concern be recorded during the site assessment and pre-commencement final micro-siting walkdown, such may be elevated to no-go areas and WEF infrastructure as well as grid connection infrastructure and access roads may need to be -shifted accordingly. The aim of the detailed assessment will be to try and identify as many of these risks as possible, but seasonal constraints may come into play and a final walkdown is usually required, which also addresses any later phase layout changes.

3.1.14 Potential Development Footprints

The proposed site potentially provides a suitable footprint for the proposed activity, taking into consideration more sensitive patches which should be avoided as indicated in Figure 73 and described below.

Since access roads for the WEF facilities require substantial construction as well as specific technical and alignment parameters, the approach of following existing farm access roads may not necessarily be the optimum solution. The constructed roads, which require specific technical specifications for the relevant construction vehicles including low-bed trucks and have a significantly larger footprint and greater significance compared to traditional two-track type farm roads, as illustrated in Figure 75 & Figure 76. The optimum approach in terms of biodiversity impact would be to minimise the footprint and keep it as low as possible. Access roads often constitute a considerable proportion of a Wind Energy Facility and in some instances, it can exceed the actual WEF facility footprint, depending on overall site accessibility and turbine layout.

Figure 75: Typical two-track type farm road.

Figure 76: Typical WEF constructed access road.

In this regard, the actual access road alignment should be provided as early in the planning stage as possible to allow for more accurate assessment. Preliminary road alignment (Figure 71) has minimised crossings of areas of elevated sensitivity and reduced to only those that are required for technical reasons, or where unavoidable. Where these high sensitivity areas are to be traversed, appropriate due diligence to be applied during construction and operational phases.

Most of the grid connection servitude is situated within moderate sensitivity Karroid vegetation; however, short sections traverse alluvial areas as well as near or on slopes having rocky outcrops. The general guiding principle should thus be to avoid loss or minimise intrusion as far as is technically possible, as per recommendations provided in Table 14.

Much of the general rocky outcrop habitat within the site is not ideally suited to Karoo Dwarf tortoise tortoises and the alluvial areas may be peripheral to preferred Riverine Rabbit habitat. It is recommended that these more sensitive positions are flagged, and the recommended further micro-siting be undertaken during the pre-construction phase.

3.2 Assessment of Risks and Impacts to Biodiversity

3.2.1 Criteria of assigning significance to potential impacts

The following methodology, as provided by CES, is applied in the specialist studies for the assessment of potential impacts.

CRITERIA	EXPLANATION	
Nature of impact	Negative or positive impact on the environment	
Type of impact	Direct, indirect and/or cumulative effect of impact on the environment.	
Duration	The significance of the impact at various time scales, as an indication of the duration of the impact. • *(S) short term* (less than 5 years) - 1 • (M) medium (5 – 20 years) - 2 • *(L) long term* (between 20 and 40 years - 3 • (P) permanent (over 40 years and resulting in a permanent change) - 4	
Extent	The physical extent of the impact. • (L) Localised (At localised scale and a few hectares in extent) – 1 • (S) Study Area (The proposed site and its immediate environs) – 2 • ® Regional (District and Provincial level) – 3 • (N) National (Country) - 3 • (I) International (Internationally) - 4	
Probability (Likelihood)	The likelihood of impacts taking place as a result of project actions differs between potential impacts • (U) Unlikely (The likelihood of these impacts occurring is slight) – 1 • (M) May Occur (The likelihood of these impacts occurring is possible) – 2 • (P) Probable (The likelihood of these impacts occurring is probable) – 3 • (D) Definite (The likelihood is that this impact will definitely occur) - 4	
Severity or Benefits	The severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party. The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it, and how effective the mitigation might be. The word 'mitigation' means not just 'compensation', but includes concepts of containment and remedy	
	Very severe (4) - An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example the permanent loss of land. **Severe** (3) - Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these. For example, the clearing of forest vegetation. **Moderately severe** (2) - Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated. For example,	**Very beneficial (4)** - A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. For example the vast improvement of sewage effluent quality. **Beneficial** (3) - A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example, an increase in the local economy. **Moderately beneficial** (2) - A medium to long term impact of real benefit to the affected system(s) or

CRITERIA	EXPLANATION	
	constructing the sewage treatment facility where there was vegetation with a low conservation value. **Slight (1)** - Medium- or short-term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. For example, a temporary fluctuation in the water table due to water abstraction. **No effect** - The system(s) or party(ies) is not affected by the proposed development.	party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way. For example, a 'slight' improvement in sewage effluent quality. **Slightly beneficial** (1) - A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these. **Don't know/Can't know** - In certain cases it may not be possible to determine the severity of an impact.
Degree of confidence	The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium or low.	
Significance	• (*VL*) *Very Low:* Considered to be negligible • *(L) Low:* Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design • *(M) Medium*: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation. • *(H) High*: Where it could have a 'no-go' implication for the project unless mitigation or re-design is practically achievable. • *(VH) Very High*: Confirmed No-Go area, no mitigation feasible, redesign and avoidance are required, where activity will have a significant permanent and irreversible impact on a critically endangered ecosystem or species population.	

3.2.2 Significance Rating

Matrix used to determine the overall significance of the impact based on the likelihood and effect of the impact below:

SEVERITY		COMPOSITE DURATION, EXTENT & PROBABILITY SCORE									
		3	4	5	6	7	8	9	10	11	12
	Slight	3	4	5	6	7	8	9	10	11	12
	Mod Severe	3	4	5	6	7	8	9	10	11	12
	Severe	3	4	5	6	7	8	9	10	11	12
	Vere Severe	3	4	5	6	7	8	9	10	11	12

The environmental significance scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

It is clear that an impact that has a slight severity could be of MODERATE significance because it is permanent (4), has a regional affect (3) and is definite. This elevates it from a LOW to a MODERATE rating. Conversely, a moderately severe impact could be rated as LOW since it is short term (1), localised (1) and only probable (3). An impact rated as severe could be of VERY HIGH significance because it is permanent (4), of national importance (3) and is definite (4). For example, the impact on a frog species of conservation concern (SCC) might only be rated as severe as a result of the project actions, but because the loss is permanent and of national importance (it's a SCC) and is definite, we rate the significance as VERY HIGH and not HIGH. If the impact was long term and not permanent then it would be rated as HIGH.

The Significance Rating Scale is defined below.

OVERALL SIGNIFICANCE *(The combination of all the above criteria as an overall significance)*	
VERY HIGH NEGATIVE	**VERY BENEFICIAL**
These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects. *Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.* *Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.*	
HIGH NEGATIVE	**BENEFICIAL**
These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long-term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light. *Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.* *Example: The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.*	
MODERATE NEGATIVE	**SOME BENEFITS**
These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium-term change to the (natural and/or social) environment. These impacts are real but not substantial. *Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.*	
LOW NEGATIVE	**FEW BENEFITS**
These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short-term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect. *Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.* *Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.*	
NO SIGNIFICANCE	
There are no primary or secondary effects at all that are important to scientists or the public. *Example: A change to the geology of a particular formation may be regarded as severe from a geological perspective but is of NO significance in the overall context.*	
DON'T KNOW	
In certain cases, it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information. *Example: The effect of a particular development on people's psychological perspective of the environment*.	

3.2.3 Significance Post Mitigation

Once mitigation measure are proposed, the following criteria are then used to determine the overall post mitigation significance of the impact:

- Reversibility: The degree to which an environment can be returned to its original/partially original state.
- Irreplaceable loss: The degree of loss which an impact may cause.
- 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 the Table 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.

REVERSIBILITY

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

3.2.4 Degree of Confidence

If you wish, you may also mention the confidence you have in your impact ratings, but this is not a legislative requirement. It does, however, assist in determining the level of certainty of our impact predictions.

DEGREE OF CONFIDENCE *(The confidence with which one has predicted the significance of an impact)*	
Certain	More than 90% sure of the facts that underpin the assessment, the data is current and the information is comprehensive enough to be *certain* of my impact rating.
Confident	More than 70% sure of the facts that underpin the assessment, the data is current and the information, although not comprehensive, is enough to be *confident* in the impact rating.
Undecided	Between 40% and 70% sure of the facts that underpin the assessment, but the data is scant and the information is outdated, not very site specific and/or has other limitations so am *undecided* if the impact rating is correct. Adopted a precautionary approach when rating this impact.
Unconvinced	Less than 40% sure of the facts that underpin the assessment, the data is scant and the information is very outdated. Lack site specific information and details on the nature of the impact, as its effect is not well researched. *Unconvinced* that the impact rating is correct and have therefore adopted a precautionary approach when rating this impact.

3.2.5 Summary of Impacts

The main impacts including actions, activities, or processes of an ecological or biodiversity nature that may have an impact or require mitigation as a result of the proposed activity include the following, which are described in more detail in Table 14:

1. Permanent or temporary loss of indigenous vegetation cover because of site clearing
2. Loss of flora species of special concern during pre-construction site clearing activities
3. Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species
4. Susceptibility of some areas to erosion
5. Disturbances to ecological processes
6. Aquatic and Riparian processes
7. Loss of Faunal Habitat
8. Loss of faunal SSC due to construction activities

3.2.6 Potential Terrestrial Biodiversity Impacts (Direct)

A summary of potential ecological and terrestrial biodiversity risks and impacts are listed in Table 14.

Table 14: Potential Impacts to Terrestrial Biodiversity

IMPACT	Nature of Impact
Vegetation	Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	Loss of flora species of special concern during pre-construction site clearing activities. Several special of concern are known from surrounding areas, which could be destroyed during site preparation.
Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
Ecological Processes	Disturbances to ecological processes: Activity may result in disturbances to ecological processes such as fragmentation (road, etc).
Aquatic and Riparian processes	Aquatic and Riparian processes: Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of special concern.
Faunal Habitat	Loss of Faunal Habitat: Activity may result in the loss of habitat for faunal species, which could result in disturbance and displacement of faunal species.
Faunal Processes	Impacts to faunal processes because of the activity such as erection of barriers to movement.
Faunal Species	Loss of faunal SSC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

3.2.7 Potential Risks to Fauna Species of Conservation Concern

Several faunal species of conservation concern were identified and confirmed to be present within the broader project area. The mitigation measures provided below will serve to minimise these impacts to acceptable levels.

Habitat Loss, degradation, and fragmentation

The development may fragment an already highly fragmented landscape which may create barriers to geneflow where subpopulations are disconnected and isolated. Roads and fences can affect the quality and quantity of available habitat, most notably through fragmentation, creating barriers to animal movement. Erosion from construction may degrade the habitat and direct loss of habitat will occur due to necessity of access roads.

Disturbance

Disturbance will be primarily in the form of visual and noise effects as well as general human activities. Visual stimuli from movements of the turbine blades may cause a disturbance which may be far reaching due to the site being open and unobscured. Noise effect from construction and associated human activities during this phase is highly probable. This impact will reduce once the WEF is operational however there will be continued noise pollution from turbines from both the hub and the swish of the blades.

Noise

The effect of noise also depends on the individual's previous exposure to the noise (noise exposure history) and the predictability of the noise to which an animal is exposed to. Noise can induce multiple biological responses, including disrupting vocal communication and auditory impairment which may cause a change in vocalisation or a shift in habitat selection. Species that rely on hearing for courtship, mating, prey location,

predator detection and homing may be particularly negatively impacted by increased noise in their environment. All SCC identified on this site, may be impacted in one way or another by noise effect and to better understand this impact it is recommended that monitoring is conducted whilst the buffers that have been provided may provide some distance from turbine to reduce this unknown effect.

Visual

Visual stimuli may affect wildlife, particularly prey animals that react to visually detected movement and therefore may be affected by the movement of turbine blades. Visual stimuli may cause annoyance or stress and the effect of visual disturbance may be far reaching where the site is open and unobscured. SCC such as the Riverine Rabbit, Mountain Reedbuck and Grey Rhebok are most likely to be impacted by possible visual stimuli but personal observation at existing windfarms suggest that they are likely to habituate over time, however this can only be confirmed through monitoring. Turbines emit sound from both the hub as well as from the swish of the blades. When it is windless the blades will be stationary and limited sound will be emitted, ambient noise readings have been found to be very similar both in terms of decibel level and frequency characteristics. During strong wind the turbines will emit more sound as blades are turning but then the ambient noise levels from the wind through the vegetation will usually be louder than the turbines. It is the in-between wind strength which may be more of a concern as the turbine's noise may be louder than ambient sounds.

Mortality from road collision

There is an increased collision risk from increased traffic levels at the site and in the general area. This impact is likely to be of highest concern during construction but is also expected during the operational phase. Roads and roadsides may attract SCC such as Riverine Rabbits and Karoo Dwarf Tortoises due to verge edge enhancement of vegetation and roads may be used to facilitate movement, thus further increasing collision risks. Access roads that traverse riverine habitats require careful planning and monitoring to reduce risk of rabbit mortality.

Predation from possible influx of Pied Crow and other bird of prey that use Powerline Pylons for nest sites

Power line infrastructure are often used for nesting sites and may lead to the proliferation of crows in the region (Cunningham *et al.* 2015). In the past three decades Pied Crow numbers have increased significantly in South Africa with their spread facilitated by electrical infrastructure (Cunningham *et al.* 2015; Fincham *et al.* 2015). A strong relationship has been found between the rate of population increase and density of power line infrastructure in shrubland biomes (Cunningham *et al.* 2015). This is particularly due to the expansion of power lines in the largely treeless, semi-arid landscapes of the Karoo. Pied Crows are generalist predators, preying on a wide range of species, with evidence of heavy predation pressures on threatened or restricted-range species such as tortoises. The development may thus create increased predation pressures on the Karoo Dwarf Tortoise and several other susceptible vulnerable faunal species of the region.

The possible artificial increase in Pied Crow abundance (also termed native invaders) may have substantial long-term negative impacts on faunal populations as nest building will occur throughout the operational phase. Furthermore, we currently have very little understanding of the ecological consequences and ecosystem-level implications of these native invaders. It is anticipated that this impact will be most severe in regions where no other power line infrastructures exist, providing nesting sites in an otherwise treeless environment.


Figure 77: Pied Crow nest on Anti-climb fences.

The design of the pylon may influence the opportunities for nesting sites. Pylons which have a lattice structure with horizontal sections provide numerous nesting sites on various levels. Additionally, anti-climb fences are also providing nesting sites for Pied Crows and other species (Figure 77). It is likely that crows (and other birds) will also nest on insulator carriers which can cause electrical problems if conducive materials such as wires are used (Figure 78) or if a nest becomes wet during rain. The existing powerlines that run into the Gamma Substation have four different pylon designs and provide an opportunity to assess which design are less favourable for nesting sites. Cross Rope Suspension Towers were found to be less desirable and provide fewer opportunities for nesting sites (Figure 79). We understand, however, that the tower design is constrained by topography, costs as well as size of the high voltage transmission lines.

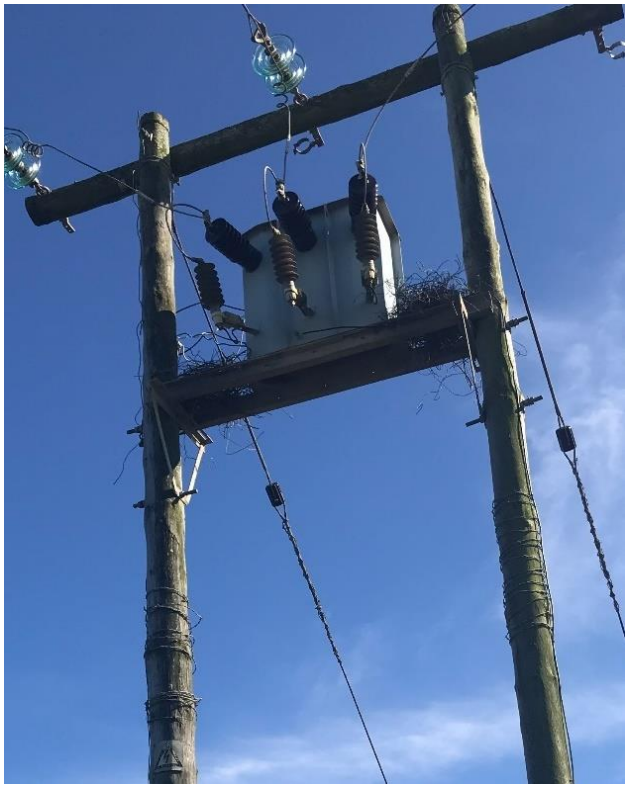



Figure 78: Crow nests constructed entirely out of wire may become a fire hazard.

Figure 79: Pylon design that provide fewer opportunities for nesting sites.

Martial Eagles are also known to nest on pylons that support high voltage transmission lines and despite these birds being threatened, the artificial dispersion and use of pylon for their nest may have negative

impact on the local fauna including the Critically Endangered Riverine Rabbits. Personal observation below Martial nests have shown that Lagomorph species (rabbits and hares) make up a substantial part of their diets (*Figure 80*).

Figure 80: Lagomorph remains under three different Martial Eagle nests.

Cumulative impact

The cumulative impact is of concern, given the fact that the renewable-energy industry is rapidly expanding in South Africa. The local fauna is already impacted and threatened by past and current land use and the combination of these existing anthropogenic impacts with planned developments may impact the local fauna with unexpectedly large effects. Cumulative effects can also result where the construction phase occurs at several locations simultaneously or if a new project begins construction immediately following the completion of another. Cumulative effects can cause a small, localized effect (which may have a limited effect on its own) to have a significant impact on population level as there may be thresholds where the cumulative effects increase disproportionally.

Cascading impact across trophic levels

The effect of the wind farm on one species may have indirect cascading effects (knock on effect) on other species within the same community due to ecological relations to one another. This means that an effect on one species may in turn affect many others within the same ecosystem. Cascading effects may be complex and unpredictable as it may be the result of different types of interactions including competition, predation, parasitism, or symbiosis.

3.2.8 Assessment of Terrestrial Biodiversity Impacts

Construction and operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not effectively managed. A summary of potential ecological and terrestrial biodiversity risks and impacts are listed in Table *14*, which describes impacts that may potentially occur in the site as well indicating the relevant EMP section.

The predicted significance of these during the construction and operational phases are summarised in Table *15*.

3.2.9 Decommissioning Phase

The activities associated with the decommissioning phase are very similar to the Construction Phase and can thus be considered to have the same impacts and mitigation measures as the Construction Phase.
The dismantling, collection, transportation and waste management treatment and final site restoration will be required during the decommissioning of the Wind Energy Facility. This will be required to be done in a timely manner and be done in a sustainable way and in accordance with environmental authority stipulation and national legislation. Decommissioning must start within 1 year after the wind farm has stopped operating at the latest. Typically, this will require all visible traces of the wind farm to be removed, including turbines and access roads, although access road may be best to leave as is for public or private usage. The concrete bases can also be removed, but it is often better to leave them under the ground, as this causes fewer disturbances. If the turbine bases are left, they would be covered with stone or other indigenous material, and the site returned as closely as practicable to its original state.

Table 15 : Impact Assessment Summary (Refer to Sections 3.2.1 & 0 for methodology).

Nature of Impact	Nature	Duration		Extent	Severity	Probability	Significance (Before)	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance (After)
Vegetation loss (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Irreversible	Resource will be partly lost	Difficult	Low
Operation	Negative	Short term (1)		Localised (1)	Slight	Unlikely (1)	Low Negative	Reversible	Resource will not be lost	Achievable	Low Negative
Loss of Flora Species (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Irreversible	Resource will be partly lost	Achievable	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	Unlikely (1)	Low Negative	Reversible	Resource will not be lost	Achievable	Low Negative
Alien Invasive Species (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Operation	Negative	Short term (/1)		Localised (1)	Slight	Probable (3)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Erosion susceptibility (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	May Occur (2)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Ecological Processes Disruptions (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Reversible	Resource will be partly lost	Difficult	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	Probable (3)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Aquatic & Riparian Processes (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	Probable (3)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Faunal Species (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Irreversible	Resource will be partly lost	Difficult	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	May Occur (2)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative

Nature of Impact	Nature	Duration		Extent	Severity	Probability	Significance (Before)	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance (After)
Faunal Habitat (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Definite (4)	Low Negative	Reversible	Resource will be partly lost	Difficult	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	May Occur (2)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative
Faunal Processes (No Alternatives)											
Construction	Negative	Short term (1)		Localised (1)	Slight	Probable (3)	Low Negative	Reversible	Resource will be partly lost	Difficult	Low Negative
Operation	Negative	Short term (1)		Localised (1)	Slight	May Occur (2)	Low Negative	Reversible	Resource will be partly lost	Achievable	Low Negative

3.2.10 Impact Summary

The impacts can be summarised as follows:

- Impacts relating to loss of vegetation and disruption to ecological processes are deemed to be **medium** before mitigation and **low** after mitigation.
- Impacts relating to disturbance and displacement of faunal habitat and faunal species of conservation concern are deemed to be **medium** before mitigation and **low** after mitigation. Any impact is likely to be temporary during construction.
- Impacts relating to disturbance of flora species of conservation concern located in the site will be **medium** before mitigation and **low** after mitigation.
- All other impacts are assessed to be of **medium** significance before mitigation and can be reduced to **low** with the implementation of the mitigation measures.

3.2.11 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant additional ancillary or linear infrastructure or indirect impacts, other than that identified above, which could impact on biodiversity and ecosystem services are anticipated. Indirect impacts will be considered and analysed in more depth during the detailed assessment and once more detailed project specifications are available, including the layout alternatives.

3.2.12 Potential Terrestrial Biodiversity Impacts (Cumulative)

Development of the entire site will result in some cumulative impacts; however, the vegetation unit, habitat and species are generally widespread. Assessment will be undertaken of the broader area with respect to other approved and planned energy related projects as part of the terrestrial biodiversity assessment. Since the actual WEF footprint is generally a low proportion of the total project area, these are not expected to be significant, but will be dependent on final layout and extent of the project that occurs in more sensitive areas.

3.2.13 Terrestrial Biodiversity Impact Reversibility

Due to the nature of the activity, impacts are likely to be reversible where extensive earthworks and infill are not required but less reversible where such does occur.

3.2.14 Impacts and Risks to Irreplaceable Biodiversity Resources

The site will likely have occasional visits from transient faunal species from the adjacent area, although it is unlikely that the proposed activity and associated infrastructure would provide a significant direct or indirect risk to any species or population that has not been assessed and mitigated in this reporting.

3.2.15 Residual Risks and Uncertainties

No significant additional ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines and railways, which can impact on biodiversity and ecosystem services are expected other than those described in this report.

3.3 Findings, Outcomes and Recommendations

3.3.1 Summary of Findings

- Areas scoring an overall LOW sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestations. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. Low and Very Low sensitivity areas include all areas that would be considered transformed and include cultivated lands, old lands, dwellings and other structures as well as other agricultural infrastructure.
- Areas scoring an overall MODERATE sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. Moderate sensitivity areas include intact areas of Eastern Upper Karroo (karroid) vegetation, that are not considered specialised habitats. Within this broad habitat several more specialist habitats are noted, some of which will require specific delineation and assessment during the layout assessment site visit, once the preliminary plan is in available. It is not expected that this will significantly affect overall turbine layout after the preliminary site survey, but some minor position adjustments may be applicable.
- Areas scoring an overall HIGH sensitivity include those areas having intact vegetation and deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are considered to be vulnerable and/or have confirmed presence of species of conservation concern. High sensitivity terrestrial areas on site include dolerite mesas (koppies) & inselbergs (ridges), as well as peripheral alluvial areas that were mapped over and above those designated in the National Biodiversity Assessment (NBA, 2018) aquatic dataset. These high sensitivity alluvial areas should be avoided as far as possible and specific footprints will likely require specific case-by-case assessment to determine if they are alluvial pans or not, in which case a very high sensitivity may be applicable. Similarly, footprints in all other high sensitivity areas should kept to a minimum and specific case-by-case assessment will be required for any footprints.
- Areas scoring an overall VERY HIGH sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat for any faunal species that is endangered or critically endangered. Very High sensitivity terrestrial vegetation areas include the primary riverine and alluvial pan areas (as designated by the NBA aquatic dataset) and river channels as well as wetlands and pans. Such areas shou be considered no-go areas, unless for crossings and linear activities. Linear activities (i.e. access roads) should not bisect any wetlands/pans/alluvial areas unless no alternative is possible for technical reasons. Each instance would require specific assessment to ascertain feasibility, impact and possible mitigation.
- No-go areas –specific no-go areas have been identified which include Riverine Vegetation, Alluvial areas, raised dolerite koppies and ridges and Rocky Outcrops.
- Cumulative impacts because of the development of the site are negligible, however the regional cumulative impact is likely to be moderate due to several planned renewable energy projects in the surrounding area. Since the specific impacts and mitigations of these projects as well as future planned projects are largely unknown, there is some uncertainty. It is assumed that specific sensitivities (such as species of conservation concern) would be addressed in a similar manner to this project, it is anticipated that the cumulative is likely to not be considered to be a fatal flaw.

All impacts are assessed to be of ***low significance after mitigation*** and specific mitigation measures are outlined in Section 4: Management Programs as well as in the general Environmental Management Plan

(Section 9.7: Annexure F: Biodiversity Environmental Management Plan). Impacts are anticipated to be as follows:

- Impacts relating to loss of vegetation and disruption to ecological processes are deemed to be **medium** before mitigation and **very low** after mitigation.
- Impacts relating to disturbance and displacement of faunal habitat and faunal species of conservation concern are deemed to be **medium** before mitigation and **very low** after mitigation.
- Impacts relating to disturbance of flora species of conservation concern located in the site will be **medium** before mitigation and **very low** after mitigation.
- All other impacts are assessed to be of **medium** significance before mitigation and can be reduced to **very low** with the implementation of the mitigation measures.

Due to the nature of the activity, the terrestrial biodiversity impacts will be permanent for the turbine footprints, substations and access roads, but temporary for the laydown areas, construction camps, OHL and jeep tracks. Portions of the site that are disturbed temporarily during construction will likely revegetate to a pre-construction state with correct stripping and replacement of topsoil. Grassy or weedy vegetation generally will rehabilitate naturally without specific techniques on completion, provided stripped topsoil is not left for a significant time period before replacement. Areas to be used for temporary laydown/construction areas must be sited to avoid any of the high sensitivity and No-Go areas as outlined in this report.

No infrastructure having a sizable footprint is located within any high or very high sensitivity areas. A few OHL pylons and jeep tracks within these areas is unavoidable and unlikely to be significant.

3.3.2 Layout Recommendations

In summary, the sites are comprised of lowland valleys with an extensive network of watercourses and alluvial areas that drain from extensive elevated plains. Between these are a series of hills with benches or steps. The most suitable place for turbines in my opinion would be either near the edges of the plateaus or on the benches on the slopes. The outer edge of the benches (and the plateau edges) tend to have rocky pavements and outcrops, so my suggestion would be to keep the road back from the edges but the turbines can be closer to the edges. They are not highly sensitive outcrops (ito terrestrial biodiversity), but my recommendation would still be to minimise footprint in these areas, which are too extensive to actually map accurately for the entire sites. The tops of the plateaus are flat to bowl shaped and some appear to also have alluvial pan areas that would need to be avoided, hence nearer (but not on) the edges would be better. For the doleritic mesas and inselbergs, these are generally small and steep and probably not suitable anyway.

