BIODIVERSITY PRE-CONSTRUCTION WALKTHROUGH ASSESSEMENT: Final Layout

140MW SUTHERLAND 2 WIND ENERGY FACILITY (DFFE REF: 12/12/20/1782/3/AM5) AND ASSOCIATED 132kV POWERLINE LINKING TO THE SUTHERLAND WEF (DEA REF: 14/12/16/3/3/1/1814/2), SUTHERLAND, NORTHERN CAPE PROVINCE

Environnemental consultant: **Nala Environmental (Pty) Ltd**

Client: **Sutherland 2 Wind Farm (Pty) Ltd**

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Executive Summary

Following the pre-construction terrestrial walkthrough undertaken for the Sutherland 2 Wind Energy Facility (WEF) (DFFE Ref: 12/12/20/1782/3/AM5) and associated 132kV Powerline linking to the Sutherland WEF (DEA Ref: 14/12/16/3/3/1/1814/2), the following mitigations and input into the Environmental Management Programme (EMPr) are recommended:

- As part of the project, water as a result of runoff at turbine locations and from roads must be well controlled.
    - This must include spreading the water over a large area in the landscape, i.e. prevent concentrated runoff that can cause erosion.
    - It must include effective dissipaters on slopes that are more susceptible to erosion.
    - A concern is the effect of the road system that will impact surface water movement. As mentioned, the roads will perform as blockages or "weirs" with the result that water can penetrate below the root depth of the plants immediately downstream of the roads. If possible, the roads must be constructed to allow for go water flow across the landscape.
    - If this is not achieved, there is a distinct possibility that the vegetation downstream of the roads can be negatively impacted.

- An effective storm water management plan should therefore be compiled by a suitable specialist and the effectivity of the plan should be regularly assessed and revised, if necessary. The plan must include silt and sediment traps, where needed, and effective dissipater structures to reduce flow velocities.

- Once the final outlay and alignment is accepted, a survey of the substation area, the turbine footprints, the road infrastructure and powerline footprint must be conducted before the initiation of the construction phase.
    - This must be conducted in spring, to ensure that the red data and protected species flowering during the period can be recorded. This will not be a complete list of species present, as the recent drought will have an impact on the re-emergence of species. In addition, there are many species that have different hydrological regime requirements before it will emerge.

- Individual plants, e.g. protected species, which can't be avoided during construction, must be mapped and the list sent to the conservation authorities (Northern Cape Department of Environment and Nature Conservation) for action.
    - A suitably qualified terrestrial ecologist must be appointed to inform the permitting process for the relocation, removal or transportation of protected species and undertake a survey of this final layout prior to commencement of any site clearing activities.
    - The specialist in conjunction with the department, must identify areas suitable for relocation following the issuing of the relevant permits from the conservation authorities.
    - It is important to note that most of these plants are sensitive to relocation and in many instances don't survive relocation. A clear strategy must be developed following the guidance and input of the terrestrial ecologist and conservation authority.

- It is recommended that all vegetation clearing within the development footprint is kept to a minimum and activities must be limited to the drier periods (late autumn and winter) to the extent which construction timelines permit, for example, following rainfall events roads must be given adequate time to dry out before traversing with heavy equipment of machinery. This will ensure that accelerated erosion is minimised.

- All clearing of vegetation must be restricted to the footprint areas only – this will limit any further loss of undisturbed vegetation and loss of habitat.
    - No driving of any vehicles outside the demarcated roads and site footprints is to be allowed.

- Indigenous shrubs and trees that are that cleared must be shredded with a wood chipper and used as mulch in exposed areas (to stabilise exposed areas and seed bank for revegetation).

- It is important to prevent pollution and all hydrocarbons must therefore be stored off-site. Where small quantities are needed onsite, it must be stored in a well-managed and constructed hydrocarbon storage facility with impermeable floors and the appropriate bunding, sumps and roofing both for onsite and offsite facilities must be provided.

- Handle hydrocarbons carefully to limit spillage and ensure all vehicles used for the project are serviced regularly in order to limit any hydrocarbon leaks.
    - This must include a designated single location on-site for refuelling and emergency maintenance (safe distance from any freshwater resource features) and a spill kit (onsite) to deal with any hydrocarbon leaks.
    - Contaminated soils must be disposed of at an approved site for treatment and records of this must be kept.

- As there were changes from the initial assessment and the final layout proposed as part of the Basic Assessment (BA) process and Amendment to split the Sutherland WEF Cluster (comprising of Sutherland WEF, Rietrug WEF and Sutherland 2 WEF), it must be noted that for the compulsory permit applications, a full walk-down assessment of the approved layout to identify the red data and protected species in the final corridors, prior to the commencement of site clearing activities, must be undertaken by a suitably qualified terrestrial ecologist.
    - This process must be carried out in the spring after rains – August/September.
    - Any clearing or construction can only commence once the final permits are received.
    - If any red data species are found within the approved layout, these must be treated as per the recommendation and protocols from the conservation authorities and the appointed terrestrial ecologist.

After mitigation, all impacts were determined to be of low or low/moderate negative significance. If the recommendations and mitigation measures are implemented and monitored over the life expectancy of the WEF and powerline project, the potential impacts on the terrestrial resource integrity and functioning can be reduced to a sufficiently low level. This can only be achieved if all the recommended management, mitigation measures and monitoring protocols form part of all Environmental Management Programmes (EMPrs) for the WEF and powerline sites. Linked to these documents are the appropriate rehabilitation guidelines and ecological monitoring recommendations.

Based on the outcomes of this pre-construction walkthrough assessment, it is my considered opinion that the proposed final layout of the Sutherland 2 WEF and associated 132kV Powerline linking to the WEF detailed in this report could be approved from a terrestrial ecological perspective.

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DECLARATION OF INDEPENDENCE

The Environmental Impact Assessment Regulations (Regulation 17 of Government Notice No R354 of 2010), requires that certain information is included in specialist reports. The terms of reference, purpose of the report, methodologies, assumptions and limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below:

Expertise of author:

- Working in the field of ecology (fauna and flora) since 1996.
- Worked in the field of freshwater ecology and wetlands since 2000.
- Involved with visual assessments since 2009.
- Is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Reg. No. 400109/95).

Declaration of independence:

BioAssets CC in an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by BioAssets CC is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure:

BioAssets CC undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to BioAssets CC by the client and in addition to information obtained during the course of this study, BioAssets CC present the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practise.

_____ 15 November 2022

Dr Wynand Vlok Date

1 INTRODUCTION

1.1 Project Background and Description of the Activity

Sutherland 2 Wind Farm (Pty) Ltd received Environmental Authorisation (EA) (DFFE Ref: 12/12/20/1782/3), dated 10 November 2016 and further amendments to the EA dated, 25 November 2016, 25 August 2017, 10 March 2020, 08 June 2020 and the latest 09 July 2021, for the development of the 140MW Sutherland 2 Wind Energy Facility (WEF) and associated infrastructure, in the Northern Cape Province. The WEF received an EA for the Independent Power Producer (IPP) portion of the on-site substation (DFFE Ref: 14/12/16/3/3/1/1814/1) on 20 October 2021 and received a separate EA for Switching Station portion of the onsite substation and 132kV overhead powerline (DFFE Ref: 14/12/16/3/3/1/1814/2) on 20 October 2021. The Environmental Management Programmes (EMPrs) for the WEF, IPP portion of the on-site substation, Eskom portion of the on-site substation, including the 132kV overhead powerline, have been approved by the Department of Forestry, Fisheries and the Environment (DFFE), and will therefore be included within the Final Layout for the WEF for completeness.

The WEF will include:

- Up to 25 wind turbines (140MW maximum export capacity), with a hub height up to of 200m and rotor diameter up to 200m.
- The wind turbines will be connected to another by means of medium voltage cables.
- An internal gravel road network will be constructed to facilitate movement between turbines on site. These roads will include drainage and cabling.
- A hardstanding laydown area of a maximum of 10 000m^2 will be constructed.
- A temporary site office will be constructed on site for all contractors, this would be approximately 5 000m^2 in size.

The proposed IPP portion of the on-site substation and associated infrastructure will include:

- An IPP portion of the on-site substation
- Laydown area
- Operation and Maintenance Building
- Fencing of the proposed on-site substation
- Battery Energy Storage Infrastructure (BESS)

The proposed Switching Station portion of the on-site substation and powerline will include:

- Switching Station portion of the on-site substation
- Fencing
- 132kV distribution line from the proposed Sutherland 2 WEF on-site substation to the Acrux third party substation (including tower/pylon infrastructure and foundations)
- Connection to the Acrux third party substation
- Service road below the powerline

The property affected by the 140MW Sutherland 2 WEF and associated infrastructure includes the following:

- Portion 1 of Tonteldoosfontein Farm 152.

The properties associated with the grid connection infrastructure project(s) include the following:

- Portion 1 of Tonteldoosfontein Farm 152
- Portion 2 of Gunsfontein Farm 151
- Portion 1 of Gunsfontein 151
- Portion 1 of Beeren Valley Farm 150
- Remaining Extent of Beeren Valley Farm 150
- Remaining Extent of Nooitgedacht Farm 148

The Sutherland 2 WEF has been selected as a Preferred Bidder project via a private off-taker and construction is expected to commence in early 2023.

Sutherland 2 Wind Farm (Pty) Ltd has commissioned Nala Environmental (Pty) Ltd to undertake the ground truthing and subsequent finalisation of the EMPrs, in terms of the NEMA EIA Regulations, 2014 (as amended). As per the conditions of the Environmental Authorisations (EAs), independent specialist walkthrough's have been undertaken to inform the final layout and final Environmental Management Programme (EMPrs) for the WEF and associated grid connection projects.

Figure 1.1: Buildable area of the proposed Sutherland 2 WEF (white shaded areas – as surveyed during the pre-construction walkthrough) with the proposed routing for the authorised 132kV powerline (yellow) between the substations.

1.2 Terms of Reference

- To conduct a biological rapid ecological pre-construction walkthrough of the target areas where the establishment of the WEF infrastructure and the associated 132kV power line are proposed for the finalisation and input to the final layout.
- To provide a professional opinion on terrestrial ecological issues related to the plants and animals in the target area to aid in planning of the final layout for the proposed project.
- Screening Tool Reports (STRs) were produced for the proposed development intentions in the context of the project layout (Figure 1.2, 1.3, 1.4 and 1.5).
- The assessment will be used to evaluate the corridor for the proposed 132kV powerline (20m wide) and the proposed footprint areas for the WEF (Figure 1.1).

- The pre-construction terrestrial walkthrough and assessment will include a rapid faunal and floral survey within the areas indicated in Figure 1.1, however, important features adjacent to these areas are included in the assessments.

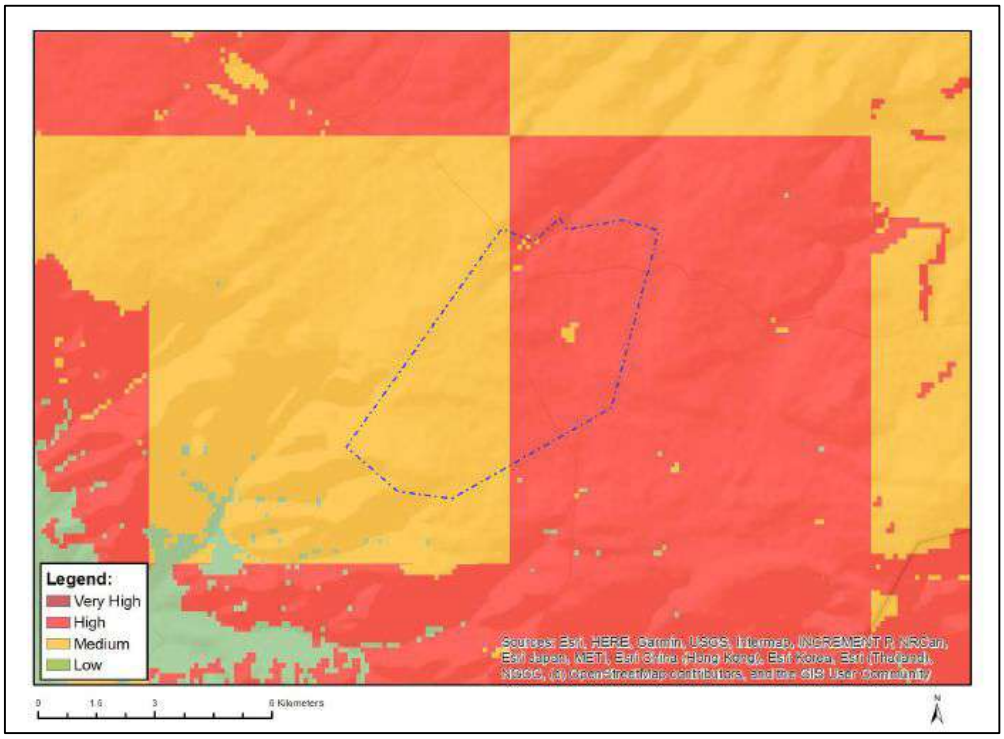

Figure 1.2: Terrestrial Animal Sensitivity Theme for the proposed WEF project as reflected in the Screening Tool report.

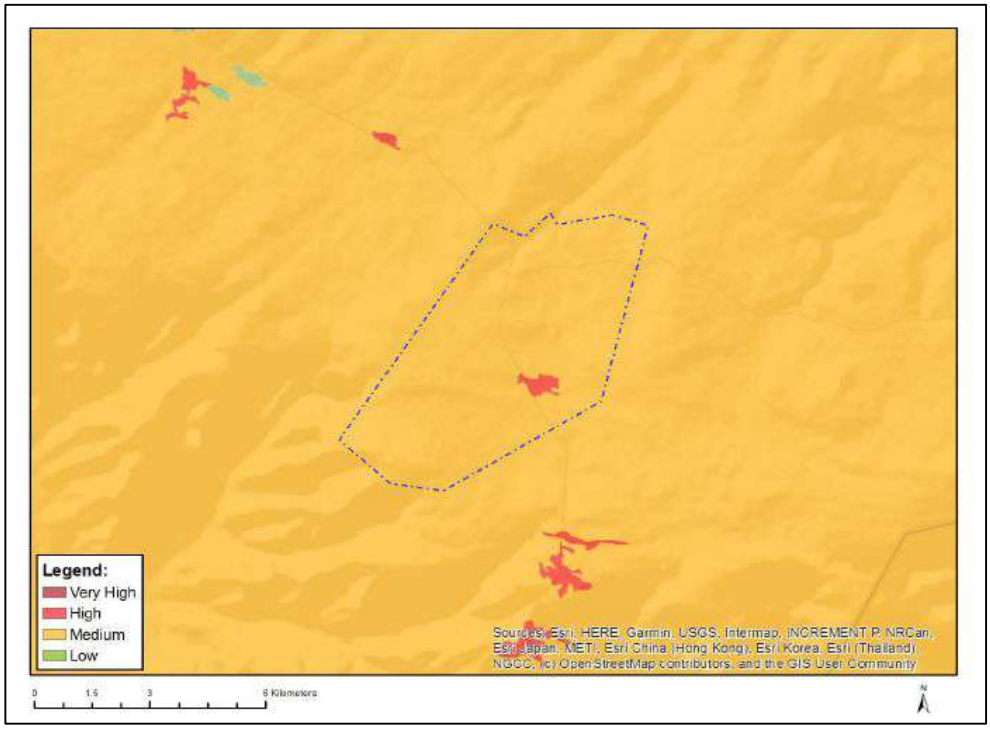

Figure 1.3: Terrestrial Plant Theme for the proposed WEF project as reflected in the Screening Tool report.

