

F-2 BIODIVERSITY

BASIC ASSESSMENT FOR THE PROPOSED
ESTABLISHMENT OF POWER LINES AND
ELECTRICAL INFRASTRUCTURE TO SUPPORT
THE MUKONDELELI WIND ENERGY FACILITY
LOCATED NEAR SECUNDA, MPUMALANGA

TERRESTRIAL BIODIVERSITY AND SPECIES:
SPECIALIST ASSESSMENT

Final Report 1



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4 January 2023

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EXECUTIVE SUMMARY

Background

Mukondeleli RF (Pty) Ltd proposes to develop the Mukondeleli Wind Energy Facility (up to 300 MW) and its associated infrastructure near Secunda in Mpumalanga. This report covers the proposed grid infrastructure (referred to as the Mukondeleli gridline or powerline in this report) which includes an on-site substation at Mukondeleli WEF, a 132kV gridline, a step-down substation and a Battery Energy Storage System (BESS) at the Sasol facility (Sasol Three Main Transmission Substation). Two alternative on-site substations are proposed with substation 1 (SS 1) the preferred option. The main Mukondeleli wind energy site will be referred to as the Mukondeleli WEF site in the current report.

This report has been prepared in terms of the Environmental Impact Assessment (EIA) Regulations under the National Environmental Management Act (Act No. 107 of 1998) (NEMA 2014, 2017) and the gazetted *Procedures for the assessment and minimum requirements for reporting on identified environmental themes in terms of Sections 24(5) (a) and (h) and 44 of the National Environmental Management Act, 1998*, when applying for Environmental Authorisation, specifically the *'Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity'* (GG 43110 / GN R320, 20 March 2020). Note that this protocol replaces the requirements of Appendix 6 of the 2014 NEMA EIA Regulations, as amended. The approach, methodology and regulatory framework is explained in Chapters 2 and 3 of the report.

Location, topography, climate, geology and soils

One gridline route is proposed but with a split towards the two alternative substations at Mukondeleli. The gridline 1 route covers a distance of approximately 7.9 km from the Mukondeleli on-site substation (SS 1) to the step-down substation and BESS at the Sasol facility. The gridline from the alternative substation (SS 2) covers a distance of approximately 8.3 km. The gridline covers the farms (or portions of) Van Tondershoek 317 IS, Bosjesspruit 291 IS, Brandspruit 318 IS and Twistdraai 285 IS. The area falls within the Gert Sibande District Municipality and the Govan Mbeki Local Municipality in the Mpumalanga province. The proposed Mukondeleli on-site substation SS 1 is located at 26° 37' 00.0" S; 29° 11' 24.0" E and SS 2 is located at 26° 37' 26.38"; 29° 11' 03.37". The step-down substation at the Sasol facility is located at 26° 33' 49.3" S; 29° 09' 41.7" E.

The site is characterised by grassland on gentle undulating plains. Altitude ranges from about 1600 m to 1646 m above sea level (Figure 1). The site is drained in the north from east to west by the Klipspruit and its tributaries and by the Boesmanspruit and its tributaries in the south. The southern and central part of the routes are underlain by dolerite (Jd), while sandstone, shale and coal beds of the Vryheid Formation, Ecca Group (Pv) cover the northern section of the gridline. Some alluvium occurs along the drainage lines. The site is covered by the Ea Land Type, which occurs on undifferentiated soils and consists of one or more vertic, melanic, red structured diagnostic horizons.

The mean annual rainfall as measured at Secunda is 693 mm with the rainy season predominantly from October to March when about 86% of the annual rainfall occurs. The mean annual temperature at Secunda is 15.8°C with the extreme maximum and minimum temperatures 33.0°C and -4.3°C respectively.

Vegetation and flora

The Mukondeleli gridline site falls in the Grassland Biome and more specifically in the Mesic Highveld Grassland Bioregion. It is located in the Soweto Highveld Grassland (Gm8) national vegetation type which has a "Vulnerable" conservation status because almost half of it has been transformed, mostly by cultivation, plantations, mining and urbanisation. Overall, the vegetation on the Mukondeleli gridline site is structurally a grassland. Based on species composition, six habitats (plant communities) were distinguished, described and mapped for the Mukondeleli

gridline site. A further four units were also distinguished, i.e. croplands, infrastructure, disturbed areas and dams. The site does not fall within any Centre of Plant Endemism.

During the field surveys, 290 plant species were recorded on the three Enertrag sites (Vhuvhili, Mukondeleli and Impumelelo). Combined, the checklist generated by the NewPosa database for the region, the red-list for Mpumalanga (Lötter 2015) and the list for the current field study yielded 396 species for the region of which 30 are protected species according to the MNCA (1998).

Twelve of the 30 Mpumalanga protected plant species (Schedule 11) were recorded during the site surveys. Another five species are on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga. None of the SCC listed by the Screening Tool were encountered on the Mukondeleli gridline site during the site visit. None of the seven SCCs (*sensu* SANBI SCC definition) listed for the region were recorded on the Mukondeleli gridline site although *Gladiolus robertsoniae* was noted at the Impumelelo site. No threatened or protected species (ToPS listed) under the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) is listed for the Mukondeleli gridline site and none were found at the site. Thirteen (13) CITES Appendix II species are listed for the region including mostly (10) species of the Orchidaceae. *Aloe ecklonis*, *Aloe transvaalensis* and *Euphorbia clavarioides* were the CITES species recorded on the Mukondeleli site. No nationally protected tree species is listed for the site and none were recorded during the site visit. No endemic species are listed for the Soweto Highveld Grassland Vegetation Type.

Forty-seven alien plant species were recorded on the three Enertrag sites of which 12 are currently declared alien invasive species and 35 naturalised alien species (Appendix B). Another four naturalised alien species are listed by NewPosa for the region.

Fauna

The site falls within the distribution range of 52 terrestrial mammal species. Three IUCN Threatened and seven Near Threatened mammal species were listed for the environs of the Mukondeleli gridline site. Mammals that have been sighted (own observations and landowner reported) include the Near Threatened Serval *Leptailurus serval*, Southern African hedgehog *Atelerix frontalis* and the Southern African vlei rat *Otomys auratus*. The steenbok *Raphicerus campestris* and the hedgehog *Atelerix frontalis* are Schedule 2 mammal species that were recorded in the vicinity of the Mukondeleli gridline (MNCA 1998). The serval *Leptailurus serval* and the hedgehog *Atelerix frontalis* are the threatened or protected mammal species (ToPS) on the Mukondeleli site, while the serval *Leptailurus serval* is the only CITES listed mammal species in the vicinity of the gridline site.