While all efforts have been made to identify and map all sensitive features, the site is extensive and there are smaller features present within the landscape, including scattered trees and tree pockets, rocky outcrops and small watercourses, which are quite extensive and not visible on aerial photos and/or could not be assessed in the time available for the preliminary site visit. Such minor features will need to be assessed once preliminary footprints are identified, which will provide a more defined site footprint that can then be assessed more thoroughly.

While the National Screening Tool did not flag any flora species of conservation concern, site observations found that a few succulents and geophytic species do occur very sporadically. They are not common and generally do not occur in substantial populations, other than the occasional individual. Final identification of these species is currently in progress; however, it is not anticipated that any of significant concern will be identified, there is a residual risk that such species could be confirmed. When the actual footprints area assessed it may be necessary to implement some minor layout adjustments to avoid areas.

The proposed activity is not aligned with land use guidelines recommendations for the designated classes (Critical Biodiversity Area 1 and 2). This will be assessed further in the detailed assessment in consultation with the authorities. Depending on the outcome of this process mitigation measures may require consideration, including biodiversity offsets.

The following recommendations concerning layout planning should be considered:

1. All watercourses and alluvial areas must be avoided by WEF and grid connection infrastructure. A minimum 32 m buffer is recommended around watercourses, but subject to the recommendations of the aquatic assessment. Infrastructure in proximity to or crossing watercourses should be limited to access roads, and other linear infrastructure only (such as access roads and OHL). Any specific crossing points should consider careful siting to ensure the least impact to such watercourses. Following existing tracks may not provide the optimum road layout and should be assesses on an individual basis as existing access track in the project area are generally very minor.
2. No WEF or OHL infrastructure, including roads and powerlines should be sited within wetlands, pans or well-defined alluvial areas as well as significant rocky outcrops. Since the area is an arid environment and water is a critical resource, no aquatic or water related processes should not be interfered with. Powerlines may traverse wetlands or watercourses, but no pylons to be placed directly in such areas as far as possible.
3. The bioregional planning indicates the areas being designated Critical Biodiversity Area 1 and 2. In terms of the associated land use guidelines the proposed activity is not compatible with the recommended land-use for such areas. Since this issue cannot be avoided, due to the location of the project site, the optimal approach would thus be to ensure connectivity is maintained across the landscape and that extensive areas are retained of each of the represented communities. Due to the large size of the project area, including the proportion that will not be developed it is anticipated this would be the case and the overall impact to conservation targets will be negligible.
4. Site observations indicated that there is significant movement of general faunal species between the watercourses and the higher lying areas, which would be expected in an arid environment. While corridors following watercourses and rivers are important, it is also important not to disconnect the Riverine habitat from the surrounding landscape significantly, but this is unlikely to be the case other than a few access road crossings, which may require wildlife passes to be established.
5. The alluvial areas outside of the NBA designated pans and wetlands (designated Very High sensitivity) have been allocated a High sensitivity as a cautionary measure to avoid as far as possible. Site specific assessment on a case-by-case basis will be required for any footprints within such areas to ascertain if specific areas should be elevated to a Very High Sensitivity, as it is not feasible to assess all areas when only a portion are likely to be developed. This can be undertaken during the final pre-construction site walkdown processes.

In terms of identifying the most suitable area, it is recommended that the most suitable footprint areas for the WEF turbine components would include the on the edges of the plateaus, away from the alluvial areas generally in the middle and also set back from the edges to avoid rocky outcrops. Similarly, turbines can be sited on the benches and steps on the slopes, also setting back from the edge to avoid rocky pavements and the outer outcrops. In these instances, the access roads should also try and avoid both the rocky outcrops as well as any plateaux alluvial areas.

There are extensive alluvial pans and alluvial floodplain areas, which will need to be avoided but the area surrounding these is not overly sensitive, this is particularly prevalent on the Soutrivier South site. In terms of terrestrial biodiversity, a concentration of birds and fauna was noted in these alluvial areas, so further consultation with the avifaunal and aquatic specialist will be required.

3.3.3 Recommendations

- It is the conclusion of this terrestrial biodiversity assessment that the proposed activity can be constructed within acceptable terrestrial biodiversity impact limits providing the recommended mitigation actions are adhered to.
- The implementation of the management actions relating to flora and fauna as well erosion and stormwater management and post construction rehabilitation, including weed and alien invasive plant management, will minimise biodiversity impacts to acceptable levels. Habitat mapping has largely allowed the more sensitive areas (such as dolerite ridges, riverine and alluvial areas) to be avoided.

4 Management Programs

Table 16 lists specific mitigation measures that must be implemented and adhered to. Additional specific Faunal mitigation measures are provided in Table 17. These must be considered to be conditions of authorisation.

Table 16: Specific Mitigation Measures and Recommendations

IMPACT	MITIGATION MEASURES
Vegetation	• Blanket clearing of vegetation must be limited to the site. No clearing outside of required footprint required for construction to take place. • Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas as far as possible, or away from watercourses, alluvial areas, and other sensitive features (rocky outcrops).
Flora Species	• A flora search and rescue is recommended before commencement. • Respective permits to be obtained beforehand.
Alien Invasive Species	• Alien trees and weeds must be removed from the site as per CARA/ NEMBA requirements. • A suitable weed and alien invasive plant management plan to be implemented in construction and operation phases. • After clearing and construction is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner, such as along road verges. This will also minimise dust.
Erosion	• Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed. • Topsoil must be stripped and stockpiled separately and replaced on completion. • If natural vegetation re-establishment does not occur, a suitable grass must be applied.
Ecological Processes	• Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.
Aquatic and Riparian processes	• Suitable structures to be constructed at watercourse crossings that do not alter flows. • Stormwater discharge into watercourses to be protected against erosion.

IMPACT	MITIGATION MEASURES
Faunal Habitat	• Blanket clearing of vegetation must be limited to the construction footprint required. • Rocky outcrop areas and Riverine Rabbit Habitat to be avoided as far as possible. • It is important that clearing activities are kept to the minimum and take place in a phased manner, where applicable. This allows any smaller animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
Faunal Processes	• The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to. • Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity. • Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances. • Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented.
Faunal Species	• A pre-commencement faunal search and rescue is recommended. • Respective permits to be obtained beforehand. • No animals are to be harmed or killed during the course of operations. • Workers are NOT allowed to snare any faunal species.

Table 17: Specific Faunal Mitigation Recommendations

IMPACT	MITIGATION MEASURES
Habitat loss, degradation, and fragmentation.	• Minimising the project footprint by utilising existing roads and disturbed areas as much as technically possible. • Locate developments away from identified sensitive habitats, this includes no go zones and buffer zones for turbine pads, electrical substations, and housing facilities as well as construction laydown areas. • Implementing adequate dust control and erosion control. • Careful planning of road layout to minimise the length of roads traversing through riverine habitats and rocky ridges that have been identified as Very high or high sensitivity which may create barriers and fragment habitats. • Establish wildlife passes, where artificial barriers are found; this particularly refers to physical barriers such as roads and fences. Develop and implement a site-specific spill management plan.
Disturbance	• Implementing adequate noise reduction measures, including the use of insulation to reduce noise output from turbine hubs.

IMPACT	MITIGATION MEASURES
	• Temporal (curtailment) restrictions. Temporal restriction strategies can focus on altering turbine operation during times or weather conditions when wildlife is most active or where a negative impact has been found during the monitoring program. • Targeted operational timing by working with wind facility managers to target specific turbines under certain weather conditions where a negative impact has been identified. This may require changing the minimum windspeed at which turbines begin to turn and generate energy (cut-in speed) so that they idle during gentle wind and in so doing reduce noise during periods of low ambient noise. • Minimise development lighting in order to minimise light pollution, disturbance to animals at night; • Minimize noise disturbance during constructions where construction takes place within 1000 m of Very high and high sensitivity habitats. Restricting noise to daytime (9 am – 4 pm) periods when most fauna are less active
Mortality from road collision.	• Careful planning of roads to minimise the length that traverses through riverine and rocky habitats that have been identified as Very high or high sensitivity. • Use existing roads as much as possible. • Roadkill monitoring program on both internal and external public roads targeting sensitive habitats and wildlife corridors. Roadkill Monitoring programs must be initiated at pre-construction phase and continued during construction and post-construction as well as conducted over different seasons. • Pre-construction Road planning to identify target sites for wildlife crossing structures which should be considered during the EIA process and with pre-construction roadkill monitoring findings. Wildlife crossing structures must be made in consultation with road planner, construction manager and wildlife biologist. This is generally more cost effective than retro fixing existing roads. • Assess efficiency of roadkill mitigation approaches via a post-implementation roadkill monitoring program. • Implementation of speed limits on both internal access WEF roads (40km/h) as well as external public roads (60km/h). • Reduced speed limits of 30km/h where roads (both internal and external) cross High and Very high sensitivity areas identified; including riverine habitat, koppies, and ecotones which may harbour sensitive species and generally have higher species diversity and abundance • Wildlife warning signage and speed reduction measures where roads cross High and Very high sensitivity areas. • Education and awareness campaigns on SCC and their habitat must form part of staff induction procedures to help increase awareness, respect, and responsibility towards the environment for all staff and contractors. • Inductions on safe wildlife passing and driving to reduce possible injury and roadkill alongside roads. • There is higher risk of collision when animals are more active which is typically from late afternoon to early morning. During these times a low-speed limit (30km/h) needs to be implemented. Night-time driving should be avoided as much as possible but, if necessary, speed needs to be reduced significantly to avoid collisions. Lagomorph species (hares and rabbits) often freeze in headlights and require headlights to be momentarily turned off to allow the animal to move off the road. • Reduced speeds also need to be implemented during reduced visibility such as misty conditions that have been observed on the site. • Induction must include reporting of any vehicle/wildlife collision or found roadkill to the appointed Roadkill monitoring personnel. • Search and rescue of slow-moving species, specifically Karoo Dwarf Tortoises, during the construction phase. IUCN guidelines for translocation of sensitive species should be consulted. Tortoises will need to be carefully relocated and provided shelter and water-rich food as well as monitoring of threatened species

IMPACT	MITIGATION MEASURES
	to ensure of their survival. Should a subpopulation be found further consultations with a herpetologist will be required for appropriated mitigation.
Predation from possible influx of corvids and/or other birds of prey that use OHLs for nest sites.	• The use of pylon designs that are less favourable for nesting sites (see Figure 79). • The monitoring of powerlines by avifaunal specialists or bird monitors. Nests found on the powerline should be identified to species level. An adaptive management approach can then be implemented, where identified problematic nests can be removed by maintenance personnel and nest deterrents fitted where needed. • The fitting of nest deterrents/discouragers on horizontal and cross beam sections where self-supporting pylons are used. • The design of the anti-climb fence must not offer any suitable sites for nests. This can be done by modifying structures so that they are angled downwards to avoid having horizontal platforms. Anti-climb fences must also be set as low as possible on the towers to discourage nesting by Pied Crows. • Record prey species below Corvid nests (not limited to powerlines) and use findings to implement culling if required. Targeting culling at individuals that prey on tortoises. • Remove available food and water that have been artificially created o No open dumpsite and carcass pits – All waste, organic and inorganic, including oil spills, and any existing agricultural biproduct needs to be environmentally safely disposed of and covered. o Avoid using livestock feeding sites to attract corvids and locate away from sensitive habitats. • Remove existing artificial nest sites including old broken windmills and telephone/electric poles. This should be done with the advice from an avifaunal specialist
Cumulative impact	• It is important to evaluate the consequences of each development before the next is begun. • Use a precautionary approach and aim to minimize negative effects even when the effects are not fully known. • Ensure the construction phase is done in as short a period as possible and avoid breeding season, typically in the spring after good rains. • Construction needs to be done during daytime, avoiding noise and disturbance when faunal communities are most likely active, particularly where the construction is in proximity to their habitat. Sensitive habitats near construction will need to be clearly marked. • Relating construction phase of the development with neighbouring developments and farming activity to ensure construction does not begin immediately after the completion of another or simultaneously. • The developer instigates a proactive mitigation measure by initiating a multi-stakeholder dialogue at a workshop to clarify these concerns and how they might be taken forward and co-funded. The aim of this mitigation is to reduce current impacts that threaten the survival of SCC populations. We recommend a biodiversity wildlife corridor approach whereby protecting sensitive habitats is made a priority. This may include species refuge areas where no form of indiscriminate wildlife killing/snaring is allowed, no or highly reduced livestock grazing, and no pest control including locust spraying is carried out. Poaching and the use of hunting dogs at site is prohibited.
Cascading impact across trophic levels.	Initiate a general Fauna Biodiversity Monitoring program o A Fauna Biodiversity program must be initiated pre-construction to have baseline population status and monitoring must be ongoing post-construction to identify any changes in occupancy in certain species' population which may in turn indirectly impact other fauna populations. o We recommend the use of multiple monitoring methods including and not limited to; camera trapping in diverse habitats, targeted camera trapping for SCC; small mammal monitoring with the use of

IMPACT	MITIGATION MEASURES
	Sherman traps; the use of Conservation Scent Detection Dog teams to assist in detecting SCC.

4.1 Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- A pre-commencement fauna relocation is likely to be required. Most faunal species in proximity are likely to vacate the area once earth moving equipment commences clearing and construction, however some species may require manual relocation.
- A pre-commencement flora relocation is likely to be required. Several PNCO protected species are present in the area.
- Topsoil must be stripped and stockpiled adjacent to any clearing for replacement after construction, in particular for access roads and turbine footprints. Additional measures should be implemented to stabilise eroded areas where necessary.

4.2 Rehabilitation and Landscaping Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable grasses and local indigenous seed mix, if deemed to be required, however, vegetation is likely to re-establish without input.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.
- Final rehabilitation *must* comply with the requirements mentioned in the Rehabilitation Plan.

4.3 Open Space Management/Conservation Plan

None are applicable for this project. Refer to Riverine Rabbit reporting for Riverine Rabbit specific measures.

4.4 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include clearing or re-excavation of portions of the broader site for maintenance and/or replacement of defective components. All measures of this report, including the EMPr should be adhered for any such maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

5 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:

- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

6 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response
- Spill management and incident response
- Waste management and incident response
- Response to emergency site shutdown, including labour and protest actions.

7 Stakeholder Engagement

Note possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities including DENC as well as local faunal working groups (Riverine Rabbit and Black Footed Cat).

No Stakeholder Engagement will be conducted specifically by the Specialist. Stakeholder Engagement will be undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report. During the site visit, some consultation with landowners and local residents during the site visit may be undertaken informally relating to Biodiversity aspects, depending on need and availability.

8 Monitoring and Review

Key monitoring activities should include the following:

1. Pre-construction
   a) Ensure flora and fauna permits are in place timeously (PNCO & ToPS) – allow at least 3 - 4 months minimum before commencement in case of authority issuing delays. As a precautionary measure, to avoid potential delays at least 6 months is advisable.
   b) Fauna Biodiversity Monitoring program to be initiated.
   c) Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, dos and don'ts and no-go areas.
2. Bush clearing
   d) Ensure working plant has no oil or hydraulic leaks.
   e) Check delineated footprints area not exceeded.
3. Construction
   f) Fauna Biodiversity Monitoring program to be implemented.
   g) Regular checks on trenches for trapped animals and possible drowning risks.
   h) Regular checks of fences for snares.
4. Rehabilitation
   i) Check quality of topsoil and weed free.
   j) Check for weed regrowth and manage timeously (before seed is set).
5. Operation monitoring
   k) Weed management on ongoing basis.
   l) Erosion to be addressed on ongoing basis.
   m) Fauna Biodiversity Monitoring program to be implemented.

9 Appendices

9.1 Appendix A: References

General Reference Sources

- Acocks, J. P. H. 1988. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & Marienne S. de Villiers. (Eds). 2014. *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland.* SANBI, Pretoria.
- Bromilow, C. 2001. *Problem Plants of South Africa*. *A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds*. Briza Publications. Pp 258
- Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. 2016. *The Red List of Mammals of South Africa, Swaziland and Lesotho.* South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Cowling, R.M., Richardson, D.M. & Pierce, S.M. 1997. *Vegetation of Southern Africa*. Cambridge University Press.
- Cunningham, S., Madden, C., Barnard, P. and Amar, A. 2015. *Electric crows: Power lines, climate change and the emergence of a native invader*. Diversity and Distributions 22: 17-29.
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karroo Veld: Ecology and Management*. Briza Publications.
- Fincham, J.E., Visagie, R., Underhill, L.G., Brooks, M. and Markus, M.B. 2015. *The impacts of the Pied Crow Corvus albus on other species need to be determined*. Ornithological Observations 6: 232-239.
- Fuggle, R. F. & Rabie, M. A. 2003. *Environmental Management in South Africa*. Juta & Co, Johannesburg.
- Germishuizen, G. & Meyer, N.L. (eds). 2003. *Plants of southern Africa: An annotated checklist*. Strelitzia, 14. Pretoria: National Botanical Institute.
- Golding, J. (Ed.) 2002. *Southern African Plant Red Data Lists*. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. *Alien Weeds and Invasive Plants*. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. Pp 300.
- Hilton-Taylor, C. 1996. *Red Data List of Southern African Plants*. National Botanical Institute.
- Hockey PAR, Dean WRJ and Ryan PG 2005. Roberts - *Birds of southern Africa*, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.
- International Finance Corporation. 2012. *Performance Standards on Environmental and Social Sustainability*.
- Low, A.B. & Rebelo, A.G. 1998. *Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Department of Environmental Affairs and Tourism.
- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. *Important Bird and Biodiversity Areas of South Africa*. Johannesburg: BirdLife South Africa.
- Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Hening, G.A., Krüger, M., Pringle, R.L., Terblanche, R.F. & Williams, M.C. (Eds). 2013. *Conservation assessment of butterflies of South Africa, Lesotho and Swaziland:* Red List and atlas. Saftronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (Eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland.* SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Mucina, L. & Rutherford, M.C. (Eds). 2006. *The vegetation of South Africa, Lesotho and Swaziland*, in Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Myers, N., Mittermeir, R.A., Mittermeir, C.G., De Fonseca, G.A.B. & Kent, J. 2000. *Biodiversity hotspots for conservation priorities*. Nature, 403: 853–858.
- Nel, J., Colvin, C., Le Maitre, D., Smith, J., Haines, I. 2013. *Defining South Africa's Water Source Areas*. WWF South Africa & Council for Scientific & Industrial Research (CSIR).
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swart, E.R., Smith-Ado, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. *Technical Report for the National Freshwater Ecosystem Priority Areas project.* Report to the Water Research Commission, WRC Report No. 1801/2/11. ISBN 978-1-4312-0149-5.
- Pienaar, K. 2000. *The South African What Flower is That*? Struik Publishers (Pty) Ltd. Cape Town.
- Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 1: Terrestrial Component.* Pretoria: South African National Biodiversity Institute.
- Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (Eds.). 2019. *South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm*. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.
- South African National Biodiversity Institute (SANBI). 2019. *National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report.* South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.
- South African National Biodiversity Institute (SANBI). 2020. *Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa*. South African National Biodiversity Institute, Pretoria. Version 1.2020.
- Stirton, C. H. 1987. *Plant Invaders: Beautiful, but Dangerous*. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.
- Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. 1999. *Coordinated waterbird Counts in South Africa, 1992-1997.* Avian Demography Unit, Cape Town.
- Turpie, J.K., Wilson, G. & Van Niekerk, L. 2012. *National Biodiversity Assessment 2011: National Estuary Biodiversity Plan for South Africa*. Anchor Environmental Consulting, Cape Town. Report produced for the Council for Scientific and Industrial Research and the South African National Biodiversity Institute.
- UN Natural Value Initiative. 2009. *The Ecosystem Services Benchmark,* 2009.
- Van Wyk, A.E. & Smith, G.F. 2001. *Regions of Floristic Endemism*: A Review with Emphasis on Succulents, Umdaus Press.
- Weather Bureau. 1988. Climate of South Africa – *Climate statistics up to 1984 (WB40).* Government Printer, Pretoria.
- Young, D.J., Harrison, J.A, Navarro, R.A., Anderson, M.A., & Colahan, B.D. (Eds). 2003. *Big birds on farms: Mazda CAR Report 1993-2001.* Avian Demography Unit: Cape Town.

Northern Cape Reference Sources

- Council for Scientific and Industrial Research (CSIR). 2009. Assessment and Evaluation of Ecosystem Services in the Succulent Karoo Biome. Report prepared for the Succulent Karoo Ecosystem

Programme (SKEP). Coordination Unit. Le Maitre, D., O'Farrell, P., Milton, S., Atkinson, D., De Lange, W., Egoh, B., Reyers, B., Colvin, C., Maherry, A., Blignaut, J.

- Desmet, P. & Marsh A. 2008. Namakwa District Biodiversity Sector Plan. Available from BGIS at http://bgis.sanbi.org/namakwa/project.asp
- Driver, A., Desmet, P. G., Rouget, M., Cowling, R. M., & Maze, K. 2003. *Succulent Karoo Ecosystem Plan: biodiversity component technical report*. Cape Conservation Unit Report No. CCU, 1(03).
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld - Ecology and Management*. Briza Press, Pretoria.
- Holness, S., Oosthuisen, E. 2016. *Critical Biodiversity Areas of the Northern Cape: Technical Report.* Northern Cape Department of Environment and Nature Conservation.
- Namakwaland District Municipality (NDM). 2008. *Namakwa Biodiversity Sector Plan*.
- Northern Cape Department of Environment and Nature Conservation. 2010. Namakwa Bioregional Plan. Available at http://bgis.sanbi.org.
- Van der Merwe, H., Van Rooyen, M.W., Van Rooyen, N., 2008a. *Vegetation of the Hantam-Tanqua-Roggeveld subregion, South Africa. Part 1. Fynbos Biome-related vegetation.* Koedoe 50 (1), 61–71.
- Van der Merwe, H., Van Rooyen, M.W., Van Rooyen, N., 2008b. *Vegetation of the Hantam-Tanqua-Roggeveld subregion, South Africa Part 2. Succulent Karoo Biome-related vegetation*. Koedoe 50 (1), 160–183

Web Database Reference Sources

- Animal Demographic Unit: http://vmus.adu.org.za
- Conservation International: http://www.biodiversityhotspots.org.
- Council for Scientific and Industrial Research. *NFEPA river FEPAs 2011* [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA rivers 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. *NFEPA wetland clusters 2011* [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. *NFEPA wetlands vegetation 2011* [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Fitzpatrick Institute of African Ornithology (2022). MammalMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=MammalMAP on 2022-10-04.
- Fitzpatrick Institute of African Ornithology (2022). OrchidMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=OrchidMAP on 2022-10-04.
- Fitzpatrick Institute of African Ornithology (2022). PHOWN Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=PHOWN on 2022-10-04.
- Fitzpatrick Institute of African Ornithology (2022). ScorpionMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ScorpionMAP on 2022-10-04.
- Fitzpatrick Institute of African Ornithology (2022). SpiderMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=SpiderMAP on 2022-10-04.
- Global Biodiversity Information Facility (GBIF): http://gbif.org.
- International Union for Conservation of Nature (IUCN) Redlist: http://iucnredlist.org
- Millennium Ecosystem Assessment (MEA). 2005: https://www.millenniumassessment.org
- Plants of Southern Africa: http://newposa.sanbi.org
- Powrie, L.W. 2013. *A database of biodiversity taxon names in South Africa for copy-and-paste into reports or documents.* South African National Biodiversity Institute, Cape Town. Obtained from SANBI on 20 July 2020.

- Powrie, L.W. 2013. *A list of South African biodiversity terms and common names for spell checking*. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- Powrie, L.W. 2013. *A list of South African botanical names for spell checking*. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org 18 July 2020.
- Powrie, L.W. 2013. *A list of South African physical feature names for spell checking*. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- Powrie, L.W. 2013. *A list of South African zoological and other (including fungi and lichen) names for spell checking.* South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- South African Bird Atlas Project: http://sabap2.birdmap.africa
- South African National Biodiversity Institute (SANBI) Redlist: http://redlist.sanbi.org
- United Nations Environment Programme (UNEP), *A to Z Areas of Biodiversity Importance:* http://www.biodiversitya-z.org
- United Nations Environment Programme (UNEP), *World Database on Protected Areas*, Protected Planet: http://www.protectedplanet.net
- World Resources Institute (WRI): https://www.wri.org

Faunal records

- *Refer to faunal assessment reporting*

9.2 Appendix B: Flora and Fauna Species Lists

9.2.1 Flora

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

SCIENTIFIC NAME	FAMILY	STATUS[16]	COMMENT/PRESENCE[17]
Monechma incanum	Acanthaceae	LC	NKu2, Low Shrubs
Aizoon schellenbergii	Aizoaceae	LC, PNCO	AZi5, Low Shrubs
Chasmatophyllum rouxii	Aizoaceae	DDD, PNCO	NKu4, Succulent Shrubs
Delosperma robustum	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Drosanthemum lique	Aizoaceae	LC, PNCO	NKu2, AZi6, Succulent Shrubs
Faucaria bosscheana	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Hereroa concava	Aizoaceae	NEST (M), VU, PNCO	
Malephora uitenhagensis	Aizoaceae	LC, PNCO	AZi6, Succulent Shrubs
Plinthus karooicus	Aizoaceae	LC, PNCO	NKu4, NKu2, Low Shrubs
Psilocaulon coriarium	Aizoaceae	LC, PNCO	NKu4, Succulent Herbs
Rabiea albinota	Aizoaceae	LC, PNCO	NKu4, Succulent Shrubs
Ruschia intricata	Aizoaceae	LC, PNCO	NKu4, Succulent Shrubs
Sceletium expansum	Aizoaceae	VU, PNCO	NKu2, Succulent Shrubs
Stomatium suaveolens	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Tetragonia arbuscula	Aizoaceae	LC, PNCO	NKu2, Low Shrubs
Trichodiadema barbatum	Aizoaceae	LC, PNCO	NKu2, Succulent Shrubs
Amaranthus dinteri subsp. dinteri	Amaranthaceae	NE	AZi5, Herbs
Boophone disticha	Amaryllidaceae	LC, PNCO	NKu2, Geophytic Herbs
Crinum variabile	Amaryllidaceae	LC, PNCO	AZi5, Geophytic Herb
Sensitive species 945	Amaryllidaceae	NEST (m), RARE, PNCO	NKu2, Geophytic Herbs
Rhus burchellii	Anacardiaceae	LC	NKu2, Tall Shrubs
Rhus lancea	Anacardiaceae	LC	AZi6, Small Trees
Carissa haematocarpa	Apocynaceae	LC	AZi6, Low Shrubs
Microloma armatum	Apocynaceae	LC	NKu2, Low Shrubs
Pachypodium succulentum	Apocynaceae	LC	NKu2, Succulent Shrubs
Tridentea jucunda	Apocynaceae	LC	NKu4, Succulent Herbs
Tridentea virescens	Apocynaceae	RARE	NKu4, Succulent Herbs
Asparagus glaucus	Asparagaceae	LC	AZi5, Low Shrubs
Asparagus mucronatus	Asparagaceae	LC	NKu2, Low Shrubs
Asparagus retrofractus	Asparagaceae	LC	NKu2, Low Shrubs

[16] **IUCN** - Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**), Least Concern (**LC**); **End** – Endemic; **PNCO** – Northern Cape & Western Cape Provincial Nature Conservation Ordinance; **Ex,** Exotic/Invasive/Weed; **NFA** – National Forest Act; **ToPS** – Threatened or Protected Species.