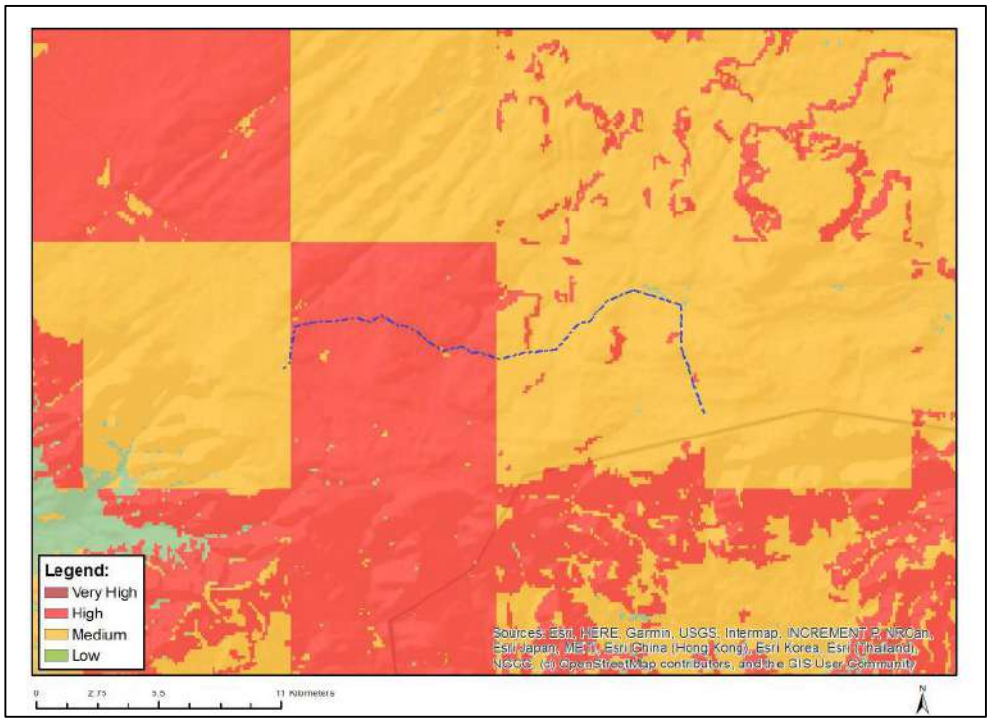

Figure 1.4: Terrestrial Animal Sensitivity Theme for the proposed 132kV power line project as reflected in the Screening Tool report.

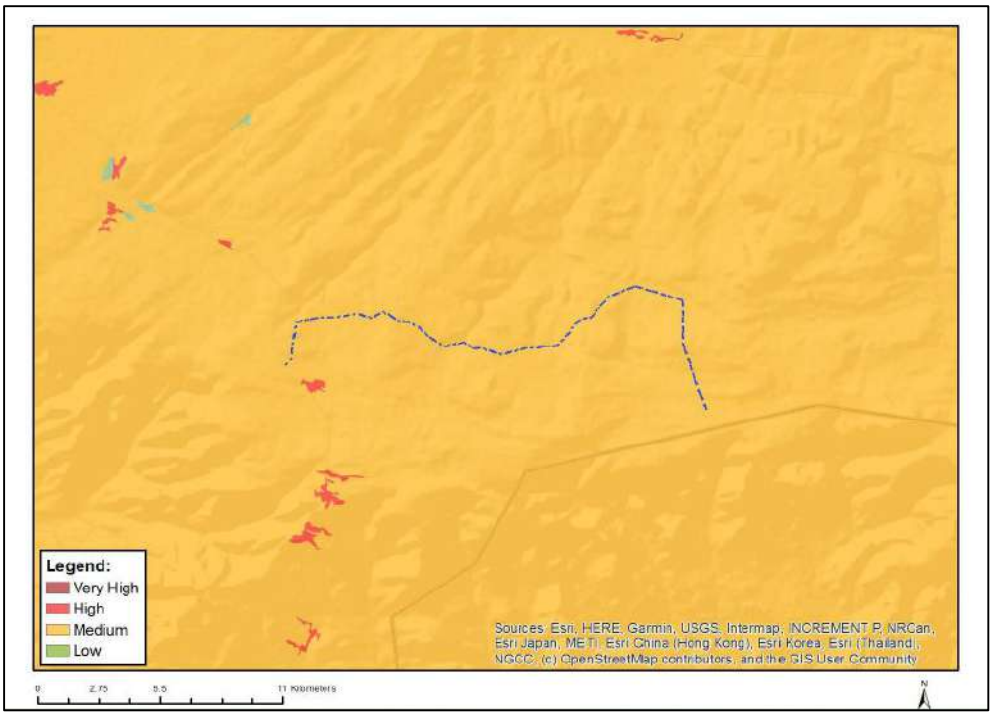

Figure 1.5: Terrestrial Plant Theme for the proposed 132kV power line project as reflected in the Screening Tool report.

2 METHODOLOGY

The assessment was conducted in two phases, the first phase was a desktop assessment evaluating existing information, including reports and assessments that forms part of the earlier EIA processes and amendments whilst the second phase included the physical pre-construction walkthrough assessment. The EIA reports were used as the latest on-site assessments and were augmented by making use of other relevant data sets (Table 2.1).

Once the important information from the desktop assessment was known, it was used to compile red data and protected species lists that were used as guidelines during the walkthrough assessment. During the walkthrough, transects across the areas indicated in Figure 1.1 were investigated and included important habitat features identified during the desktop assessment. The rapid survey was used to identify the dominant features, general species assessment and any red data or protected plant and animal species encountered. This information was used to identify sensitive areas (including "no-go" zones).

In addition to the EIA reports consulted, additional data sources from the literature and GIS spatial information have been consulted and used, where applicable, in the study.

Google Earth Imagery (Google Earth ©) have been utilised to identify and delineate habitat and ecosystem features and units.

Additional existing data layers that were incorporated into this assessment, in order to determine important (sensitive) terrestrial and freshwater entities, are summarised in Table 2.1.

Table 2.1: Data coverages used to inform the ecological and freshwater resource assessment.

Data/Coverage Type	Relevance	Source
South African Vegetation Map (GIS Coverage)	Classify vegetation types and determination of reference primary vegetation.	SANBI (2018)
South African Biodiversity Institute (New POSA database)	Specimens collected on site and its immediate vicinity.	SANBI (2016)
National Biodiversity Assessment – Threatened Ecosystems (GIS Coverage)	Determination of national threat status of local vegetation types.	SANBI (2011)
The Virtual Museum (Online search)	Online and literature sources such as MammalMap, ReptileMap, FrogMap and the ReptileAtlas.	FitzPatrick Institute of African Ornithology (2022)
National Biodiversity Assessment – Threatened Ecosystems (GIS Coverage)	Determination of national threat status of local vegetation types.	SANBI (2011)
SAPAD – South Africa Protected Areas Database (GIS Coverage)	Shows the location of protected areas within the region	http://egis.environment.gov.za DEA (2020)
SACAD – South Africa Conservation Areas Database (GIS Coverage)	Shows the location of conservation areas within the region	http://egis.environment.gov.za DEA (2020)

2.1 Habitat and Biological Analysis

The Botanical Database of Southern Africa (BODATSA) have been consulted in order to obtain a list of species recorded within the area (Table 2.2). This species list provided an indication of the potential diversity expected, the potential presence of range restricted species and other Species of Conservation Concern (SCC). The "Screening Reports for an Environmental Authorisation", as required by the 2014 EIA Regulations, were done to determine the sensitivity of the terrestrial animal and plant species for the study area. Based on this analysis of available floristic and faunal literature and the identification and delineation of habitat units, a list of SCC likely to occur within the project area was generated (SANBI, 2022).

Additional information regarding ecosystems, vegetation types, animal species and SCC include the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina and Rutherford: The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, 2018).
- The Mammals of the southern African Subregion (Skinner and Chimimba, 2005), A Guide the Reptiles of southern Africa (Alexander and Marais, 2007), Atlas and Red Data book of the Reptiles of South Africa, Lesotho and Swaziland (Minter *et al*., 2004) and A Complete Guide to the Frogs of southern Africa (Du Preez and Carruthers, 2009).
- Historic specialist reports for the proposed infrastructure to support the Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities (WEFs).

Table 2.2: The list compiled of verified collections associated from the study area and its immediate surrounding area (SANBI, 2016).

Family	*Genus and species*	Family	*Genus and species*
Aizoaceae	*Antimima sp.*	Hyacinthaceae	*Massonia sp.*
Aizoaceae	*Cleretum lyratifolium*	Hypoxidaceae	*Pauridia aquatica*
Aizoaceae	*Drosanthemum sp.*	Iridaceae	*Lapeirousia montana*
Aizoaceae	*Malephora crassa*	Iridaceae	*Moraea ciliata*
Aizoaceae	*Mesembryanthemum nitidum*	Iridaceae	*Romulea diversiformis*
Aizoaceae	*Mesembryanthemum oubergense*	Iridaceae	*Romulea eburnea*
Aizoaceae	*Mesembryanthemum tetragonum*	Iridaceae	*Romulea hallii*
Aizoaceae	*Ruschia sp.*	Iridaceae	*Romulea komsbergensis*
Aizoaceae	*Stomatium villetii*	Iridaceae	*Romulea multifida*
Anacardiaceae	*Searsia burchellii*	Iridaceae	*Romulea subfistulosa*
Asphodelaceae	*Bulbine abyssinica*	Iridaceae	*Romulea syringodeoflora*
Asteraceae	*Arctotis diffusa*	Iridaceae	*Romulea tetragona*
Asteraceae	*Dicerothamnus rhinocerotis*	Iridaceae	*Romulea tortuosa*
Asteraceae	*Euryops marlothii*	Iridaceae	*Syringodea unifolia*
Asteraceae	*Helichrysum hamulosum*	Molluginaceae	*Pharnaceum aurantium*
Asteraceae	*Hertia ciliata*	Oxalidaceae	*Oxalis odorata*
Asteraceae	*Leysera tenella*	Poaceae	*Chaetobromus involucratus*
Asteraceae	*Oedera oppositifolia*	Poaceae	*Ehrharta delicatula*
Asteraceae	*Osteospermum scariosum*	Poaceae	*Pentameris aristifolia*
Boraginaceae	*Amsinckia menziesii*	Poaceae	*Poa bulbosa*
Brassicaceae	*Heliophila seselifolia*	Poaceae	*Schismus barbatus*
Brassicaceae	*Hornungia procumbens*	Poaceae	*Tribolium hispidum*
Caryophyllaceae	*Scleranthus annuus*	Poaceae	*Tribolium purpureum*
Caryophyllaceae	*Stellaria media*	Polygalaceae	*Muraltia horrida*
Colchicaceae	*Colchicum volutare*	Polygonaceae	*Rumex cordatus*
Crassulaceae	*Crassula deltoidea*	Rosaceae	*Cliffortia arborea*

Crassulaceae	*Crassula dependens*	Santalaceae	*Thesium sonderianum*
Crassulaceae	*Crassula expansa*	Scrophulariaceae	*Cromidon varicalyx*
Crassulaceae	*Crassula roggeveldii*	Scrophulariaceae	*Manulea diandra*
Crassulaceae	*Crassula subaphylla*	Scrophulariaceae	*Selago crassifolia*
Ebenaceae	*Diospyros austroafricana*	Scrophulariaceae	*Zaluzianskya bella*
Euphorbiaceae	*Euphorbia mauritanica*	Scrophulariaceae	*Zaluzianskya minima*
Fumariaceae	*Cysticapnos sp.*	Scrophulariaceae	*Zaluzianskya peduncularis*
Hyacinthaceae	*Lachenalia congesta*	Solanaceae	*Solanum tomentosum*
Hyacinthaceae	*Lachenalia ensifolia*	Urticaceae	*Urtica urens*
Hyacinthaceae	*Lachenalia longituba*		

2.2 Site visit

The site (i.e., buildable area and powerline routing) was visited and evaluated from the 5th to the 11th of June 2022 and although late spring is deemed as the most suitable season for conducting such surveys, the request was to undertake the assessment at the end of winter due to time constraints, in order to accommodate for the stipulated financial close timelines.

This will have an impact on data collected, as late spring and early summer are the active growing season for most of the plants, especially geophytes, which is typically dormant for the rest of the year. This will require a specialist to do a spring survey to compile the list of red data and protected species for the permit applications (remove and relocations or destruction of limited specimens), this will be undertaken following the approval of the layout and prior to commencement of site clearing activities at the site. It is likely that there are species present that were not recorded.

As for the faunal component, the colder weather means that the coldblooded animals are less active and therefore their presence will not be as obvious as during very warm and hot periods. However, the footprint was covered in some detail and the results are considered highly reliable. It is unlikely that there are any significant species or features present that were not recorded.

2.3 Site visit limitations

2.3.1General assumptions and limitations

- This report deals exclusively with the defined areas and the impacts upon the vegetation, animals and natural habitat in that area and its immediate surrounding landscape (Figure 1.1).
- It is assumed that all relevant project information provided by the proponent and engineering design team to the ecological specialist was correct and valid at the time that it was provided.
- Additional information used to inform the assessment was limited to data and GIS coverage available for the Northern Cape Province at the time of the assessment.

2.3.2 Sampling assumptions and limitations

- While disturbance and transformation of habitats can lead to shifts in the type and extent of ecosystems, it is important to note that the current extent and classifications are reported on here.
- The accuracy of the delineation is based solely on the recording of the relevant onsite indicators using a handheld Global Position System (GPS). GPS accuracy will therefore influence the accuracy of the mapped sampling points and the resource boundaries and an error of 3 to 5m can be

expected. All vegetation and terrain sampling points were recorded using a Garmin Montana 610 GPS and captured using Geographical Information Systems (GIS) for further processing.

- Infield vegetation and animal assessments were undertaken within a specific focal area in the vicinity of the proposed development (Figure 1.1).
- Sampling by its nature means that generally not all aspects of ecosystems can be assessed and identified.
- This largely restricted the assessment to transects, but allowed for focussing on areas that stood out.
- With ecology being dynamic and complex, there is the likelihood that some aspects (some of which may be important) may have been overlooked e.g. where dense patches of vegetation obscured the view or simply where it falls outside transects walked during the assessment.
- All vegetation information recorded outside of the immediate development footprint was based on the onsite observations of the author and no formal in-depth vegetation sampling was undertaken. Furthermore, the vegetation information provided for the development footprint and the immediate adjacent areas, only gives an indication of the dominant and indicator species and only provides a general indication of the composition of the vegetation communities. Thus, the vegetation information provided for these areas is somewhat limited in terms of true botanical applications i.e. accurate and detailed species list, phytosociological classification and rare, red data and protected species identification. It is assumed the reports reviewed included detailed surveys that were conducted during the initial EIA process for the project.
    - The area received a reasonable amount of early summer rain but this has not significantly contributed to the recent growth in the area with regards to seeding and flowering of the natural vegetation (for identification purposes to species level). There was however a lack of geophytes, but the other vegetation had some good growth earlier in the year (well represented, but indistinguishable due to a lack of seeds and flowers) during the time of the assessment.
    - The footprint was covered in some detail and the results are considered highly reliable. It is likely that there are species present that were not recorded.

- The assessment of the mammals, reptiles and amphibians covered the larger portion of the proposed development footprint and all signs of activity (namely scat, paw-prints and burrows) and actual observations were noted. This include observations in the area just outside the footprint area, as the animals move actively in the landscape and can therefore reside within the area.
    - Transects covered for the vegetation were used for the animal assessment and as noted, the cooler temperature had an impact on the activity of some animals. Many of the animals are nocturnal by nature and no night surveys were conducted. In addition, no trapping for small mammals and reptiles were conducted (limited period for the survey).