Thirty-two (32) reptile species are listed for the region. *Smaug giganteus*, the giant girdled lizard, has a Vulnerable IUCN status and is classified as Endangered in the NEMBA (2007c) ToPS list, but was not highlighted by the screening tool for the site and was not listed on the MTPA database for the participating farms. Provincially protected reptile species include 15 Schedule 2 Protected reptiles and 17 Schedule 5 reptiles. The two CITES listed reptile species that were recorded for the region were the Giant girdled lizard (ouvolk) *Smaug giganteus* and the Common girdled lizard *Cordylus vittifer*. The only reptile that the landowners reported for the Mukondeleli gridline site, is the Rinkhals *Hemachatus haemachatus*.

None of the species (avifauna and bats excluded) listed by the Screening Tool *viz.* *Lepidochrysops procera* and *Crocidura maquassiensis*, were recorded on site. These species are also not listed in the ADU database, the MNCA (1998) schedule lists or the MTPA database for the participating farms.

Conservation

The CBA map indicates the presence of CBA1s and a CBA2s across a large section of especially the farms Van Tondershoek and Bosjesspruit. The Mukondeleli on-site substations (preferred on-site substation SS1 and the alternative SS2) is located in a CBA and where possible should be repositioned. Sections of the gridline traverse CBA1 and CBA2s in the south. These sites must be micro-sited prior to approval of final layout such that the site can be groundtruthed and any sensitivity areas avoided. Pylon positions can be selected to avoid drainage lines.

The Mukondeleli gridline is not located in a protected area and does not form part of the NPAES (2010). It is also not earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA). There are some small Ecological Support Areas (ESA)(local corridors) demarcated along the Mukondeleli gridline route. ESAs need to be maintained in at least a functional and often natural state, but some limited habitat loss may be acceptable and thus well-positioned pylons should not degrade the ESAs. Land use guidelines for ONAs are not required to meet biodiversity targets and subsequently, power lines should be permissible in ONAs.

Large portions of the site are demarked as either 'Heavily modified' or 'Moderately modified – old lands', especially in the east. These MBSP categories do not have equivalent categories in the SANBI CBA classification system and must be assumed to degraded to such an extent that they cannot qualify as ESAs or ONAs.

The site does not fall in a Strategic Water Source Area (SWSA). Although the Screening Tool did not mention river of wetland FEPAs the entire Mukondeleli site is contained in an Upstream Management Area river FEPA. In the current assessment, the area mapped as river FEPA did not emerge as being highly sensitive and the sensitivity model that was applied, classified only the drainage lines on site as being of high sensitivity with most of the area classified as low sensitivity and a few spots of medium sensitivity. Several Highveld wetland categories are present in the Mukondeleli gridline site, with most of the seeps and channelled valley-bottom wetlands captured in the CBA delineation.

Sensitivity

The Site Sensitivity Verification Report is given in Appendix D. A sensitivity model was applied to the data for each of the four habitats (plant communities) on site. Overall, the wetlands were classified as having a high sensitivity (Habitat 7), and the remainder classified as low sensitivity. The proposed gridline route traverses drainage lines and wetlands and the position of pylons should avoid these habitats. Along the watercourses, buffers are applicable to the development. A buffer zone of 32 m is usually applied to drainage lines, but the aquatic specialists may apply wider buffer zones along these habitats. **We recommend that the buffer specifications of the aquatic specialist are followed for all drainage lines/channelled valley bottom wetlands and seeps.**

Screening tool

The Site Sensitivity Verification Report is given in Appendix D.

Plant Species Theme

The Screening Tool rated the sensitivity of the Plant Species Theme as **medium** and two species were highlighted as being of concern. None of the SCC highlighted by the screening tool were recorded on site and our site verification indicated that most of the site had a **low** sensitivity.

Animal Species Theme

The Screening Tool rated the sensitivity of the Animal Species Theme as **medium**. Animal species (excluding avifauna and bats) highlighted by the Screening Tool for the region included *Crocidura maquassiensis* and *Lepidochrysois procera*. None of these species were listed in the MTPA database for the farms participating in the proposed Mukondeleli WEF development nor were they listed in the ADU mammal species list for the region and the MNCA (198) lists for the Mpumalanga province. They were not recorded on site during the survey. *Lepidochrysois procera* is

unlikely to occur on site because its host plant (*Ocimum obovatum*) was not present. What the screening tool did not highlight was the possible presence of the Giant girdled lizard, a species with a Vulnerable IUCN status. However, the species was not recorded on site. Overall, the sensitivity of the animal species theme (avifaunal and bat components excluded) is rated as **medium**. If the suggested mitigation measures are followed the animal SCC should not be negatively affected by the development.

Relative Terrestrial Biodiversity Theme

The Screening Tool rated the sensitivity of the Relative Terrestrial Biodiversity Theme as very high based on the presence of a Vulnerable ecosystem, CBAs, ESAs and Protected Area Expansion Strategy (NPAES). River or wetland FEPAs were not flagged by the screening tool as reasons for the very high sensitivity. Our background study confirmed that the Soweto Highveld Grassland vegetation type on site is listed as Vulnerable. However, the study area is not located in an area earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter MTPA). Our background study indicated the presence of CBAs on site. However, our sensitivity analysis rated large areas delineated as CBA as being of low sensitivity. Nevertheless, the gridline should where possible not be located within the area demarcated as CBA.

If the same 4-tiered scale were to be applied to the Terrestrial Biodiversity Theme, as in the case of the other themes, we would downgrade it to **low to medium**.

Environmental Impact Assessment

The direct, indirect and cumulative impacts of the proposed development on the Terrestrial Biodiversity and Species were assessed based on the knowledge gained during the site visit and literature review. Each of the impacts is briefly described in Chapter 13 in terms of the nature; proposed mitigation measures; and the significance of the impact without and with the mitigation measures applied. The methodology follows the guidelines provided by the CSIR.

The key issues are that the site falls within a “Vulnerable” national vegetation type and that large parts of the site have been identified as CBAs. Infrastructure positioning should be modified/amended to avoid the high sensitivity sections of the CBAs.