[17] **NKu2** - Upper Karoo Hardeveld, **NKu4** - Eastern Upper Karoo, **AZi5** - Bushmanland Vloere & **AZi6** - Southern Karoo Riviere.

SCIENTIFIC NAME	FAMILY	STATUS[16]	COMMENT/PRESENCE[17]
Asparagus striatus	Asparagaceae	LC	NKu2, AZi6, Low Shrub
Asparagus suaveolens	Asparagaceae	LC	NKu2, Low Shrubs
Aloe broomii	Asphodelaceae	LC, PNCO	NKu2, Succulent Shrubs
Aloe chlorantha	Asphodelaceae	NT, PNCO	NKu2, Succulent Shrubs
Asplenium cordatum	Aspleniaceae	LC, PNCO	NKu2, Geophytic Herbs
Amphiglossa callunoides	Asteraceae	VU	AZi6, Succulent Shrubs
Amphiglossa triflora	Asteraceae	LC	NKu2, Low Shrubs
Chrysocoma ciliata	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Cineraria arctotidea	Asteraceae	LC	NKu2, Herbs
Cineraria polycephala	Asteraceae	LC	NKu2, Low Shrubs
Eriocephalus decussatus	Asteraceae	LC	AZi5, Low Shrubs
Eriocephalus ericoides subsp. ericoides	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Eriocephalus spinescens	Asteraceae	LC	NKu4, NKu2, AZi5, Low Shrubs
Euryops annae	Asteraceae	LC	NKu2, Low Shrubs
Euryops candollei	Asteraceae	LC	NKu2, Low Shrubs
Euryops empetrifolius	Asteraceae	LC	NKu2, Low Shrubs
Euryops lateriflorus	Asteraceae	LC	NKu2, Low Shrubs
Euryops nodosus	Asteraceae	LC	NKu2, Low Shrubs
Euryops petraeus	Asteraceae	LC	NKu2, Low Shrubs
Felicia filifolia subsp. filifolia	Asteraceae	LC	NKu2, Low Shrubs
Felicia muricata	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Garuleum latifolium	Asteraceae	LC	NKu2, Low Shrubs
Gazania krebsiana	Asteraceae	LC	NKu2, Herbs
Helichrysum dregeanum	Asteraceae	LC	NKu4, Low Shrubs
Helichrysum lucilioides	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Helichrysum zeyheri	Asteraceae	LC	NKu2, Low Shrubs
Hertia cluytiifolia	Asteraceae	DDD	NKu4, Succulent Shrubs
Kleinia longiflora	Asteraceae	LC	NKu2, Succulent Shrubs
Leysera tenella	Asteraceae	LC	NKu2, Herbs
Osteospermum leptolobum	Asteraceae	LC	NKu4, Low Shrubs
Pegolettia retrofracta	Asteraceae	LC	NKu2, AZi5, Low Shrubs
Pentzia globosa	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Pentzia incana	Asteraceae	LC	NKu4, AZi6, Low Shrubs
Pentzia spinescens	Asteraceae	LC	NKu2, Low Shrubs
Phymaspermum parvifolium	Asteraceae	LC	NKu4, Low Shrubs
Phymaspermum scoparium	Asteraceae	DDD	NKu4, Tall Shrub
Pteronia adenocarpa	Asteraceae	LC	NKu2, Low Shrubs
Pteronia glauca	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Pteronia sordida	Asteraceae	LC	NKu2, Low Shrubs
Rosenia humilis	Asteraceae	LC	NKu4, NKu2, Low Shrubs
Troglophyton capillaceum subsp. capillaceum	Asteraceae	LC	NKu2, Herbs
Vellereophyton niveum	Asteraceae	LC	NKu2, Herbs
Rhigozum obovatum	Bignoniaceae	LC	NKu2, Tall Shrubs

SCIENTIFIC NAME	FAMILY	STATUS[16]	COMMENT/PRESENCE[17]
Rhigozum trichotomum	Bignoniaceae	LC	AZi5, Low Shrubs
Ehretia rigida subsp. rigida	Boraginaceae	LC	NKu2, Tall Shrubs
Lepidium africanum subsp. africanum	Brassicaceae	LC	NKu2, Herbs
Wahlenbergia tenella	Campanulaceae	LC	NKu2, Low Shrubs
Cadaba aphylla	Capparaceae	LC	NKu2, AZi6, Tall Shrubs
Dianthus caespitosus subsp. caespitosus	Caryophyllaceae	LC	NKu2, Herbs
Gymnosporia buxifolia	Celastraceae	LC	AZi6, Tall Shrubs
Bassia salsoloides	Chenopodiaceae	LC	AZi6, Low Shrubs
Salsola aphylla	Chenopodiaceae	LC	AZi5, AZi6, Succulent Shrubs
Salsola arborea	Chenopodiaceae	NE	AZi6, Succulent Shrubs
Salsola calluna	Chenopodiaceae	LC	NKu4, Low Shrubs
Salsola geminiflora	Chenopodiaceae	LC	AZi5, AZi6, Succulent Shrubs
Salsola gemmifera	Chenopodiaceae	LC	AZi5, AZi6, Succulent Shrubs
Salsola glabrescens	Chenopodiaceae	LC	AZi5, Succulent Shrubs
Salsola rabieana	Chenopodiaceae	LC	AZi5, Succulent Shrubs
Salsola tetrandra	Chenopodiaceae	LC	NKu4, Succulent Shrubs
Androcymbium albomarginatum	Colchicaceae	LC	NKu2, Geophytic Herbs
Adromischus fallax	Crassulaceae	RARE, PNCO	NKu2, Succulent Herbs
Adromischus humilis	Crassulaceae	LC, PNCO	NKu2, Succulent Herbs
Crassula barbata subsp. broomii	Crassulaceae	DDT, PNCO	NKu2, Succulent Shrubs
Cyperus marginatus	Cyperaceae	LC	AZi6, Graminoids
Cyperus usitatus	Cyperaceae	LC	NKu4, Graminoids
Isolepis expallescens	Cyperaceae	NEST (M), VU (D2)	AZi6, Graminoid
Diospyros austro-africana	Ebenaceae	LC	NKu2, Tall Shrubs
Diospyros lycioides	Ebenaceae	LC	AZi6, Tall Shrubs
Euclea undulata	Ebenaceae	LC	AZi6, Tall Shrubs
Euphorbia hypogaea	Euphorbiaceae	LC	NKu4, Succulent Shrubs
Acacia karroo	Fabaceae	LC	AZi6, Small Trees
Aspalathus acicularis subsp. planifolia	Fabaceae	LC	NKu4, Low Shrubs
Indigofera alternans	Fabaceae	LC	NKu4, Herbs
Indigofera sessilifolia	Fabaceae	LC	NKu2, Low Shrubs
Lessertia frutescens	Fabaceae	LC	NKu2, Low Shrubs
Lotononis azureoides	Fabaceae	RARE	NKu2, Low Shrubs
Lotononis minima	Fabaceae	DDT	AZi5, Herbs
Melolobium candicans	Fabaceae	LC	NKu2, Low Shrubs
Melolobium microphyllum	Fabaceae	LC	NKu2, Low Shrubs
Parkinsonia africana	Fabaceae	LC	AZi5, Tall Shrubs
Xerocladia viridiramis	Fabaceae	LC	AZi5, Tall Shrubs
Pelargonium abrotanifolium	Geraniaceae	LC	NKu2, Low Shrubs
Pelargonium minimum	Geraniaceae	LC	NKu4, NKu2, Herbs
Pelargonium ramosissimum	Geraniaceae	LC	NKu2, Low Shrubs

SCIENTIFIC NAME	FAMILY	STATUS[16]	COMMENT/PRESENCE[17]
Albuca setosa	Hyacinthaceae	LC, PNCO	NKu2, Geophytic Herbs
Drimia intricata	Hyacinthaceae	LC, PNCO	NKu2, Geophytic Herbs
Lachenalia aurioliae	Hyacinthaceae	LC, PNCO	NKu2, Geophytic Herbs
Ornithogalum paucifolium subsp. karooparkense	Hyacinthaceae	DDT, PNCO	NKu2, Geophytic Herbs
Moraea pallida	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Moraea polystachya	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Syringodea bifucata	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Syringodea concolor	Iridaceae	LC, PNCO	NKu4, Geophytic Herbs
Ballota africana	Lamiaceae	LC	AZi6, Low Shrubs
Anisodontea malvastroides	Malvaceae	RARE	NKu2, Tall Shrub
Grewia robusta	Malvaceae	LC	AZi6, Tall Shrubs
Hermannia filifolia var. filifolia	Malvaceae	LC	NKu2, Low Shrubs
Hermannia multiflora	Malvaceae	LC	NKu2, Low Shrubs
Hermannia pulchella	Malvaceae	LC	NKu2, Low Shrubs
Hermannia vestita	Malvaceae	LC	NKu2, Low Shrubs
Melianthus comosus	Melianthaceae	LC	NKu2, AZi6, Tall Shrubs
Limeum aethiopicum	Molluginaceae	LC	NKu4, NKu2, Low Shrubs
Oxalis depressa	Oxalidaceae	LC, PNCO	NKu2, Geophytic Herbs
Aristida adscensionis	Poaceae	LC	NKu4, NKu2, Graminoids
Aristida congesta	Poaceae	LC	NKu4, NKu2, Graminoids
Aristida diffusa	Poaceae	LC	NKu4, NKu2, Graminoids
Cenchrus ciliaris	Poaceae	LC	NKu2, AZi6, Graminoids
Chloris virgata	Poaceae	LC	NKu4, Graminoids
Cynodon incompletus	Poaceae	LC	NKu4, NKu2, AZi6, Graminoids
Digitaria eriantha	Poaceae	LC	NKu2, Graminoids
Ehrharta calycina	Poaceae	LC	NKu2, Graminoids
Enneapogon desvauxii	Poaceae	LC	NKu4, NKu2, Graminoids
Enneapogon scaber	Poaceae	LC	NKu2, Graminoids
Enneapogon scoparius	Poaceae	LC	NKu4, NKu2, Graminoids
Eragrostis bergiana	Poaceae	LC	NKu4, Graminoids
Eragrostis bicolor	Poaceae	LC	NKu4, Graminoids
Eragrostis curvula	Poaceae	LC	NKu4, NKu2, Graminoids
Eragrostis lehmanniana	Poaceae	LC	NKu4, NKu2, Graminoids
Eragrostis nindensis	Poaceae	LC	NKu2, Graminoids
Eragrostis obtusa	Poaceae	LC	NKu4, NKu2, Graminoids
Eragrostis procumbens	Poaceae	LC	NKu2, Graminoids
Fingerhuthia africana	Poaceae	LC	NKu4, NKu2, Graminoids
Heteropogon contortus	Poaceae	LC	NKu4, NKu2, Graminoids
Merxmuellera disticha	Poaceae	LC	NKu2, Graminoids
Phragmites australis	Poaceae	LC	AZi6, Megagraminoid
Sporobolus fimbriatus	Poaceae	LC	NKu4, NKu2, Graminoids
Sporobolus ludwigii	Poaceae	LC	NKu4, Graminoids
Sporobolus nervosus	Poaceae	LC	AZi5, Graminoids
Sporobolus tenellus	Poaceae	LC	NKu4, Graminoids
Stipagrostis ciliata	Poaceae	LC	NKu4, NKu2, AZi5, Graminoids

SCIENTIFIC NAME	FAMILY	STATUS[16]	COMMENT/PRESENCE[17]
Stipagrostis namaquensis	Poaceae	LC	AZi5, AZi6, Graminoids
Stipagrostis obtusa	Poaceae	LC	NKu4, NKu2, AZi5, Graminoids
Themeda triandra	Poaceae	LC	NKu4, NKu2, Graminoids
Tragus berteronianus	Poaceae	LC	NKu4, NKu2, Graminoids
Tragus koelerioides	Poaceae	LC	NKu4, NKu2, Graminoids
Polygala seminuda	Polygalaceae	LC	NKu2, Low Shrubs
Cheilanthes bergiana	Pteridaceae	LC	NKu2, Geophytic Herbs
Nenax microphylla	Rubiaceae	LC	NKu4, NKu2, Low Shrubs
Thesium lineatum	Santalaceae	LC	NKu2, Semiparasitic Shrub
Aptosimum elongatum	Scrophulariaceae	LC	NKu2, Low Shrubs
Aptosimum procumbens	Scrophulariaceae	LC	NKu4, Low Shrubs
Aptosimum spinescens	Scrophulariaceae	LC	NKu2, Low Shrubs
Jamesbrittenia atropurpurea	Scrophulariaceae	LC	NKu2, Low Shrubs
Selago albida	Scrophulariaceae	LC	NKu2, Low Shrubs
Selago geniculata	Scrophulariaceae	LC	NKu4, Low Shrubs
Selago magnakarooica	Scrophulariaceae	LC	NKu2, Low Shrubs
Selago persimilis	Scrophulariaceae	DDD	NKu4, Low Shrubs
Selago saxatilis	Scrophulariaceae	LC	NKu4, Low Shrubs
Selago walpersii	Scrophulariaceae	DDT	NKu4, Low Shrubs
Sutera halimifolia	Scrophulariaceae	LC	NKu2, Low Shrubs
Sutera pinnatifida	Scrophulariaceae	LC	NKu2, Herbs
Lycium cinereum	Solanaceae	LC	NKu4, NKu2, AZi6, Succulent Shrubs
Lycium hirsutum	Solanaceae	LC	AZi6, Succulent Shrubs
Lycium horridum	Solanaceae	LC	NKu4, Tall Shrubs
Lycium oxycarpum	Solanaceae	LC	NKu4, NKu2, AZi6, Succulent Shrubs
Lycium pumilum	Solanaceae	LC	AZi5, Succulent Shrubs
Solanum capense	Solanaceae	LC	NKu2, Low Shrubs
Tamarix usneoides	Tamaricaceae	LC	AZi6, Tall Shrubs
Gnidia polycephala	Thymelaeaceae	LC	NKu4, Low Shrubs
Tribulus terrestris	Zygophyllaceae	LC	NKu4, NKu2, Herbs
Zygophyllum flexuosum	Zygophyllaceae	LC	NKu2, Succulent Shrubs

9.2.2 Fauna

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
MAMMALS			
Aethomys granti	Grant's Rock Mouse	LC	
Aethomys namaquensis	Namaqua Rock Mouse	LC	
Antidorcas marsupialis	Springbok	LC (2016)	Present
Atilax paludinosus	Water Mongoose	LC (2016)	Present
Bathyergus suillus	Cape Dune Mole-rat	LC (2016)	Present
Bunolagus monticularis	Riverine Rabbit	CR, NEST (H, M)	Usually confined to dry riverbeds areas having riparian shrubby vegetation or on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo. PRESENT. Separate study has been conducted. Refer to Riverine Rabbit reporting.
Canis mesomelas	Black-backed Jackal	LC (2016)	Present
Caracal caracal	Caracal	LC (2016)	Present
Cynictis penicillata	Yellow Mongoose	LC (2016)	Present
Dama dama	Fallow Deer	Introduced	
Damaliscus pygargus pygargus	Bontebok	VU (2016)	
Elephantulus edwardii	Cape Elephant Shrew	LC (2016)	
Elephantulus rupestris	Western Rock Elephant Shrew	LC (2016)	
Elephantulus sp.	Elephant Shrews		
Equus quagga	Plains Zebra	NT (IUCN, 2016)	
Equus zebra	Mountain Zebra	VU (2018)	
Felis lybica	African Wildcat	LC	Present
Felis nigripes	Black-footed Cat	VU, ToPS, CITIES 1	Camera trap record confirmed presence near the western edge of the Taaibos site. Approximately 1.5 km from a DFFE designated high sensitivity area (outside project footprint). Refer to Faunal SCC reporting.
Genetta genetta	Common Genet	LC (2016)	Present
Genetta tigrina	Cape Genet (Cape Large-spotted Genet)	LC (2016)	
Herpestes pulverulentus	Cape Gray Mongoose	LC (2016)	Present

[18] **IUCN** - Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**), Least Concern (**LC**); **NotThr** – Not Threatened [not an IUCN category]; **End** – Endemic; **PNCO** – Northern Cape & Western Cape Provincial Nature Conservation Ordinance; **Ex**, Exotic/Invasive; ToPS – Threatened or Protected Species.

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
Hystrix africaeaustralis	Cape Porcupine	LC	Present
Ictonyx striatus	Striped Polecat	LC (2016)	Present
Lepus capensis	Cape Hare	LC	
Lepus saxatilis	Scrub Hare	LC	
Macroscelides proboscideus	Short-eared Elephant Shrew	LC (2016)	
Mastomys coucha	Southern African Mastomys	LC (2016)	
Mastomys natalensis	Natal Mastomys	LC (2016)	
Mellivora capensis	Honey Badger	LC (2016)	
Miniopterus natalensis	Natal Long-fingered Bat	LC (2016)	
Myosorex varius	Forest Shrew	LC (2016)	
Neoromicia capensis	Cape Serotine	LC (2016)	
Orycteropus afer	Aardvark	LC (2016)	Present
Oryx gazella	Gemsbok	LC (2016)	Present
Otocyon megalotis	Bat-eared Fox	LC (2016)	Present
Otomys unisulcatus	Karoo Bush Rat	LC (2016)	
Panthera pardus	Leopard	VU (2016)	
Papio ursinus	Chacma Baboon	LC (2016)	
Parotomys brantsii	Brants's Whistling Rat	LC (2016)	
Parotomys littledalei	Littledale's Whistling Rat	NT (2016)	
Pedetes capensis	Springhare	LC	Present
Pelea capreolus	Vaal Rhebok	NT (2016)	
Poecilogale albinucha	African Striped Weasel	NT (2016)	Present
Procavia capensis	Cape Rock Hyrax	LC (2016)	Present
Proteles cristata	Aardwolf	LC (2016)	Present
Raphicerus campestris	Steenbok	LC (2016)	Present
Redunca fulvorufula fulvorufula	Southern Mountain Reedbuck	EN (2017)	Present
Rhabdomys pumilio	Xeric Four-striped Grass Rat	LC (2016)	
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC (2016)	
Suricata suricatta	Meerkat	LC (2016)	Present
Sylvicapra grimmia	Bush Duiker	LC (2016)	Present
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC (2016)	
Tragelaphus strepsiceros	Kudu	LC	Present
Vulpes chama	Cape Fox	LC (2016)	Present
Xerus inauris	South African Ground Squirrel	LC	Present
BIRDS[19]			
Afrotis afraoides	Northern Black Korhaan/Bustard (split)	LC	
Alopochen aegyptiaca	Egyptian Goose	LC	Present
Amadina erythrocephala	Red-headed Finch	LC	
Anas capensis	Cape Teal	LC	
Anas erythrorhyncha	Red-billed Teal (Duck)	LC	
Anas smithii	Cape Shoveler	LC	

[19] **BLSA** – Birdlife South Africa

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
Anthropoides paradiseus	Blue Crane	Global: VU; BLSA: NT	Present, Refer to separate avifaunal assessment.
Anthus crenatus	African Rock Pipit	Global: LC; BLSA: NT	Refer to separate avifaunal assessment.
Anthus nicholsoni	Nicholson's Pipit		
Apus affinis	Little Swift	LC	
Aquila verreauxii	Verruax Eagle	NEST (H,M)	Present, Refer to separate avifaunal assessment.
Ardea cinerea	Grey Heron	LC	
Ardea melanocephala	Black-headed Heron	LC	
Bradornis infuscatus	Chat Flycatcher	LC	
Buteo [augur] rufofuscus	Jackal Buzzard	LC	Present
Buteo rufofuscus	Jackal Buzzard	LC	Present
Calendulauda sabota	Sabota Lark	LC	
Caprimulgus sp.	Nightjar	LC	Present
Cercomela familiaris	Familiar Chat	LC	Present
Cercomela schlegelii	Karoo Chat	LC	
Cercomela sinuata	Sickle-winged Chat	LC	
Cercomela tractrac	Tractrac Chat	LC	
Cercotrichas (Erythropygia) coryphaeus	Karoo Scrub-Robin	LC	
Certhilauda subcoronata	Karoo Long-billed Lark (split)	LC	
Charadrius tricollaris	Three-banded Plover	LC	
Chersomanes albofasciata	Spike-heeled Lark	LC	
Ciconia nigra	Black Stork	Global: LC; BLSA: VU	Refer to separate avifaunal assessment.
Columba guinea	Speckled (Rock) Pigeon	LC	
Corvus albicollis	White-necked Raven	LC	
Corvus albus	Pied Crow	LC	
Creatophora cinerea	Wattled Starling	LC	
Elanus caeruleus	Black-shouldered (Winged) Kite	LC	
Emberiza capensis	Cape Bunting	LC	
Emberiza impetuani	Lark-like Bunting	LC	
Eremomela icteropygialis	Yellow-bellied Eremomela	LC	
Eremopterix australis	Black-eared Sparrowlark (Finchlark)	LC	
Eremopterix verticalis	Grey-backed sparrow lark	LC	Present
Estrilda astrild	Common Waxbill	LC	
Eupodotis vigorsii	Karoo Korhaan	Global: LC; BLSA: NT	Present, Refer to separate avifaunal assessment.
Falco amurensis	Amur (Eastern Red-footed) Falcon (Kestrel)	LC	
Falco biarmicus	Common Lanner Falcon	LC	Present
Falco naumanni	Lesser Kestrel	LC	
Falco rupicolus	Rock Kestrel		
Fulica cristata	Red-knobbed Coot	LC	
Galerida magnirostris	Large-billed Lark	LC	

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
Gyps africanus	White-backed Vulture	Global: CR; BLSA: CR	Refer to separate avifaunal assessment.
Himantopus himantopus	Black-winged Stilt	LC	
Hirundo albigularis	White-throated Swallow	LC	
Hirundo fuligula	Rock Martin	LC	
Hirundo rustica	Barn (European) Swallow	LC	
Hirundo spilodera	South African Cliff-Swallow	LC	
Lanius collaris	Southern Fiscal	LC	
Malcorus pectoralis	Rufous-eared Warbler	LC	
Megaceryle maxima (H. maximus)	Giant Kingfisher	LC	
Melierax canorus	Pale Chanting Goshawk	LC	Present
Micronisus (Melierax) gabar	Gabar Goshawk	LC	
Motacilla capensis	Cape Wagtail	LC	
Myrmecocichla formicivora	Ant-eating Chat	LC	
Neotis ludwigii	Ludwigs Bustard	NEST (H,M), Global: EN; BLSA: EN	Present, Refer to separate avifaunal assessment.
Nycticorax nycticorax	Black-crowned Night-Heron	LC	
Oena capensis	Namaqua Dove	LC	
Oenanthe monticola	Mountain Chat (Wheatear)	LC	
Oenanthe pileata	Capped Wheatear	LC	
Passer domesticus	House Sparrow	LC	
Passer melanurus	Cape Sparrow	LC	
Pavo cristatus	Common Peacock(Peafowl)	LC	
Ploceus velatus	Southern Masked Weaver	LC	
Podiceps nigricollis	Black-necked Grebe	LC	
Polemaetus bellicosus	Martial Eagle	Global: VU; BLSA: EN	Refer to separate avifaunal assessment.
Polyboroides typus	African Harrier-Hawk (Gymnogene)	LC	
Prinia maculosa	Karoo Prinia (split)	LC	
Pterocles namaqua	Namaqua Sandgrouse	LC	
Pycnonotus nigricans	African Red-eyed Bulbul	LC	
Quelea quelea	Red-billed Quelea	LC	
Recurvirostra avosetta	Pied (Avocet) Avocet	LC	
Rhinoptilus africanus	Double-banded Courser	LC	
Sagittarius serpentarius	Secretarybird	Global: VU; BLSA: VU	Present, Refer to separate avifaunal assessment.
Saxicola torquata	African (Common) Stonechat	LC	
Serinus alario	Black-headed Canary	LC	
Serinus albogularis	White-throated Canary	LC	
Serinus flaviventris	Yellow Canary	LC	
Spizocorys conirostris	Pink-billed Lark	LC	
Spizocorys sclateri	Sclater's Lark	Global: NT; BLSA: NT	Refer to separate avifaunal assessment.
Spreo bicolor	Pied (African Pied) Starling	LC	
Streptopelia capicola	Cape Turtle (Ring-necked) Dove	LC	

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
Streptopelia senegalensis	Laughing (Palm) Dove	LC	
Tadorna cana	South African Shellduck	LC	Present
Telophorus zeylonus	Bokmakierie	LC	
Threskiornis aethiopicus	African Sacred Ibis	LC	Present
Tricholaema leucomelas	Acacia Pied Barbet	LC	
Tringa nebularia	Common Greenshank	LC	
Turdus smithi	Karoo Thrush (split)	LC	
Upupa africana	African Hoopoe	LC	
Vanellus armatus	Blacksmith Lapwing (Plover)	LC	
Vanellus coronatus	Crowned Lapwing	LC	Present
REPTILES			
Afroedura karroica	Karoo Flat Gecko	LC (2018)	
Agama aculeata aculeata	Common Ground Agama	LC (2014)	
Agama atra	Southern Rock Agama	LC (2014)	
Aspidelaps lubricus lubricus	Coral Shield Cobra	LC	
Bradypodion ventrale	Eastern Cape Dwarf Chameleon	LC (2014)	
Chersobius boulengeri	Karoo Dwarf tortoise (Karoo padloper)	NEST (H,M), EN, ToPS	Present, Widespread distribution and likely to occur sporadically throughout the site. Although not confirmed to be present, this species is expected to be found throughout the broader area as it has been recorded in the surrounding area. Refer to Faunal SCC reporting.
Chondrodactylus bibronii	Bibron's Gecko	LC (2014)	
Dasypeltis scabra	Rhombic Egg-eater	LC (2014)	
Gerrhosaurus typicus	Karoo Plated Lizard	LC (2014)	
Homopus femoralis	Greater Padloper	LC (2014)	
Karusasaurus polyzonus	Karoo Girdled Lizard	LC (2014)	
Meroles suborbitalis	Spotted Desert Lizard	LC (2014)	
Naja nivea	Cape Cobra	LC (2014)	
Pachydactylus kladaroderma	Thin-skinned Gecko	LC (2014)	
Pachydactylus latirostris	Quartz Gecko	LC (2014)	
Pachydactylus mariquensis	Marico Gecko	LC (2014)	
Pachydactylus oculatus	Golden Spotted Gecko	LC (2014)	
Pedioplanis burchelli	Burchell's Sand Lizard	LC (2014)	
Pedioplanis laticeps	Karoo Sand Lizard	LC (2014)	
Pedioplanis lineoocellata pulchella	Common Sand Lizard	LC (2014)	
Pedioplanis namaquensis	Namaqua Sand Lizard	LC (2014)	
Pelomedusa galeata	South African Marsh Terrapin	Not evaluated	
Psammobates tentorius subsp. ?	Tent Tortoise (subsp. ?)	LC (2014)	
Psammobates tentorius tentorius	Karoo Tent Tortoise	NotTh	Present

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
Psammobates tentorius trimeni	Namaqua Tent Tortoise	NotTh	
Psammobates tentorius verroxii	Verrox's Tent Tortoise	NotTh	
Psammophis notostictus	Karoo Sand Snake	LC (2014)	
Pseudocordylus microlepidotus	Cape Crag Lizard	LC	
Pseudocordylus microlepidotus namaquensis	Nuweveldberg Crag Lizard	LC (2014)	
Stigmochelys pardalis	Leopard Tortoise	LC (2014)	Present
Trachylepis capensis	Cape Skink	LC (2014)	
Trachylepis occidentalis	Western Three-striped Skink	LC (2014)	
Trachylepis sulcata sulcata	Western Rock Skink	LC (2014)	
Trachylepis variegata	Variegated Skink	LC (2014)	
AMPHIBIANS			
Amietia fuscigula	Cape River Frog	LC (2017)	
Amietia poyntoni	Poynton's River Frog	LC (2017)	
Cacosternum boettgeri	Common Caco	LC (2013)	
Poyntonophrynus vertebralis	Southern Pygmy Toad	LC	
Tomopterna tandyi	Tandy's Sand Frog	LC	
Vandijkophrynus gariepensis gariepensis	Karoo Toad (subsp. gariepensis)	LC	
Xenopus laevis	Common Platanna	LC	
INVERTEBRATES			
BUTTERFLIES			
Acanthovalva focularia		NotThr [not an IUCN category]	
Aloeides damarensis damarensis	Damara russet	LC (2013)	
Aloeides macmasteri	Large plain russet	LC (2013)	
Aloeides pierus	Veined russet	LC (2013)	
Aloeides vansoni	Roggeveld russet	LC (2013)	
Argyraspodes argyraspis	Warrior silver-spotted copper	LC (2013)	
Azanus ubaldus	Velvet-spotted babul blue	LC (2013)	
Belenois aurota	Pioneer caper white	LC (2013)	
Brephidium metophis	Tinktinkie pygmy blue	LC (2013)	
Catopsilia florella	African migrant	LC (2013)	
Chiasmia observata		NotThr [not an IUCN category]	
Chilades trochylus	Grass jewel blue	LC (2013)	
Chrysoritis chrysantas	Karoo daisy copper	LC (2013)	
Chrysoritis pan lysander	Lysander opal	LC (2013)	
Eublemma seminivea			
Helicoverpa armigera			
Junonia hierta cebrene	Yellow pansy	LC (2013)	
Leptomyrina lara	Cape black-eye	LC (2013)	
Leptotes sp.			
Loxostege frustalis			

SCIENTIFIC NAME	COMMON NAME	STATUS[18]	COMMENT/PRESENCE
Lycaena clarki	Eastern sorrel copper	LC (2013)	
Papilio demodocus demodocus	Citrus swallowtail	LC (2013)	
Pontia helice helice	Southern meadow white	LC (2013)	
Pseudozarba opella			
Scopula sp.			
Spialia agylla agylla	Grassveld sandman	LC (2013)	
Spialia nanus	Dwarf sandman	LC (2013)	
Spialia sataspes	Boland sandman	LC (2013)	
Spialia spio	Mountain sandman	LC (2013)	
Stygionympha irrorata	Karoo hillside brown	LC (2013)	
Stygionympha robertsoni	Koppie hillside brown	LC (2013)	
Thestor protumnus aridus	Boland skolly	LC (2013)	
Tylopaedia sardonyx sardonyx	King copper	LC (2013)	
Vanessa cardui	Painted lady	LC (2013)	
Zamarada sp.			
Zizeeria knysna knysna	African grass blue	LC (2013)	
SCORPIONS			
Opistophthalmus sp.		ToPS	
BABOON SPIDERS			
Harpactira namaquensis		ToPS	

9.3 Appendix C: Systematic Planning Frameworks

9.3.1 Vegetation of Southern Africa

A general description of the vegetation units is provided below (as per Mucina & Rutherford, 2006, as amended) as a reference point for the baseline vegetation composition.