2.3.3 Baseline Ecological Assessment – assumptions and limitations

- All assessment tools utilised within this study were applied only to the resources and habitats located within the survey area (Figure 1.1) and which are at risk of being impacted by the proposed development. Any resources located outside of the areas and which is not a risk of being impacted were not assessed.
- It should be noted that the most appropriate assessment tools (under the conditions and timeframes) were selected for the analysis of the specific features and resources that may potentially be impacted by the proposed development. The selection was based on the assessment practitioner's knowledge and experience of these tools and their attributes and shortcomings.
    - It is important to note that no active trapping for small mammals or reptiles were conducted (time constraint).
    - During the walkthrough, an active search approach was employed for sightings of animals or signs of activity e.g. burrows, droppings and scat or shed skin or quills.

3 LITERATURE ASESSMENT

3.1 The Importance of Biodiversity and Conservation

The term "Biodiversity" is used to describe the wide variety of plant and animal species occurring in their natural environment or habitat. Biodiversity encompasses not only all living things, but include a series of interactions that sustain the biota, which are termed ecological processes. South Africa's biodiversity provides an important basis for economic growth and development and keeping our biodiversity intact is vital to ensure the on-going provision of ecosystem services i.e. the supply of clean water through good catchment management and aesthetical values to the people. The role of biodiversity in combating climate change is well recognised and further accentuates the key role that biodiversity management plays on a global scale (Driver et al., 2012).

Typical pressures that natural ecosystems face from human activities include the loss and degradation of the natural habitat, invasive alien species, pollution and waste and climate change (Driver et al., 2012). High levels of infrastructural and intensive agricultural development typically restrict the connectivity of natural ecosystems and maintaining this connectivity is considered critical for the long-term persistence of both ecosystems and species, in the face of human development and global climatic changes. The loss of biodiversity puts aspects of our economy and quality of life at risk and reduces socio-economic options for future generations. In essence, that scenario makes it clear that sustainable development is then not possible.

3.2 Natural vegetation unit associated with the study area

According to Mucina and Rutherford (2006), the Roggeveld Shale Renosterveld (FRs 3) comprises of an undulating, slightly sloping plateau landscape, with low hills and broad shallow valleys (sandy soils). The natural vegetation is characterised by the moderately tall shrublands which is dominated by *Elytropappus rhinocerotis* and where the more moist and rocky habitats support a rich geophytic flora.

The broad geology of the vegetation unit overlies mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup), with some intrusions of the Karoo Dolerite Suite. The vegetation unit is regarded to have a **moderate** erosion potential (Mucina and Rutherford, 2006), but on sloped areas devoid of vegetation, the impact can be **high**.

It is noted that the study area forms part of the core zone of the Hantam Roggeveld Centre of Endemism (Mucina and Rutherford, 2006; van Wyk and Smith, 2001) where it is distributed across the Northern and Western Cape provinces. To the west it is on the edge of the Great Escarpment above the Tanqua Basin with the Hantam Plateau region to the south. Dispersed within the landscape one find numerous isolated high plateau areas.

According to Mucina and Rutherford (2006) the conservation status of the vegetation unit is considered as **Least Threatened** with a conservation target of 27%. Unfortunately, very little is conserved in statutory or private conservation areas. It is important to note that only a small part has been transformed (1%), but local overgrazing presents a high risk. Climatic patterns indicate the rainfall to vary between 180mm and 430mm. These rain events are evenly distributed throughout the year, with a slight peak in March. The mean daily maximum and minimum temperatures range between 29.3°C and 0.2°C for January and July with a high frost incidence of 30 to 70 days per year (Mucina and Rutherford, 2006), with snow a regular feature.

According to Mucina and Rutherford (2006) the more important vegetation (excluded from the list are the SCC) species include shrubs i.e. *Euryops lateriflorus, Asparagus capensis var. capensis, Chrysocoma oblongifolia, Dimorphotheca cuneata, Diospyros austro-africana, Elytropappus rhinocerotis, Eriocephalus africanus var. africanus, E. ericoides subsp. ericoides, E. eximius, Euryops cuneatus, E. imbricatus, E. marlothii, E. microphyllus, E. trifidus, Felicia filifolia subsp. filifolia, F. muricata subsp. cinerascens, F. scabrida, Helichrysum hamulosum, H. lucilioides, Hermannia multiflora, Lessertia fruticosa, Nenax microphylla, Passerina nivicola, Pteronia erythrochaeta, Rosenia oppositifolia, Selago articulata, S. saxatilis, Ursinia pilifera* and *Zygophyllum spinosum. Stomatium rouxii* (a succulent shrub) is found in the presence of a number of herbs such as *Cotula microglossa, Diascia parviflora, Lasiopogon muscoides, Pharnaceum croceum* and *Senecio hastatus.* The geophytic herbs include *Drimia intricata, Geissorhiza heterostyla, Hesperantha cucullata, Oxalis obtusa, Romulea atrandra, R. diversiformis, R. rosea, R. tetragona, R. tortuosa* and *Spiloxene capensis. S*ucculent herbs and climbers present are *Crassula corallina subsp. coralline* and *Crassula roggeveldii.* In this vegetation unit, graminoides are not abundant but *Ehrharta calycina, Pentaschistis aristifolia, P. patula, Schismus inermis* and *S. scaberrimus* are known from the area.

Biogeographically important taxa include the Hantam-Roggeveld endemics *Zaluzianskya violacea* and *Colchicum hantamense* and other endemics such as *Euryops sulcatus, Lasiospermum poterioides, Manulea diandra, Daubenya aurea, Gladiolus marlothii, Ixia thomasiae, Polyxena longituba, Romulea hallii, R. komsbergensis, R. multifida, R. subfistulosa,* and *R. syringodeoflora* are found (Mucina and Rutherford, 2006).

The following protected genera and species were listed for the study area (Botha, 2021):

- All species of the Genus *Pelargonium (*Family*:* Geranaceae):
    - *Pelargonium abrotanifolium*
- All species of the family Mesembryanthemaceae:
    - *Stomatium suaveolens, S. difforme, Ruschia cradockensis, Mesembryanthemum nodiflorum, Antimima* spp. (prolongata?), *A. ivory, Drosanthemum hispidum* and *D. eburneum*
- All species of the genus *Colchicum* (Family: Colchicaceae):
    - *Colchicum eucomoides* and *Colchicum volutare*

- All species of the family Crassulaceae:
    - *Crassula columnaris, C. deltoidei* and *C. nudicaulis*
- All species of the family Iridaceae:
    - *Babiana cuneata*
- All species of the family Lachenalia (no Hyacinthaceae):
    - *Lachenalia attenuata*
- All species of the Genus *Pectinaria* (Family: Apocynaceae):
    - *Pectinaria articulata*

When looking at the description of the vegetation composition on the farm Tonteldoosfontein (i.e. the study area) as noted by Van der Merwe *et al*. (2008) and supported by McDonald (2011), it is dominated by the ***Euryops lateriflorus—Dicerothamnus rhinocerotis*** **Mountain Renosterveld** with elements of the ***Montinia caryophyllacea—Pteronia glauca*** **Roggeveld Escarpment Karoo** to the south of the site and the ***Euryops multifidus—Rosenia oppositifolia*** **Mountain Renosterveld** to the extreme north (McDonald, 2011). This assessment differ from the view of Botha (2021).

Botha (2021) was of the opinion that the entire project footprint can be associated with a singular vegetation community, namely the ***Rosenia humilis – Elytropappus rhinocerotis*** **Mountain Renosterveld**. The area is dominated by the fairly flat plateau sections near the escarp with some small micro variations within this landscape. The vegetation community is dominated by dwarf shrubs such as *Chrysocoma ciliata, Eriocephalus ericoides, Felicia filifolia subsp. filifolia, Pentzia dentata, Pteronia glomerata, P. glauca, Rosenia humilis, Asparagus capensis var. capensis, E. rhinocerotis* and the grass species *Tenaxia stricta, Pentameris airoides* and *Ehrharta calycina* (Botha, 2021).

Furthermore, within this community, three variations are noted i.e. a *Chrysocoma ciliata* variation, a *Tenaxia stricta* variation and a *Stomatium difforme* variation (**not associated with the study site, but present to the east**). Edaphic factors are the main driving force of these variation, mainly soil depth and rockiness (Botha, 2021).

The author (Botha, 2021) is of the opinion that the *Chrysocoma ciliata* variation dominates the areas with slightly deeper soil profiles, although the soils still tend to be relative shallow and is typically fine sand derived from the weathering of sandstones. Species that dominate (moderate to moderate-low density) include low growing dwarf shrub vegetation cover with *C. ciliata, Elytropappus rhinocerotis, Ehrharta calycina, Pentameris airoides, Felicia oppositifolia, Selago distance* and *Pentzia dentata* with *Lachenalia attenuata, Osteospermum glabrum, Hyobance sanguinea, Asparagus capensis, Muraltia spinosa* and *Gnidia geminiflora* regarded as key and diagnostic species of this variation.

The *Tenaxia stricta* variation is associated with sandstone boulder and rocky outcrops and is characterised by a denser and taller mixed dwarf shrubland. Dominant species within this variation include *Ehrharta calycina, Festuca scabra, T. stricta, C. ciliata, E. rhinocerotis, Eriocephalus ericoides, Pentzia dentata* and *Rosenia humulis*. Key and diagnostic species of this variation include *Colchicum eucomoides, Tetraria cuspidata, Pentameris pyrophila, Dolichotrix ericoides, Diospyros austro-africana, Selago aspera, Passerina truncate, Pteronia glauca, D. rhinocerotis, T. stricta, Selago saxatilis, Hebenstretia robusta, Moraea cookie, Tetraria cuspidate, Diospyros austroafricana, Colchicum volutare, Gnidia geminiflora, Passerina truncata* and *Pteronia incana* (Botha, 2021).

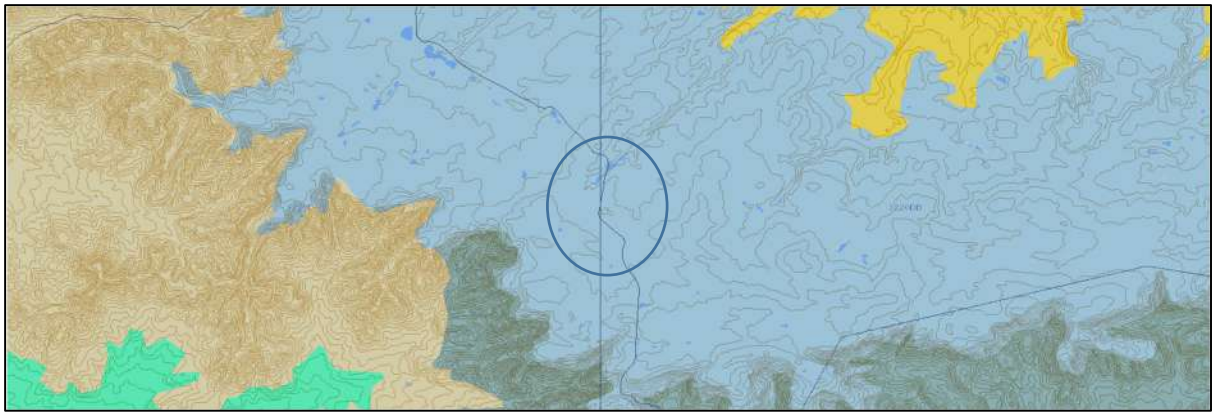

Figure 3.1: Vegetation diversity associated with the study area. The Roggeveld Shale Renosterveld (FRs 3) in light blue with the Roggeveld Karoo (yellow) in the north and the Central Mountain Shale Renosterveld (grey) in the southwest and south.

3.3 Critical Biodiversity Areas and Broad Scale Ecological Processes

3.3.1 Northern Cape Critical Biodiversity Areas

Systematic conservation assessment is the technical, often computer-based, identification of priority areas for conservation. This assessment informs conservation planning and decision-making (Figure 3.2).

Figure 3.2: The map indicating the Northern Cape Conservation Plan. The CBA (green areas with the outline of the WEF (Buildable area) in coloured polygons).

In the conservation strategies the **Critical Biodiversity Areas** (CBA's) (including Protected Areas (PAs) are defined as terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI 2007). Linked to the CBA are other classifications i.e. the Ecological support areas (ESA's).

- Critical biodiversity areas (CBA's) are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses (SANBI 2007).

- Ecological support areas (ESA's) are areas that are not essential for meeting biodiversity representation targets or thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas (SANBI 2007).

The PA and CBA 1 or natural landscapes are viewed as:

- Ecosystems and species fully intact and undisturbed.
- These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met.
- These are landscape that are at or past their limits of acceptable change (SANBI 2007).

The second category is the CBA 2 or near-natural landscapes:

- Ecosystems and species largely intact and undisturbed.
- Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets.
- These are landscapes that are approaching but have not passed their limits of acceptable change (SANBI 2007).

The third category is the Ecological Support Areas (ESA) or functional landscapes:

- Ecosystems moderately to significantly disturbed, but still able to maintain basic functionality.
- Individual species or other biodiversity indicators may be severely disturbed or reduced.
- These are areas with low irreplaceability with respect to biodiversity pattern targets only (SANBI 2007).

The fourth category is the Other Natural Areas (ONA) and Transformed:

- These are the production landscapes with a need to manage the land to optimise sustainable utilisation of the resources (SANBI 2007).

3.4 Species of Conservation Concern (SCC)

The screening tool report (STR) generated include seven (7) sensitive plant species (SCC), one (1) species with a high sensitivity and fourteen (14) species with a medium sensitivity with a probability to occur within the vegetation unit associated with the project area (the WEF site and the power line to the Sutherland/Dwarsrug substation).

When looking at the probability of the SCC occurring on the WEF study area, four (4) of the seven (7) species have been recorded in the larger footprint area, but **none recorded in the proposed layout areas recommended for the turbine areas**. **None of the species were observed during the recent assessment within the areas demarcated for the proposed development**. This is however not a clear indication that the species are not present. It will be important to evaluate the area during the final walkthrough and ensure the survey is conducted in the season that will ensure possible flowering

plants present. It is noted that three (3) of the species were collected in 1953 and 1954 (no subsequent samples in the area) and the fourth in 2016 (only sample in the area).

The following species are listed in the STR (excluding the sensitive spp.): *Romulea multifida* (high) and the medium sensitive species i.e. *Antimima androsacea, Antimima emarcescens, Delosperma sphalmanthoides, Helictotrichon barbatum, Helictotrichon namaquense, Romulea hallii, Romulea multifida, Romulea eburnea, Adromischus phillipsiae, Asparagus mollis, Hesperantha flava, Eriocephalus grandiflorus, Cliffortia arborea* and *Octopoma nanum* (Table 3.1).

Two (2) animals are listed with a medium sensitivity that may occur in the study area. These are *Bunolagus monticularis* (CR) and *Chersobius boulengeri* (EN).

Table 3.1: List of the STR species (excluding the SCC sensitive spp.) with information of habitat types where it was collected (New POSA, 2022) to determine the probability of occurring on the study site (SANBI, 2016).