Potential impacts identified during construction, operational and decommissioning phases

- The clearing of natural vegetation
- The loss of threatened, protected, CITES listed and/or endemic plants/animals
- Loss of faunal habitat
- Direct faunal mortalities due to construction and increased traffic
- Increased dust deposition
- Increased human activity, noise and light levels
- Establishment of alien vegetation
- Increased water run-off and erosion
- Changes in animal behaviour

Cumulative impacts

- Vegetation loss and habitat destruction
- Compromising integrity of CBAs, ESAs and NPAES
- Reduced ability to meet conservation obligations and targets
- Loss of landscape connectivity and disruption of broad-scale ecological processes

The impacts, mitigation measures, management objectives and actions as well as monitoring are discussed in Chapter 13 and also in the Environmental Management Programme Input (see Chapter 15).

Legislative and permit requirements

The most important permit requirement is the permit that needs to be obtained for the removal of plant species protected in Mpumalanga (MTPA). Legislative requirements also relate to the combatting of alien invasive species. Other aspects are summarised in Chapter 14, e.g. NEMBA (ToPS listed species) and CITES listed species.

Final specialist statement and authorisation recommendation

Our findings related to the Terrestrial Ecology and Species are the following:

Provided the positioning of gridline infrastructure takes sensitive habitats, i.e. drainage lines and wetlands and CBAs into consideration, the resulting low sensitivity rating and low impact significance for many of the habitats means the project could go ahead, provided all mitigation measures and management actions proposed to conserve protected fauna and flora on the site, are taken into consideration. **We thus recommend authorisation of the project provided all mitigation measures are implemented.**

A brief summary of the most important considerations is provided below:

Vegetation and flora:

- **Vegetation types:** The Soweto Highveld Grassland vegetation type is listed as “Vulnerable” and consequently the gridline infrastructure should give preference to the habitats on site where past disturbance has occurred e.g. disturbed areas, cultivated cropland or abandoned cropland (old lands).
- **Threatened plant species:** No IUCN threatened or red-listed plant species were encountered during the field survey.
- **Protected plant species:** No ToPS species or protected tree species were recorded on site. A number of Mpumalanga protected species were recorded on site, but none with a threatened IUCN status.
- **CITES:** *Aloe ecklonis*, *Aloe transvaalensis* and *Euphorbia clavarioides* were the CITES species recorded on the Mukondeleli WEF site.
- **Habitats:** Three of the four habitats on site had a low sensitivity rating, while the wetland habitat (Habitat 7, including dams) had a high sensitivity rating. All other habitats (mostly man-made) had a low sensitivity rating.
- **Overall sensitivity of plant theme based on the status of the habitats (plant communities):** Rated as **low**, provided some infrastructure is repositioned to avoid CBAs, drainage lines and wetlands. The Soweto Highveld Grassland has a Vulnerable threat status and to minimise the impact on the vegetation a ground cover should be maintained in the servitude along the gridline.

Fauna (avifaunal and bat components excluded):

- **Screening Tool:** The species that were highlighted by the Screening tool, viz. the Maquassie musk shrew (*Crocidura maquassiensis*) and *Lepidochrysops procera* were not encountered on site and are not listed on the ADU database for the region or the MNCA (1998) provincial species lists.
- **Threatened animal species:** The giant girdled lizard (*Smaug giganteus*), a reptile with a Vulnerable IUCN status has been noted on Mukondeleli according to one of the landowners. This species was however not highlighted by the Screening Tool.
- **Near Threatened species:** Three Near Threatened mammal species are reported for the vicinity of the gridline, according to the landowners. i.e. the serval (*Leptailurus serval*), the Southern African hedgehog (*Atelerix frontalis*) and the Southern African vlei rat *Otomys auratus*. None of these species were however highlighted by the Screening Tool.
- **Overall sensitivity of animal theme (avifaunal and bat components excluded):** This is rated as **medium**. If the suggested mitigation measures are followed the animal SCC should not be negatively affected.

Conservation:

- **Protected Areas:** The study area is not located in a protected area.
- **National Protected Areas Expansion Strategy (NPAES):** The development will not interfere with the protected areas expansion strategy according to the NPAES spatial data of 2010 and it is also not earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA).
- **Critical Biodiversity Areas (CBAs):** The on-site substations are currently located in the CBA area, however the particular site was classified as having a low sensitivity in the current assessment. These sites must be micro-sited prior to approval of final layout such that the site can be groundtruthed and any sensitivity areas avoided. Pylon positions can be selected to avoid drainage lines.
- **Ecological Support Areas (ESAs):** There are ESAs (local corridors) distinguished along the gridline route. However, the development should not impact negatively on these units.
- **Freshwater Ecosystem Priority Area (FEPA):** Although the entire site is classified as an upstream management area, the site assessment of the vegetation and the application of a sensitivity model rated most of the river FEPA area as being of low to medium sensitivity, with only the drainage lines having a high sensitivity.
- **Mpumalanga Highveld wetlands:** These wetlands were largely incorporated into the delineation of the CBAs (refer to aquatic specialist report for wetlands).

Ecological processes, function and drivers:

- Overall, it is unlikely that the development will contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions.
- The disturbance caused by the construction of the infrastructure will inevitably create conditions favourable for invasion by alien species and thus a programme for the early detection as well as control of alien invasive plant species must be implemented.
- Fire is an important driver of vegetation dynamics in the Grassland Biome and can occur when the fuel load is high. To avoid damage to the infrastructure, fire will have to be suppressed. If the grass layer is regularly mowed/brush cut, it should prevent grasses from becoming moribund in the absence of fire, although regular mowing could affect seed set.

Significance of environmental impacts:

Overall the significance of the environmental impacts was rated as very low to low. In summary:

- Since the development footprint is expected to be relatively small, the loss of habitat within the Soweto Highveld Grassland vegetation type will be fairly small. However, our impact assessment was based on the assumptions (i) only a service track would be cleared and a vegetative groundlayer would be retained beneath the rest of the servitude; and (ii) where the vegetation was destroyed at the pylon sites during construction, that it will be rehabilitated and allowed to recover.
- **From an ecological point of view,** large portions of the site have been heavily modified (compare CBA map and are no longer prime examples of the Soweto Highveld Grassland. If the development is thus primarily contained within the heavily or moderately modified areas it would not affect the status of the vegetation type since these modified area were already considered as lost for the allocation of a vulnerable status of the vegetation type.
- Habitat 7 was rated as highly sensitive in the current assessment.
- Most of the habitats traversed by the proposed gridline were rated as having a low sensitivity.
- None of the species highlighted by the screening tool were encountered on site, thus the impact on populations of threatened or protected species will be negligible if all mitigation measures are applied. Although not mentioned by the screening tool, the Giant girdled lizard has been reported by one of the landowners. As a precautionary measure once the footprint has been amended to take all

specialist assessments into consideration, a survey of the footprint could be undertaken to establish the presence/absence of the species.