Eastern Upper Karoo (NKu 4)

One of the largest vegetation types in the country and consists of flat and gently sloping plains vegetation dominated by dwarf microphyllous shrubs with 'white' grasses, especially *Aristida, Eragrostis* and *Stipagrostis* and occupies an extent of 20 324 km^2 (Mucina & Rutherford 2006). Eastern Upper Karoo is found in the Northern, Western and Eastern Cape, between Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north and Burgersdorp and Cradock in the east, and the Great Escarpment in the south (Mucina & Rutherford 2006). The Eastern Upper Karoo is classified as Least Threatened and less than 2% has been transformed (Mucina & Rutherford 2006). The vegetation type is however poorly represented in formal protected areas. Its geology consists of mudstones and sandstones of the Beaufort Group supporting duplex soils, which are vulnerable to erosion as illustrated below.

The vegetation of the Eastern Upper Karoo is dominated by grasses and low shrubs, with greater abundance of shrubs in shallow and stony soils. Characteristic species observed within this habitat includes shrubs and herbs such as *Lycium cinereum, Lycium pumilum, Chrysocoma ciliata, Eriocephalus ericoides, Pentzia incana, Felicia muricata, Gnidia polycephala, Helichrysum lucilioides, Rosenia humilis, Ruschia intricata, Euryops lateriflorus, Dicerothamnus rhinocerotis, Felicia filifolia* and *Pentzia sphaerocephala,* as well as grasses such as *Aristida adscensionis*, *Aristida congesta, Aristida diffusa, Cynodon incompletus, Enneapogon desvauxii, Eragrostis chloromelas, Eragrostis curvula, Eragrostis lehmanniana, Eragrostis obtusa, Sporobolus fimbriatus* and *Tragus koelerioides*. Species of conservation concern were not abundant, and this habitat is not considered sensitive, outside of the extensive watercourses, wetland, seep and pan areas in the lowlands as well as on some of the larger flatter plateaus.

The extensive low-lying flat-bottomed valleys tend to be grassier with slopes differentiated from the plains in that the vegetation tends to be woodier and at least on wetter aspect slopes and rockier slopes, containing a higher abundance of taller woody species. The grass component is largely similar to the plateau areas with some changes in abundance, with *Themeda triandra, Heteropogon contortus, Sporobolus fimbriatus* and *Digitaria eriantha* being especially prevalent. Typical occasional trees and shrubs include *Searsia erosa, Searsia ciliata, Euclea crispa, Colpoon compressum, Rhamnus prinoides, Diospyros austro-africana, Tarchonanthus minor, Maytenus undata.* Although the relative abundance of species of conservation concern within this habitat is relatively low, the slopes, usually comprising several steps or benches with rocky pavements and outcrops on the outer edge, are generally considered somewhat more sensitive on account of the slightly higher diversity of such areas as well as providing habitat for a range of smaller mammal and reptile species. The development footprint potential in this habitat is thus considered to be lower and although not considered a no-go area, should be avoided where possible. The minimum recommendation is to site roads back from the outcrop edges with the turbine and laydown area extending towards the edge (thus reducing overall impact to the outcrops/pavement edge). Specific case-by case assessments will be required in these instances.

A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table *18*.

Table 18: Eastern Upper Karoo (Nku 4) species.

GROWTH FORM	DESCRIPTION/SPECIES
Grasses	*Aristida congesta (d), A. diffusa (d), Cynodon incompletus (d), Eragrostis bergiana (d), E. bicolor (d), E. lehmanniana (d), E. obtusa (d), Sporobolus fimbriatus (d), Stipagrostis ciliata (d), Tragus koelerioides (d), Aristida adscensionis, Chloris virgata, Cyperus usitatus, Digitaria eriantha, Enneapogon desvauxii, E. scoparius, Eragrostis curvula, Fingerhuthia africana, Heteropogon contortus, Sporobolus ludwigii, S. tenellus, Stipagrostis obtusa, Themeda triandra, Tragus berteronianus.*
Herbs	*Indigofera alternans, Pelargonium minimum, Tribulus terrestris.*
Tall Shrubs	*Lycium cinereum (d), L. horridum, L. oxycarpum.*
Low Shrubs	*Chrysocoma ciliata (d), Eriocephalus ericoides subsp. ericoides (d), E. spinescens (d), Pentzia globosa (d), P. incana (d), Phymaspermum parvifolium (d), Salsola calluna (d), Aptosimum procumbens, Felicia muricata, Gnidia polycephala, Helichrysum dregeanum, H. lucilioides, Limeum aethiopicum, Nenax microphylla, Osteospermum leptolobum, Plinthus karooicus, Pteronia glauca, Rosenia humilis, Selago geniculata, S. saxatilis.*
Succulent Shrubs	*Euphorbia hypogaea, Ruschia intricata.*
Geophytic Herbs	*Moraea pallida (d), Moraea polystachya, Syringodea bifucata, S. concolor.*
Succulent Herbs	*Psilocaulon coriarium, Tridentea jucunda, T. virescens.*
Biogeographically Important Taxa (BIT)	None
Endemic Taxa	Succulent Shrubs: *Chasmatophyllum rouxii, Hertia cluytiifolia, Rabiea albinota, Salsola tetrandra*. Tall Shrub: *Phymaspermum scoparium*. Low Shrubs: *Aspalathus acicularis subsp. planifolia, Selago persimilis, S. walpersii.*
Remarks	This vegetation type has the largest mapped area of all vegetation units. The regions between Colesberg (Northern Cape) and Springfontein (Free State) fall within a broad ecotone where the grassy Eastern Upper Karoo grades into Xhariep Karroid Grassland.

Upper Karoo Hardeveld (NKu 2)

Occurs in the Northern Cape, Western Cape and Eastern Cape provinces on the plains of the Eastern Upper Karoo, discrete areas of slopes and ridges including dolerite dykes and sills in the region spanning Middelpos in the west and Strydenburg, Richmond and Nieu-Bethesda in the east. Most crest areas and steep slopes of the Great Escarpment facing south between Teekloofpas (connecting Leeu-Gamka and Fraserburg) and eastwards to Graaff-Reinet. (Mucina & Rutherford, 2006). The vegetation occurs on the steep slopes of koppies, butts, mesas and parts of the Great Escarpment covered with large boulders and stones supporting sparse dwarf Karoo scrub with drought-tolerant grasses of genera such as *Aristida, Eragrostis* and *Stipagrostis*. (Mucina & Rutherford, 2006). The lower layer of the vegetation is dominated by dwarf small-leaved shrubs and the upper layer is dominated by tall shrubs and/or grasses. The geology consists of primitive, skeletal soils in rocky areas developing over sedimentary rocks such as mudstones and arenites of the Adelaide Subgroup of the Karoo Supergroup and to a lesser extent also the Ecca Group (Waterford and Volksrust Formations) as well as Jurassic dolerite sills and dykes and subsummit positions of mesas and butts with dolerite boulder slopes (Mucina & Rutherford 2006). According to the National Biodiversity Assessment (2019), the vegetation is currently classified as Least Threatened and the target for conservation is 21 %; only 3% is formally conserved at present. Succulent species including protected species are generally more prevalent in the rocky areas.

The more mountainous and higher elevation areas (including along the western side of the Soutrivier site and the northern portion of the Taaibos site) have a distinctly cooler microclimate with a greater diversity of succulent and geophytic species noted. The plains of Eastern Upper Karoo are also interspersed with smaller mesas and inselbergs and although not having true Upper Karoo Hardeveld as described above, elements of this unit are distinctly present, giving it an intermediate composition and appearance. A general list of species that are represented in the vegetation type and conservation status characterises is provided in Table 19.

Table 19: Upper Karoo Hardeveld (Nku 2) species.

GROWTH FORM	DESCRIPTION/SPECIES
Grasses	*Aristida adscensionis (d), A. congesta (d), A. diffusa (d), Cenchrus ciliaris (d), Enneapogon desvauxii (d), Eragrostis lehmanniana (d), E. obtusa (d), Sporobolus fimbriatus (d), Stipagrostis obtusa (d), Cynodon incompletus, Digitaria eriantha, Ehrharta calycina, Enneapogon scaber, E. scoparius, Eragrostis curvula, E. nindensis, E. procumbens, Fingerhuthia africana, Heteropogon contortus, Merxmuellera disticha, Stipagrostis ciliata, Themeda triandra, Tragus berteronianus, T. koelerioides.*
Herbs	*Troglophyton capillaceum subsp. capillaceum, Dianthus caespitosus subsp. caespitosus, Gazania krebsiana, Lepidium africanum subsp. africanum, Leysera tenella, Pelargonium minimum, Sutera pinnatifida, Tribulus terrestris.*
Tall Shrubs	*Lycium cinereum (d), Rhigozum obovatum (d), Cadaba aphylla, Diospyros austro-africana, Ehretia rigida subsp. rigida, Lycium oxycarpum, Melianthus comosus, Rhus burchellii.*
Low Shrubs	*Chrysocoma ciliata (d), Eriocephalus ericoides subsp. ericoides (d), Euryops lateriflorus (d), Felicia muricata (d), Limeum aethiopicum (d), Pteronia glauca (d), Amphiglossa triflora, Aptosimum elongatum, A. spinescens, Asparagus mucronatus, A. retrofractus, A. striatus, A. suaveolens, Eriocephalus spinescens, Euryops annae, E. candollei, E. empetrifolium, E. nodosus, Felicia filifolia subsp. filifolia, Garuleum latifolium, Helichrysum lucilioides, H. zeyheri, Hermannia filifolia var. filifolia, H. multiflora, H. pulchella, H. vestita, Indigofera sessilifolia, Jamesbrittenia atropurpurea, Lessertia frutescens, Melolobium candicans, M. microphyllum, Microloma armatum, Monechma incanum, Nenax microphylla, Pegolettia retrofracta, Pelargonium abrotanifolium, P. ramosissimum, Pentzia globosa, P. spinescens, Plinthus karooicus, Polygala seminuda, Pteronia adenocarpa, P. sordida, Rosenia humilis, Selago albida, Solanum capense, Sutera halimifolia, Tetragonia arbuscula, Wahlenbergia tenella.*
Succulent Shrubs	*Aloe broomii, Drosanthemum lique, Faucaria bosscheana, Kleinia longiflora, Pachypodium succulentum, Trichodiadema barbatum, Zygophyllum flexuosum.*
Geophytic Herbs	*Albuca setosa, Androcymbium albomarginatum, Asplenium cordatum, Boophone disticha, Cheilanthes bergiana, Drimia intricata, Oxalis depressa.*
Semiparasitic Shrubs	*Thesium lineatum (d).*
Biogeographically Important Taxa (BIT)	None listed
Endemic Taxa	Succulent Shrubs: *Aloe chlorantha*, *Crassula barbata* subsp. *broomii*, *Delosperma robustum, Sceletium expansum*, *Stomatium suaveolens*. Low Shrubs: *Cineraria polycephala*, *Euryops petraeus*, *Lotononis azureoides*, *Selago magnakarooica*. Tall Shrub: *Anisodontea malvastroides*. Herbs: *Cineraria arctotidea*, *Vellereophyton niveum*. Succulent Herbs: *Adromischus fallax*, *A. humilis*. Geophytic Herbs: *Gethyllis longistyla*, *Lachenalia auriolae, Ornithogalum paucifolium* subsp. *karooparkense.*
Remarks	One of the richer floras of the Nama-Karoo Biome, this type also contains a substantial number of diagnostic species relative to the surrounding extensive flats (i.e. the Eastern, Northern and Western Upper Karoo vegetation units). Examples are the widespread occurrence of *Asparagus mucronatus, A. striatus*, *Cissampelos capensis*, *Pachypodium succulentum*, *Rhigozum obovatum* and *Cenchrus ciliaris* in this unit. Many of the endemic species listed are found along the Great Escarpment part of this vegetation type.

9.3.2 National Biodiversity Assessment (NBA, 2019)

The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. The NBA is especially important for informing the National Biodiversity Strategy and Action Plan (NBSAP), the National Biodiversity Framework (NBF) and the National Protected Area Expansion Strategy (NPAES), and also informs other national strategies and frameworks across a range of sectors, such as the National Spatial Development Framework, the National Water and Sanitation Master Plan and the National Biodiversity Economy Strategy. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator

in national reporting in South Africa since 2005. It is computed by intersecting maps of ecosystem types and ecological condition with the map of protected areas. Ecosystem types are then categorised based on the proportion of the biodiversity target for each ecosystem type that is included in one or more protected areas. For terrestrial ecosystems, biodiversity targets are set for each ecosystem type using established species–area accumulation curves (ranging between 16 % and 34%). The status categorisation is based on a complex set of criteria, but for the purposes of this reporting, can be summarised as follows (NBA, 2019; IUCN RLE, 2017):

STATUS	DESCRIPTION
Least Concern	These ecosystems have lost only a small proportion (~more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).
Vulnerable	Vulnerable terrestrial ecosystems have lost some (~more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.
Endangered	Endangered terrestrial ecosystems have lost significant amounts (~less than 40 % remains) of their original natural habitat, so their functioning is compromised.
Critically Endangered	Critically Endangered terrestrial ecosystems have lost significant amounts (~less than 20 % remains) of their original natural habitat, and therefore considered to have an extremely high risk of collapse.

9.3.3 Northern Cape Critical Biodiversity Areas (NC CBA, 2016)

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

Targets for terrestrial ecosystems were based on established national targets (Driver et al., 2012), while targets used for other features were aligned with those used in other provincial planning processes. The required representation of biodiversity features was achieved in a spatially efficient manner which avoided incompatible land uses and activities where possible. The assessment approach and map categories are designed to be compatible with the Guideline Regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans (DEAT, 2009). Where possible, all targets were met in the identified set of CBAs. Targets ranged from 16% to 36% of original area for particular vegetation types (with most targets being in the range 19-24%), up to 100% of known habitat for key threatened species (especially for Critically Endangered and Endangered species with small known distributions). The target setting process, which is aligned with the processes used in other South African systematic plans. Targets for vegetation types were those used in the National Biodiversity Assessment (NBA) (Driver, et al., 2012). Some additional targets were set for rare and threatened habitat types (Holness & Oosthuizen, 2016) based on additional expert defined criteria, none of which are present on or in the immediate vicinity of site. These include the following:

- Ecosystem Threat status: The standard National Biodiversity Assessment (Driver, et al., 2012) method for evaluating threat status was used. The following ecosystem types triggered CBA status on this basis - Alexander Bay Coastal Duneveld (Critically Endangered), Namib Seashore Vegetation

(Endangered) & Lower Gariep Alluvial Vegetation (Endangered with known under-mapped degradation and transformation).

- Rarity (under 5 000 Ha in the province and not widely distributed elsewhere) - Cape Vernal Pools & Vanrhynsdorp Shale Renosterveld.
- Extreme rarity and endemism (rare types with under 5 000 Ha originally or remaining often at a single site which are not widely distributed outside the province) - Arid Estuarine Salt Marshes, Kamiesberg Granite Fynbos, Kobee Succulent Shrubland, Namaqualand Seashore Vegetation, Namib Lichen Fields & Vyftienmyl se Berge Succulent Shrubland.
- Ecosystem process importance or high biodiversity value with significant loss underway - *Upper Gariep Alluvial Vegetation* (evidence gathered by DENC suggests that degradation of this vegetation type is just as intense as the Lower Gariep Alluvial. Further, it has significant process value for maintenance of hydrological processes); *Richtersveld Coastal Duneveld* (critical for coastal processes and evidence of significant loss with approximately 30% of complete loss already recorded with significant additional fragmentation issues) & *Nieuwoudtville Shale Renosterveld* (a vulnerable type with extremely high biodiversity value and limited extent within the province).

The Northern Cape Province covers approximately 37.3 million hectares. The CBA designation (NC CBA, 2016) and coverage is indicted in Table 20..

Table 20: Northern Cape CBA coverage.

CBA Category	Area (km2)	Percent
Protected Area	18 139.9 km^2	4.9 %
Critical Biodiversity Area 1	30 627.4 km^2	8.2 %
Critical Biodiversity Area 2	75 777.5 km^2	20.3 &
Ecological Support Area	52 631.0 km^2	14.1 %
Other Natural Area	191 618.2 km^2	51.4 &
Not designated (including transformed and any undesignated)	4 206.0	1.1 %
TOTAL	**373 000 km^2**	100.0 %

Based on the above, it is noted that land-based protected areas currently contribute less than 5 % of the Northern Cape landcover. An additional 28.5 % constitutes Critical Biodiversity Area with 14.1 % Ecological Support Area. Over 50 % is designated Other Natural Area, typically being most suited to development requiring large scale clearing.

Much of the current conservation effort in South Africa is focused on promoting land-use practices that reconcile development opportunities and spatial planning at a landscape scale, with the over-arching goal of maintaining and increasing the resilience of ecosystems, especially in the face of climate change. This landscape approach to biodiversity conservation involves working within and beyond the boundaries of protected areas to manage biodiversity within a mosaic of land-uses.

One of the primary aims is to achieve economic goals whilst the health of ecosystems is maintained, and the loss of important or threatened species or habitats is avoided. Creating functional connectivity in landscapes is a key aspect of promoting ecosystem resilience (the ability of the ecosystem to absorb a certain amount of change yet remain functional). Ecosystem resilience can be maintained or built through an approach that focuses on intact areas, maintaining biodiversity priority areas in a natural or near-natural state, maximising connectivity between these areas and maximising the diversity of species and ecosystems. Resilient ecosystems can:

- Maintain the ecological and evolutionary processes that allow biodiversity to persist in these ecosystems;
- Better-withstand human-induced pressures (from, for example, too frequent fires);

- Adapt to the impacts of climate change, such as increased rainfall variability;
- Mitigate the effects of climate change by continuing to capture and store carbon;
- Deliver ecosystem services, such as the provision of clean water and flood attenuation.

9.3.4 Western Cape Biodiversity Spatial Plan (WC BSP, 2017)

The Western Cape is endowed with world-renowned biodiversity and natural resources. Together with this unparalleled endowment comes international responsibilities as well as significant opportunities for our people and the biodiversity economy. The Western Cape Biodiversity Spatial Plan (WC BSP, 2017) represents the "state of the art" provincial systematic biodiversity planning product. It represents the priority biodiversity areas and ecological infrastructure that need to be secured in the long-term in order that we, together with CapeNature, fulfil our core provincial mandate for biodiversity management.

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

The CBA map indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate:

I. areas that need to be safeguarded in order to meet national biodiversity thresholds.
II. areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
III. important locations for biodiversity features or rare species.

Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. None are present withi the site or immediate vicinity.

Table 21: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2017)

CBA MAP CATEGORY:	DEFINING CRITERIA
Protected Areas	Areas that are proclaimed as protected areas under national or provincial legislation. Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.
Critical Biodiversity Areas 1 (CBA)	Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. Maintain in a natural or near natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.
Critical Biodiversity Areas 1 (CBA 2)	Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. Maintain in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.
Ecological Support Areas 1 (ESA 1)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.

CBA MAP CATEGORY:	DEFINING CRITERIA
	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.
Ecological Support Areas 2 (ESA 2)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services. Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.
Other Natural Areas (ONA)	Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem. Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high-impact land uses.
No Natural Area Remaining (NNAR)	Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action. Manage in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high impact land uses.

9.3.5 Best Practice Systematic Conservation Planning Guidelines

(derived from Western Cape, Mpumalanga and other plans)

The main purpose of a biodiversity plan is to ensure that the most recent and best quality spatial biodiversity information can be accessed and used to inform land-use and development planning, environmental assessments and authorisations, and natural resource management. A biodiversity sector plan achieves this by providing a map (or maps) of terrestrial and freshwater areas that are important for conserving biodiversity pattern and ecological processes – these areas are called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). The maps are provided together with contextual information on biodiversity, and land-use guidelines that can be incorporated into the policies and decisions of a wide range of sectors. A Biodiversity Sector Plan is based on a fine-scale systematic biodiversity plan (1:50 000 or finer), and has boundaries aligned with administrative boundaries (such as a municipality or groups of municipalities).

A Biodiversity Conservation Plan can be used to guide conservation action (such as identifying priority sites for expansion of protected areas), or to feed spatial biodiversity priorities into planning and decision-making in a wide range of cross-sectoral planning processes and instruments such as provincial and municipal integrated development plans and spatial development frameworks, land-use management schemes, environmental management frameworks and environmental management plans. While the Northern Cape conservation plan does not specify comprehensive guidance regarding land use, comparable plans, such as the Free state, Western Cape and Mpumalanga do provide guidelines, which are outlined in more detail below.

The flowing core categories used in Systematic Planning are designated as follows:

- Protected Areas: Areas that are formally protected by law and recognised in terms of the Protected Areas Act (this includes contract protected areas declared through the biodiversity stewardship programme).
- Critical Biodiversity Areas (CBAs): Areas that are required to meet biodiversity targets for species, ecosystems or ecological processes. These include:
- All areas required to meet biodiversity pattern targets and to ensure continued existence and functioning of species and ecosystems, special habitats and species of conservation concern;
- Critically Endangered ecosystems; and
- Critical linkages (corridor 'pinch-points') to maintain connectivity.

CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species.

- Ecological Support Areas (ESAs): Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of protected areas or CBAs and for delivering ecosystem services. In the terrestrial assessment they support landscape connectivity and strengthen resilience to climate change. ESAs need to be maintained in at least a functional and often natural state, supporting the purpose for which they were identified. They include features such as riparian habitat surrounding rivers or wetlands, corridors, over-wintering sites for Blue Cranes, and so on.
- Other Natural Areas (ONAs): Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.
- Moderately or Heavily Modified Areas (sometimes called 'transformed'): Areas that have been heavily modified by human activity so that they are by-and-large no longer natural, and do not contribute to biodiversity targets. Some of these areas may still provide limited biodiversity and ecological infrastructural functions but, their biodiversity value has been significantly and, in many cases, irreversibly compromised.

Table 22: Summary of map categories shown in terrestrial CBA mapping, and their meanings.

Map Category	Description	Sub- Category	Description
Protected Areas	Areas that are formally protected by law and recognised in terms of the Protected Areas Act, including contract protected areas declared through the biodiversity stewardship programme.	National Parks & nature Reserves	Includes formally proclaimed national Parks, nature Reserves, Special nature Reserve, and Forest nature Reserves.
		Protected Environments: Natural	Includes Protected Environments, declared in terms of Protected Areas Act (Act 57 of 2003, as amended).
		Protected Environments: Modified	Heavily modified areas in formally proclaimed Protected Environments.
Critical Biodiversity Areas (CBA)	All areas required to meet biodiversity pattern and process targets; critically Endangered ecosystems, critical linkages (corridor pinch-points) to maintain connectivity; CBAs are areas of high biodiversity value that must be maintained in a natural state.	CBA: Irreplaceable	This category includes: (1) Areas required to meet targets and with irreplaceability values of more than 80%. (2) critical linkages or pinch-points in the landscape that must remain natural; (3) critically Endangered Ecosystems.
		CBA: Optimal	The CBA Optimal Areas (previously called 'important and necessary' in the MBCP) are the areas optimally located to meet both the various biodiversity targets and other criteria defined in the analysis. Although these areas are not 'irreplaceable' they are the most efficient land configuration to meet all biodiversity targets and design criteria.
Ecological Support Areas (ESA)	Areas that are not essential for meeting targets, but that play an important role in	ESA: Landscape corridor	The best option to support landscape-scale ecological processes, especially allowing for adaptation to the impacts of climate change.