Family	*Genus and species*	Known habitat preference	Status	Known occurrence
Aizoaceae	*Antimima androsacea*	Rocky slopes, 1200-1800 m	CR	North of Sutherland
Aizoaceae	*Antimima emarcescens*	Occurs in loamy soil between rocks, often in shrubby vegetation, 1200-1400 m.	VU	North of site - Sutherland and further NE
Aizoaceae	*Antimima ivori*	This species is endemic to the Roggeveld Escarpment in the Northern Cape, where it occurs from Sutherland to Fraserburg. It is localized to crevices in exposed sandstone.	Rare	North and NE of study area, including power line (low probability)
Aizoaceae	*Delosperma sphalmanthoides*	Shallow soils over shale rocks between 1 500 to 1 600 m.	VU	No record near site
Aizoaceae	*Octopoma nanum*	Flats and gentle slopes with loamy soils and sparse quartz gravel.	VU	No record near site
Asparagaceae	*Asparagus mollis*	Southern Roggeveld Escarpment to Matjiesfontein	VU	On escarp - south west, outside foot print area
Asteraceae	*Eriocephalus grandiflorus*	Lower foothills in quartz patches	Rare	Below escarp
Crassulaceae	*Adromischus phillipsiae*	Sheltered rock crevices in loam soil.	Rare	West of road R354
Iridaceae	*Hesperantha flava*	Stony soils of decomposing shale, Succulent Karoo	Rare	Record NE low probability
Iridaceae	*Romulea eburnea*	Shale soils.	VU	SW of site, low probability
Iridaceae	*Romulea hallii*	Roggeveld Plateau southwest of Sutherland.	VU	SW of site, low probability
Iridaceae	*Romulea multifida*	Roggeveld Plateau. Damp clay flats, 1500 m.	VU	Near site - probability to the eastern part of the site
Poaceae	*Helictotrichon barbatum*	Lower rocky slopes in Mountain Renosterveld on clays.	VU	No record near site
Poaceae	*Helictotrichon namaquense*	Sandy flats in Mountain Renosterveld.	VU	No record near site
Rosaceae	*Cliffortia arborea*	Cliffs and ledges of dolerite, sandstone, and shale escarpment	VU	Escarp on south - avoid (low probability)

When looking at the information in Table 3.1, there are six (6) of the species that can occur in the study area i.e. *Asparagus mollis, Hesperantha flava, Romulea eburnea, Romulea hallii, Romulea multifida* and *Cliffortia arborea*. This is based on the POSA maps and distribution information (SANBI, 2016) for the study area and the immediate surrounding areas. The other species have a low to very low probability of being present (but not excluded) when looking at the known distribution and samples collected on the POSA database.

3.5 Animals

The animals that can be present on site or adjacent to the proposed corridor is listed in Table 3.2 (Amphibians), Table 3.3 (Mammals) and Table 3.4 (Reptiles).

In addition to the two (2) red data mammals listed *Bunolagus monticularis* (CR) and *Chersobius boulengeri* (EN), three (3) other red data species are known from the area i.e. *Pelea capreolus* (NT), *Felis nigripes* (VU) and *Panthera pardus* (VU).

Table 3.2: List of Amphibians recorded in the QDSs associated with the study area (3220DA/DB - FitzPatrick Institute of African Ornithology, 2022).

Family	*Genus and species*	Common name	Conservation status
Bufonidae	*Vandijkophrynus gariepensis gariepensis*	Karoo Toad (subsp. gariepensis)	Least Concern
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	Least Concern
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	Least Concern
Pyxicephalidae	*Tomopterna delalandii*	Cape Sand Frog	Least Concern

Table 3.3: List of Mammals recorded in the QDSs associated with the study area (3220DA/DB - FitzPatrick Institute of African Ornithology, 2022: Stuart and Stuart, 2007).

Family	*Genus and species*	Common name	Conservation status
Bathyergidae	*Cryptomys hottentotus*	Southern African Mole-rat	Least Concern
Bovidae	*Connochaetes taurinus taurinus*	Blue wildebeest	Least Concern
Bovidae	*Oreotragus oreotragus*	Klipspringer	Least Concern
Bovidae	*Oryx gazella*	Gemsbok	Least Concern
Bovidae	*Pelea capreolus*	Vaal Rhebok	Near Threatened
Canidae	*Otocyon megalotis*	Bat-eared Fox	Least Concern
Cercopithecidae	*Papio ursinus*	Chacma Baboon	Least Concern
Gliridae	*Graphiurus (Graphiurus) ocularis*	Spectacled African Dormouse	Least Concern
Herpestidae	*Herpestes pulverulentus*	Cape Grey Mongoose	Least Concern
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	Critically Endangered
Leporidae	*Lepus capensis*	Cape Hare	Least Concern
Leporidae	*Lepus saxatilis*	Scrub Hare	Least Concern
Macroscelididae	*Elephantulus rupestris*	Western Rock Elephant Shrew	Least Concern
Macroscelididae	*Macroscelides proboscideus*	Short-eared Elephant Shrew	Least Concern
Muridae	*Acomys (Subacomys) subspinosus*	Cape Spiny Mouse	Least Concern
Muridae	*Aethomys granti*	Grant's Rock Mouse	Least Concern
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	Least Concern
Muridae	*Gerbilliscus paeba*	Paeba Hairy-footed Gerbil	Least Concern
Muridae	*Otomys unisulcatus*	Karoo Bush Rat	Least Concern
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern
Nesomyidae	*Petromyscus collinus*	Pygmy Rock Mouse	Least Concern
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	Least Concern
Soricidae	*Crocidura cyanea*	Reddish-gray Musk Shrew	Least Concern
Soricidae	*Crocidura hirta*	Lesser Red Musk Shrew	Least Concern
Soricidae	*Myosorex varius*	Forest Shrew	Least Concern
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	Least Concern

Table 3.4: List of Reptiles recorded in the QDSs associated with the study area (3220DA/DB - FitzPatrick Institute of African Ornithology, 2022).

Family	*Genus and species*	Common name	Conservation status
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern
Cordylidae	*Cordylus minor*	Western Dwarf Girdled Lizard	Least Concern
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	Least Concern
Cordylidae	*Pseudocordylus microlepidotus namaquensis*	Nuweveldberg Crag Lizard	Least Concern
Elapidae	*Aspidelaps lubricus lubricus*	Coral Shield Cobra	Least Concern
Elapidae	*Hemachatus haemachatus*	Rinkhals	Least Concern
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	Least Concern
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern
Gekkonidae	*Pachydactylus geitje*	Ocellated Gecko	Least Concern
Gekkonidae	*Pachydactylus kladaroderma*	Thin-skinned Gecko	Least Concern

Gekkonidae	*Pachydactylus mariquensis*	Marico Gecko	Least Concern
Gekkonidae	*Pachydactylus oculatus*	Golden Spotted Gecko	Least Concern
Gekkonidae	*Pachydactylus purcelli*	Purcell's Gecko	Least Concern
Lacertidae	*Pedioplanis burchelli*	Burchell's Sand Lizard	Least Concern
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	Least Concern
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern
Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	Least Concern
Scincidae	*Trachylepis variegata*	Variegated Skink	Least Concern
Testudinidae	*Chersina angulata*	Angulate Tortoise	Least Concern
Testudinidae	*Homopus areolatus*	Parrot-beaked Tortoise	Least Concern
Testudinidae	*Homopus femoralis*	Greater Padloper	Least Concern
Testudinidae	*Psammobates tentorius*	Tent Tortoise	Least Concern

Historic reports (initial Basic Assessments and Environmental Assessments referred to as the Komsberg Renewable Energy Project Western Cape and Northern Cape (McDonald, 2011)) indicate that the habitat for *Bunolagus monticularis* is not optimum. It is known that *B. monticularis* prefer habitat in the deeper soils and specific riparian vegetation is not found along the smaller drainage lines on site (Sutherland 2 WEF project) (Todd, 2011). The suitable habitat is associated with the larger stream of the Riet River to the east of the site (Sutherland and Rietrug project). The species is known to occur in the lower reaches of the system and it is therefore possible to occur in the upper reaches on the northern aspect of the Komsberg, where it drops off to the north (Todd, 2011). **There is no confirmed siting on the property of the species.**

According to Collins et al. (2016), the expanded project between 1999 and 2013 has improved the distribution knowledge of *Bunolagus monticularis* and has been recorded in the vicinity of the site during the EWT Riverine Rabbit Project of 2010 (McDonald, 2011). When evaluating the specific habitat requirements, Skinner and Chimimba (2005) described their needs as being "*confined to riparian bush on the narrow alluvial fringe of seasonally dry watercourses in the central Karoo*". In their assessment, Collins et al., (2016) reported that a number of populations and subpopulations of *B. monticularis* were recorded in the Little Karoo and near Touws River during work in 2002, and this has therefore questioned the validity of the known habitat requirements and distribution of the species. According to McDonald (2011), there was no published research at that stage to confirm the distribution of the species or its habitat requirements outside of the traditional distribution range.

The assessment by Collins et al. (2016) noted that the current broad vegetation associated with the species in the larger Karoo biome (including the Succulent and Nama Karoo regions) refer to "*broad habitat types and that some of the recently discovered subpopulations in the northern part of the distribution range are always associated with alluvial floodplains and narrow belts of riverine vegetation adjacent to seasonal rivers*". The authors are of the opinion that this association with the floodplains in this part of its distribution range indicate a specific connotation with floodplains and is not necessarily holding true for all the vegetation types in its distribution range. This is illustrated by the fact that some specimens have been found in old cultivated fields.

The species is known to occur in the Riet Rivier drainage system to the northwest of the site from where it drains northwards from the north-eastern sections of the area (Komsberg WEF area). One can therefore deduct that *B. monticularis* is present in this area. According to the McDonald (2011), it "makes use of the riparian fringe[s] in the lower Riet system. The author speculates that it is reasonable to assume where the turbines and connecting road systems are placed outside the sensitive areas (e.g. drainage lines), impacts would probably be low. It must be remembered that

Desmet and Marsh (2008) regarded the riparian buffers as Critical Biodiversity Areas in the Namakwa Biodiversity Sector Plan. The habitat for breeding for *B. monticularis* is known as burrows of between 200 – 300mm deep (Duthie, 1989). The remaining areas of the site to the west do not appear to represent suitable habitat and the nearest other localities where it has been recorded are to the west of Sutherland and just to the north of Matjiesfontein, both of which some distance from the site (McDonald, 2011).

The possibility of *Chersobius boulengeri* being present is low. The altitude and the lack of suitable habitat must be noted. *Chersobius boulengeri* 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. Annual rainfall is low (approximately 150 to 400 mm over the species' range) and relatively unpredictable with a coefficient of variation between 35 and 40%. The species 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, but few rocky sites over the range offer suitable retreats for the species (Hofmeyer et al., 2017).

Pelea capreolus is are associated with rocky hills, grassy mountain slopes and plateau grasslands in the eastern extent of their distribution. In the south and southwest, their distribution is associated with the rocky hills of mountain fynbos and the little Karoo. They are predominantly browsers, often feeding on ground-hugging forbs and largely water independent, obtaining most of their water requirements from their food (Avenant, 2013). Numerous animals were observed during the 2010 survey (Todd, 2011) and the author of the report noted that the conservation status at the time was least concern (IUCN), but that the impact of the WEF development on the animals is not known. In general, the development will have a short-term impact on the resident animals, as they will move away during the increase in activity, but can return after the construction phase. A potential concern will be illegal hunting with snares during the construction phase and operational phase (lower incidence).

Felis nigripes (VU) are predominantly ground-dwellers and will not readily take to trees and lead a solitary existence except when with kittens or during brief mating periods. They are extremely secretive in nature and strictly crepuscular and nocturnal and are active throughout the night, even hunting at temperatures of –8˚C (Olbricht and Sliwa, 1997). During the day, the cats make use of dens. The species prefers hollowed out abandoned termite mounds when available (especially for the kittens), but will use dens dug by other animals such as Springhares (*Pedetes capensis*), Cape Ground Squirrels (*Xerus inauris*) and Aardvark (*Orycteropus afer*). It is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds. It inhabits 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 asl. It is not found in the driest and sandiest parts of the Namib and Kalahari Deserts (Sliwa, 2013).

Panthera pardus has a wide habitat tolerance, including woodland, grassland savannah and mountain habitats, but also occur widely in coastal scrub, shrubland and semi-desert. Densely wooded and rocky areas are preferred as choice habitat types and they have a highly varied diet, ranging from arthropods to large antelope up to the size of adult male *Tragelaphus oryx*. Densities of the species vary with habitat, prey availability, and threat severity, from less than one individual per 100 km² to over 30

individuals per 100 km². Within the assessment region, the lowest densities are in the Kalahari and Western Cape mountains i.e. Western Cape densities range from 0.25 – 2.3 individuals per 100 km^2 (Swanepoel et al., 2016).

4 RESULTS AND DISCUSSION – Terrestrial biodiversity baseline assessment

The biodiversity assessment will focus on the proposed WEF development and further give a short assessment of the power line between the Sutherland 2 and Arcrux substation located within the authorised Sutherland WEF site. A general plant list (Table 4.1) was compiled (not a detailed list) as the focus was on red data and protected species, the habitat diversity and sensitivity in the footprint area and the animals observed (including signs of activity).

During the assessment, it was noted that the natural vegetation conformed to the classification as noted by Van der Merwe *et al.* (2008) and McDonald (2011) i.e. the *Euryops lateriflorus—Dicerothamnus rhinocerotis* Mountain Renosterveld. This can be linked to the time of the survey towards the end of summer, where the herbs and geophytes tend to be absent (e.g. as a result of grazing) and the impact of the recent drought. For this assessment (and the small difference between the comment from Botha (2021)), it was clear that **the current natural vegetation composition associated with the unit described by Van der Merwe *et al.* (2008)**.

4.1 Species of Conservation Concern (SCC)

4.1.1 Plant species

During the recent survey **no plant SCC were observed** (refer to para 3.4). Habitat can be present, but most the recorded positions of collected species (historically) falls outside the site area with a number of specimens only collected in the area more than 60 years ago. That doesn't exclude its presence, but it does lower the probability significantly.

The four (4) species collected previously in the study area were collected to the north and east of the footprint area. Two (2) species were collected just north of the farmstead in the wetted areas and the other on rocky outcrops to the east of the house and other buildings.

4.1.2 Animal species

With regards to the listed SCC animal species, **there was no habitat observed that conforms to the habitat needs and preference of *Bunolagus monticularis***. As noted by Todd (2011), the Riet Rivier to the northeast of the study site can have some potential habitat, but suitable areas will most probably be more to the lower slopes were the habitat is suited to the needs of the Riverine Rabbit. It does however not exclude its possible presence, but in consultation with land owners, it was observed "*that it was not seen or heard of in the area in the last 30 years*" (Tossie Muller, pers. com., 2022). In addition, the deeper sandy areas associated with the breeding burrow requirements (Duthie, 1989; Skinner and Chimimba, 2005) on floodplains are absent. This restricts the possibly of its presence on the farm Tonteldoosfontein.

The STR listed the sensitivity for the presence of *Bunolagus monticularis* as "**medium**" and this can be considered as possible in the larger quadrant, but probably "**low**" or "**very low**" for the study site. Based on the report from Todd (2011), the author noted when looking at the larger development, that it is "*understood that this species is likely to be restricted to the riparian fringes and alluvial plains of the ephemeral rivers of the site (referring to the Rietrug/Sutherland project east of Sutherland 2) [and that] the potential impacts on this species could be significantly mitigated by avoiding these areas*".

With this in mind, the **probability of the presence of *Bunolagus monticularis* at the study area footprint (Figure 4.1) is therefore low**.

With regards to *Chersobius boulengeri*, **limited habitat was observed in the footprint area of the proposed project area**. The STR listed the sensitivity for the species as "**medium**". A comment from Victor Loehr (Loehr pers. comm., 2022) indicate that the altitude at the site can be outside the known range of *C. boulengeri*. During the survey, the areas near the escarp to the south and the low hills to the north have potential habitat for the species. Again the landowner (Tossie Muller, pers. comm., 2022) noted that the species were not observed in the last 30 years. It is suggested that an additional survey can be conducted in summer to confirm the status of the species (linked to the survey for *Bunolagus monticularis*)

From the literature it is noted the *Chersobius boulengeri* has a strong affinity with dolerite, shale and ironstone ridges and other rocky outcrop types (e.g. sandstone) within the southern Succulent and Nama Karoo biomes (and peripherally in the Albany Thicket biome). It was recorded that the species utilise holes, rock cracks, cavities under rocks and under ledges as shelter (rather than under vegetation, like many other tortoises) (Loehr *et al.,* 2021) and this is regarded as the most important component of essential habitat that determines the likelihood of presence or absence in a specific area. The species spend approximately 80–90% of their time in retreats and activity in the summer was restricted to the afternoon and evening, when tortoises walked and scanned for food and retreats and fed only 11 min/d on average (Loehr *et al.,* 2021). One can therefore assume the **presence of the species is low and the sensitivity can be considered to be** "**low**".