- Depending on the type of fencing to be erected at some of the infrastructure, the gridline infrastructure will contribute minimally to obstruction of animal movement.

Key environmental mitigation and management actions proposed

- Ensure that the placing of infrastructure takes the sensitivity mapping of the ecological assessment into account to avoid and reduce impacts on species and habitats of conservation concern.
- Demarcate all infrastructure sites clearly to avoid unnecessary clearance of the vegetation.
- Avoid or minimise impacts that could potentially affect animal behaviour.
- Trenches should not be left open for long periods of time. Trenches should be inspected regularly for the presence of trapped animals.
- Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns.
- Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site.
- Speed limits should be strictly adhered to.
- Dust control measures should be implemented.
- Permits have to be obtained for the removal of Mpumalanga protected species.
- Implement a monitoring program for the early detection of alien invasive plant species.
- Employ a control program to combat declared alien invasive plant species.

Preferred infrastructure locations

On-site substation (SS 1): The site location is acceptable in terms of our sensitivity findings and falls in a habitat with low sensitivity. However, the site falls in an area demarcated as CBA1 according to the Mpumalanga Biodiversity Sector Plan (2014) and therefore should be micro-sited to a more acceptable location.

Alternative on-site substation (SS 2): The site location is acceptable in terms of our sensitivity findings and falls in a habitat with low sensitivity. However, the site falls in an area demarcated as CBA1 according to the Mpumalanga Biodiversity Sector Plan (2014) and therefore should be micro-sited to a more acceptable location. The substation site also falls in an area demarcated as seep.

Gridline: The powerline covers some CBAs, ESAs and wetlands. Pylon positions can be selected to avoid drainage lines.

Sasol step-down substations & BESS: Both sites are located in totally degraded areas.

SPECIALIST DECLARATION

This report has been prepared in terms of the Environmental Impact Assessment (EIA) Regulations under the National Environmental Management Act (Act No. 107 of 1998) (NEMA 2014, 2017) and the gazetted 'Procedures for the assessment and minimum criteria for reporting on identified environmental themes' (Government Gazette 43110, No. 320, 20 March 2020 and Government Gazette 43855, No. 1150, 30 October 2020) (NEMA 2020a, 2020b). Note that these protocols replace the requirements of Appendix 6 of the 2014 NEMA EIA Regulations.

Note: This specialist assessment was commissioned prior to the gazetting of the 'Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species' and the 'Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species' (GG 43855 / GN R1150, 30 October 2020). Nevertheless, the Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Animal Species were considered and the findings are contained in the Site Verification Report. Where appropriate a compliance statement has been appended to the Site Verification Report.

Appointment of specialist

Ekotrust cc was originally commissioned by CSIR (EMS, SMART PLACES) Stellenbosch to provide an assessment on the Terrestrial Biodiversity and Species of the Mukondeleli Wind Energy Facility, located to the east of Secunda in the Mpumalanga province. However, the management of the project was subsequently taken over by WSP Group Africa during 2022.

Company profile:

Name of Company: Ekotrust cc
(Registration number: CK90/05465/23)
Sole Member: Dr Noel van Rooyen
Founding date: 1990

Ekotrust cc specialises in habitat evaluation, vegetation classification and mapping, floristic diversity assessments, rare species assessments, alien plant assessments and management, wildlife management, wildlife production and economic assessments, veld condition assessment, bush encroachment, fire management, carrying capacity, wildlife numbers and ratios.

Specialist declaration

We, Noel van Rooyen and Gretel van Rooyen, as the appointed independent specialists, hereby declare that we:

- act as independent specialists in this application;
- perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report, as it relates to our specialist input/study, to be objective, true and correct within the framework of assumptions and limitations;

- do not have and will not have any business, financial, personal or other interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations 2014, and amendments 2017; *Procedures for the assessment and minimum requirements for reporting on identified environmental themes* in terms of Sections 24(5) (a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation, and any specific environmental management act (NEMA 2020);
- declare that there are no circumstances that may compromise our objectivity in performing such work;
- have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- will comply with the Act, Regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- have no vested interest in the proposed activity proceeding;
- undertake to disclose to the applicant and the competent authority all material information in our possession that reasonably has or may have the potential to influence any decision to be taken with respect to the application by the competent authority; or the objectivity of any report, plan or document to be prepared by us for submission to the competent authority;
- all the particulars furnished by us in this form are true and correct; and
- realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

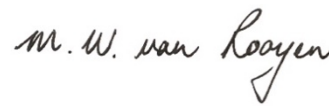
Indemnity and conditions relating to this report:

The observations, findings, recommendations and conclusions provided in the current report are based on the compilers' best scientific and professional knowledge and other available information. If new information should become available Ekotrust cc reserves the right to modify aspects of the report. This report (hard copy and/or electronic) must not be amended or extended without the prior written consent of the author. Furthermore, any recommendations, statements or conclusions drawn from or based on this report must make reference to the report. If these recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety (as an Appendix).

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Signature of specialists:



Name of specialists: Dr N van Rooyen
4 January 2023

Prof. MW van Rooyen
4 January 2023

LIST OF FIGURES

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ACRONYMS

| | |
|--------|---|
| AIS | Alien Invasive species |
| BA | Basic Assessment |
| BAR | Basic Assessment Report |
| CBA | Critical Biodiversity Area |
| CBD | Convention on Biodiversity |
| CITES | Convention on the International Trade in Endangered Species of Wild Fauna and Flora |
| CSIR | Council for Scientific and Industrial Research |
| DFFE | Department of Forestry, Fisheries and the Environment |
| DEA | Department of Environmental Affairs |
| DEA&DP | Department of Environmental Affairs and Development Planning |
| DWS | Department of Water and Sanitation |
| EA | Environmental Authorisation |
| EAP | Environmental Assessment Practitioner |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| EIAr | Environmental Impact Assessment Report |
| EMPr | Environmental Management Plan Report |
| ESA | Ecological Support Area |
| IUCN | International Union for the Conservation of Nature |
| I&APs | Interested and Affected Parties |
| GIS | Geographical Information System |
| MBSP | Mpumalanga Biodiversity Sector Plan |
| MNCA | Mpumalanga Nature Conservation Act |
| MPHG | Mpumalanga Highveld Grassland |
| MTPA | Mpumalanga Tourism & Parks Agency |
| GIS | Geographical Information System |
| NEMA | National Environmental Management Act |
| NEM:BA | National Environmental Management: Biodiversity Act |
| NPAES | National Protected Area Expansion Strategy |
| ONA | Other Natural Areas |
| PA | Protected Area |
| SEA | Strategic Environmental Assessment |
| SANBI | South African National Biodiversity Institute |
| ToPS | Threatened and Protected Species |
| ToR | Terms of Reference |
| SEF | Solar Energy Facility |
| WEF | Wind Energy Facility |