Map Category	Description	Sub- Category	Description
	supporting the functioning of CBAs and that deliver important ecosystem services	ESA: Local corridor	Finer-scale alternative pathways that build resilience into the corridor network by ensuring connectivity between climate change focal areas, reducing reliance on single landscape-scale corridors.
		ESA: Species Specific	Areas required for the persistence of particular species. Although these may be production landscapes, a change in land-use may result in loss of this species from the area. (Only one species-specific ESA was included in the analysis — an over-wintering site for blue cranes).
		ESA: Protected Area Buffers	Areas surrounding protected areas that moderate the impacts of undesirable land-uses that may affect the ecological functioning or tourism potential of PA's. Buffer distance varies according to reserve status: national Parks — 10 km; nature Reserves — 5 km buffer; Protected Environments — 1 km buffer.
Other Natural Areas (ONA)	Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.		
Moderately or Heavily Modified Areas	Areas in which significant or complete loss of natural habitat and ecological function has taken place due to activities such as ploughing, hardening of surfaces, open-cast mining, cultivation and so on.	Heavily Modified	All areas currently modified to such an extent that any valuable biodiversity and ecological functions have been lost.
		Moderately Modified: Old lands	Old, cultivated lands that have been allowed to recover (within the last 80 years), and support some natural vegetation. Although biodiversity pattern and ecological functioning may have been compromised, the areas may still play a role in supporting biodiversity and providing ecosystem services.

Networks of ecological corridors

Ecological corridors of natural and near-natural land ensure connectivity between various spatial elements in the land- scape. They link key protected areas with climate change refugia and other features of the landscape that promote adaptation to the effects of climate change. Two types of ecological corridors are differentiated:

- Landscape corridors, which are the best large-scale options for linking areas that are important for climate change resilience across provinces.
- Local corridors, which take effect at a finer scale to make the network of landscape corridors more robust to disturbance; they provide alternative pathways and critical linkages that should not be lost in the land- scape.

Because of the technology used in the development of Systematic Planning it was possible to minimise the presence of 'narrow bottlenecks' and avoid including large areas of modified land in the network of ecological corridors, wherever possible. Special attention was also paid to ensuring seamless alignment with ecological corridors that have been identified in the biodiversity plans of KwaZulu-Natal, Free State and Gauteng.

Areas important for climate change resilience

The spatial analysis undertaken identified parts of the landscape where it is likely that ecosystems will be most able to maintain a stable ecological composition and structure in the face of climate change, based on a range of possible future climate change scenarios (NBA 2011; Holness, pers. comm.). These areas are referred to as areas important for climate change resilience. They include diverse landscapes such as:

- Local refugia (e.g. kloofs and south facing slopes): Areas important for landscape connectivity (e.g. riparian corridors)
- Areas with steep temperature, precipitation and altitude gradients (e.g. south-facing slopes);
- Areas of high biotic diversity where many different habitat and biome types are found in close proximity and plant endemism is high.

Desired Management Objectives

The desired management objective for a parcel of land, or freshwater feature, refers to the ecological condition in which it should be maintained. These not only determine the ecological state or condition in which the land or freshwater feature should be maintained, but also provide the broad direction for appropriate land- or resource-use activities and management practices. Only those land- or resource-use activities that are compatible with maintaining the desired management objective should be encouraged. Different categories on the CBA maps have specific desired management objectives, according to their biodiversity priority (Table 23). In broad terms, the biodiversity priority areas need to be maintained in a healthy and functioning condition, whilst those that are less important for biodiversity can be used for a variety of other land-uses.

Table 23: Map categories, definitions, and desired management objectives

Map Category	Definition	Desired Management Objectives
Protected Areas	Those areas that are proclaimed as protected areas under national or provincial legislation, including gazetted Protected Environments.	Areas that are meeting biodiversity targets and therefore must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity.
Critical Biodiversity Areas (CBAs)	Areas that are required to meet biodiversity targets, for species, ecosystems, or ecological processes.	Must be kept in a natural state, with no further loss of habitat. Only low-impact, biodiversity-sensitive land-uses are appropriate.
Ecological Support Areas (ESAs)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of protected areas or CBAs and for delivering ecosystem services.	Maintain in a functional, near-natural state, but some habitat loss is acceptable. A greater range of land-uses over wider areas is appropriate, subject to an authorisation process that ensures the underlying biodiversity objectives are not compromised.
Other natural Areas (ONAs)	Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem.	An overall management objective should be to minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. These areas offer the greatest flexibility in terms of management objectives and permissible land-uses, but some authorisation may still be required for high-impact land-uses.
Heavily or Moderately Modified Areas	Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructural functions, even if they are never prioritised for conservation action.	Such areas offer the most flexibility regarding potential land-uses, but these should be managed in a biodiversity-sensitive manner, aiming to maximise ecological functionality and authorisation is still required for high-impact land-uses. Moderately modified areas (old lands) should be stabilised and restored where possible, especially for soil carbon and water-related functionality.

The CBA map provided in this report indicates the Terrestrial categorisation of the site and surrounding area. The general guideline recommendations for these categorisations are described below.

Land-use guidelines for terrestrial Critical Biodiversity Areas (CBAs)

Critical Biodiversity Areas are required to meet biodiversity targets and need to be maintained in a healthy natural state.

Irreplaceable CBA (CBA 1) are the most important biodiversity areas in the province, outside of the protected area network. They represent the last remaining options for securing critical biodiversity and ecosystems and for achieving biodiversity targets. If these areas suffer any further loss of habitat or

ecological function, it is likely that the biodiversity targets will not be met and the status of species and ecosystems will decline.

Some CBAs are considered irreplaceable because they form what are called 'critical linkages or pinch-points, or because they incorporate threatened ecosystems. critical linkages are highly constrained areas within a natural landscape that are vital for maintaining the linkage and ecological integrity of the corridor network. If these critical linkages are lost, it would result in disruption of the corridor network.

Optimal CBA (CBA 2) have an irreplaceability of less than 80% but are the most optimally located and the most efficient solution (i.e., occupying the smallest possible area) to meet biodiversity targets as well as other criteria such as avoiding high-cost areas where there are competing land-uses. There may be options to achieve the targets elsewhere, but these will require more land or may lead to increasing conflict between competing land uses.

Permissible land uses are those that are compatible with maintaining the natural vegetation cover of CBAs in a healthy ecological state, and that do not result in loss or degradation of natural habitat. Some low-intensity agricultural land-uses, such as grazing of livestock, may be acceptable in CBAs, on condition that best-practice guidelines aimed at benefiting the biodiversity assets and reducing the vulnerability of each site are implemented. An example of such best-practice guidelines is the recently released grazing and burning guidelines for managing grasslands for biodiversity and livestock production (SANBI, 2014). Land uses that should not be in terrestrial CBAs because they cause loss of natural habitat or ecosystem functionality, include:

- Any form of mining or prospecting.
- Extensive or intensive grazing that results in species diversity being lost through selective- or over-grazing.
- conversion of natural habitat for intensive agriculture (cultivation) or plantation forestry.
- Expansion of existing settlements or residential, commercial or industrial infrastructure.
- new hard infrastructure, and linear developments such as roads, railways and pipelines.
- complete-barrier fencing (i.e. game-proof fences) in in CBA (or ESA) corridors.
- Linear infrastructure of any sort that disrupts the connectivity of CBA (or ESA) corridors.

Land-use guidelines for terrestrial Ecological Support Areas

Ecological support areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and deliver important ecosystem services. They facilitate landscape connectivity, promote resilience to climate change, and buffer elements of the landscape including protected areas and sites that are important for the survival of individual species.

ESA: Landscape and Local Corridors: The purpose of ecological corridors is to provide intact pathways for long-term biological movement. Landscape-scale corridors represent the best option for promoting resilience to climate change and the persistence of biodiversity as they provide pathways for the movement of plants and animals in response to environmental change. They also support the natural movement of species between populations to ensure population viability. Landscape corridors are aligned with areas that have maximum amounts of remaining natural habitat. Local corridors are fine-scale corridors that contribute to connectivity between climate change refugia. They represent alternative pathways for movement of species, and thus lessen impacts on critical linkages and landscape-scale corridors and provide networks that are more resistant to disturbance.

ESA: Species-Specific Sites: These are areas required for the persistence of specific species. Only one area, an important over-wintering site for blue cranes, that is shared with Gauteng, and which comprises a matrix of natural and cultivated lands, was identified as an ESA in the MBSP.

ESA: Protected Area Buffers: These are areas around protected areas where changes in land-use may affect the ecological functioning or tourism potential of the adjacent protected area. The purpose of buffer zones is to reduce the impacts of undesirable land-uses on the environment, and to provide opportunities for tourism. Modification of the natural habitat within the buffer zones may have negative impacts on the zonation and management plan of the adjacent protected area.

Permissible land-uses: There is more flexibility in terms of options for compatible land-uses in ESAs than there is in CBAs. However, ESAs do need to remain ecologically functional, which means that they need to be maintained in at least a near-natural state, although some loss of biodiversity pattern through a variety of land uses is acceptable.

Land-use guidelines for terrestrial Other Natural Areas

The overall purpose of these land-use guidelines is to promote the effective management of biodiversity as required in Section 41(a) of the Biodiversity Act (Act 10 of 2004, as amended) and in terms of the National Environmental Management Act (Act 107 of 1998, as amended). The guidelines provide advice on which land-uses and activities are most compatible with maintaining the ecological integrity of CBAs and ESAs, and other parts of the landscape, based on the desired management objectives for the land and the anticipated impact of each land-use activity on biodiversity patterns and ecological processes. The land-use guidelines have been developed in consultation with some planners from other sectors, and in a way that aims to minimise potential conflict between land uses. However, their focus is on identifying land-uses that are biodiversity compatible. They should, therefore, be used in conjunction with any other sector-specific guidelines that may be available for the province.

Land-use guidelines are presented below for terrestrial and freshwater ecosystems. These guidelines are intended primarily to guide planning and decision-making in terrestrial and freshwater Critical Biodiversity Areas and Ecological Support Areas on land outside of protected areas. However, brief guidelines are also provided for certain categories of protected areas, such as Protected Environments, in which a range of land uses other than biodiversity conservation is possible. In the sections that follow, general recommendations are given for each category on the CBA maps, relating to desired management objectives and appropriate land uses.

Other natural Areas (OnAs) are not required to meet biodiversity targets, and so are not identified as a priority. They do, however, retain much of their natural character. The biodiversity in these non-priority landscapes may still be of value and contribute to maintenance of viable species populations and natural ecosystem functioning and Other natural Areas may provide essential ecological infrastructure and ecosystem services.

Permissible land uses: ONA's offer the greatest flexibility in terms of management objectives and permissible land-uses and are generally recommended (along with Modified Areas) as the sites for higher-impact land-uses. However, because ONAs may still have significant ecological, aesthetic and social value, they should not be regarded as 'ecological wastelands' or areas where 'anything goes.' Planners are still required to give due consideration to assessing environmental factors, socio-economic efficiency, aesthetics and impacts on the sense-of-place in making decisions about the location of land uses in these areas. Environmental authorisation may still be required for high-impact land-us- es in terms of the listed activities in the EIA Regulations, and other relevant legislation.

Land-use guidelines for terrestrial Heavily or Moderately Modified Areas

Heavily modified areas are those in which significant or complete loss of natural habitat and ecological functioning has taken place due to activities such as ploughing, hardening of surfaces, mining, cultivation, and other activities that modify natural habitat. Even so, they may include small remnants of natural habitat such as the patches or strips of natural habitat that survive between cultivated lands, along river-lines and ridges and in open spaces in towns. These disconnected remnants are often biologically impoverished, highly vulnerable to damage and have limited likelihood of being able to persist but may contain residual biodiversity value or may provide ecological infrastructure or certain ecosystem services.

Moderately Modified - Old Lands (sometimes called 'old fields' in other documents) are those areas that were used for cultivation or mining in the past (within the last 80 years) but are no longer used for these purposes and have been left to re-vegetate. These old lands are areas where biodiversity pattern and ecological function have been seriously compromised in the past, but they may still play an important role in the provision of ecosystem services or may provide important habitats for certain animal species. For example, old lands can provide important feeding grounds for birds such as blue cranes, and disused mine shafts can provide suitable habitats for certain bats.

Permissible land-uses: Heavily modified areas are those preferred for intensive land-uses such as the construction of settlements, industrial development and other
land-uses that have a high impact. These land-uses should still be located and managed in ways that maintain any residual ecological functionality, and that does not impact negatively on species for which these modified sites may be important. In some cases, restoration may be advisable.

9.3.6 Succulent Karroo Ecosystem Plan (SKEP, 2003)

The Succulent Karoo stretches along the western side of South Africa and Namibia and is one of only two global hotspots that are entirely arid (Conservation International 2006). The natural vegetation of the Succulent Karoo provides a significant ecosystem service in the form of forage for livestock production. Livestock production has both monetary and social value. One threat to Biodiversity in the area is the less-than-ideal farming practices. Due to a lack of infrastructure, especially fencing, optimal farm management is not implemented. The main reason for this is that farms in the region have a low income because of the unfavourable and harsh environmental conditions. Farms in the region yield a low income because of the harsh environmental conditions and the unpalatable grazing. Additionally, the monetary value of the land is low and the cost of infrastructure so high that it is not financially viable for a farmer to invest too much in infrastructure as it will not be possible to recover these costs. There is willingness amongst farmers for improved farm management and infrastructure development; however, their financial means usually do not allow it (van der Merwe, 2008a). Although damage can happen fast, recovery in the Karoo is slow, because it depends upon unpredictable rainfall events (Esler et al. 2006).

9.3.7 Namakwa Biodiversity Sector Plan (2008)

Located within the Succulent Karoo, one of only two semi-arid biodiversity hotspots in the world and exhibiting by far the highest plant diversity of any arid ecosystem. It covers both Succulent Karoo (winter rainfall) and Nama Karoo (summer rainfall) arid systems as well as a small part of the Mediterranean-climate Fynbos (*and Renosterveld*) in the extreme SW of the District. Having both summer and winter rainfall arid zones means that it is an area containing an exceptional variety of biodiversity.

The scarcity of water resources is a defining feature of this arid environment. The two main river systems – the Orange River in the north and the Oliphant's/Doring River system that flows in a northwesterly

direction through the Hantam and Karoo Hoogland Municipalities – are both under pressure from the clearing of land for agriculture and the encroachment of alien vegetation along riverbanks. Similarly, the high yielding water catchment areas of the high mountain areas – some of which provide a significant amount of fresh water to surrounding towns – are also demonstrating lower yields because of a lack of efficient water management strategies. In order to maintain ecosystem health and thereby ensure the sustainability of existing towns and land use practices it is critical to safeguard these areas. Effective water resource management is essential in the Northern Cape, especially since it is an extremely water limited area.

Land Use

Land use is generally defined by livestock grazing and mining – the two major economic drivers in the region. Another significant economic factor for the NDM's economy is "flower" tourism that is based on the fantastic annual wildflower displays that cover regions in a kaleidoscope of colour each spring. This is a distinctly seasonal aspect of the economy, lasting only eight to ten weeks, and being highly dependent on the timing and duration of the previous winter rains. However, there are indications that in recent years the regional ecotourism industry is diversifying (e.g., 4x4 and nature tourism) with greater numbers of tourists arriving throughout the year.

Although livestock grazing is, in theory, a viable and biodiversity friendly land use in the region, in practice this is often not the case. Over grazing, especially considering the effects of climate change, constitutes the biggest threat to biodiversity, mostly by virtue of it being the most widely practiced land use activity in the region. Effective veld management plans and practices (especially around catchment areas) is critical for sustainable land use. Goat and sheep farming is a major land use – which could render large areas unable to support its ecosystem functions. The resultant erosion and reduction in vegetation cover would not only affect the productivity of the land, but also affect water quality and wetland health – thus having a direct impact upon human wellbeing.

Mining practices has had multiple impacts upon both the economy and the landscape. The remnants of mining activities can be seen in each local municipality, in the form of mine dumps and excavations, although not prevalent in the specific area.

Critical Biodiversity and Ecological Process Areas

The Namakwa Bioregional Plan also identifies south facing slopes as being sensitive features, being sensitive to projected climate change.

The illegal collection of unique plant species – especially from areas such as quartz patches that are located near to roads is a major threat to biodiversity in the Succulent Karoo. Such quartz patches are not common in the site and surrounding area.

9.3.8 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans.

9.3.9 Strategic Water Source Areas

Strategic water source areas (Figure 81) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

Strategic water source areas can be regarded as natural "*water factories*", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

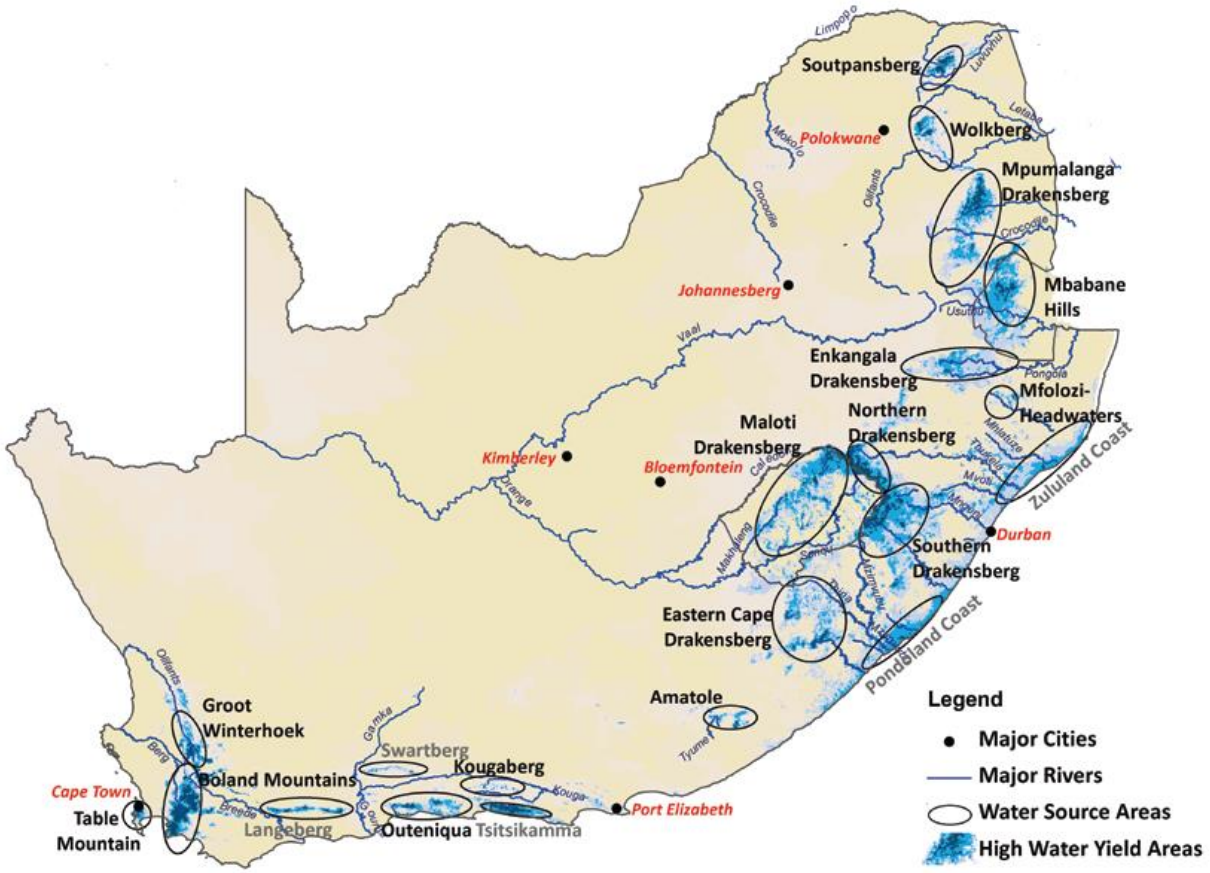


Figure 81: South Africa Water Source Areas [Source: Nel, et al, 2013]

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is considered to be one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem.

Overloading with nutrients and other pollutants from urban, agricultural and industrial waste has resulted in many dams shifting to an algae-dominated, or eutrophic, state. Sixty-five per cent of the country's dams are now estimated to be eutrophic or borderline eutrophic, with most of these algal blooms containing cyanobacteria (blue-green algae) that is toxic to human health. This renders water of high quality unavailable if not treated, which coupled with failing water infrastructure, represents a major challenge to water security in the near future. Water managers are inevitably faced with finding new and innovative ways of improving both water quality and quantity to meet the increasing water demands of the country. Managing strategic water source areas is one way to meet this challenge.

9.3.10 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland and estuary ecosystems of South Africa. It provides strategic spatial priorities

for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or '*FEPAs*'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

1. Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of special concern (e.g., very restricted distributions in South Africa)
2. River ecosystem types – 20% of total length per type
3. Wetland ecosystem types – 20% of total area per type
4. Wetland clusters – 20% of total area per wetland vegetation group
5. Free-flowing rivers – 20% of total length per ecoregion group
6. Priority estuaries – 100% of all priority estuaries, which already took into account biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or "riparian habitat" along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter ('food') in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its "riparian habitat" by a buffer area.

9.3.11 Key Biodiversity Areas

Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all of the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.

- To gather new data regularly and monitor IBA's in order to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

9.4 Vegetation and Ecological Processes and Corridors

9.4.1 Critical Biodiversity Areas

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, development within these areas is not encouraged. The following issues need to be considered when considering development within a CBA:

- Are there alternative areas within the site but outside of the CBA that could be developed?
- Does the project undermine the overall ecological functioning of the broad CBA area?
- Can mitigation measures reduce the impact of the development on ecological processes?

9.4.2 Ecosystem Processes

Distinct ecological processes are generally associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g., environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow. However, the spatial components of processes have rarely been considered in conservation planning – an approach that is also especially useful for development planning in biodiversity hotspots. Three types of ecological processes are discussed below.

9.4.3 Ecosystem Services

"Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling". (Millennium Ecosystem Assessment (MEA), 2005) Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide[20]:

- buffers against natural hazards such as fire and floods[e]

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

- carbon sequestration (storage), important for reducing the impacts of climate change®
- regulation of water supply®
- grazing for wild animals and livestock®
- natural spaces for recreation & tourism®
- the air we breathe®
- spiritual, ritual and ceremonies®
- horticultural & wildflower industries
- natural heritage®
- food, timber, fibre and medicinal plants®

Rivers are central to human welfare and economic development. They provide:

- water for agricultural, industrial and domestic uses®
- flood attenuation and regulation®
- food and medicinal plants®
- transport and/or purification of biodegradable wastes®
- tourism, recreational and cultural use®
- enhanced property values

Estuaries, together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to:

- subsistence fishing
- commercial fisheries (as they provide a refuge for commercial fishes when they are young)
- wildlife habitat e.g., nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles)
- tourism, recreational, cultural use and craft materials
- enhanced property values

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

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

Net Primary production®: This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations' ability to maintain this ecosystem process. This ecological process is especially significant for the ORT, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

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

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

9.4.4 Ecological Support Areas

These include supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. The ESA'S are not well defined in the ECBCP (refer to Section 2.3.8). ESAs are generally extensions to the CBA area incorporating small areas that are perhaps no longer natural, or are comprised of secondary vegetation, generally following the drainage line ecological corridors within the wider surrounding landscape that will improve connectivity.

9.4.5 Critical/Important Terrestrial Habitats

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

Feature	Desired State
Rocky Outcrops	Rocky outcrops can provide habitat for geophytic species that often have limited distributions or localised populations.
Wetland habitat	Critical habitat in an arid environment, often seasonal and provide habitat for a wide range of aquatic species.
Grassland	High diversity grasslands are considered to be important habitats.
Colonies or Populations of Threatened or Protected Species	Areas where such species occur are considered to be critical habitat.

9.4.6 Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Eradication protocol

The act required the removal of these species, being the responsibility of the landowner, as described in Table 24 below.

Table 24: Legislation regarding invasive alien species.

The National Environmental Management Act: Alien and Invasive Species Act (18 September 2020) stipulates the following: *6. Control measures*

(1) In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply.
(2) Such control measures may relate to –
(I) the control of weeds and invader plants.
(3) A control measure may –
(a) contain a prohibition or an obligation with regard to any matter referred to in subsection (2).
(5) Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence.

In this regard, Government Notice R. 598 – National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Gazette number 37885), dated August 2014, further stipulates the following:

CHAPTER 2: CATEGORIES OF LISTED INVASIVE SPECIES

2. Category 1a: Listed Invasive Species

(1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.
(2) A person in control of a Category 1a Listed Invasive Species must-
(a) comply with the provisions of section 73(2) of the Act.
(b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and
© allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.
If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

3. Category 1b: Listed Invasive Species

(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.
(2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.
(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

4. Category 2: Listed Invasive Species

(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.
(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.
(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.
(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.
(6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any

person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

5. Category 3: Listed Invasive Species

(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

<u>CHAPTER 7: ISSUING, AMENDMENT AND CANCELLATION OF PERMITS</u>

29. Sale or transfer of alien and listed invasive species

(1) If a permit-holder sells a specimen of an alien or listed invasive species or sells the property on which a specimen of an alien or listed invasive species is under the permit-holder's control, the new owner of such specimen or such property must apply for a permit in terms of Chapter 7 of the Act.

(2) The new permit-holder contemplated in sub-regulation (1) will be subject to the same conditions as the permit-holder who has sold the specimen of an alien or listed invasive species, or the property on which a specimen of an alien or listed invasive species occurs, unless specific circumstances require all such permit conditions to be revised, in which case full reasons must be giving in writing by the issuing authority.

(3) The seller of any immovable property must, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed invasive species on that property.

<u>CHAPTER 9: COMPLIANCE AND ENFORCEMENT</u>

35. Offences and penalties

(1) Any offence committed in terms of section 101 of the Act shall, upon conviction, carry the penalties referred to in section 102 of the Act.

(2) Any person who contravenes or fails to comply with a provision of these regulations is guilty of an offence and is liable, on conviction, to-

(a) a fine not exceeding five million rand, and in the case of a second or subsequent conviction, to a fine not exceeding R 10 million; or

(b) imprisonment for a period not exceeding 10 years; or

© to both such fine and imprisonment.

The seller of any immovable property must also, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed IAPs on the property. Property sales agreements dated 1 October 2014 and onwards, should also incorporate a clause in terms of which the purchaser acknowledges that he has acquainted himself with the extent and the nature of the property he is buying and that he accepts the property as such, including the vegetation on the property.

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the construction EMP, and a detailed action plan compiled and implemented by the ECO. Any seed-bearing material is to be disposed of at a registered landfill.

9.5 Appendix D: Faunal Species of Conservation Concern Assessment

Refer to separate report entitled *Terrestrial Fauna Sensitivity Study for the proposed Taaibos and Soutrivier Wind Energy Facilities*, compiled by Aliénor Brassine (MSc, Pr. Sci. Nat.), 20 October 2022.