4.2 Habitat and general natural vegetation sensitivity (original broad buildable area layout assessment)

The evaluation for the study area was done in the twelve (12) subunits as mapped on the initial "buildable and grid" layout supplied by the Applicant (kml file). For the discussion, each area will be discussed in order to give more detail related to the specific habitat features and possible impacts and sensitivities (Figure 4.1).

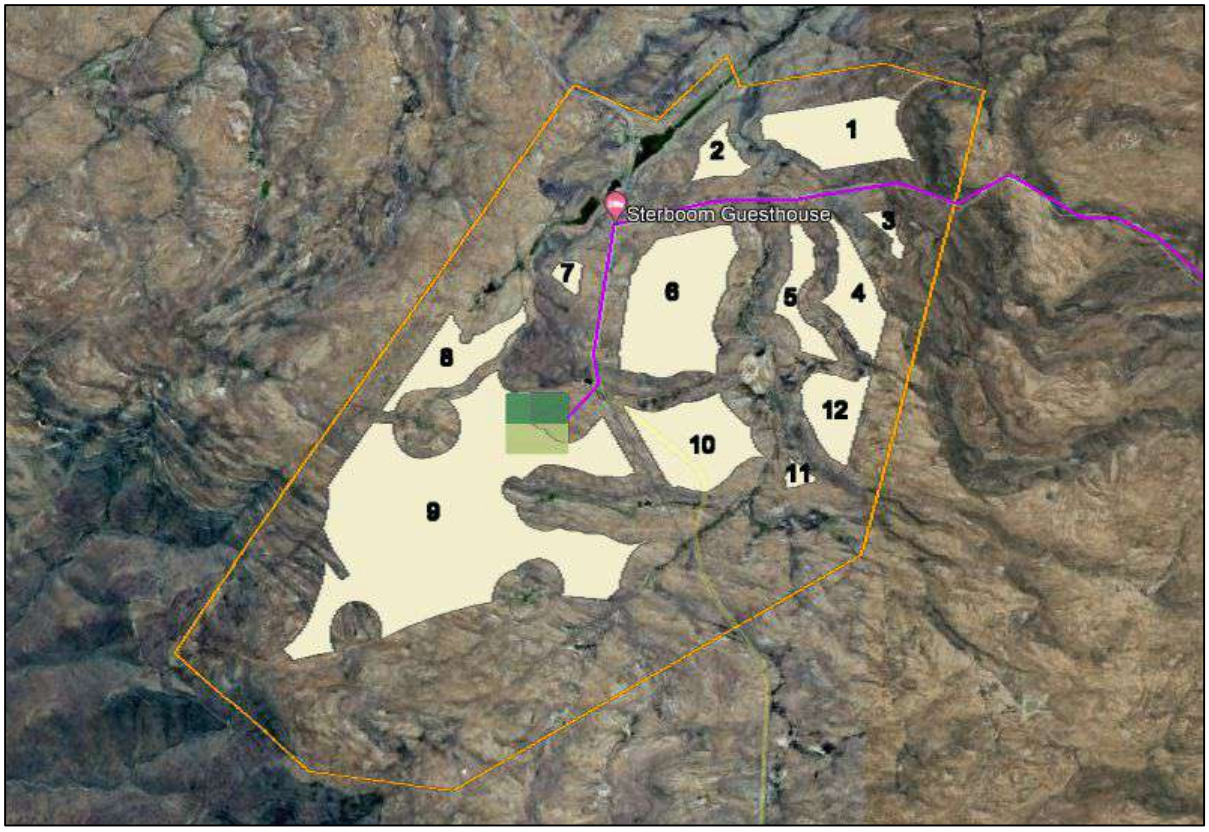

Figure 4.1: Layout of the proposed WEF with number used for the assessment and this discussion.

4.2.1 WEF area

The evaluation during the assessment of the larger study area (Figure 1.1) indicated that the habitat is in a good condition. The fact that the area was under intensive agricultural use for many decades, show some impacts related to the activities. These include some cultivated areas that are devoid of natural vegetation (still utilised for crop and feed production) and areas that were left fallow for many years and the artificial impoundments. The areas around the farmstead and working facilities (kraals, watering points and roads) are noted to be moderately modified, but no large impacts were noted.

The landscape in general is dominated by the undulating shrubland with small rocky outcrops, bedrock sheets, crests and ridges dispersed in the area. To the south, the area associated with the escarp is noted as a sensitive area. The steep slopes will be very sensitive as habitat for specialist plants, feeding and habitation for animals and birds and with a high erosion potential.

Zone 1 (Figure 4.1)

This area to the north of the proposed development footprint (Figure 4.2) is near the low hills and escarp to the Portugals River. The small area has sensitive areas, mostly associated with the "escarp" zones to the east, north and west. In the rest, some rocky areas are present and therefore the placement of roads and turbine must be carefully chosen. The steeper areas have a habitat sensitivity of moderate to high with a high erosion potential.

Figure 4.2: The areas of notice in Zone 1 – The sensitive areas to the west (red) and the depression and lichen field on the rocky area (yellow).

Zone 2 (Figure 4.1)

This is a very small undulating area with a number of areas that will be considered as very sensitive (Figure 4.3). The northern and western sides are near deep gullies draining to the northeast into the Portugals River. It will be important to place the turbine close to the access roads (probably from the south) in order to lower any impacts on the sensitive areas. Note the drainage channels in the area and refer to the wetland assessment report for recommendations. Sensitivity near the sloped areas are high with erosion considered to be high on exposed soils.

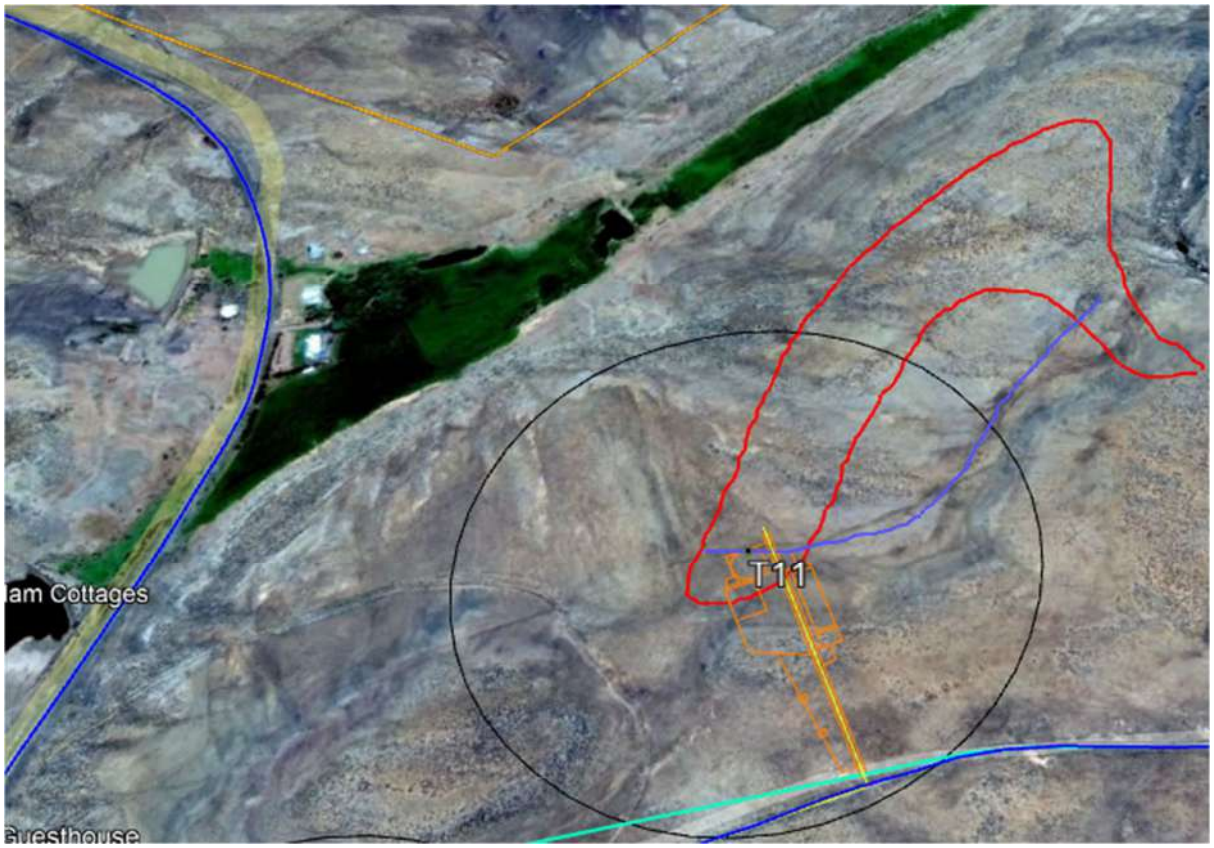

Figure 4.3: The steep slopes (red) and drainage line (blue) in this zone considered as sensitive.

Zone 3 (Figure 4.1)

This zone is bordered by the drainage lines to the east and west and the areas near the crests are of moderate to high sensitivity (Figure 4.4). The erosion potential in this area will vary from low to moderate, depending on the sloped areas utilised. The vegetation on the flat plateau area is more uniform and impacts will be lower. It is recommended that the placement of turbines are on the central "spine" of the area between the deeper gullies to the east and west. Again, there are some rocky outcrops dispersed through the area and it will be important to avoid these areas with the final placement of the turbines.

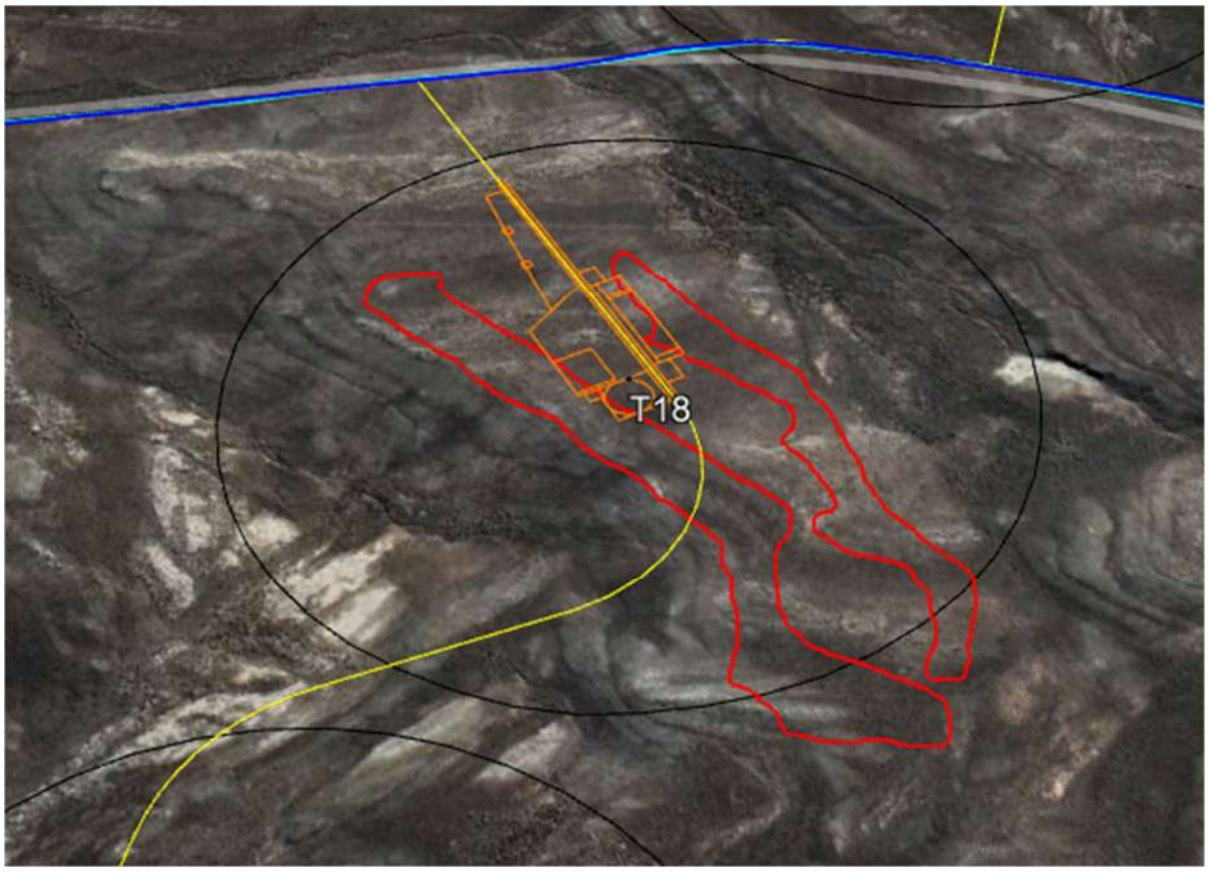

Figure 4.4: The sensitive areas associated with the drainage areas in zone 3.

Zone 4 (Figure 4.1)

The zone is an elongated section between the south/north draining ephemeral streams, with slopes to the west generally steeper compared to the eastern side (Figure 4.5). This area have some large bedrock sheets which are considered to be sensitive habitats. To the east on the farm Beerenvalley, these areas had a high plant diversity (including a number of protected species) that gave it a higher sensitivity rating compared to the undulating areas (short shrubland) and can include *Antimima spp., Delosperma spp., Romulea spp.* and *Octopoma spp.* The placement of turbines must be away from the steeper slopes and must avoid the bedrock sheets and rocky outcrops.