GLOSSARY

| | |
|---|---|
| Alien invasive species | Any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. |
| Alternative | A possible course of action, in place of another, that would meet the same purpose and need (of the proposal). Alternatives can refer to any of the following, but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and alternative materials. |
| Alluvium | Unconsolidated material deposited by flowing water |
| Biodiversity | The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It includes diversity within species, between species and of ecosystems. |
| Category 1a Listed Invasive Species | Species listed by notice in terms of section 70(1)(a) of the act, as a species that must be combatted or eradicated. Landowners are obliged to take immediate steps to control Category 1a species in compliance with sections 75(1), (2) and (3) of the Act. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such a programme. |
| Category 1b Listed Invasive Species | Species listed by notice in terms of section 70(1)(a) of the act, as species that must be controlled. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such a programme. |
| Category 2 Listed Invasive Species | Species listed by notice in terms of section 70(1)(a) of the Act as species that require a permit to carry out a restricted activity specified in the Notice or an area specified in the permit, as the case may be. Permit-holders must ensure that specimens of the species do not spread outside the area specified in the Notice or permit. |
| Category 3 Listed Invasive Species | A species listed by notice in terms of section 70(1)(a) of the act, as species that are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice. However, a Category 3 Listed Invasive Species that occurs in riparian areas must be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3. |
| Critical Biodiversity Areas | Areas required to meet biodiversity targets for ecosystems, species or ecological processes. CBAs are regarded as areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species. |
| Critically Endangered species | Indigenous species facing an extremely high risk of extinction in the wild in the immediate future. |
| Development | The building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity. |
| Development footprint | Any evidence of physical alteration as a result of the undertaking of any activity. |
| Ecological Support Areas | These are not essential for meeting biodiversity targets, but play an important role in supporting the functioning of Protected Areas or CBAs and are often vital for delivering ecosystem services. ESAs must be maintained in at least a functional and often natural state, but some limited habitat loss may be acceptable. |
| Endangered species | Indigenous species facing a high risk of extinction in the wild in the near future, although they are not yet Critically Endangered species. |
| Habitat | A place where a species or ecological community occurs naturally. |
| Indigenous vegetation | Vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years. |
| Indigenous | A species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity. |
| Introduced | In relation to a species, means the introduction by humans, whether deliberately or accidentally, of a species to a place outside the natural range or natural dispersal potential of that species; |
| Linear activity | An activity that is arranged in or extending along one or more properties and which affects the environment or any aspect of the environment along the course of the activity, and includes railways, roads, canals, channels, funiculars, pipelines, conveyor belts, cableways, power lines, fences, runways, aircraft landing strips, firebreaks and telecommunication lines. |
| Mitigate | The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action. |
| "No-Go" option | The "no-go" development alternative option assumes the site remains in its current state, i.e. there is no development in the proposed project area. |
| Schedules 1 – 4: Specially protected game, Protected game, Ordinary game and protected wild animals | Any species of wild animal specified in Schedule 1, 2, 3 & 4 of the Act (MNCA 1998). |
| Schedule 5: Wild animals | Provisions of Section 33 apply (MNCA 1998): No person shall import into the province, keep, possess, sell, purchase, donate or receive as a donation or convey a Schedule 5 live wild animal without a permit. |
| Schedule 6: Exotic animals | Provisions of Section 34 apply (MNCA 1998): No person shall keep, possess, sell, donate or receive as a donation or convey a Schedule 6 live exotic animal without a permit. |
| Schedule 7: Invertebrates | Provisions of Section 35(1) apply (MNCA 1998): No person shall collect, catch, kill, keep, purchase, sell, donate or receive as a donation, convey, import or export a Schedule 7 invertebrate without a permit. |
| Schedule 8: Problem Animal | An animal declared to be a problem animal listed in Schedule 8 of the Act (MNCA 1998). |

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| Schedules 11 & 12: Protected plants and specially protected plants | Any species of flora specified in Schedules 11 and 12 of the Act (MNCA 1998). |
| Schedule 13: Invader weeds and plants | Any species of flora specified in Schedule 13 of the Act (MNCA 1998). No person shall possess, sell, purchase, donate or receive as a donation, convey, import or cultivate a Schedule 13 declared invader weed or plant without a permit. |
| Vulnerable species | Indigenous species facing a high risk of extinction in the wild in the medium-term future, although they are not Critically Endangered species or an Endangered species. |
| Watercourse | Includes (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, pan, lake or dam into which, or from which, water flows; and a reference to a watercourse includes, where relevant, its bed and banks. |
| Wetland | Land that is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. |

GENERAL INFORMATION

Study site: Mukondeleli Wind Energy Facility: One gridline route is proposed with access to two alternative substations (SS 1 & SS 2). The gridline infrastructure includes an on-site substation at the Mukondeleli WEF (plus alternative site), a 132kV gridline, step-down substation and Battery Energy Storage System (BESS) (plus alternative site along gridline 3) at the Sasol facility (Sasol Three Main Transmission Substation). The gridline traverses the farms or farm portions of Van Tondershoek 317 IS; Bosjesspruit 291 IS, Brandspruit 318 IS and Twistdraai 285 IS.