9.6 Appendix E: Abbreviations and Glossary

9.6.1 Abbreviations

AOO	Area of Occupancy (the area within its 'extent of occurrence' which is occupied)
CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs (*now DFFE, see below*)
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
~~DEDEAT~~	~~Eastern Cape Department of Economic Development, Environmental Affairs and Tourism~~
DEMC	Desired Ecological Management Class
DENC	Northern Cape Department of Environmental Affairs and Nature Conservation
DFFE	The Department of Environmental Affairs was renamed the Department of Forestry and Fisheries and the Environment (DFFE), incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries.
DWAF	Department of Water Affairs and Forestry (former department name)
DWS	Department of Water Affairs and Sanitation
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
EOO	Extent of Occurrence (the spatial spread of the areas currently occupied)
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LHS	Left Hand Side (refers to river bank side, facing downstream)
LM	Local Municipality
masl	meters above sea level
NBA	National Biodiversity Assessment
NC	Northern Cape
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NEMA	National Environmental Management Act, Act 107 of 1998
NFA	National Forest Act, Act 84 of 1998
PEMC	Present Ecological Management Class
PES	Present Ecological State
PNCO	Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).
RDL	Red Data List
RHS	Right Hand Side (refers to river bank side, facing downstream)
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SoER	State of the Environment Report
SSC	Species of Special Concern
ToPS	Threatened of Protected Species (NEM:BA)
ToR	Terms of Reference
+ve	Positive
-ve	Negative

9.6.2 Glossary

Alien Invasive Species (AIS)	An alien species whose introduction and/or spread threaten biological diversity (Convention on Biological Diversity). Note: "*Alien invasive species"* is considered to be equivalent to "*invasive alien species"*. An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity (*IUCN*).
Area of Occupancy	Area of Occupancy is the area within its 'extent of occurrence' which is occupied. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats.
Best Environmental Practice	The application of the most appropriate combination of environmental control measures and strategies (Stockholm Convention).
Best Management Practice	Established techniques or methodologies that, through experience and research, have proven to lead to a desired result (BBOP).
Biodiversity	Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
Biodiversity Offset	Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity (BBOP).
Bioremediation	The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.
Boundary	Landscape patches have a boundary between them which can be defined or fuzzy (Sanderson and Harris, 2000). The zone composed of the edges of adjacent ecosystems is the boundary.
Catchment	In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.
Connectivity	The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.
Corridors	Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as "steppingstones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
Critically Endangered (CR)	A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an extremely high risk of extinction in the wild (*IUCN*).
Cultural Ecosystem Services	The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations, and aesthetic values (Millennium Ecosystem Assessment).
Cumulative Impacts	The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation (BBOP).
Data Deficient (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat(*IUCN*).
Degraded Habitat/Land	Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
Disturbance	An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.
Ecological Function	How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.

Ecological Function	How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.
Ecological Pattern	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.
Ecological Process	Includes *Physical processes* [Climate (precipitation, insolation), hydrology, geomorphology]; *Biological processes* [Photosynthesis, respiration, reproduction]; *Ecological processes* [Competition, predator-prey interactions, environmental gradients, life histories]
Ecological Processes	Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened.
Ecological Structure	The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.
Ecology	Ecology (from Greek: οἶκος, "house" and -λογία, "study of") is the study of the relationships between living organisms, including humans, and their physical environment. Ecology considers organisms at the individual, population, community, ecosystems, and biosphere level. Ecology overlaps with the closely related sciences of biogeography, evolutionary biology, genetics, ethology and natural history. Ecology is a branch of biology, and it is not synonymous with environmentalism.
Ecosystem	All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecosystem Services	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.
Ecosystem Status	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem (Millennium Ecosystem Assessment).
Ecotone	The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone.
Edge	The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.
Emergent Tree	Trees that grow above the top of the canopy
Endangered (En)	Endangered terrestrial ecosystems have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. A taxon (species) is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild (*IUCN*).
Endemic	A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region,

	which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threated Species.
Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Estuary	a partially or fully enclosed body of water - (a) which is open to the sea permanently or periodically; and (b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.
Evolutionary Processes	The process by which genetic changes have taken place and continue to take place in populations of plants and animals over successive generations in response to environmental changes. Evolutionary Processes includes the mechanisms that produce the biodiversity of life and include Mutation and Migration (Gene Flow), Genetic Drift, Natural Selection, Common Descent, Speciation, Sexual Selection, and Biogeography. Disruptions to evolutionary processes can prevent ecosystems and species from adapting to environmental change over time. Significant fragmentation is considered to be an important disrupter of evolutionary processes.
Exotic	Non-indigenous; introduced from elsewhere, may also be a *weed* or alien *invasive* species. Exotic species may be invasive or non-invasive.
Extent of Occurrence	Extent of Occurrence is the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence.
Fragmentation (Habitat Fragmentation)	The 'breaking apart' of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occurs.
Habitat	The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.
Habitat Banking	A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time (IEEP).
IFC PS6	International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
Indicator	Information based on measured data used to represent an attribute, characteristic, or property of a system.
Indicator species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.
Indigenous	Native; occurring naturally in a defined area.
Indigenous Species (Native species)	A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (*Bern Convention 1979*). A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy using its natural dispersal systems (*modified after the Convention on Biological Diversity*)
Indirect Impact	Impacts triggered in response to the presence of a project, rather than being directly caused by the project's own operations (BBOP)
Instream habitat	Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;
Intact Habitat / Vegetation	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Intrinsic Value	The inherent worth of something, independent of its value to anyone or anything else.
Keystone Species	Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.
Landscape	An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems (Millennium Ecosystem Assessment).
Landscape Approach	Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations (FAO).
Landscape connectivity	The degree to which the landscape facilitates or impedes movement among resource patches.

Least threatened / Least Concern (LC)	These ecosystems have lost only a small proportion (more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild). A taxon (species) is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (*IUCN*).
Matrix	The "*background ecological system*" of a landscape with a high degree of connectivity.
Natural Forest (Indigenous Forest)	The definition of "*natural forest*" in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: 'A natural forest means a group of indigenous trees • whose crowns are largely contiguous • or which have been declared by the Minister to be a natural forest under section 7(2) This definition should be read in conjunction with Section 2(1)(x) which states that 'Forest' includes: • A natural forest, a woodland, and a plantation • The forest-produce in it; and • The ecosystems which it makes up. The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (Podocarpus latifolius) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as: • A generally multi-layered vegetation unit • Dominated by trees that are largely evergreen or semi-deciduous • The combined tree strata have overlapping crowns, and crown cover is >75% • Grasses in the herbaceous stratum (if present) are generally rare • Fire does not normally play a major role in forest function and dynamics except at the fringes • The species of all plant growth forms must be typical of natural forest (check for indicator species) • The forest must be one of the national forest types
Near Threatened (NT)	A taxon (species) is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (*IUCN*).
Patch	A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.
Protected Area	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.
Range restricted species	Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited extent of occurrence (EOO): • For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km2).
Refugia	A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.
Rehabilitation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure (BBOP).
Resilience	The capacity of a natural system to recover from disturbance (OECD).
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions (IFC).
Riparian	Pertaining to, situated on or associated with the banks of a watercourse, usually a river or stream.
Riparian Habitat	Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

River Corridors	River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED).
Terrestrial	Occurring on, or inhabiting, land.
Threatened Species	Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species (*IUCN*). Any species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate (EU).
Traditional Ecological Knowledge	Knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry (CBD).
Transformation	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.
Transformed Habitat/Land	Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
Tributary	A small stream or river flowing into a larger one.
Untransformed Habitat/Land	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Vulnerable (Vu)	Vulnerable terrestrial ecosystems have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat. A taxon (species) is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (*IUCN*).
Watercourse	Natural or man-made channel through or along which water may flow. A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows. and a reference to a watercourse includes, where relevant, its bed and banks;
Weed	An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.
Wetlands	A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.

9.7 Annexure F: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included I the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in 0 will be managed / controlled as set out under mitigating measures (0) and as detailed in this section for the more significant impacts during the operational phase.

9.7.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern *must* be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation *should* be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and *must* not be disturbed, upset or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site *must* be done as described in the Rehabilitation Plans.

Flora search and Rescue

The following flora relocation plan is recommended:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of special concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a protected area.

9.7.2 Alien and Invasive Plan Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.

- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species *must* be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

9.7.3 Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers *should* also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor *must* strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making *must* be strictly prohibited.
- The Contractor *should* take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.
- The Contractor *must* ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor *must* supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and “hot work” *must* be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area *must* be away from flammable stores. All events must be under management’s supervision and a fire extinguisher *will* be immediately available. “Low-smoke” fuels must be used (e.g., charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor *must* take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

9.7.4 Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

9.7.5 Dust

- To manage complaints relation to impacts on the nearby communities, a dust register *will* be developed.
- If required, water spray vehicles *will* be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens *should* be used to reduce wind and dust in open areas.

9.7.6 Infrastructural Requirements

Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

Stormwater and Erosion Control

- Stormwater Management Plans *must* be developed for the site and should include the following:
  - The management of stormwater during construction.
  - The installation of stormwater and erosion control infrastructure.
  - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater *must* be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes *should* be profiled at a maximum 1:3 gradient.
- Diversion channels *should* be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation *must* be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections *will* be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas *must* be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.

- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity.

Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previous stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This ***shall*** be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This ***must*** be done in conjunction with the ECO.
- Final rehabilitation ***must*** comply with the requirements mention in the Rehabilitation Plan.

9.7.7 Rehabilitation Plan

Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and environmental risk. The

depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contract to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

Botanical name	Common name	Approx seed mixture /Ha
Cynodon dactylon	Kweek	12 kg/ Ha
Eragrostis curvula	Weeping Love Grass	6 kg/ Ha
Eragrostis tef	Teff	2 kg/ Ha
Digitaria eriantha	Smuts Grass	4 kg/ Ha
Other indigenous veld grasses can be added to the seed mix		± 4 kg/Ha

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site
- Stabilise disturbed soil and rock faces
- Minimize surface erosion and consequent siltation of natural water course located on site
- Control wind-blown dust problems
- Enhance the physical properties of the soil
- Re-establish nutrient cycling
- Re-establish a stable ecological system

Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e., conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation
- Existing vegetation will be retained as far as possible to minimize erosion problems.

Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas

9.7.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.
To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

9.7.9 Closure objectives and extent of alignment to pre-construction environment

Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

9.8 Appendix G: General Impact Rating Scale

To ensure a direct comparison between various specialist studies, six standard rating scales are defined and used to assess and quantify the identified impacts. This is necessary since impacts have several parameters that need to be assessed.
These scales are:

1. The Severity/ Benefit Scale, which assesses the importance of the impact from a purely technical perspective.
2. The Spatial Impact Scale, which assesses the extent or magnitude of the impact (the area that will be affected by the impact).
3. The Temporal Impact Scale, which assesses how long the impact will be felt. Some impacts are of a short duration, whereas others are permanent.
4. The Degree of Certainty Scale, which provides a measure of how confident the author feels about their prediction.
5. The Likelihood Scale, which provides an indication of the risk or chance of an impact taking place.
6. The Environmental Significance Scale, which assesses the importance of the impact in the overall context of the affected system or party.

To ensure integration of social and ecological impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g., vegetation, fauna etc.) was assessed first. Thereafter, each impact was assessed within the context of time and space, and the probability of the impact occurring was quantified using the degree of certainty scale.
The impact was then assessed in the context of the whole environment to establish the "environmental significance" of the impact to the flora and vegetation.
The scales are described in detail below.

9.8.1 The Severity/ Beneficial Scale

The *severity scale* was used to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on an affected system (for ecological impacts) or an affected party. This methodology attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialist.

NEGATIVE IMPACT	POSITIVE IMPACT
Very severe An irreversible and permanent change to the affected system(s)) which cannot be mitigated. For example, change in topography resulting from a quarry.	Very Beneficiary A permanent and very substantial benefit to the affected system(s) with no alternative to achieve this benefit.
Severe Long-term impacts on the affected system(s) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial A long-term impact and substantial benefit to the affected system(s). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
Moderately severe Medium- to long-term impact on the affected system(s) that could be mitigated.	Moderately beneficial A medium- to long-term impact of real benefit to the affected system(s) Other ways of optimising are equally difficult, expensive and time consuming (or a combination of these), as achieving them in this way.
Slight	Slightly beneficial A short- to medium-term impact and negligible benefit to the affected system(s) Other ways of optimising the

NEGATIVE IMPACT	POSITIVE IMPACT
Medium- to short term impacts on the affected system(s) Mitigation is very easy, cheap, less time consuming or not necessary.	beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect The system(s) is not affected by the proposed development.	Do not know/Cannot know In certain cases, it may not be possible to determine the severity of the impact.

The severity of impacts can be evaluated with and without mitigation order to demonstrate how serious the impact is when nothing is done about it. For beneficial impacts, optimisation means anything that can enhance the benefits. However, mitigation or optimisation must be practical, technically feasible and economically viable.

9.8.2 Spatial and Temporal Scales

Two additional factors were considered when assessing the impacts, namely the relationship of the impact to Spatial and Temporal Scales.
The *spatial scale* (shown in italics) defines the impact at the following scales.

SPATIAL SCALE	EXPLANATION
Localised	at a localised scale (i.e., few hectares in extent). The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	the site, some effects to surrounding area (*~10 km*)
District	the site, some effects to wider surrounding area (*~100 km*)
Regional	the site, some effects to surrounding area (*+250 km*)
National	Impacts will affect at a country level
International	Impacts extend beyond country boundary

The *temporal scale* (shown in italics) defines the impact at the following scales.

TEMPORAL SCALE	EXPLANATION
Short Term	Less than 5 years. Many construction phase impacts will be of a short duration
Medium Term	Between 5 and 20 years
Long Term	Between 20 and 40 years, and from a human perspective essentially permanent.
Permanent	Over 40 years and resulting in a permanent and lasting change.

9.8.3 The Degree of Certainty and the Likelihood Scale

It is also for each specialist to state the degree of certainty, or the confidence attached to their prediction of significance. For this reason, a 'degree of certainty' scale (shown in bold) must be used.

DEGREE	DESCRIPTION
Definite:	More than 90% sure of fact. To use this one will need to substantial supportive data.
Probable:	Between 70% and 90% sure of fact.
Possible:	Between 40% and 70% sure of fact.
Unsure:	Less than 40% sure of fact.

The risk or likelihood (shown in normal font) of impacts being manifested differs. There is no doubt that some impacts would occur, but certain other (usually secondary data) impacts are not as likely and may or

may not result. Although these impacts maybe severe, the likelihood of them occurring may affect their overall significance and must therefore be considered. It is therefore necessary for the author to state his estimate of the likelihood of an impact occurring, using the following likelihood scale:

DEGREE	DESCRIPTION
Very unlikely	The chance of these impacts occurring is extremely slim, e.g., natural forces destroying a dam wall.
Unlikely	The risk of these impacts occurring is slight.
May occur	The risk of these impacts is more likely, although it is not definite.
Very Likely	Slight chance that this impact will not occur.
Definite	There is no chance that this impact will not occur.

9.8.4 The Environmental Significance Scale

The environmental significance scale is an attempt to evaluate the significance of an impact, the severity or benefit of which has already been assessed. This evaluation needs to be assessed in the relevant context, as an impact can either be ecological or social, or both. Since the severity of impacts with and without mitigation will already have been assessed, significance was only evaluated after mitigation. In many cases, this mitigation will take place, as it has been incorporated into project design. A six-point significance scale is applied as follows:

SIGNIFICANCE	DESCRIPTION
Very High (6)	Impacts considered to have a major and permanent change to natural environment and are rate as VERY HIGH, usually resulting to severe or very severe/ beneficial to highly beneficial effects.
High (5)	Long term change and are rated as HIGH resulting to severe or moderately severe effects/ beneficial to moderately beneficial.
Moderate (4)	Medium to long-term effects. Impacts are rated as MODERATE with moderately severe or moderately beneficial effects.
Low (3)	Medium to short term effects. Impacts are rated as MODERATE resulting in moderately severe or moderately beneficial effects.
Insignificant (2)	Short term effects are present. Impacts are rated as SLIGHT resulting in SLIGHTLY BENEFICIAL effects. Residual effects are present but are of no consequence.
No Significance (1)	No primary or secondary effects, resulting in NO SIGNIFICANT impact.
Do not Know (0)	Not possible to determine the significance of impacts

9.8.5 Absence of Data

In certain instances, an assessment must be produced in the absence of all the relevant and necessary data, due to paucity or lack of scientific information on the study area. It is more important to identify all the likely environmental impacts than to precisely evaluate the more obvious impacts. It is important to be on the conservative side in reporting likely environmental impacts. Because assessing impacts with a lack of data is more dependent on scientific judgment, the rating on the certainty scale cannot be too high. It is for these reasons that a degree of certainty scale has been provided, as well as the categories DON'T KNOW or CAN'T KNOW.

9.9 Appendix H: Declaration, Specialist Profile and Registration

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED WKN WINDCURRENT TAAIBOS AND SOUTRIVIER WEF, ASSOCIATED GRID CONNECTION AND OTHER INFRASTRUCTURE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

Details of Specialist, Declaration and Undertaking Under Oath

Page 1 of 3

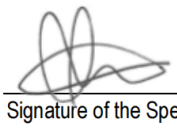
1. SPECIALIST INFORMATION

Specialist Company Name:	None			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100 %
Specialist name:	Jamie Pote			
Specialist Qualifications:	BSc (Hons)			
Professional affiliation/registration:	SACNASP (115233) – Ecological Science IAIAsa (5045)			
Physical address:				
Postal address:	Postnet Suite 57, PBag X13130, Humewood			
Postal code:	6013	Cell:		
Telephone:		Fax:		
E-mail:	jamiepote@gmail.com			

2. DECLARATION BY THE SPECIALIST

I, Mr Jamie Pote_____, declare that –

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



Signature of the Specialist

N/A

Name of Company:

02/01/2023

Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Mr Jamie Pote_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

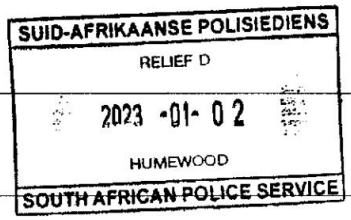
N/A

Name of Company

02/01/2023

Date

Signature of the Commissioner of Oaths

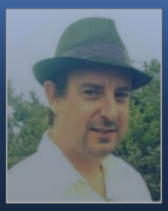


2023-01-02

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 3 of 3



Jamie Pote

SENIOR ECOLOGIST AND ENVIRONMENTAL SCIENTIST

CONTACT

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jamiepote@live.co.za
Port Elizabeth, South Africa
Linkedin.com
Jamiepote
Bluesky-SA

ABOUT ME

16 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 220 projects in southern, western and central Africa. Senior Environmental Consultant and EAP on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. GIS mapping and analytics.

EDUCATION

Bachelor of Science
Rhodes University
2001 (Botany & Environmental Science)

Bachelor of Science (Honours)
Rhodes University
2002 (Botany)

Professional Natural Scientist
SACNASP
2016

SERVICES

Terrestrial Biodiversity/Ecological Assessments
Environmental & Ecological Risk-Assessments
Bioremediation, Restoration & Rehabilitation Plans
Environmental Management Plans & Programmes
GIS Mapping & Analysis & Web maps
Alien Invasive Management (Terrestrial)
Environmental Auditing & Monitoring (ECO)
Flora Search & Rescue & Relocation
Independent Environmental & Ecological review
Permit and License applications
Environmental & Mining Applications

EXPERIENCE AND CLIENTS

Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

Key Projects

- *Over 220 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Mining applications and construction auditing on over 40 projects and more than 300 gravel borrow pits for the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Construction monitoring.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing for various clients including the Department of Transport and SANRAL.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- Various Environmental Management and Rehabilitation Plans.

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Jamie Robert Claude Pote

Registration Number: 115233

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **20 July 2016** Expires **31 March 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

MR JAMIE POTE BSC (HONS) PR.SCI.NAT.

PROJECT EXPERIENCE

PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS

- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE PROJECTS

- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

SPECIALISED ECOLOGICAL REPORTS

- Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM 2015
- Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape 2014
- Mapping and Ecological services for Congo Agriculture, Republic of Congo 2013
- Rehabilitation Plan for Nieu Bethesda, Eastern Cape 2011
- Mapping of pipeline for Kenton Water Board, Eastern Cape 2010
- Rehabilitation Plan for N_2 Upgrade - Coega to Colchester, NMB 2010
- Representative for landowner group for Seaview burial Park, NMB 2010
- Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB 2008
- Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape 2007
- Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape 2006
- Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape 2003

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Amalinda crossing, BCM, Eastern Cape 2019
- Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape 2019
- Ecological Assessment for Nelson Mandela University Access Road, NMB 2019
- Botanical Assessment for Zachtevlei Dam (Lady Grey), Eastern Cape 2017
- Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape 2017
- Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape 2012
- Botanical Assessment for Jansenville Cemetery, Eastern Cape 2009
- Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB 2008
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape 2007
- Botanical Assessment for PE Airport Extention, NMB 2006
- Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape 2006

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

- Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB 2013

- Ecological Assessment Review for Penhoek Road widening, Eastern Cape 2012
- Ecological Assessment for R61 road widening, Eastern Cape 2012
- Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB 2010
- Botanical Assessment for Motherwell - Blue Water Bay Road, NMB 2010
- Ecological Assessment for Port St John Road, Eastern Cape 2010
- Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape 2009
- Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB 2009
- Botanical Assessment for Manganese Conveyor Screening Report, NMB 2008
- Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape 2006

MINING PROJECTS

- Ecological Assessment for Bochum Borrow Pits, Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines) 2013
- Ecological Assessment for Thulwe Road Borrow Pits, Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana 2010
- Botanical Assessment for Zwartenbosch Quarry, Eastern Cape 2008
- Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape 2008
- Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape 2008
- Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape 2008
- Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape 2008
- Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape 2008
- Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape 2008
- Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape 2008
- Regional Botanical Map for mining prospecting permit, Welkom 2008
- Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit – Jeffreys Bay, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms river/Kareedouw, Eastern Cape 2007
- Biophysical Assessment for Humansdorp Quarry, Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB 2006
- GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape 2006
- Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo 2006
- Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape 2006

POWERLINE INFRASTRUCTURE PROJECTS

- Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM 2016
- Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM 2016
- Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline 2015
- Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape 2013
- Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, Eastern Cape 2012

- Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB 2012
- Botanical Assessment for Dedisa-Grassridge Powerline, Eastern Cape 2010
- Ecological Assessment for Grahamstown-Kowie Powerline, Eastern Cape 2010
- Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB 2009
- Botanical Assessment for Eskom Powerline - Albany-Kowie, Eastern Cape 2009
- Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB 2006
- Botanical Assessment for Eskom Power line – Tyalara-Wilo, Eastern Cape 2006
- Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape 2004

PIPELINE INFRASTRUCTURE PROJECTS

- Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape 2020
- Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3) 2018
- Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme 2017
- Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey) 2017
- Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape 2016
- Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4) 2013
- Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5) 2013
- Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng 2012
- Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape 2010
- Basic Botanical Assessment for Chatty Sewer, NMB 2010
- Species of Special Concern Mapping for Seaview Pipeline, NMB 2009
- Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB 2009
- Map Production for Russell Rd Stormwater, NMB 2008
- Basic Botanical Assessment for Albany Pipeline, Eastern Cape 2008
- Environmental Risk Assessment for Elands River pipeline, Eastern Cape 2007
- Detailed Botanical Assessment for Motherwell Pipeline, NMB 2007
- Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape 2007
- Botanical & Floristic Report for Hankey pipeline, Eastern Cape 2006
- Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape 2004

HOUSING DEVELOPMENT PROJECTS

- Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape 2020
- Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay 2019
- Ecological Assessment for erf 14, Kabega, Port Elizabeth 2017
- Ecological Assessment for Fairwest Rental Housing, Port Elizabeth 2017
- Ecological Assessment for Hankey Housing, Kouga District Municipality 2015
- Ecological Assessment for Lebowakgoma Housing, Limpopo 2013
- Ecological Assessment for Giyani Development, Limpopo 2013
- Ecological Assessment for Palmietfontein Development, Limpopo 2013
- Ecological Assessment for Seshego Development, Limpopo 2013
- Botanical Assessment for Sheerness Road, BCM, Eastern Cape 2013
- Ecological Assessment for Ethembeni Housing, NMB 2012
- Ecological Assessment for Pelana Housing, Limpopo 2012
- Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape 2011
- Botanical Assessment for The Crags 288/03, Western Cape 2010
- Ecological Assessment Revision Report for Fairview Housing, NMB 2010
- Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape 2010
- Botanical Assessment for Little Ladywood, Western Cape 2010
- Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB 2010
- Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape 2010

- Botanical Assessment for Willow Tree Farm, NMB 2010
- Botanical Assessment for Kouga RDP Housing, Eastern Cape 2009
- Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB 2009
- Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape 2009
- Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay - 438/4, Western Cape 2009
- Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape 2008
- Site screening assessment for Greenbushes Site screening, NMB 2008
- Botanical Assessment for Fairfax development, Eastern Cape 2008
- Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape 2008
- Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB 2008
- Site Screening for Mount Road, NMB 2008
- Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB 2008
- Botanical Assessment for Greenbushes 130, NMB 2008
- Botanical Assessment for Greenbushes Kuyga no. 10, NMB 2008
- Botanical Assessment for Plettenberg Bay - 438/24, Western Cape 2007
- Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape 2007
- Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape 2006
- Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape 2006
- Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape 2006
- Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM 2006
- Botanical Assessment for Bosch Hoogte, NMB 2006
- Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape 2006
- Botanical Assessment for Plettenberg Bay - 444/27, Western Cape 2006
- Botanical Assessment for Leisure Homes, BCM, Eastern Cape 2006
- Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape 2005
- Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB 2005
- Botanical Assessment for Smart Stone, NMB 2005
- Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape 2005
- Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB 2005
- Basic Botanical Assessment for Parsonsvlei 3/4, Eastern Cape 2005
- Botanical Assessment for Bridgemead – Malabar PE, NMB 2004

AGRICULTURAL PROJECTS

- Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape 2015
- Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape 2014
- Ecological Assessment for Citrus expansion on Farm 960, Patensie 2014
- Ecological Assessment for Tzaneen Chicken Farm, Limpopo 2013
- Botanical Assessment and Open Space Management Plan for Kudukloof, NMB 2010
- Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB 2010
- Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB 2006

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

- Species List& Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape 2009
- Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape 2008
- Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort, Eastern Cape 2006

MIXED USE DEVELOPMENT PROJECTS

- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB 2010
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB 2009
- Botanical Assessment and GIS maps for Utopia Estate PE, NMB 2008
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB 2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Ecological Assessment for Parsonsvlei Erf 984 & 1134 Parsonsvlei, NMB 2020
- Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB 2020
- Ecological Assessment for Bay West City ENGEN Service Station, NMB 2015
- Ecological Assessment for Green Star grading for SANRAL, NMB 2014
- Ecological Assessment for OTGC Tank Farm, NMB 2012
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB 2010
- Botanical Assessment for Bluewater Bay Erf 805, NMB 2009
- Ecological Assessment for Bay West City, NMB 2007
- Botanical Assessment for Kenton Petrol Station, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB 2005

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape 2018
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape 2010
- Botanical Assessment and EMP for Zwartenbosch Road, Eastern Cape 2010
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB 2008
- Botanical Assessment - Housing development for Coega Ridge, NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB, 2008
- Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB 2006
- Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape 2006
- Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape 2006
- Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape 2006
- Botanical Assessment for Rosehill Farm, Eastern Cape 2005
- Botanical Assessment for Resolution Game Farm, Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape 2005
- Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape 2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape 2020
- Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape 2019
- Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape 2019
- Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape 2018
- Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape 2018
- Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017

- Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5) 2016
- Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2016
- Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4) 2015
- Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB 2014
- Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape 2013
- Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3) 2013
- Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB 2013
- Flora and Fauna Search and Rescue for Jeffreys Bay School, Eastern Cape 2013
- Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape 2012
- Flora Relocation for Disco Poultry Farm, NMB 2010
- Flora Relocation for Mainstream Windfarm, Eastern Cape 2010

ENVIRONMENTAL MANAGEMENT PLANS

- Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandala Bay Municipality 2020
- Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality 2019
- Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape 2010
- Wetland Management Plan for NMB Portnet, NMB 2010
- Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape 2009
- Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape 2006
- EMP for Kromensee EMP (Jeffries Bay), Eastern Cape 2006
- Floral Survey for Mbotyi Conservation Assessment, Eastern Cape 2005
- Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape 2005

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

- ECO for DRPW IRM Road Maintenance projects, Baviaans LM 2019
- ECO for DRPW IRM Road Maintenance projects, Senqu LM 2019
- ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM 2019
- ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM 2019
- ECO for DRPW IRM Road Maintenance projects, Elundini LM 2019
- ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM 2019
- ECO for Construction of Fairwest Village Housing Project 2019
- ECO for Construction of Utopia Estate 2019
- ECO for Construction of NMU West End Student Residences Phases 1 & 3 2019
- ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM 2018
- ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgijima) LM 2018
- ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2017
- ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts 2017
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2017
- ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL) 2016
- Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbashe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Senqu LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Elundini LM 2016

- ECO and Environmental Management for closure of Bushmans River Landfill site 2016
- ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's 2015
- ECO for Riversbend Citrus Farm, NMB 2014
- ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA 2014
- ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba 2014
- EMP and ECO for Utopia Estate, NMB 2013
- Final EMP submission for Seaview Garden Estate, NMB 2012
- ECO audits for NMB Road surfacing, NMB (multiple contacts) 2011
- EMP submission and ECO for Seaview Garden Estate, NMB 2010
- ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape 2010
- EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape 2009
- Flora Relocation Plan and Permit application for Wildemans Plaas, NMB 2006

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

- Basic Assessment Application for Parsonsvlei Erf 984 & 1134 Parsonsvlei 2020
- Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse) 2020
- Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development 2020
- Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10 2020
- Basic Assessment Application for Nelson Mandela University Access Road, NMB 2019
- Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay 2019
- Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation 2019
- Basic Assessment Application for Erf 14 Kabega, NMBM 2017
- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2017
- Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay 2017
- Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape 2015
- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2015
- Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018

ENVIRONMENTAL SCREENING PROJECTS

- Environmental Screening Report for Proposed Life Hospital parking expansion, NMB 2019
- Environmental Screening Report for Erf 984 & 1134 development, Parsonsvlei, NMB 2019
- Environmental Screening Report for proposed Khayalethu School, Buffalo City 2018
- Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB 2017
- Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB 2017
- Environmental Screening Report for Proposed Fairwest Social Housing project, Fairview, NMB 2016
- Environmental Screening Report for Development of Little Chelsea No 25, NMB 2016
- Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood) 2015
- Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth 2015
- Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe 2015
- Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth 2015
- Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate 2015
- Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB 2015

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT) 2019
- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape– (SANRAL) 2018
- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL) 2017
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits – Intsika Yethu and Emalahleni (DRPW) 2015
- Mining BAR/EMP's for Joe Gqabi DM Borrow Pits – Senqu (DRPW) 2015
- Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits – Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Amahlathi LM Borrow Pits – Amatole (DRPW) 2015
- Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits – Amatole (DRPW) 2015
- Mining BAR/EMP's for Sundays River Valley LM Borrow Pits – Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Kouga LM Borrow Pits – Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 – Matatiele (DRPW)

SECTION 24G APPLICATIONS

- 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust) 2015
- Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape 2015

GIS AND IT DEVELOPMENT

- Development of *iAuditor* Environmental Audit templates (DRPW audits) 2014
- Landsat Image classification and analysis (Congo Agriculture) 2010
- Development of GIS databases and mapping tools for Manifold GIS software 2008

CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. Fuelwood harvesting and selection in Valley Thicket, South Africa. Journal of Arid Environments, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. The homegarden cultivation of indigenous medicinal plants in the Eastern Cape. Indigenous Plant Use Forum, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage. Working for Water Inaugural Research Symposium 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape. Working for Water Inaugural Research Symposium 19 - 21 August 2003, Kirstenbosch, South Africa.

OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuis & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in Cyphia (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED WKN WINDCURRENT TAAIBOS AND SOUTRIVIER WEF, ASSOCIATED GRID CONNECTION AND OTHER INFRASTRUCTURE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	N/A			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Alienor (Eleanor) Brassine			
Specialist Qualifications:	MSc			
Professional affiliation/registration:	SACNASP (116197) – Ecological Science			
Physical address:	10 Tewkesbury Crescent, Hillcrest, KZN			
Postal address:	PO Box 191			
Postal code:	3640	Cell:	0764946881	
Telephone:		Fax:		

2. DECLARATION BY THE SPECIALIST

I, _____Alienor Brassine_____, declare that –

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

Signature of the Specialist

N/A
Name of Company:

04/01/2023
Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Alienor Brassine, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Name of Company

04/01/2023

Date 04/01/2023

Signature of the Commissioner of Oaths

PETER DEXTER CFP
Commissioner of Oaths
Bellevue Campus, 5 Bellevue Road
Kloof, 3610

Date 04/01/2023

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Eleanor Iseult Brassine

Registration Number: 116197

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

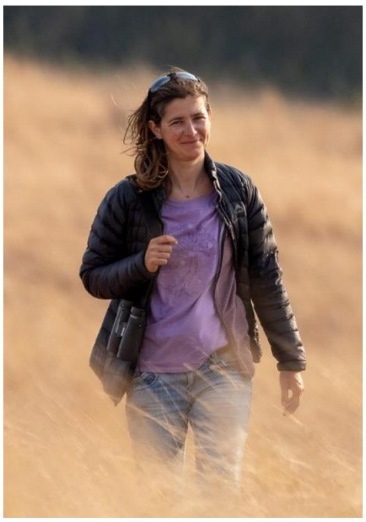
Ecological Science (Professional Natural Scientist)

Effective **21 September 2016** Expires **31 March 2023**

Botha
Chairperson

Chief Executive Officer

To verify this certificate scan this code



Mrs Aliénor (Eleanor) Brassine

Pr.Sci.Nat Registration no: 116197

alienor.brassine@gmail.com
+27 (0)76 494 6881
Fluent in English and French
DOB: 05/02/1987
Belgian citizen with Permanent Residency in South Africa

WORK HISTORY

- 2015 - Present: **Independent Wildlife Biologist and Ecologist,** registered **Professional Natural Scientist** in the discipline of Ecological Science with South African Council for Natural Scientific Professions (SACNASP). Clients:
    - **Jamie Pote:** Faunal Species of Conservation Concern assessment and reporting
    - **EnviroWorks**: fauna specialist studies
    - **Arcus Consulting Pty Ltd:** Southern Mountain Reedbuck camera trap monitoring surveys, avifaunal monitoring and bat equipment installation.
    - **Bohemian Scientist:** Riverine Rabbit surveys
    - **Hollands and Associates Environmental Consultants:** avifaunal monitoring
    - **Wildskies Ecological Services Pty Ltd:** Avifauna monitoring
    - **The National Geographic Okavango Wilderness Project:** collaboration for analyzing and publication of camera trap data of Angolan highland mammal surveys.
    - **Simon Todd Consulting:** faunal assessment studies, including Riverine Rabbit camera trap survey, avifaunal surveys and faunal diversity surveying.
    - **The Endangered Wildlife Trust, Cheetah Metapopulation Project:** data management and cheetah identification for the Kruger Cheetah Census
    - **Animalia**: Bat studies and equipment installation

- 2015 - Present: **Co-owner** and **Photographer** for **Lodge Shots** (www.lodgeshots.com) Marketing photography of tourism establishments in Africa
- 2019, 2017, 2016, 2015: **Coordinator and teacher** for **Leeds University** (UK) African Ecology Field Courses (South Africa)
- 2015: **Teaching assistant** for **Arizona State University** (USA) study abroad Wildlife Ecology program in South Africa in partnership with Rhodes University
- 2014: **MSc candidate** and **demonstrator** for 3rd year Zoology students at **Rhodes University**
- 2011 – 2013: **Resident Researcher/Cheetah Expert at *Mashatu Nature Reserve, Botswana*** and ***National Geographic Explorer*** and founder of ***The Northern Tuli Cheetah Project***.
- 2011 **Horseback safari guide** at **Horizon Horseback Safari**
- 2010: **French and English foreign language teacher** for ***AYC Intercultural Programmes,*** Thailand
- 2009: **Zoology tutor** for university students studying Cell Biology and Zoology at **Rhodes University**, South Africa.

EDUCATION & QUALIFICATION

- **Master of Science** in Zoology, Rhodes University (2015)
- **BSc Honours** in Zoology (African Vertebrate Biodiversity), Rhodes University (2009)
- **Bachelor of Science** - Majors: Zoology & Entomology, Rhodes University (2006-2009)
- SASSETA-accredited **K9 Dog Handler** (DH5) for scent detection (2021) with trained and certified Conservation Scent Detection Dog, Kwando (2022)
- Permit to Operate **Work at Height** and **Fall Arrest Technician** (2018-2021)
- **FGASA level 1**: South African field guide's license (2011)
- **TEFL** (Teaching English Foreign Language) (2010)
- **HIGCSE** (University of Cambridge International Examinations): Biology (1), French (1), Geography (1), Maths (2), Physical Science (2), English (3), St Paul's College - Namibia (2001-2005)

PERSONAL EXPERIENCE & SKILLS

- Fauna Surveys: Camera trapping for general fauna inventories and species-specific surveys including Southern Mountain Reedbuck, Cheetah and Riverine Rabbit. Implementation of all aspects of surveys including data management, data analyses and scientific reporting.
- Avifauna surveys: Bird identification, pre- and post-construction bird monitoring protocols for Wind Energy Facilities according to Birdlife SA guidelines.
- Bat Monitoring: SongMeter and equipment installation, setup, downloads & maintenance.
- Work at Heights: installation of bat microphones on Meteorological (Met) Masts and Wind Turbines.
- Other ecological survey techniques: questionnaires/interviews, photographic survey, collaring and radio tracking large predators, pit fall trap, small-mammal (Sherman trap) surveys and bird mist-netting.
- Managing research projects: proposal writing and project fundraising, responsible for time, financial and personnel management, data collection, data analysis and reporting.
- Coordinating and teaching student ecology field courses
- Microsoft Office proficiency and familiar with a range of IT software applications including GIS and Statistical software.
- Self-motivated and ability to work in the field independently with limited resources and leadership skills including working with and managing assistants
- Excellent interpersonal and communication skills
- Excellent knowledge of southern African mammals and birds
- Experienced 4x4 driver with own vehicle
- Scent-Dog training for the detection of rare species substances.

AWARDS

2014 - **Rhodes University Postgraduate Scholarship**

2014 - **NRF Innovation Master Bursary**

2014 – **Rhodes University Full Colours** – Sports Council award

2012 – 2013 - **National Geographic Big Cats Initiative Grant**

2012 – 2013 – **Rufford Small Grant**

2012 – **Idea Wild** funding

2012 – **Zoofaris & Wildwonders** funding

2009 – **Rhodes University Half-colours** – Sports Council award

REFERENCES

John Power
Biodiversity Specialist: Mammals
Department of Economic Development, Environment, Conservation & Tourism
North West Provincial Government
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Bohemian Scientist
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Vincent van der Merwe
National Cheetah Metaopulation Manager
Endangered Wildlife Trust
vincentv@ewt.org.za
+27 74 166 0410

PUBLICATIONS

- BRASSINE, E. & PARKER, D. 2015. Trapping elusive cats: using intensive camera trapping to estimate the density of a rare African felid. PLOS ONE 10(12): e0142508. doi:10.1371
- BRASSINE, E. 2014. The cheetahs of the Northern Tuli Game Reserve, Botswana: Population estimates, monitoring techniques and human-predator conflict. MSc thesis. Rhodes University. Grahamstown
- CRAIG, C. A., BRASSINE, E. I. AND PARKER, D. M. 2017. A record of cheetah (Acinonyx jubatus) diet in the Northern Tuli Game Reserve, Botswana. Afr. J. Ecol. doi:10.1111/aje.1237
- COOMBS, G., DOLD, A.P., BRASSINE, E.I. & PETER, C.I. 2012. Large pollen loads of a South African asclepiad do not interfere with the foraging behavior or efficiency of pollinating honeybees. *Naturwissenshaften:* DOI 10.1007/s00114-012-0932-2
- VAN DER WEYDE, L. K., et al. (2021). Collaboration for conservation: Assessing countrywide carnivore occupancy dynamics from sparse data. *Diversity and Distributions*:1–13. https://doi.org/10.1111/ddi.13386

9.10 Appendix I: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

SCOPE

The protocol (*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 (GN 320, 20 March 2020))* provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*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 NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation21.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (https://screening.environment.gov.za/screeningtool). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute22.

SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken using:
   a. a desk top analysis, using satellite imagery,
   b. a preliminary on-site inspection; and
   c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
   a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.
   b. contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and
   c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

21 The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

22 The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on ther screening tool).

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being 'low sensitivity' for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.	✓
1.3	However, where the information gathered from the site sensitivity verification differs from the designation of 'very high' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'low' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.	✓
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a 'low' terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.	✓
1.5	If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.	✓
	VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features	
2	Terrestrial Biodiversity Specialist Assessment	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	✓
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	✓
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	✓
2.3.1	a description of the ecological drivers or processes of the system and how the proposed development with impact these;	✓
2.3.2	ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	✓
2.3.3	the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	✓
2.3.4	the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments);	✓
2.3.5	a description of terrestrial biodiversity and ecosystems on the preferred site, including:	✓
(a)	main vegetation types;	✓
(b)	threatened ecosystems, including fisted ecosystems as well as locally important habitat types identified;	✓
(c)	ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
(d)	species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;	✓
2.3.6	the assessment must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	✓
2.3.7	the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	✓
2.3.7.1	terrestrial critical biodiversity areas (CBAs), including:	✓
(a)	the reasons why an area has been identified as a CBA;	✓
(b)	an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;	✓
(c)	the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);	✓
(d)	the impact on ecosystem threat status;	✓
(e)	the impact on explicit subtypes in the vegetation;	✓
(f)	the impact on overall species and ecosystem diversity of the site; and	✓
(g)	the impact on any changes to threat status of populations of species of conservation concern in the CBA;	✓
2.3.7.2	terrestrial ecological support areas (ESAs), including:	✓
(a)	the impact on the ecological processes that operate within or across the site;	✓
(b)	the extent the proposed development will impact on the functionality of the ESA; and	✓
(c)	loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration | and movement of flora and fauna;	✓
2.3.7.3	protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including	✓
(a)	an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	✓
2.3.7.4	priority areas for protected area expansion, including-	✓
(a)	the way in which in which the proposed development will compromise or contribute to the expansion of the protected area I network;	✓
2.3.7.5	Strategic Water Source Areas (SWSAs) including:	✓
(a)	the impact(s) on the terrestrial habitat of SWSA; and	✓
(b)	the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses),	✓
2.3.7.6	FEPA sub catchments, including-	✓
(a)	the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;	✓
2.3.7.7	indigenous forests, including:	✓
(a)	impact on the ecological integrity of the forest and	✓
(b)	percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	✓
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report	✓
3	Terrestrial Biodiversity Specialist Assessment Report	

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
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;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,	✓
3.1.4	description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;	✓
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;	✓
3.1.6	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	✓
3.1.7	additional environmental impacts expected from the proposed development;	✓
3.1.8	any direct, indirect, and cumulative impacts of the proposed development;	✓
3.1.9	the degree to which impacts, and risks can be mitigated;	✓
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),	✓
3.1.13	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate,	✓
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 a not; and	✓
3.1.15	any conditions to which this statement is subjected.	✓
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.	✓
	LOW SENSITIVITY RATING – for terrestrial biodiversity features	
4	Terrestrial Biodiversity Compliance Statement	✓
4.1	The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences.	✓
4.2	The compliance statement must:	✓
4.2.1	be applicable to the preferred site and proposed development footprint;	✓
4.2.2	confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and	✓
4.2.3	indicate whether or not the proposed development will have any impact on the biodiversity feature.	✓
4.3	The compliance statement must contain, as a minimum, the following information:	✓
4.3.1	the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
4.3.2	a signed statement of independence by the specialist;	✓
4.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
4.3.4	a baseline profile description of biodiversity and ecosystems of the site;	✓
4.3.5	the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;	✓
4.3.6	in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures propped, the land can be returned to the current state within two years of completion of the construction phase;	✓
4.3.7	where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	✓
4.3.8	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	✓
4.3.9	any conditions to which this statement is subjected.	✓
4.4	A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓

ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Compliance Statement.	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial animal species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	✓
1.7	The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline23, and the study area must include the PAOI, as determined.	✓
	VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species	
2	Terrestrial Animal Species Specialist Assessment	✓
	VERY HIGH SENSITIVITY RATING Critical habitat for range-restricted species24 of conservation concern, that have a global range of less than 10 km2. SCC listed on the IUCN Red List of Threatened Species25 or on South Africa's National Red List website26 as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare. Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species. These areas are irreplaceable for SCC. **HIGH SENSITIVITY RATING** Confirmed habitat for SCC. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. These areas are unsuitable for development due to a very likely impact on SCC.	✓
2.1	The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with a field of practical experience relevant to the taxonomic group ("taxa") for which the assessment is being undertaken.	✓
2.2	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline27; and must:	✓
2.2.1	identify the SCC which were found, observed or are likely to occur within the study area;	✓
2.2.2	provide evidence (photographs or sound recordings) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility28, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	✓
2.2.3	identify the distribution, location, viability29 and provide a detailed description of population size of the SCC, identified within the study area;	✓
2.2.4	identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area;	✓
2.2.5	determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international	✓

23 Available at https://bgis.sanbi.org/
24 Species with a geographically restricted area of distribution.
25 https://www.iucnredlist.org/
26 This category includes the categories Extremely Rare, Critically Rare, and Rare
27 Available at https://bgis.sanbi.org/
28 The preferred platform is iNaturalist.org but any other national or international virtual museum.
29 the ability to survive and reproduce in the long term.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	
2.2.6	determine the potential impact of the proposed development on the habitat of the SCC located within the study area;	✓
2.2.7	include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation;	✓
2.2.8	identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	✓
2.2.9	identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability;	✓
2.2.10	determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;	✓
2.2.11	discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species30; or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and	✓
2.2.12	identify any alternative development footprints within the preferred site which would be of “low” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.3	The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report.	✓
3	Terrestrial Animal Species Specialist Assessment Report	✓
3.1	This report must include as a minimum the following information:	✓
3.1.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
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;	✓
3.1.5	a description of the mean density of observations/number of sample sites per unit area31 and the site inspection observations;	✓
3.1.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
3.1.7	details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported32;	✓
3.1.8	the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area;	✓

30 Undescribed species are to be assessed as “High Sensitivity”.
31 Species Environmental Assessment Guideline
32 The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
3.1.9	the location of areas not suitable for development and to be avoided during construction where relevant;	✓
3.1.10	a discussion on the cumulative impacts;	✓
3.1.11	impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	✓
3.1.12	a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development 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	✓
3.1.13	a motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were 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.	✓
4	MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION	
	MEDIUM SENSITIVITY RATING – for terrestrial animal species: Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species33. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	✓
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guidelines.	✓
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as "medium" sensitivity by the screening tool.	✓
4.6	Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol.	✓
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.	✓
5	LOW SENSITIVITY RATING – for terrestrial animal species	
	Terrestrial Animal Species Compliance Statement Areas where no natural habitat remains. Natural areas where there is no suspected occurrence of SCC.	✓
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of "low" sensitivity for terrestrial animal species; and	✓

33 The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement34 must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	the mean density of observations/ number of samples sites per unit area.	✓
5.3.6	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.7	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial plant species must submit a Terrestrial Plant Species Specialist Assessment Report.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for terrestrial plant species must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for terrestrial plant species must submit a Terrestrial Plant Species Compliance Statement.	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial plant species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Plant Species Compliance Statement must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial plant species sensitivity and it is found to be of a “very high” or “high” terrestrial plant species sensitivity, a Terrestrial Plant Species Specialist Assessment must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint	✓

34 An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	
1.7	The Terrestrial Plant Species Specialist Assessment and the Terrestrial Plant Species Compliance Statement must be undertaken within the study area.	✓
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline35, and the study area must include the PAOI, as determined.	✓
	VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species	
2	Terrestrial Plant Species Specialist Assessment	✓
	VERY HIGH SENSITIVITY RATING Critical habitat for range-restricted species36 of conservation concern, that have a global range of less than 10 km2. SCC listed on the IUCN Red List of Threatened Species37 or on South Africa's National Red List website38 as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare. Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species. These areas are irreplaceable for SCC. **HIGH SENSITIVITY RATING** Confirmed habitat for SCC. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. These areas are unsuitable for development due to a very likely impact on SCC.	✓
2.1	The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with a field of practical experience relevant to the taxonomic group ("taxa") for which the assessment is being undertaken.	✓
2.2	The assessment must be undertaken within the study area.	✓
2.3	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline39; and must:	✓
2.3.1	Identify the SCC which were found, observed or are likely to occur within the study area;	✓
2.3.2	provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility40, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	✓

35 Available at https://bgis.sanbi.org/
36 Species with a geographically restricted area of distribution.
37 https://www.iucnredlist.org/
38 This category includes the categories Extremely Rare, Critically Rare, and Rare
39 Available at https://bgis.sanbi.org/
40 The preferred platform is iNaturalist.org but any other national or international virtual museum.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
2.3.3	identify the distribution, location, viability41 and provide a detailed description of population size of the SCC, identified within the study area;	✓
2.3.4	identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area;	✓
2.3.5	determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	✓
2.3.6	determine the potential impact of the proposed development on the habitat of the SCC located within the study area;	✓
2.3.7	include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation;	✓
2.3.8	identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	✓
2.3.9	identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability;	✓
2.3.10	determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;	✓
2.3.11	discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species42;	✓
2.3.12	identify any alternative development footprints within the preferred site which would be of “low” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.4	The findings of the assessment must be written up in a Terrestrial Plant Species Specialist Assessment Report.	✓
3	Terrestrial Plant Species Specialist Assessment Report	✓
3.1	This report must include as a minimum the following information:	✓
3.1.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
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;	✓
3.1.5	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
3.1.6	a description of the mean density of observations/number of sample sites per unit area43 and the site inspection observations;	✓

41 the ability to survive and reproduce in the long term.
42 Undescribed species are to be assessed as “High Sensitivity”.
43 Species Environmental Assessment Guideline

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
3.1.7	details of all SCC found or suspected to occur on site, ensuring sensitive species44 are appropriately reported;	✓
3.1.8	the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area;	✓
3.1.9	the location of areas not suitable for development and to be avoided during construction where relevant;	✓
3.1.10	a discussion on the cumulative impacts;	✓
3.1.11	impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	✓
3.1.12	a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development 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	✓
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.	✓
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
4	MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION	
	MEDIUM SENSITIVITY RATING – for terrestrial plant species: Suspected habitat for SCC based either on there being records for this species collected in the past, prior to 2002, or being a natural area included in a habitat suitability model45. SCC listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.	✓
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guidelines.	✓
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as “medium” sensitivity by the screening tool.	✓
4.6	Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	✓
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Plant Species Compliance Statement must be submitted.	✓
5	LOW SENSITIVITY RATING – for terrestrial plant species	

44 The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

45 The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	Terrestrial Plant Species Compliance Statement Areas where no natural habitat remains. Natural areas where there is no suspected occurrence of SCC.	✓
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of "low" sensitivity for terrestrial plant species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement46 must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
5.3.7	the mean density of observations/ number of samples sites per unit area47; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

46 An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline
47 Refer to the Species Environmental Assessment Guideline

9.11 Appendix J: Site Sensitivity Verification Report

9.11.1 Purpose of Report

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 Act, when applying for Environmental Authorisation*", as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken through the use of:
    a. a desk top analysis, using satellite imagery.
    b. a preliminary on -site inspection; and
    c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
    a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
    b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
    c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of 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 (GN 320, 20 March 2020).

9.11.2 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.

- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- Critical Biodiversity Areas of the Northern Cape (2016) – Bioregional Plan.
- Namakwa District Biodiversity Sector Plan (2008) – Bioregional Plan.
- Succulent Karoo Ecosystem Planning (SKEP, 2002).
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (http://csg.dla.gov.za).
- Cadastral and other topographical country data - Chief Surveyor General (http://csg.dla.gov.za).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

9.11.3 Site visit

Several site visits were undertaken in order to accommodate seasonal sampling. Site visit dates include the periods 24 February 2022 to 04 April 2022 (late summer) and 22 to 24 June 2022 (early Winter). The site falls within a summer rainfall area, however significant rainfall occurred during the 2021/2022 period and including significant unseasonal rainfall including autumn and winter rainfall. Good rainfalls occurred several weeks preceding and during both site visits. For the purposes of this report, based on favourable seasonal rainfall and on-site observations over multiple seasons, the site visit is deemed to be adequate.

The site visit and assessment were undertaken by Mr Jamie Pote, SACNASP registered ecological scientist with a BSc (Hons) degree in Botany and a BSc degree in Botany and Environmental Science, with nearly 20 years' experience undertaking ecological and biodiversity assessments. Additional faunal aspects were undertaken by Christy Bragg (SACNASP), Alienor Brassine (SACNASP) and Zoe Woodgate (SACNASP) specifically relating to Riverine Rabbits, which were identified early in the processes to be of concern and potentially present. Alienor Brassine (SACNASP), has also contributed additional faunal reporting relating to other faunal species of conservation concern, inclusive of her extensive time on site undertaking camera trapping and bird monitoring. Faunal survey information is thus based on several sources including incidental camera trap records, observation by Jamie Pote and Alienor Brassine during site visits as well as some evidence from other persons parties in and around the site. Camera trapping undertaken primarily for Riverine Rabbit surveys also served a secondary purpose of providing general faunal records for a broader range of faunal species. Camera trapping was undertaken during the periods November 2021-January 2022 and March 2022 – May 2022 for Taaibos, and September to November 2022 for Soutrivier.

9.11.4 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report and have been undertaken by an aquatic specialist.

- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- Any flora surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

9.11.5 Site and Activity Description

The proposed projects consists of two extensive areas, namely Taaibos to the west and Soutrivier to the east (Figure 1), in an extensive low-lying area, surrounded by and intersected by several mountainous ranges (Figure 6). The site is situated to the south of the R63 road that connects Loxton in the west and Victoria West in the east, within the Northern Cape Province and the overall project area covers an area more than 1 000 square kilometres.