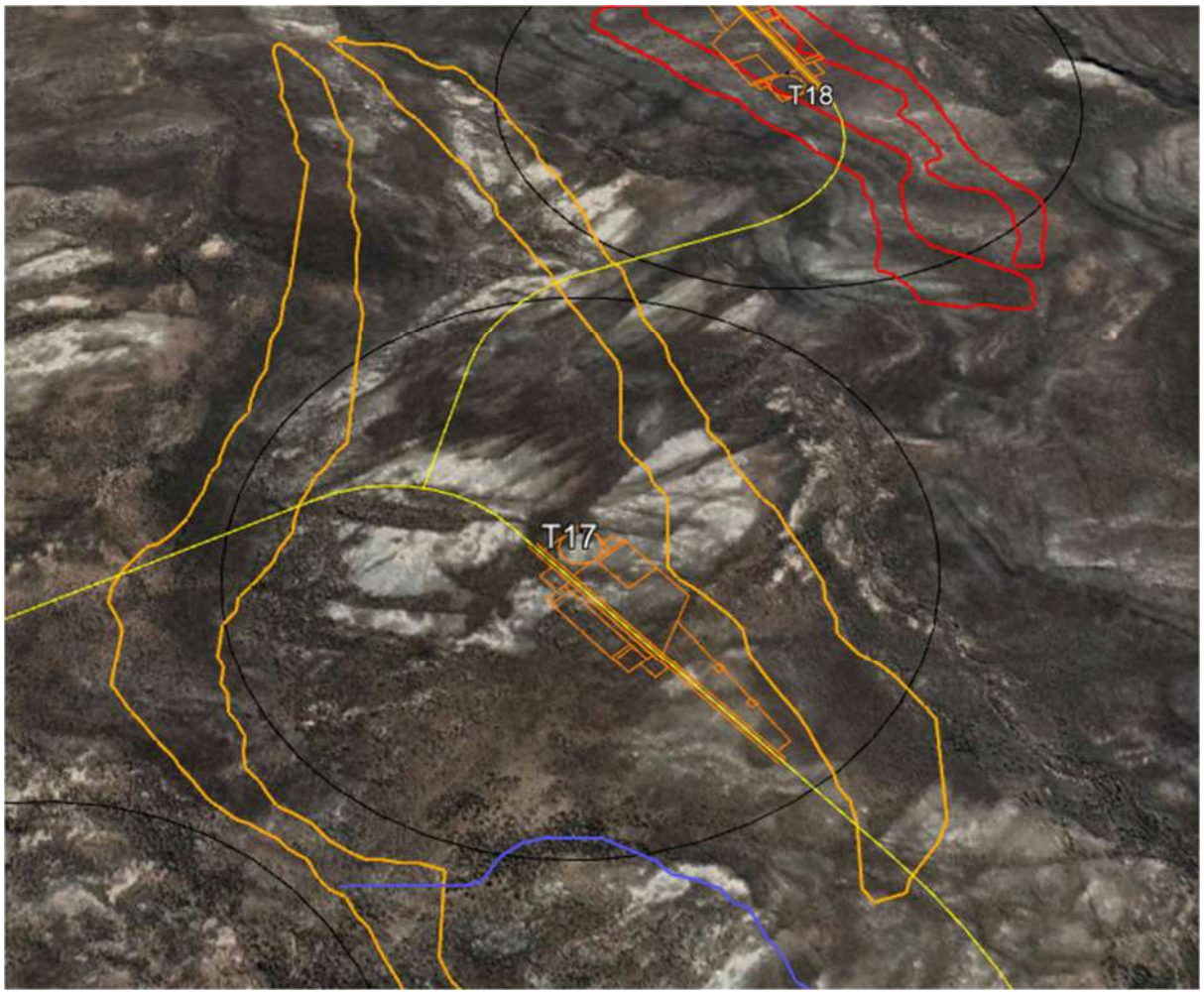

Figure 4.5: Areas of sensitivity (slopes in orange) and a prominent drainage line (blue) noted for consideration.

Zone 5 (Figure 4.1)

A long, narrow zone with a steep incline to the east and a more steady, but wide slope to the west (Figure 4.6). As noted with the previous areas, the slopes are more sensitive (moderate to high) and there are a number of bedrock sheets that are very sensitive areas (examples demarcated in Figure 4.6). These must be avoided with the placement of turbines and roads and no driving is allowed over these areas. The vegetation is low to moderately sensitive in relation to diversity and the area has a low to moderately high erosion potential (higher on steep slopes).

Figure 4.6: The steeper slopes and some bedrock sheets demarcated – noted to be sensitive areas.

Zone 6 (Figure 4.1)

This area has a diversity of habitat types, ranging from the higher areas (low mountains and koppies) to the west, sloping east to the large drainage line associated with the large impoundment (Figure 4.7). On the southern boundary of this area, a steep slope is present and it will limit the extent of placement of turbines in the area. It include some rocky outcrops and bedrock sheets, considered as sensitive in relation to natural vegetation diversity and habitat for animals, birds and reptiles. There is a high plateau area (southern portion of the zone that drops to the northeast. This “escarp” area is sensitive and it is recommended to consider placement of turbines carefully. The lower area to the north east has sloped areas and drainage channels, but structures can be strategically placed without a huge compromise to the environment. The sensitivity range between low to high through the section with a low to moderately high (even high) erosion potential in areas. The natural vegetation sensitivity range between low to moderate (linked to habitat areas). Access roads must follow contours to limit the impacts to the habitat.

Figure 4.7: The area with the more sensitive areas to the south and west and the small portion in the northeast with possible protected plants in the wetted and rocky area.

Zone 7 (Figure 4.1)

This is a small footprint with steep slopes to the south, west and north (Figure 4.8). It is suggested to place the turbine close road to the east where it will have lowest impact on the undisturbed habitat and natural vegetation. The sensitivity range between low and high (related to the steep slopes, outcrops and ridges). The vegetation is low to moderate with regards to the sensitivity of the diversity on the flat plateau area.

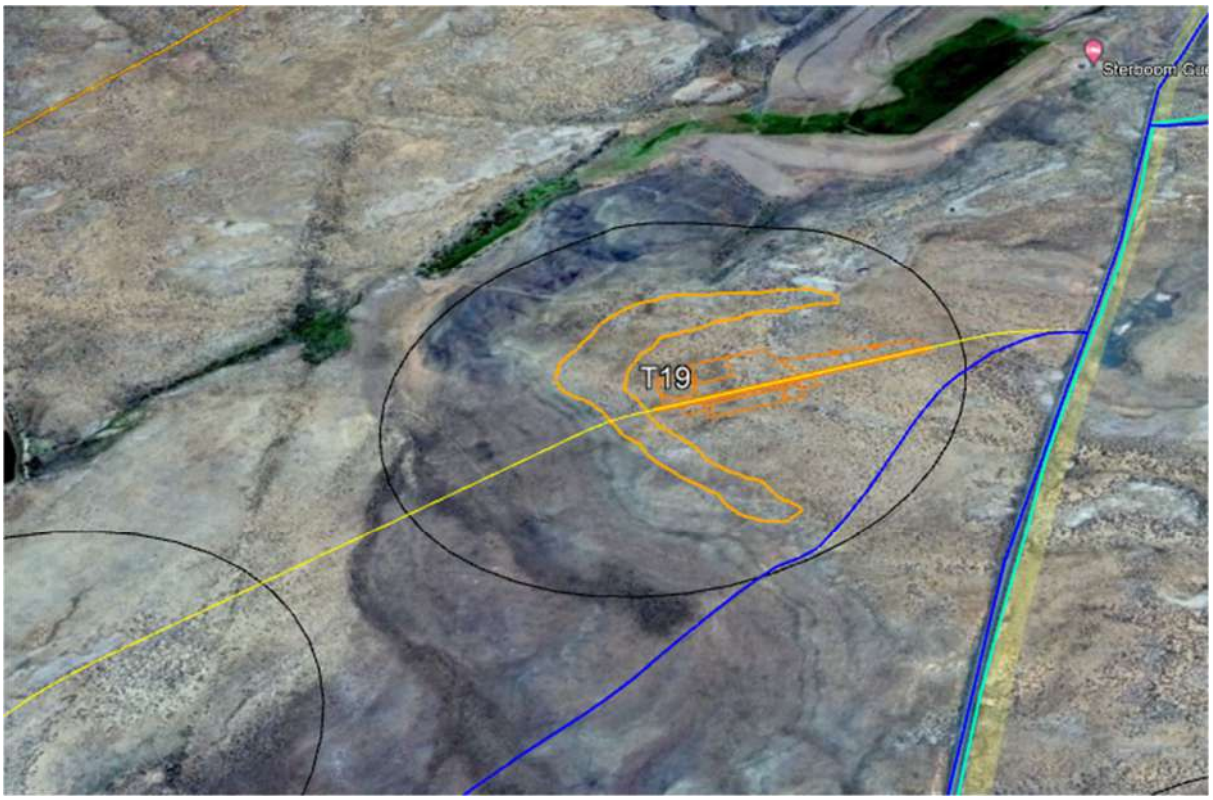

Figure 4.8: The sensitive zone to the south and west (demarcated in orange) with the old historic structures to the north.

Zone 8 (Figure 4.1)

The zone (Figure 4.9) is an elongated area, with numerous sensitive habitat features that include the bedrock sheets, rocky outcrops and drainage lines. The eastern boundary of the proposed area is in close proximity to a prominent drainage channel (south to north) feeding the impoundment. The resident breeding pair of *Tadorna cana* at the impoundment seems to utilise the rocky habitat for a nesting site. Noted along the eastern side of the footprint area is the stone fence posts and the old shepherds hut (southwestern corner). The habitat sensitivity across the area varies (depending on the micro habitat) and ranges from low (i.e. the moderately undulating plateau areas) to high (i.e. the rocky ridges, outcrops and bedrock sheets).

Figure 4.9: The sensitive slopes to the south – some plateau areas present for a turbine – and examples of rocky outcrops and ridges to the north.

Zone 9 (Figure 4.1)

This large area is to the southwest of the project layout (Figure 4.10). The area near the escarp (southwestern corner, east of the water point) of the zone has sensitive habitats (the rocky slopes) and a high erosion potential. If it is possible to place a turbine, it must be near the existing road to the northeast (depending on other specialist assessments e.g. birds). The region to the east (farm boundary) is mostly associated with the escarp and steep slopes and therefore considered to be the more sensitive areas. The escarp is having higher plant diversity and some of the red data species listed (POSA, 2022) are associated with this habitat type, making this part a very sensitive habitat area. To the north of the impoundment, there are some rocky ridges and outcrops that must be avoided with the infrastructure development. The vegetation on the plateau areas are less diverse and is mostly considered to have the lowest number of protected species. As noted in the background assessment, the areas around bedrock sheets, rocky outcrops and ridges are sensitive in relation to the plant diversity and as habitat for the animals and reptiles. The sandy flats between the outcrops are used for habitation by larger animals (especially those that burrow) and as a foraging zone. It is noted that the natural vegetation along the eastern boundary of the area is larger in size. This can be related to the deeper soils and wetter conditions (more water channelled) on the slopes to the west.

The middle portion of the zone have a number of flat plateaus to the centre and the east, which will be more suitable areas for the construction of turbines. The area associated with the eastern boundary north of the impoundment, has varied habitat. In general, the landscape slopes to the east with a number of ephemeral drainage lines present. It is possible to place the turbines between the rocky ridges and low points of the drainage lines. This will lower the potential impacts on the vegetation and habitat. It will be important to plan the internal road layout to take these sensitive areas into consideration and where possible, to use the contours to lower impacts on the sensitive sloped areas.

The area to the north and east of the two (2) impoundments are similar to the middle portion. The western boundary is steeper and sloped to the west (Tankwa River). The areas to the centre and the east have suitable plateau areas that can be used for the placement of turbines. However, the outcrops, ridges and rocky areas must be avoided.

Figure 4.10: The large zone to the south east with some of the sensitive areas highlighted. In red the sensitive area associated with the escarp. In orange, some of the ridges, sloped areas and rocky outcrops noted.

Zone 10 (Figure 4.1)

The area east of the main road (Figure 4.11) traversing the site from north to east, is associated with the low mountains sloping to the east and the larger drainage systems that form part of the upper catchment of the Portugals River. The area has a number of bedrock sheets and rocky outcrops, but included is larger areas that are more flat and suitable for turbine positions. The important aspect is to look at the possible footprint areas and access roads that will lower the impacts on the sensitive habitats and sloped areas that are more prone to erosion. The vegetation sensitivity range from low to moderate or moderately high. The sloped areas and drainage lines are considered more sensitive with the rocky outcrops and bedrocks sheets areas with a higher sensitivity (plant diversity, including the protected families and habitat for animals). Access to the area must take the contours from adjacent sites into consideration to ensure the impacts to the environment are minimised.

Figure 4.11: The southern section adjacent to the road with some of the prominent sensitive areas (as examples). Rocky outcrops and bedrock sheets are dispersed throughout the area and require selected placement of turbines and roads.

Zone 11 (Figure 4.1)

This small footprint (Figure 4.12) in the south-eastern corner of the proposed development is sloped to the west with drainage lines prominent to the north and west. The vegetation is modified close to the water point and on the slopes. Habitat is dominated by the rocky nature and small sections of bedrock sheets. It is possible to find a footprint for a turbine in an area that will have a small impact on the environment. The access road will be important, as drainage lines to the west are considered as sensitive. The habitat sensitivity range from moderately low to moderate and the erosion potential low to moderate.

Figure 4.12: The small area in the south east with slopes and drainage areas to the north and the rocky areas in the southwest.

Zone 12 (Figure 4.1)

This area is on a plateau area with steep slopes to the south and west (Figure 4.13). On the plateau, there are potential sites (suitable footprint size) for the turbines and the vegetation in the flatter areas will have a low to moderate sensitivity (related to diversity). As was noted in the area, numerous rocky outcrops, crest and bedrock sheet areas are present. It will be important to ensure that the access road to the area follows the less steep contours. The sensitivity related to the habitat vary from moderately low to high (slopes, crests and bedrock sheets in the plateau landscape).

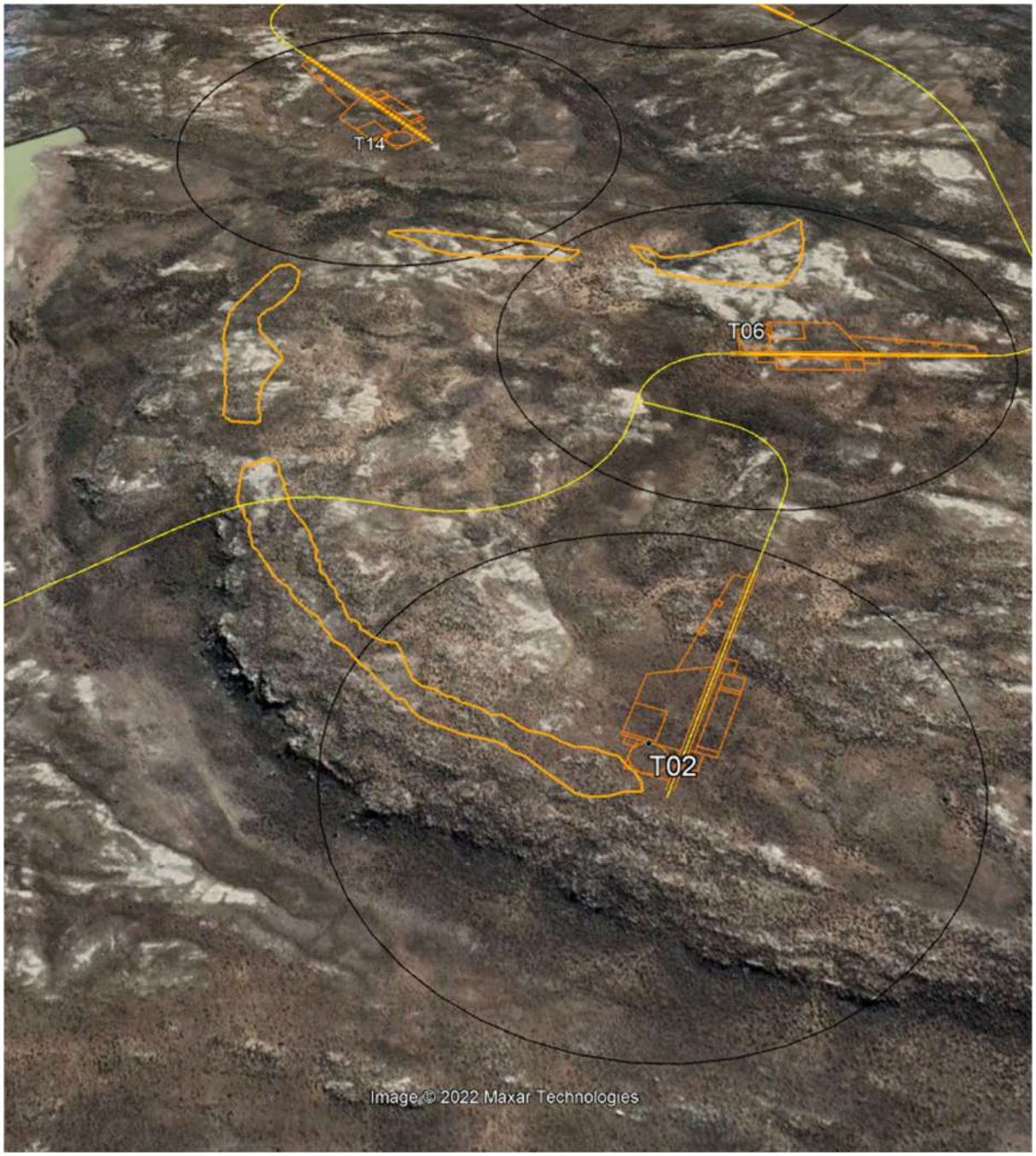

Figure 4.13: The area with the steeper slopes indicated (orange), but the plateau area has a number of drainage lines, rocky outcrops and bedrock sheets that must be avoided.