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TERMS OF REFERENCE

The Scope of Work for the terrestrial biodiversity and ecology specialist study includes the following tasks:

- Compilation of a specialist study in adherence to:
 - o the gazetted ‘Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity’ (GG 43110 / GN R320, 20 March 2020). Note that this protocol replaces the requirements of Appendix 6 of the 2014 NEMA EIA Regulations, as amended;
 - o any additional relevant legislation and guidelines that may be deemed necessary.
- The assessment should be based on existing information, national and provincial databases, SANBI mapping, professional experience and field work conducted.
- Undertake a site inspection to identify the site sensitivities, and verify them in terms of the National Web-Based Screening Tool (<https://screening.environment.gov.za/>).
- If needed, liaise with the South African National Biodiversity Institute (SANBI) to obtain information on sensitive species flagged in the National Web-Based Screening Tool (where species names are obscured / only numbered).
- Describe the terrestrial ecological features of the project area, with focus on features that are potentially impacted by the proposed project. The description should include the major habitat forms within the study site, giving due consideration to terrestrial ecology (flora and fauna), Species of Conservation Concern (SCC) or Protected Species.
- If applicable, specify development set-backs/buffers, and provide clear reasons for these recommendations.
- Map the sensitive ecological features within the proposed project area, showing any “no-go” areas (i.e. “very high” sensitivity).
- Provide input on the preferred infrastructure locations following the sensitivity analysis.
- Provide sensitive features spatial data in a useable GIS format (.kmz /.shp).
- Provide an assessment of direct, indirect and cumulative impacts associated with the proposed WEF, with and without mitigation.
- Address relevant concerns/comments raised by Interested and Affected Parties and Stakeholders, including the Competent Authority, during Public Participation Processes.
- Identify relevant legislative requirements and permits that may be required.
- Recommend mitigation measures, best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts to be included in the Environmental Management Programme (EMPr).
- Update the draft specialist study report after Environmental Assessment Practitioner (EAP) and client review (before public release) and after public review for submission to the Competent Authority for decision-making.
- Address any queries from the Competent Authority during the decision-making phase.

Note from Ekotrust cc: This specialist assessment was commissioned prior to the gazetting of the ‘Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species’ and the ‘Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species’ (GG 43855 / GN R1150, 30 October 2020). Therefore, the assessment of terrestrial animal and plant species for purposes of this project was undertaken in terms of the ‘Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity’ (GG 43110 / GN R320, 20 March 2020), and of which the specialists’ findings are included in this Terrestrial Biodiversity and Species Specialist Assessment Report.

STATEMENTS, LIMITATIONS, ASSUMPTIONS AND UNCERTAINTIES

The following assumptions, limitations or uncertainties are listed regarding the evaluation of the impacts of the proposed Mukondeleli project on the terrestrial biodiversity and ecology:

- The area has been moderately collected in the past and the list of plant species that could potentially occur on site as obtained from the NewPosa database, is thus considered to provide a fair representation of the flora on site.
- Rare and threatened plant and animal species are generally uncommon and/or localised and the once-off survey may fail to locate such species. Information on rare and threatened plant and animal species was supplemented by data provided by MTPA (M. Lötter) on localities of such species at farm level.
- Rare plant species usually occur in specialised and localised habitats, thus special attention was given to these habitats.
- The site visit was undertaken in December 2021 after the region had received good rains, thus the botanical assessment was conducted under favourable conditions.
- No aerial census, road census or trapping (either camera trapping or by way of Sherman traps) was conducted for fauna, since these methods generally provide an underrepresentation of the full faunal diversity within the limited timeframe available. Faunal lists were sourced from literature and the website of the Animal Demography Unit of the University of Cape Town.

1. INTRODUCTION

Mukondeleli RF (Pty) Ltd proposes to develop the Mukondeleli Wind Energy Facility (WEF) (up to 300 MW) and its associated infrastructure near Secunda in Mpumalanga. This report covers the proposed grid infrastructure (referred to as the Mukondeleli gridline site in this report) which includes two alternative on-site substations at Mukondeleli WEF, a 132kV gridline covering a distance of approximately 8 km, a step-down substation and a Battery Energy Storage System (BESS) at the Sasol facility (Sasol Three Main Transmission Substation).

The proposed Mukondeleli gridline and associated infrastructure include the following components:

- Two alternative substations to facilitate grid connection.
- A 33/132kV Eskom Switching substation at the Mukondeleli WEF site to facilitate grid connection covering approximately 2 ha (plus 100 m buffer zone). The on-site substation will feed electricity generated by the proposed Mukondeleli WEF into the step-down substation at the Sasol facility. The on-site substation will accommodate 1 x 132 kV incoming feeder bay, 1x 132 kV outgoing feeder bay and a motorised isolator with protection and metering.
- Overhead 132 kV powerlines of approximately 8 km to connect the on-site Mukondeleli WEF and Sasol step-down substations.
- Step-down substation and Lithium-ion Battery Energy Storage System (BESS) area at the Sasol facility. The BESS will comprise several utility scale battery modules within shipping containers or an applicable housing structure on a concrete foundation with a capacity of up to 300 MW/1200 MWh.

A Basic Assessment process is required for the proposed development of the Mukondeleli gridline and associated infrastructure. As required in Part A of the Government Gazette 43110, GN 320 (20 March 2020), a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area.

This report presents the Specialist Terrestrial Biodiversity and Species Basic Assessment Report for the proposed Mukondeleli gridline and associated infrastructure. The scope, purpose and objectives of the report have essentially been summarised in the ToR.

2. APPROACH AND METHODOLOGY

2.1 Approach

The study commenced as a desktop study, followed by field-based surveys in December 2021. October to March is the main rainy season when about 86% of the annual rainfall occurs thus the botanical assessment was conducted under favourable conditions.

The focus of the site survey was:

- to undertake a site sensitivity verification in order to confirm the current land use and environmental sensitivity as identified by the Screening Tool; and
- to conduct surveys (fauna and flora) of the Vhuvhili, Mukondeleli and Impumelelo sites to classify the vegetation into habitats (or plant communities), to identify sensitive habitats, compile species lists and to search for Species of Conservation Concern (SCC). According to SANBI's (SANBI 2020) definition of SCC, these are species that have a high conservation importance in terms of preserving South Africa's high floristic and faunal diversity and include not only threatened species, but also those classified as Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining, Data Deficient - Insufficient Information (DDD) and Data Deficient – Taxonomic (DDT) (www.redlist.SANBI.org).