The area consists of extensive mudstone derived wide flat-bottomed river valleys, surrounded by a series of sandstone hilly plateaus and intersected by higher lying doleritic mesas and inselbergs. Drainage of the area is complex, with an extensive network of drainage lines and watercourses intersecting the landscape, with the Taaibos site draining ultimately into the Brakrivier and Kleinbrakrivier towards the west and north. The southern portion of the Soutrivier site drains southwards into the Soutrivier, while the north drains northwards and westwards, also into the Brakrivier and Kleinbrakrivier.

The application is being undertaken in several separate components and this site verification pertains to all components.

9.11.6 National Environmental Screening Tool

The DFFE Screening Tool indicates the following:

- Terrestrial Biodiversity is *Very High* & Low
- Plant species sensitivity is Low & Medium
- Animal Species sensitivity is Medium & High
- Aquatic Sensitivity is Low & *Very High*

Taaibos WEF & Collector Grid Connections

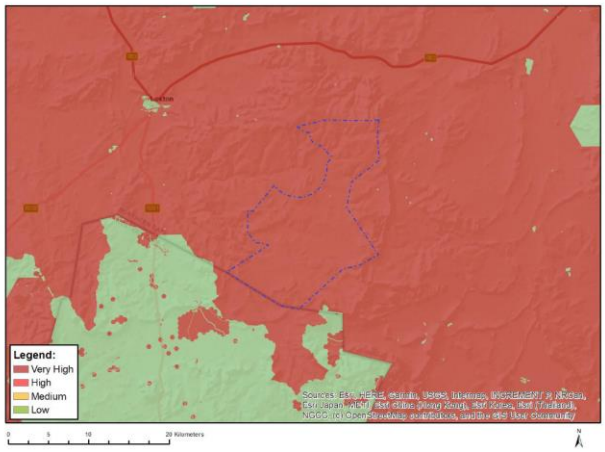

Figure 82: Terrestrial Biodiversity Sensitivity (Taaibos).

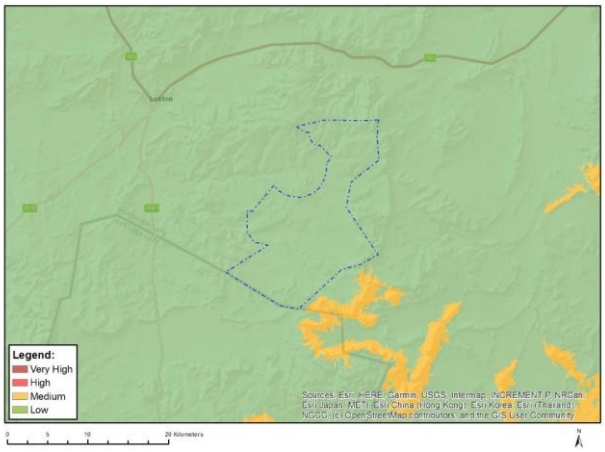

Figure 83: Plant Species Sensitivity (Taaibos).

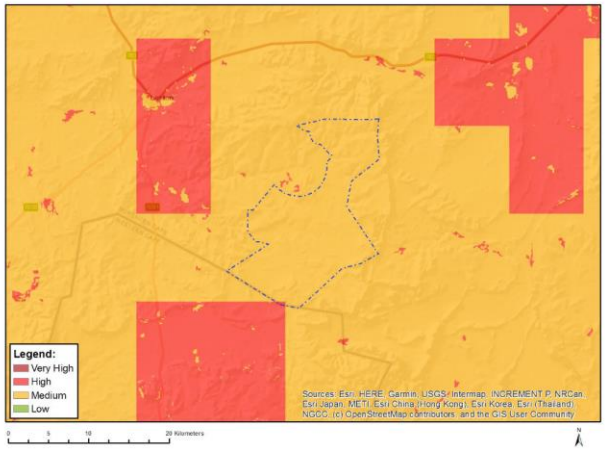

Figure 84: Animal Species Sensitivity (Taaibos).

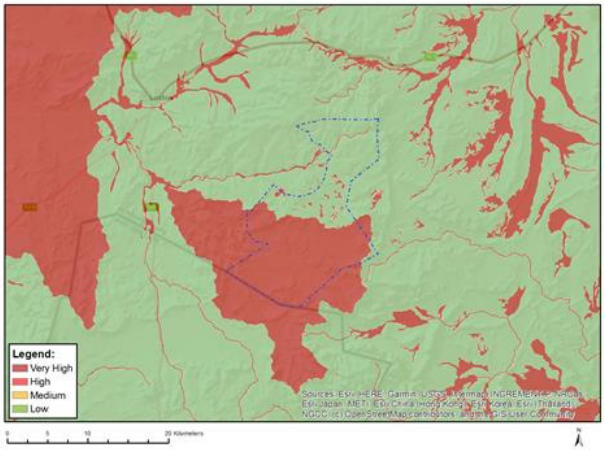

Figure 85: Aquatic Sensitivity (Taaibos).

Taaibos to Soutrivier 400 kV Grid Connection

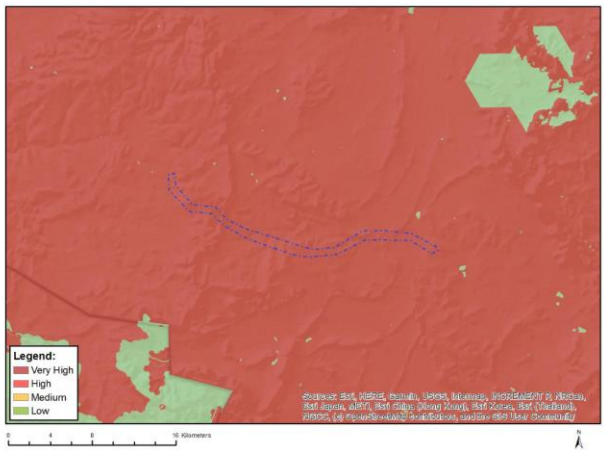

Figure 86: Terrestrial Biodiversity Sensitivity (Taaibos grid).

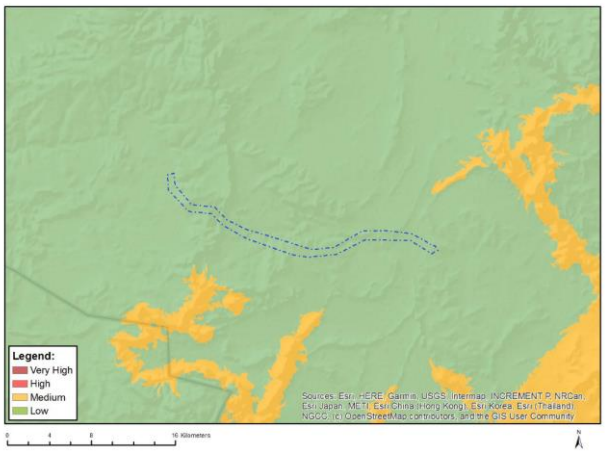

Figure 87: Plant Species Sensitivity (Taaibos grid).

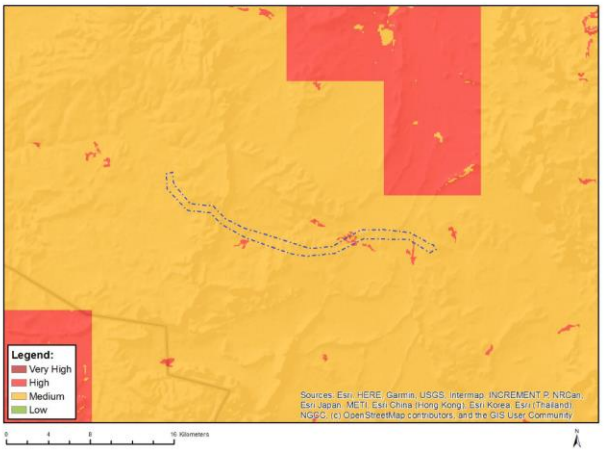

Figure 88: Animal Species Sensitivity (Taaibos grid).

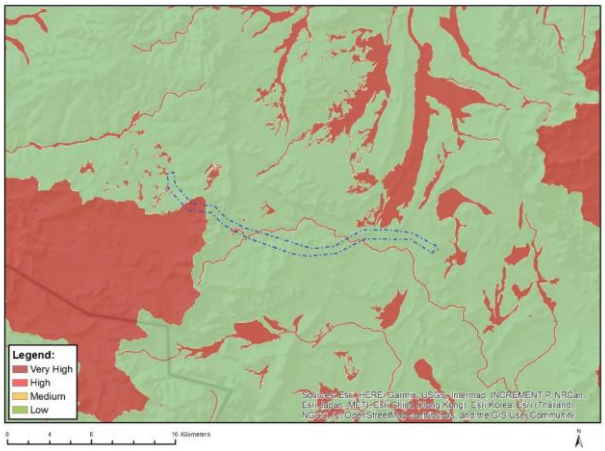

Figure 89: Aquatic Sensitivity (Taaibos grid).

Soutrivier WEF & Collector Grid Connections

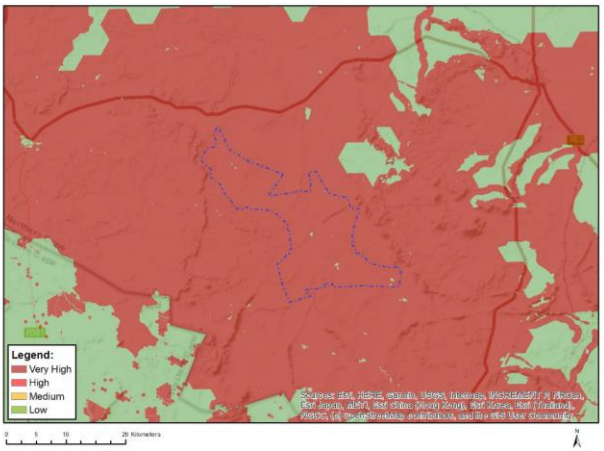

Figure 90: Terrestrial Biodiversity Sensitivity (Soutrivier).

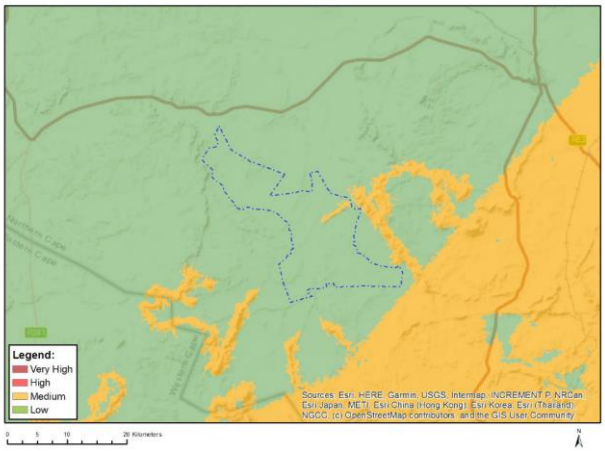

Figure 91: Plant Species Sensitivity (Soutrivier).

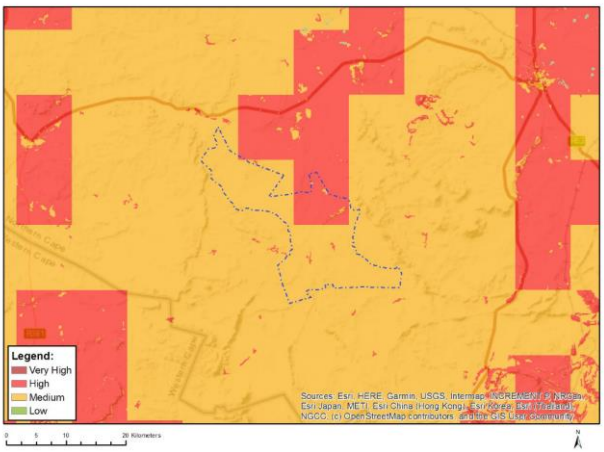

Figure 92: Animal Species Sensitivity (Soutrivier).

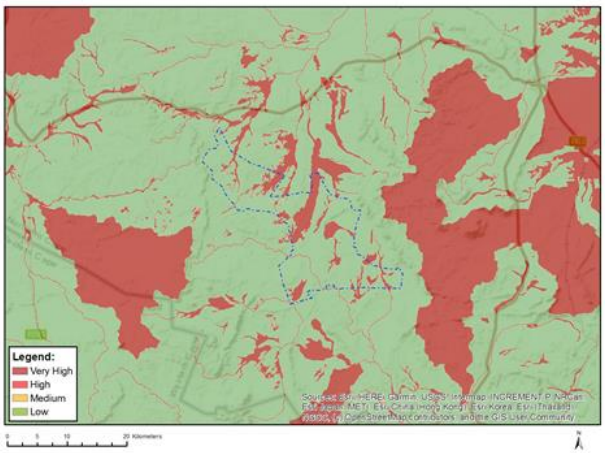

Figure 93: Aquatic Sensitivity (Soutrivier).

Soutrivier to Gamma 400 kV Grid Connection

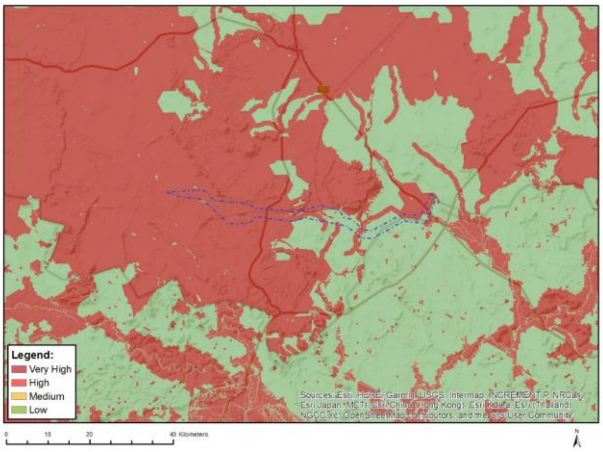

Figure 94: Terrestrial Biodiversity Sensitivity (Soutrivier grid).

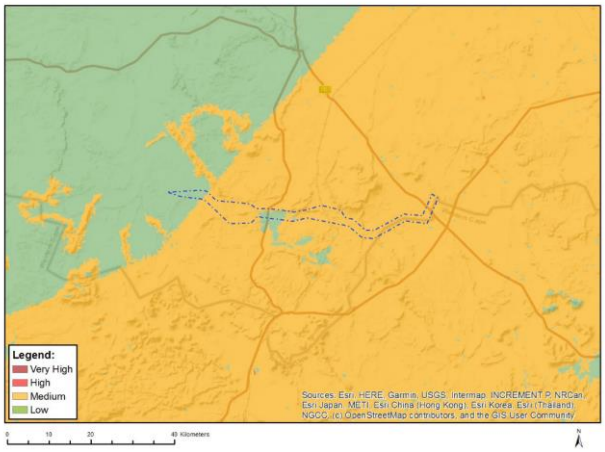

Figure 95: Plant Species Sensitivity (Soutrivier grid).

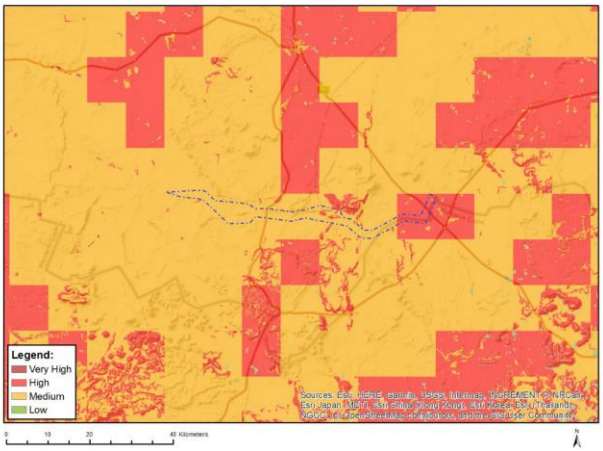

Figure 96: Animal Species Sensitivity (Soutrivier grid).

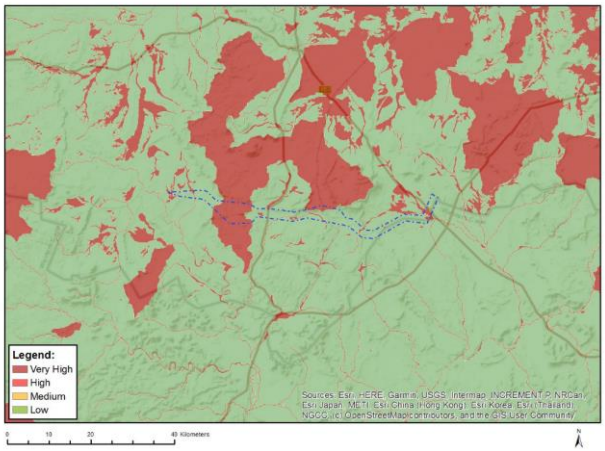

Figure 97: Aquatic Sensitivity (Soutrivier grid).

	Feature(s) in proximity (Taaibos)	**Feature(s) in proximity (Soutrivier)**	**Feature(s) in proximity (Soutrivier grid)**	**Feature(s) in proximity (Taaibos grid)**
Terrestrial Sensitivity				
Very High	CBA 1 & 2, ESA, FEPA Sub-catchments, and PAES.	CBA 1 & 2 and PAES.	CBA 1 & 2, ESA 1 & 2, FEPA Sub-catchments, PAES	CBA 1 & 2, FEPA Sub-catchments, PAES
High	None	None	None	None
Medium	None	None	None	None
Low	Present	Present	Present	Present
Plant Sensitivity				
Very High	None	None	None	None
High	None	None	None	None
Medium	None	Sensitive species 945	*Isolepis expallescens, Hereroa concava,* Sensitive species 945	None
Low	Present	Present	Present	Present
Animal Sensitivity				

	Feature(s) in proximity (Taaibos)	Feature(s) in proximity (Soutrivier)	Feature(s) in proximity (Soutrivier grid)	Feature(s) in proximity (Taaibos grid)
Very High	None	None	None	None
High	*Neotis ludwigii* (bird)	*Neotis ludwigii* (bird), *Bunolagus monticularis* (mammal)	*Bunolagus monticularis* (mammal), *Neotis ludwigii, Aquila verreauxii* (birds)	*Bunolagus monticularis* (mammal),
Medium	*Neotis ludwigii, Aquila verreauxii* (birds) *Bunolagus monticularis* (mammal), *Chersobius boulengeri* (Reptile)	*Neotis ludwigii, Aquila verreauxii* (birds) *Bunolagus monticularis* (mammal), *Chersobius boulengeri* (Reptile)	*Neotis ludwigii, Aquila verreauxii* (birds) *Bunolagus monticularis* (mammal), *Chersobius boulengeri* (reptile)	*Bunolagus monticularis* (mammal), *Neotis ludwigii, Aquila verreauxii* (birds), *Chersobius boulengeri* (reptile)
Low	*None*	*None*	*None*	None
Aquatic Sensitivity				
Very High	Rivers, Wetlands & FEPA quinary catchments	Rivers & Wetlands.	Rivers, Wetlands, FEPA: quinary catchments	Rivers, Wetlands & FEPA quinary catchments
High	None	None	None	None
Medium	None	None	None	None
Low	Present	Present	Present	Present

As apparent from the DFFE National Environmental Screening Tool, the following can be deducted:

5. The **Terrestrial Biodiversity Theme** is Very High, with Critical Biodiversity Area (CBA) 1 & 2, Ecological Support Area (ESA), National Protected Area Expansion Strategy areas (NPAES, PAES, 2010, 2018) and FEPA: quinary catchments covering portions of the site and surrounding area.
6. The **Plant Species Theme** is Medium with several species, namely Sensitive species 945 (Rare, non-IUCN category), *Isolepis expallescens* (Vulnerable) and *Hereroa concava* (Vulnerable) possibly *occurring* in the vicinity of the site, requiring verification. Based on available information, the Sensitive species 945 and *Hereroa concava* appear to be associated with dolerite hills, generally more common to the south of the site but extending into the site as narrow hills or ridges. The species could also be found in rocky outcrops or outcrops on the slopes of hills but will require physical assessment on site. *Isolepis expallescens* is modelled to possibly occur in the neighbouring area associated with the Gamma substation grid connection, but is associated with damp areas around watercourses. Both of these habitat areas will generally be considered to be higher sensitivity areas and any infrastructure in these areas would be minimal.
7. The **Animal Species Theme** is Medium with two possible terrestrial species identified, namely *the* Critically Endangered Riverine Rabbit *(Bunolagus monticularis*) and the Endangered Karoo Padloper (*Chersobius boulengeri*). A separate study is in progress relating to the Riverine Rabbit, which is usually associated with dry watercourses and associated surrounding riparian vegetation. The Karoo Padloper is likely to be more widespread and not necessarily associated with any habitat. Mitigation would most likely include search and rescue and speed control of vehicles and surveys on specific footprints once the detailed layout has been completed. The black footed cat is also known to the west of Taaibos site with a confirmed sighting during the Riverine Rabbit camera trap survey, but not specifically predicted to occur within the site boundary.
8. The **Aquatic Theme** is Very High, due to the presence of numerous non-perennial watercourses and wetlands and a portion of Taaibos being within a FEPA quinary catchment. Such aquatic habitat is likely not suitable for construction of WEF footprints due to risk of seasonal flooding, however any infrastructure (such as road crossings) should be sited with due care to minimise impacts. A separate Aquatic Assessment will be conducted, however terrestrial ecological processes relating to fauna and

flora will be considered in this reporting, as these seasonal features are an important ecological component of the landscape.

The site assessment will physically screen for the presence of these, and other possible species not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report. Avifaunal species are not specifically assessed as they are addressed in the separate Avifaunal report by the appropriate specialist.

9.11.7 Findings, Outcomes and Recommendations

Terrestrial Biodiversity

Site verification of the Terrestrial Biodiversity sensitivities is summarised in Table 25 and depicted in *Figure* 98, where CBA 1 is dark green, and CBA 2 is light yellow. Rivers and Wetlands are also indicated.

Table 25: Terrestrial Biodiversity Features.

Feature		COMMENT
Critical Biodiversity Area 1:	Present	Likely associated with broader landscape level ecological processes and conservation priorities.
Critical Biodiversity Area 2:	Present	Likely associated with broader landscape level ecological processes and conservation priorities.
Ecological Support Area 1:	Present	Likely associated with broader landscape level ecological processes and conservation priorities.
Other Natural Areas	Present	Likely associated with broader landscape level ecological processes and conservation priorities.

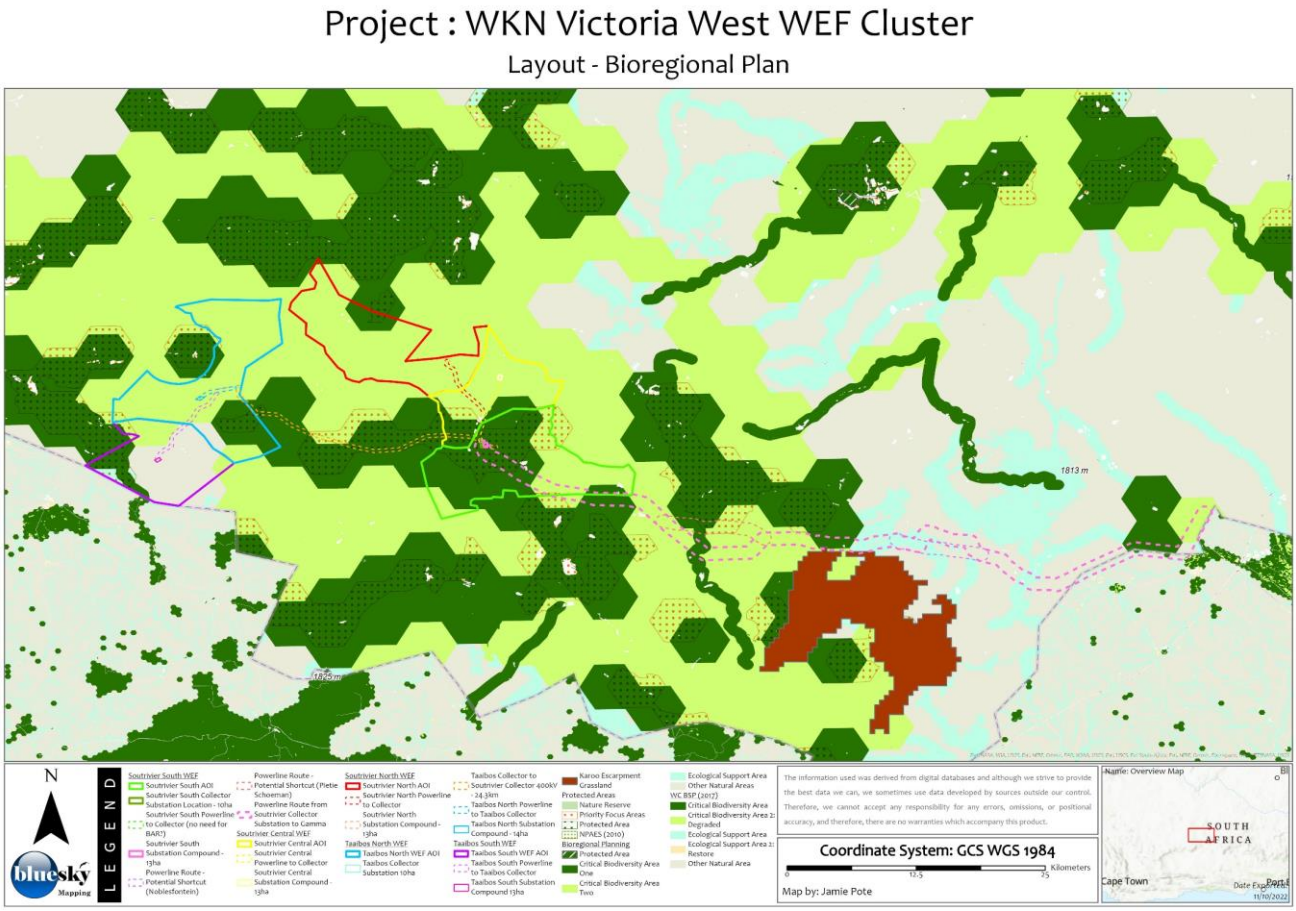

Figure 98: Map indicating Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) and Rivers and Wetlands.

Plant Species (Flora)

National Environmental Screening Tool flagged several flora species. Further screening of species on the site concluded that no flora species of conservation concern having an elevated status and/or limited distribution range are confirmed present. Several widespread and common species protected in terms of the respective Provincial Nature Conservation Ordinance are present which will require permits for removal and/or relocation.

Animal Species (Fauna)

Several mammal species listed in the screening tool are confirmed present within the project area, including Riverine Rabbit. These will be specifically assessed in the reporting process. Several widespread and common species protected in terms of the respective Provincial Nature Conservation Ordinance are present which will require permits for removal and/or relocation.

Aquatic

Wetland, Alluvial and watercourse features are present in the broader area, including several non-perennial watercourses and the adjacent riparian vegetation.

9.11.8 Conclusions

The site verification thus confirms that the site falls within the terrestrial biodiversity screening tool designated Critical Biodiversity 1 & 2 and Ecological Support Area. These designations are likely associated with broader landscape level ecological processes and conservation priorities of the affected vegetation units.

The site verification also confirms the presence of flagged faunal species, including Riverine Rabbit, but no flagged flora species confirmed to be present during site verification phase.

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