4.2.2 Connecting power line (132kV) between the Sutherland 2 and the authorised Rietrug and Sutherland substation (Arcrux substation)

The habitat associated with the for the proposed power line between the Sutherland 2 project and the Rietrug and Sutherland projects to the east are generally modified Figure (1.1).

It starts on the farm Tonteldoosfontein at the proposed substation site and links to the road to the east. From the road, it follows the dirt road, crossing the farm Gunsfontein, to Beerenvalley and the farm Scholtzenhof to the proposed Rietrug WEF substation area (Figure 1.1). The corridor crossing Tonteldoosfontein to the road is fair to good condition and the habitat is considered to be of low to moderate sensitivity and is related to ridges, rocky outcrops, bedrock sheets and drainage lines. The section following the main dirt road north is of similar sensitivity, but in both section the impacts can be mitigated with careful placement of pylons to avoid any sensitive areas.

Once the road turns east along the road to Scholtzenhof, it is near the road and impacts can be mitigated with placement of structures on the less sensitive areas. Again the sensitivity along this section is related to rocky outcrops, ridges, limited bedrock sheets and stream and drainage crossings. The area where the corridor crosses the farm Gunsfontein is more undulating compared to the section of Tonteldoosfontein. The sensitivity in general will be moderate to high and is related to the steeper slopes, the higher erosion potential and the stream crossings. Currently there are areas with some notable erosion (deep gullies) that is having a negative impact on the habitat. It is recommended that appropriate rehabilitation be undertaken on the road and the adjacent areas to limit this problem from escalating.

On the farm Scholtzenhof the landscape consists of rolling and undulating hills with the sensitivity of the habitat regarded as moderate. The impacts again will influence the more sensitive areas such as the rocky outcrops, ridges of the low hills and any drainage lines.

4.3 Habitat and animal sensitivity

During the survey, very little activity of any animals were noted. This could be for the following reasons: it was during a cool spell (low activity, especially for reptiles), human activity (low impact) and grazing (small livestock herds). There were some signs of rodent activity (mostly near rocky outcrops and wetted areas), old droppings of hare (possibly *Lepus saxatilis* and *Pronolagus saundersiae*) and antelope (possibly *Pelea capreolus* and *Sylvicapra grimmia*). Other species presence observed included *Herpestes pulverulentus* and *Hystrix africaeaustralis*.

This is no indication of a lack of animals, but just a suggestion that the time of the survey (cooler period, no trapping and day-time survey) was not optimal (refer 2.3.2). The habitat diversity for small mammals and reptiles are good, as there are many rocky outcrops present in the shrubland, the mountain slopes and on the plateau area. This can be done during the summer camera trapping assessment for *Bunolagus monticularis* and visual assessment for the presence of *Chersobius boulengeri.*

The rocky areas are considered to be the optimum habitat for many of the animals expected to be present, but it is not the only areas to be utilised. In the shrubland, a number of mammals, rodents and reptiles will be present and utilise the habitat for burrows (larger species), cover under vegetation and feeding.

4.4 CBA assessment and impacts

The general vegetation composition for the study area is considered to comprise mainly of one plant community. As stated by Botha (2021), "*the entire project footprint can be associated with a singular vegetation community, namely the Rosenia humilis – Elytropappus rhinocerotis Mountain Renosterveld. The area is dominated by the fairly flat plateau sections near the escarp with some small micro variations within this landscape. The vegetation community is dominated by dwarf shrubs such as Chrysocoma ciliata, Eriocephalus ericoides, Felicia filifolia subsp. filifolia, Pentzia dentata, Pteronia glomerata, P. glauca, Rosenia humilis, Asparagus capensis var. capensis, E. rhinocerotis and the grass species Tenaxia stricta, Pentameris airoides and Ehrharta calycina".*

Although the larger study area falls within the CBA 1 area, the projects have been authorised and appropriate mitigation measures provided to reduce impacts to acceptable levels. These have been incorporated into the EMPrs (along with appropriate management plans) and will be strictly adhered too.

Figure 4.2: Selected images of some of the sensitive rocky areas in the study area.

Figure 4.3: Examples of the sensitive ridges associated with the study area.

Figure 4.4: The sensitive bedrock sheets – high sensitivity with regards to the vegetation and animals associated with the habitat type.

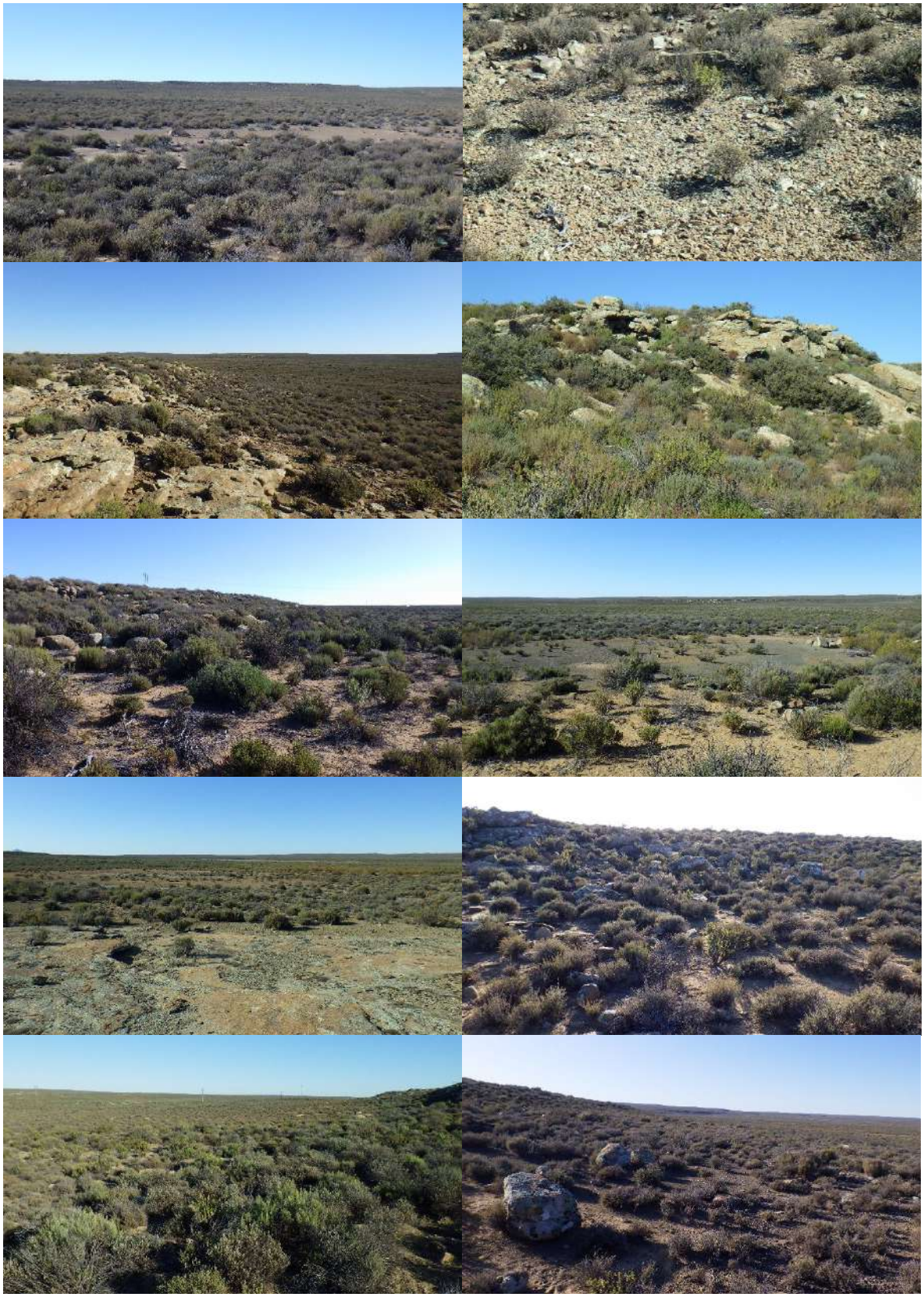

Figure 4.5: Examples of the sensitive ridges associated with the study area.

Figure 4.6: Stream, drainage lines and pans are some of the sensitive areas dispersed in the landscape.

Figure 4.7: Examples of areas that the animals use as habitation in the study area (rocky areas, burrows in deeper soils and dense vegetation).

Figure 4.8: Examples of preferable foot print site for turbine positions on flat plateau areas.

5 FINAL TURBINE LAYOUT ASSESSMENT AND SENSITIVITY ANALYSIS

The final layout of the proposed turbine positions were received and assessed against the original walkthrough assessment and sensitivity analysis. The comments of this assessment is included as Table 5.1.

Table 5.1: The table include the new number allocated for the turbines (Figure 5.1), whether it was assessed and comments related to the final layout assessment.

Number	Evaluated	Comment
T01	y	Moderately sensitive form a habitat perspective, vegetation low to moderate sensitivity. Near edge, steep slopes to the west
T02	y	Near escarp to the south - currently outside the area investigated, habitat and vegetation low to moderate sensitivity.
T03	y	Area fine, low sensitivity for the vegetation and the habitat.
T04	y	Near escarp, sensitivity is moderate related to the habitat, erosion potential moderate and vegetation low to moderate sensitivity.
T05	y	Area fine, habitat and vegetation sensitivity low to moderate, as the area is undulating with some drainage channels.
T06	y	Turbine in area investigated and the area is fine. The road east to Turbine 17 more sensitive with undulating landscape – vegetation and habitat moderate sensitivity.
T07	y	Area fine, vegetation low to moderate sensitivity, the habitat and erosion moderate. The road to T09 fine with the erosion potential low to moderate.
T08	y	Moderately sensitive vegetation and habitat – low to medium. Road east to T06 - slopes, high sensitivity.
T09	y	Moderately sensitive - slope to south to river system. Habitat moderately sensitive - important for plants and animals.
T10	y	Area fine. Some rocky areas and slopes with moderate to high erosion potential, the vegetation sensitivity low to medium and the habitat sensitivity moderate to high, erosion potential high on the access road.
T11	y	Area fine (vegetation low to moderate), but undulating with increased erosion potential and a drainage system to the northeast.
T12	y	High sensitivity in the area - not defined during survey. Rocky areas and rock plates which are important animal and plant habitat. Slopes to east - drainages with the erosion potential low to moderate. Access road to the west with some rocky areas and undulating.
T13	y	Moderately sensitive with regards to the vegetation (undulating, drainage) with the habitat sensitivity moderate to high and the slopes with a low to moderate erosion potential.
T14	y	General area fine, with the vegetation sensitivity low, the habitat sensitivity low to medium and the erosion potential ranging between low and high (rocky areas, narrow "escarp", slopes). The road to T17 - fair, not all evaluated, but profile indicate vegetation sensitivity low to medium.
T15	y	Moderate sensitivity (vegetation) and the rocky areas (habitat sensitivity Low to medium). The road from T01, not evaluated – seems the habitat sensitivity is medium to high, the vegetation is medium and the erosion potential to be low to medium.
T16	y	Moderately sensitive - slopes and vegetation (L/M) and the habitat sensitivity (M/H).
T17	y	Moderate to high sensitivity, rock slabs – habitat sensitivity = H, vegetation = M/H, erosion potential = L.
T18	y	Moderately sensitive. Undulating, slopes with sensitivity for the habitat = M/H (varying), Vegetation = M and the erosional potential = L/M/H (depending on proximity to escarp areas).
T19	y	Area fine - best solution for that area.
T20	y	Moderately sensitive - undulating, rocky outcrops, rock structures (heritage) with the sensitivity for the habitat (H), vegetation (M/H) and the erosion potential (L/M). Close proximity to escarp makes it less ideal site, habitat and vegetation more diverse in the rocky areas.
T21	y	Moderate to high sensitivity - stone structures near turbine position, laydown area in sensitive rocky area (e.g. S32.62058 E20.74068) with the habitat sensitivity (H/VH), vegetation = (L/M - rocky, wetlands).
T22	y	Area fine – habitat = L/M (rocky), vegetation = L/M, slopes to east - drainage lines.
T23	y	Moderate to high sensitivity. Habitat = M/H, vegetation = M, erosion potential = M/H, slopes to river. Road outside area investigated.
T24	y	Moderate to high sensitivity: habitat = M/H, wetland depression, vegetation = M, erosion potential M/H.
T25	y	Moderate to high sensitivity: habitat = M/H, wetland depression, vegetation = M, erosion potential M/H.

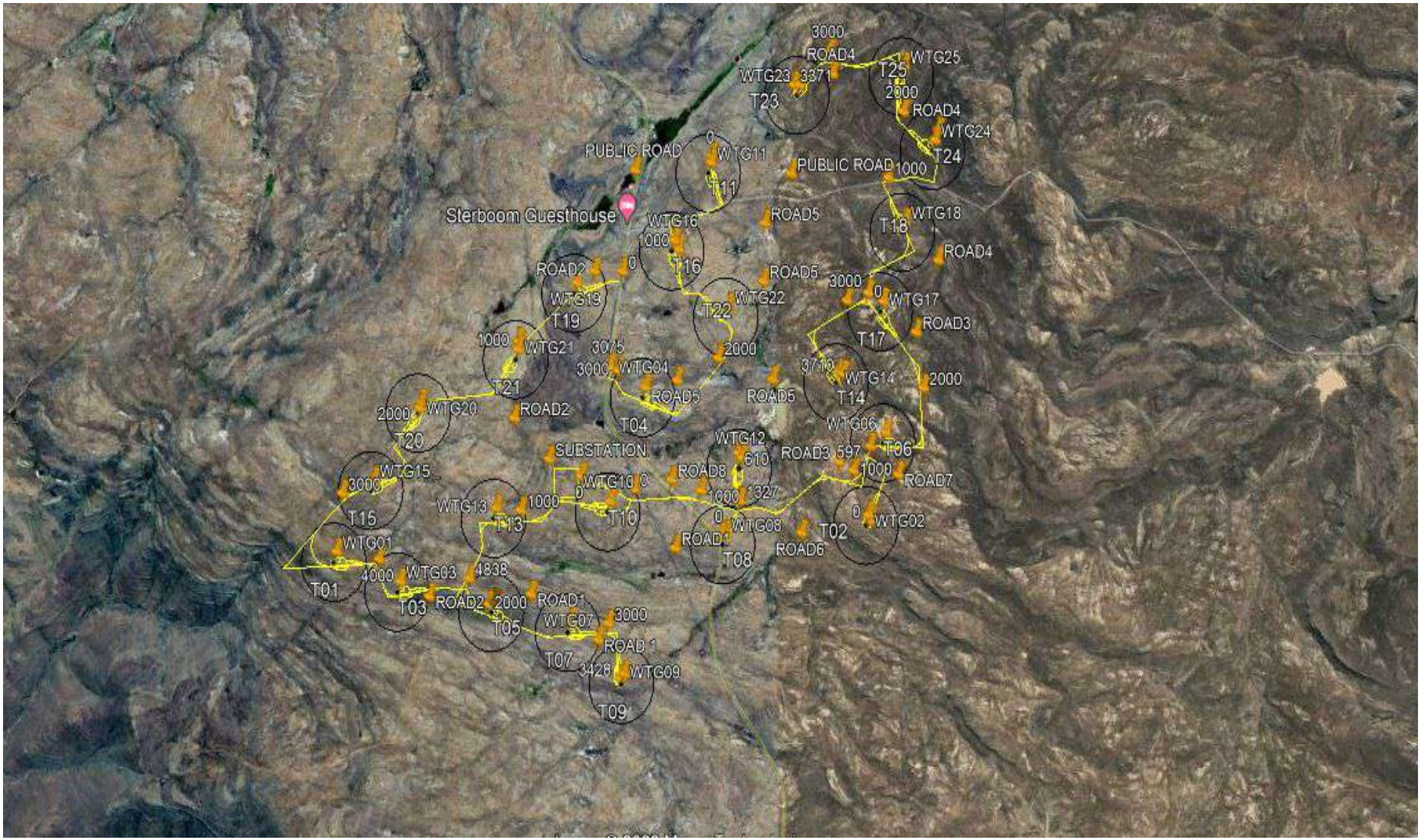

Figure 5.1: Final proposed layout received from the Applicant.