Hard copy and digital information from spatial databases, such as BGIS of the South African Biodiversity Institute (SANBI) for maps of Critical Biodiversity Areas, Protected Areas, Nationally Protected Area Expansion Strategy (NPAES), Freshwater Ecosystem Priority Areas (FEPA); the geological survey maps (2628 East Rand); land type maps (2628 East Rand); topocadastral maps (2629CA SECUNDA and 2629CB BAANBREKER 1:50 000 maps); vegetation types of SANBI (2006 – 2018); NewPosa database of SANBI; and databases of the Animal Demography Unit, University of Cape Town, as well as literature were sourced to provide information on the environment and biodiversity of the study area.

Satellite images (Google Earth) were used to stratify the area into relatively homogeneous terrain/vegetation units. The vegetation survey consisted of visiting the mapped units and systematically recording plant species on site, and estimating their canopy cover. A total of 34 sample plots were surveyed on the Mukondeleli WEF site. However, a further 46 sample plots were surveyed on the Vhuvhili and Impumelelo sites in the nearby region and the total of 80 sample plots were used to compile a differential table (Appendix A) to identify the habitats (or plant communities) for the region. Physical habitat features were also noted. During the site visit, digital photographs were taken and representative photographs of the different habitats are included in the report. The site was also surveyed for rare, threatened and/or endemic plant species during the site visit.

The animal site survey was limited to day-time visual assessments on site. Animal species presence on site was mainly attained by means of direct or indirect sighting methods (animals, spoor, burrows, scats, sounds), whilst traversing the site by vehicle or on foot. Red-listed species are generally uncommon and/or localised and the survey may have been insufficient to record their presence at or near the proposed development. Furthermore, the owners of the participating farms were consulted regarding sightings of especially mammal species on the properties. **Please note the avifaunal and bat components will be assessed in the avifaunal and bat specialist assessments and are not part of the current report.**

2.2 Vegetation and flora

The plant species data were summarised in a phytosociological table (Appendix A) and seven habitats (or plant communities) and a further four habitats were identified, described and mapped for the region. The term species is used here in a general sense to denote species, subspecies and varieties. The checklist of plant species in Appendix B was compiled from the NewPosa database of the South African National Biodiversity Institute (newposa.sanbi.org) and supplemented by lists of rare species of the Mpumalanga Tourism & Parks Agency and own observations during the vegetation surveys. The IUCN status, conservation and protected status of all plant species provided in Appendix B were determined from available literature and Acts, e.g. NewPosa database (newposa.sanbi.org), and Red list database (redlist.sanbi.org) of the South African National Biodiversity Institute; NEM:BA (2007c) (ToPS list); NFA (2021), CITES (2021) and the MNCA (1998).

2.3 Fauna

Species lists (the term species is used here in a general sense to denote species, subspecies and varieties) of the faunal component were sourced from the Animal Demography Unit, University of Cape Town website (www.adu.uct.ac.za) and consulting of other available databases and/or relevant literature, e.g. Leeming (2003), Skinner and Chimimba (2005), Alexander and Marais (2007), Mecenero *et al.* (2013), Bates *et al.* (2014), Child *et al.* (2016), MNCA (1998) lists and DEA (2016a) to determine the diversity, conservation status and distribution of relevant faunal species (Appendix C). These species lists were supplemented by own observations and observations from the landowners.

2.4 Sensitivity assessment

Based on the environmental features and the species encountered in the on-site survey, a sensitivity assessment of each habitat was done (Chapter 10). Sensitive features are presented spatially in GIS format (provided as a separate .kmz file).

2.5 Sources of information

Vegetation:

- Vegetation types occurring in the area were obtained from Mucina & Rutherford (2006) and the revised national vegetation map produced by SANBI in 2018 (SANBI 2006-2018).
- Conservation status of the vegetation types was obtained from Mucina & Rutherford (2006) and the National List of Threatened Ecosystems (NEMA 2011, Skowno *et al.* 2018).
- Information on species endemic to a national vegetation type was obtained from Mucina & Rutherford (2006);
- The Mukondeleli gridline site does not occur in any Centre of Plant Endemism (Van Wyk & Smith 2001).
- A plant species checklist of the immediate region around the site (2628DB, 2629CA & 2629CB grids) was obtained from the NewPosa database of the South African National Biodiversity Institute (SANBI) (Appendix B) (website accessed November 2021).
- The IUCN Red List Categories of the plant species were extracted from the Threatened Species Programme (Red List of South African plants; website accessed November 2021) as well as the NewPosa database of the South African National Biodiversity Institute (SANBI) (website accessed November 2021).
- The MNCA (1998) was consulted to establish provincially specially protected and protected status of plant species including the rare plant species at and near the Mukondeleli gridline site (data provided by M. Lötter, MTPA).
- The National Protected tree list (NFA 2021) was consulted.

- **The wetland component is reported on separately (see aquatic specialist report).**

Fauna

- Lists of mammals, reptiles, frogs, butterflies (Lepidoptera), spiders and scorpions were extracted from the Animal Demography Unit, University of Cape Town website (<http://vmus.adu.org.za>; accessed November 2020) and supplemented by information gathered in Skinner and Chimimba (2005) for mammals; Bates *et al.* (2014) for reptiles; and Mecenero *et al.* (2013) for butterflies (Appendix C).
- The IUCN Red List Categories for the animal species were extracted from Child *et al.* (2016) for mammals; Bates *et al.* (2014) for reptiles; and Mecenero *et al.* (2013) for butterflies. No IUCN Categories are however available for spiders.
- Data provided by M. Lötter, MTPA were consulted on localities of rare species at farm level and to determine provincially specially protected and protected status of animal species.
- **The avifauna and bat components are reported on separately (see avifaunal and bat specialist reports).**

Other

- The Mpumalanga Biodiversity Sector Plan (MBSP) was consulted for maps indicating CBAs and ESAs in the region of the Mukondeleli gridline site.
- The National Protected Areas Expansion Strategy (NPAES 2010) was consulted for possible inclusion of the site into a protected area in future (biodiversityadvisor.sanbi.org; accessed October 2021) as well as the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA).
- NFEPA database (2011) was consulted for inclusion of the site in a Freshwater Ecosystem Priority Area and MPHG Wetlands database (2014) was consulted for wetlands on site (biodiversityadvisor.sanbi.org; accessed October 2021).

Regulatory framework

- The regulatory framework follows the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA 1998, when applying for Environmental Authorisation were published in the Government Gazette 43110, No 320, 20 March 2020 (NEMA 2020).