6 CONCLUSIONS

6.1 Significance of impacts

The proposed Sutherland 2 WEF is planned southeast of Sutherland on the farm Tonteldoosfontein (Figure 1.1 and Figure 4.1). The area is associated with the undulating landscape near the plateau of the Komsberg range and falls within some sensitive habitat areas.

The impacts currently noted in the area relate to intensive agriculture over an extended period and include livestock grazing (main activity) and cultivated lands (small areas). The development of infrastructure include roads and farm tracks, homesteads, barns and facilities to house animals (e.g. kraals), water points (boreholes, water storage dams and drinking points), impoundments and fences.

The impacts to the proposed development will have varying intensity to the biota and the habitat with resulting changes in the landscape. A factor that is not currently fully understood, is the impact of changes in the climatic patterns in the semi-arid and arid regions. It is important to note that these changes is having a noticeable result in the region and the area associated with the proposed project. These cumulative impacts added to the recent extended drought had an influence on the vegetation composition and animals in the area (not studied in detail). In discussions with landowners it is clear that long-term grazing is having a significant impact. One (1) landowner mentioned the farm he is currently working on, lost 75% of its grazing capacity. The question is, is it all related to poor land use practises, i.e. stocking loads of livestock, or is it partially related to the climatic changes resulting in the natural vegetation composition over time?

Habitat

When evaluating the habitat in the study area, it is clear that some changes have occurred as a result of the human activities in the area. As part of the management strategies on the farms, the erection of fences is needed to manage the livestock herds and grazing. This resulted in the associated roads and tracks, the installation of water points and boreholes. An alternative option is the management of grazing with water points. This entails the placement of more water points, the removal of fences and manage grazing areas by the manipulation of water to the different drinking points.

In general, the habitat associated with the study area is in a fair to good condition. Some erosion (limited) was observed and the main impacts will be regarded as the large impoundments, houses and the infrastructure for storing of equipment and livestock kraals and pens. The proposed development will have a negative impact on the environment and will vary between low and moderate, with some impacts that can be considered to be high.

The habitat has different types and it include the shrubveld (larger proportions of the habitat) with a **low sensitivity** from an ecological perspective. These areas have good vegetation and some animals use the larger plants as cover from predators. Other species will use the sandy substrate to dig holes and burrows as living quarters. Dispersed in the landscape is numerous ridges on the hills, rocky outcrops and bedrock sheets, which are considered to be of a **medium (some areas medium/high) sensitivity**. This is related to the rocky outcrops and crests or ridges offering good habitation habitat for animals, reptiles, birds and even bats. With regards to the natural vegetation, these areas have more diverse plant communities compared to the shrubveld. The areas with a lower densities of plants, but mostly more protected species are the bedrock sheets and are therefore considered to have a **medium to high sensitivity**. Avoiding any construction or other activities are therefore critical.

The natural vegetation associated with the streams are important and slightly more diverse compared to the shrubland zones. The vegetation is therefore of **moderate sensitivity**, while the habitat types are regarded as of **moderate to high sensitivity**.

Natural vegetation

The clearing of natural vegetation to accommodate the footprint of the substation and turbines will have a **low to moderate** impact. This is related to the total removal of the vegetation (approximately 250m^2 for each turbine) with the added change that the hardened surface can contribute to increased runoff and erosion. To lower the risk of the increased runoff, it is recommended to ensure some permeable compounds are used on the edges to ensure water penetration occur and that excessive runoff is prevented. The risk will increase if the sites for turbines are selected on slopes and ridges of the low hills.

The proposed development can have a significant impact on the red data and protected species if development is not well managed. This include the avoidance of the sensitive habitat types i.e. the ridges, rocky outcrops and bedrock sheets (**moderate to high sensitivity**). These areas have shown to have a low density of plants, but in most instances have a higher diversity and this include the protected genera associated with the area. The area of the proposed development is mapped as a CBA, but the uniform vegetation composition and impacts related to the long-term intensive grazing, have impacted on the ecosystem. **If the placement of the turbines and roads are well executed, the overall impact can be low**.

In order to address the loss of diversity in the natural vegetation composition, it is recommended that the natural resilience of the plants must be used in order to improve the veld conditions. It is suggested that a detailed veld assessment must be carried out as a baseline study to determine the status of the natural vegetation composition of the farm. Once completed, this information and data must form part of a management plan to be incorporated into the EMPr for the WEF during the construction and operational phases. This can be a long-term objective which forms part of the rehabilitation commitment from the developer.

When determining the carrying capacity of the veld, the potential loss of natural vegetation (clearing of footprint areas) as a result of the proposed development must be taken into consideration. Therefore, the cumulative impacts of the long-term grazing and clearing for the development must be calculated following completion of construction. These factors and the existing farm camp grazing system will inform the carrying capacity that will ensure that the natural vegetation biodiversity will improve on the farm Tonteldoosfontein.

It is critical to remember, that the “new” climax plant community, will differ from the historic information, as it must account for potential changes in the plant community in relation to climatic changes. The rehabilitation plan must include a stringent monitoring protocol. This approach to improving the vegetation diversity will ensure that the proposed project can be implemented, but at the same time, all efforts are put into place the restore the natural vegetation and maintain the sensitive rating linked to the CBA assessment as listed in the Northern Cape Conservation Plan. Part of the development must focus on a water distribution strategy to ensure that trampling is reduced and larger areas can be rested for recovery and restoration. The strategy must further ensure that selective grazing is minimised in order for the vegetation diversity to recover.

The proposed development will have a **low to moderate** impact on the vegetation. The cumulative impact for the project will be **moderate**, as the road layout will cover a large area. Although the physical loss of vegetation can be considered to be low, but the long-term effect of roads modifying water flow in the landscape, will have a larger impact. It is important to note that the flow of water in the landscape will be affected by the roads. These structures will act as mini weirs, diverting water away from the intended drainage route. A second impact is that the water will penetrate to a deeper level and this will have an impact on the vegetation directly below the road (downstream side). In order to maximise the limited water available in the landscape, most of the natural vegetation in the area have very shallow root systems. Therefore the diverted flows can have a negative impact over the long term (e.g. the operational time if the WEF).

In addition to the footprint of turbines, substation and the road infrastructure, the run-off can contribute to erosion in the area. The soils have **a low to moderate** erosion potential (with good vegetation cover), but it will be **moderate to high** in areas devoid of vegetation and steeper slopes. This aspect (erosion) will need careful and regular monitoring to ensure that if problems occur, immediate action and rehabilitation are done. The impact can be **very low** if well managed, but can be **moderate or high** if the problems aren't address timeously.

It is recommended that following layout approval, a terrestrial ecologists (botanical, faunal, water resources) must be consulted during the construction phase (prior to any clearing activities) to ensure no red data species are present in the final footprint (spring survey on all affected areas and part of the permit application). This must be conducted prior to commencement of construction of the project and all site clearing activities. This will be the most effective strategy to identify any protected or red data plants. If any are identified, the process must then include consultation with the conservation authorities to finalise the actions (e.g. remove and relocate the affected plants if deemed the best option).

Animals

With regards to the animals in the area, the indication is that the presence on the red data species *Bunolagus monticularis* and *Chersobius boulengeri*, are not probable. It is recommended that the sensitive habitats which are regarded as potential habitat for the species, are not included in the footprint of the WEF layout. These include the rivers and streams and rocky outcrop and the crests of hills and low mountains in the area.

With regards to the other animal species (mammals, reptiles and rodents), it is accepted that most of the species will dissipate during the construction phase of the proposed project. Once the activities cease and the operational phase is well underway, the animals will return if suitable habitat is present. It will be important during the construction and operational phases that the management strategy ensure no illegal trapping or hunting of any animals occur.

6.2 General Recommendations

- As part of the project, water as a result of runoff at turbines and from roads must be well controlled.
    - This must include spreading the water over a large area in the landscape, i.e. prevent concentrated runoff that can cause erosion.
    - It must include effective dissipaters on slopes that are more susceptible to erosion.

  - A concern is the effect of the road system that will impact surface water movement. As mentioned, the roads will perform as blockages or "weirs" with the result that water can penetrate below the root depth of the plants immediately downstream of the roads. If possible, the roads must be constructed to allow for go water flow across the landscape.
  - If this is not achieved, there is a distinct possibility that the vegetation downstream of the roads can be negatively impacted.

- An effective storm water management plan should therefore be compiled by a suitable specialist and the effectivity of the plan should be regularly assessed and revised if necessary. The plan must include silt and sediment traps where needed and effective dissipater structures to reduce flow velocities.

- Once the final outlay and alignment is completed and approved, a survey of the substation area, the turbine footprints, the road infrastructure and powerline footprint must be conducted (spring survey) before the initiation of the construction phase. This is to confirm the presence or absence of any red data and protected species once the final layout is approved.

- Individual plants, e.g. protected species, which can't be avoided during construction, must be mapped and the list send to the conservation authorities for action.
  - A suitably qualified terrestrial ecologist must be appointed to inform the permitting process for the relocation, removal or transportation of protected species and undertake a survey of this final approved layout prior to commencement of any site clearing activities. The specialist must identify areas suitable for relocation following the issuing of the relevant permits from the conservation
  - It is important to note that most of these plants are sensitive to relocation and in many instances don't survive relocation. A clear strategy must be developed following the guidance and input of the terrestrial ecologist and conservation authority.

- It is recommended that all vegetation clearing within the development footprint is kept to a minimum and activities must be limited to the drier periods (late autumn and winter) to the extent which construction timelines permit for example, following rainfall events roads must be given adequate time to dry out before traversing with heavy equipment of machinery. This will ensure that accelerated erosion is minimised.

- All clearing of vegetation must be restricted to the footprint areas only – this will limit any further loss of undisturbed vegetation and loss of habitat.
  - No driving of any vehicles outside the demarcated roads and site footprints is to be allowed.

- Indigenous shrubs and trees that are that cleared must be shredded with a wood chipper and used as mulch in exposed areas (to stabilise exposed areas and seed bank for revegetation).

- It is important to prevent pollution and all hydrocarbons must therefore be stored off-site. Where small quantities are needed onsite, it must be stored in a well-managed and constructed hydrocarbon storage facility with impermeable floors and the appropriate bunding, sumps and roofing both for onsite and offsite facilities must be provided.

- Handle hydrocarbons carefully to limit spillage and ensure all vehicles used for the project are serviced regularly in order to limit any hydrocarbon leaks.
    - This must include a designated single location on-site for refuelling and emergency maintenance (safe distance from any freshwater resource features) and a spill kit (onsite) to deal with any hydrocarbon leaks.
    - Contaminated soils must be disposed of at an approved site for treatment and records of this must be kept.

- As there were changes from the initial assessment and the final layout proposed as part of the Basic Assessment and Amendment to split the Sutherland WEF Cluster (comprising of Sutherland WEF, Rietrug WEF and Sutherland 2 WEF), it must be noted that for the compulsory permit applications, a full walk down assessment to identify the red data and protected species in the final corridors, prior to the commencement of site clearing activities must be undertaken by a suitably qualified terrestrial ecologist.
    - Any clearing or construction can only commence once the final permits are received.
    - If any red data species are found within the new approved layout, these must be treated as per the recommendation and protocols from the conservation authorities and the appointed terrestrial ecologist.
    - This assessment must be done in spring to ensure optimum conditions to identify as many species as possible.

After mitigation all impacts were determined to be of low or low/moderate negative significance. If the recommendations and mitigation measures are implemented and monitored over the life expectancy of the WEF and powerline projects, the potential impacts on the terrestrial resource integrity and functioning can be reduced to a sufficiently low level. This can only be achieved if all the recommended management, mitigation measures and monitoring protocols form part of all EMPrs for the WEF and powerline site. Linked to these documents are the appropriate rehabilitation guidelines and ecological monitoring recommendations.

Based on the outcomes of this pre-construction walkthrough assessment, it is my considered opinion that the proposed final layout detailed in this report could be approved from a terrestrial ecological perspective.

Table 6.1: A summary of the key impacts identified for the proposed development.

Construction Phase		
Direct Impacts	Loss of vegetation during construction	• The activity during construction of the proposed project (access roads, substations, turbine and the connecting powerline) will result in the loss of habitat as a result of vegetation clearing of indigenous vegetation, resulting in permanent loss in these areas. • Uncontrolled construction activity outside the footprint would result in additional plant community degradation, resulting in the permanent loss of vegetation and sensitive habitats.
	Loss of vegetation within a CBA area.	• Uncontrolled construction outside the footprint could result in the unnecessary loss and disturbance of vegetation in the CBAs areas. • The proposed project will have an impact on the natural vegetation.
	Erosion and soil compaction	• The manoeuvring of construction vehicles within the project footprint will result in soil compaction, which will lead to increased soil erosion and reduced porosity.
	Introduction of alien invasives	• Disturbance to the vegetation and soil during construction may provide an opportunity for alien plant species to colonise (low probability, as there is currently a limited seedbank).
	Impacts on floral habitats and ecosystems	• Construction run-off and erosion may result in increased edge effect pressures, alien plant invasion and erosion, leading to the loss of ecosystem functioning. • Uncontrolled construction activities, (e.g. extending beyond the development footprint) can put pressure on sensitive plant populations which may result in permanent loss.
	Disturbance to surrounding faunal species	• During the Construction Phase, vehicular movement, noise and habitat destruction may cause disturbance to resident faunal species, which could lead to a disturbance in normal behaviour • During the Construction and Operational Phases, poaching of wild animals by workers may occur, resulting in population losses.
	Impacts on floral habitats and ecosystems	• Construction run-off and erosion may result in increased edge effect pressures, alien plant invasion and erosion, resultantly leading to loss of ecosystem function. Uncontrolled construction activities, (e.g. extending beyond the development footprint) can put pressure on protected plant populations/species of special concern which have been identified in the area, which may result in permanent loss.
Indirect Impacts	Loss of vegetation during construction	• Uncontrolled construction outside the approved development footprint may result in inadvertent damage and could lead to permanent loss of larger sections of natural vegetation.
	Disturbance to surrounding wildlife and fauna	• The unregulated clearing of vegetation beyond the development footprint could result in disturbance of specialised faunal habitats and associated species (e.g. wetlands, ridges, rocky outcrops), resulting in reduced faunal populations.
	Disturbance of sensitive areas	• Uncontrolled construction activities and irresponsible construction of access roads, substation sites, turbine footprints and powerlines routes may contribute to erosion and degradation of water-courses and associated riparian habitats, resulting in permanent habitat degradation.
Operational Phase		
	Impacts on the habitat and disturbance to fauna and flora	• There will be a potential of road kills i.e. the access road and internal roads associated with the WEF. • Due to increased activity there is an increase of poaching potential – both for animals and plants. • Cleared areas (servitudes and access roads – hard surfaces) will be prone to increased erosion.

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