3. REGULATORY FRAMEWORK

3.1 Introduction

The White Paper on the conservation and sustainable use of South Africa's biodiversity and the National Environmental Management Act (Act No. 107 of 1998) specifies that due care must be taken to conserve and avoid negative impacts on biodiversity and that the sustainable, equitable and efficient use of biological resources must be promoted. Various acts provide control over natural resources in terms of their conservation, the use of biological resources and avoidance of negative impacts on biodiversity. Some international conventions are also relevant to sustainable development.

3.2 Natural resources

Terrestrial and other ecosystems and their associated species are widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets. While some of this use is well managed and/or sustainable, much is thought to be unsustainable. "Use" in this case refers to direct use, such as collecting, harvesting, hunting and fishing for human consumption and production, as well as more indirect use such as ecotourism and wildlife ranching.

3.3 Convention on Biodiversity (CBD)

South Africa is a signatory to the United Nations Convention on Biological Diversity (CBD), which was ratified in 1995. The CBD requires signatory states to implement the objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources; and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14 (a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

3.4 National Environmental Management Act (Act No. 107 of 1998) (NEMA)

NEMA is the framework environmental management legislation, enacted as part of the government's mandate to ensure every person's constitutional right to an environment that is not harmful to his or her health or well-being. It is administered by the Department of Forestry, Fisheries and the Environment (DFFE), but several functions have been delegated to the provincial environment departments. One of the purposes of NEMA is to provide for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment. The Act further aims to provide for institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state and to provide for the administration and enforcement of other environmental management laws.

The EIA Regulations Listing Notices of 2010 were repealed in 2014 and amended regulations and listings were published in 2014 and 2017 under the National Environmental Management Act (NEMA 2014, 2017). Listing Notice 1 (GRN No. 327), Listing Notice 2 (GRN No 325) and Listing Notice 3 (GRN No 324) of the 2017 Regulations list activities that may require Environmental Authorisation prior to commencement of an activity and identify competent authorities in terms of sections 24(2) and 24D of the Act.

Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA 1998, when applying for Environmental Authorisation were published in the Government Gazette 43110, No 320, 20 March 2020.

3.5 National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)

As the principal national act regulating biodiversity protection, NEM:BA, which is administered by DFFE, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner. The term 'biodiversity', according to the Convention on Biodiversity (CBD), refers to the variability among living organisms from all sources including, *inter alia* terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity in genes, species and ecosystems.

Threatened ecosystems

Section 53 of NEM:BA lists the threatened status of ecosystems, i.e. Critically Endangered ecosystems, Endangered ecosystems, and Vulnerable ecosystems. The list of threatened ecosystems was published in 2011 (NEM:BA 2011). The recent 2018 National Biodiversity Assessment (Skowno *et al.* 2018) includes the updated extent and status of threatened ecosystems, although not yet formally adopted under the NEM:BA.

Threatened or Protected Species (ToPS) Regulations

Section 56 of NEM:BA makes provision for the declaration of species which are of such high conservation value, national importance or are considered threatened that they need protection, i.e. Critically Endangered species, Endangered species and Vulnerable species. Lists of species that are threatened or protected, and associated activities that are prohibited and/or exempted from restriction were published in 2007 (NEMBA 2007c). Any proposed development involving one or more threatened or protected species and/or prohibited/restricted activities will require a permit in term of these Threatened or Protected Species (ToPS) Regulations.

Alien and Invasive Species (AIS) Regulations

Chapter 5 of NEM:BA provides for the protection of biodiversity from alien and invasive species. The act defines alien species and provides lists of invasive species in regulations. The Alien and Invasive Species (AIS) lists were published in Government Gazette No. 43726 of 18 September 2020 (NEM:BA 2020a). The Alien and Invasive Species (AIS) Regulations, in terms of Section 97(1) of NEM:BA, was subsequently published in Government Gazette No. 43735 of 25 September 2020 (NEM:BA 2020b).

In terms of the aforementioned legislation, the following categories of declared alien and invasive plants are recognised in South Africa (see Glossary for explanations):

1. Category 1a Listed Invasive Species
2. Category 1b Listed Invasive Species
3. Category 2 Listed Invasive Species
4. Category 3 Listed Invasive Species

3.6 The National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA)

NEM:PAA provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.

3.7 National Forests Act (Act No. 84 of 1998) (NFA)

The National Forest Act makes provision for the declaration of for example specially protected areas, forest nature reserves, forest wilderness areas and protected woodlands. The latest list of declared protected tree species in terms of the NFA was published in 2021 (NFA 2021). In terms of section 15(1) of this act, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. The competent authority responsible for considering and issuing the license will be the national Department of Forestry, Fisheries and the Environment (DFFE).

3.8 Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)

The objectives of the Conservation of Agricultural Resources Act are to provide for the conservation of the natural agricultural resources by the maintenance of the production potential of the land; by combating and preventing erosion and weakening or destruction of the water resources; and by protecting natural vegetation and combating weeds and invader plants. In order to achieve the objectives, certain control measures are prescribed to which land users must comply. The activities mentioned relate to:

- the cultivation of virgin soil;
- the irrigation of land;
- the prevention or control of waterlogging or salinisation of land;
- the utilisation and protection of vleis, marshes and water courses;
- the regulation of the flow pattern of run-off water;
- the utilisation and protection of vegetation; and
- the restoration or reclamation of eroded land.

3.9 Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES is an international agreement to which countries adhere voluntarily. The aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The species covered by CITES are listed in three appendices reflecting the degree of protection that the species needs. Appendix I includes species that are threatened with extinction and trade in these species is permitted only in exceptional circumstances. Appendix II lists species that are not necessarily now threatened with extinction, but that may become so unless trade is closely controlled. Appendix III lists species that are protected in at least one country that has asked other CITES parties for assistance in controlling the trade (Website: www.cites.org, accessed October 2020).

4. STUDY AREA

4.1 Location

The proposed Mukondeleli gridline routes are located south of Secunda and traverses the farms (or portions of) Van Tondershoek 317 IS, Bosjesspruit 291 IS, Vlakspruit 292 IS, Goedehoop 290 IS, Brandspruit 318 IS and Twistdraai 285 IS (Figures 1 & 2). The area falls within the Gert Sibande District Municipality and the Govan Mbeki Local Municipality in the Mpumalanga province. The proposed Mukondeleli on-site substation is located at 26° 37' 31.0" S; 29° 10' 55.0" E and the northern step-down substation at the Sasol facility is located at 26° 32' 59.0" S; 29° 11' 13.0" E.

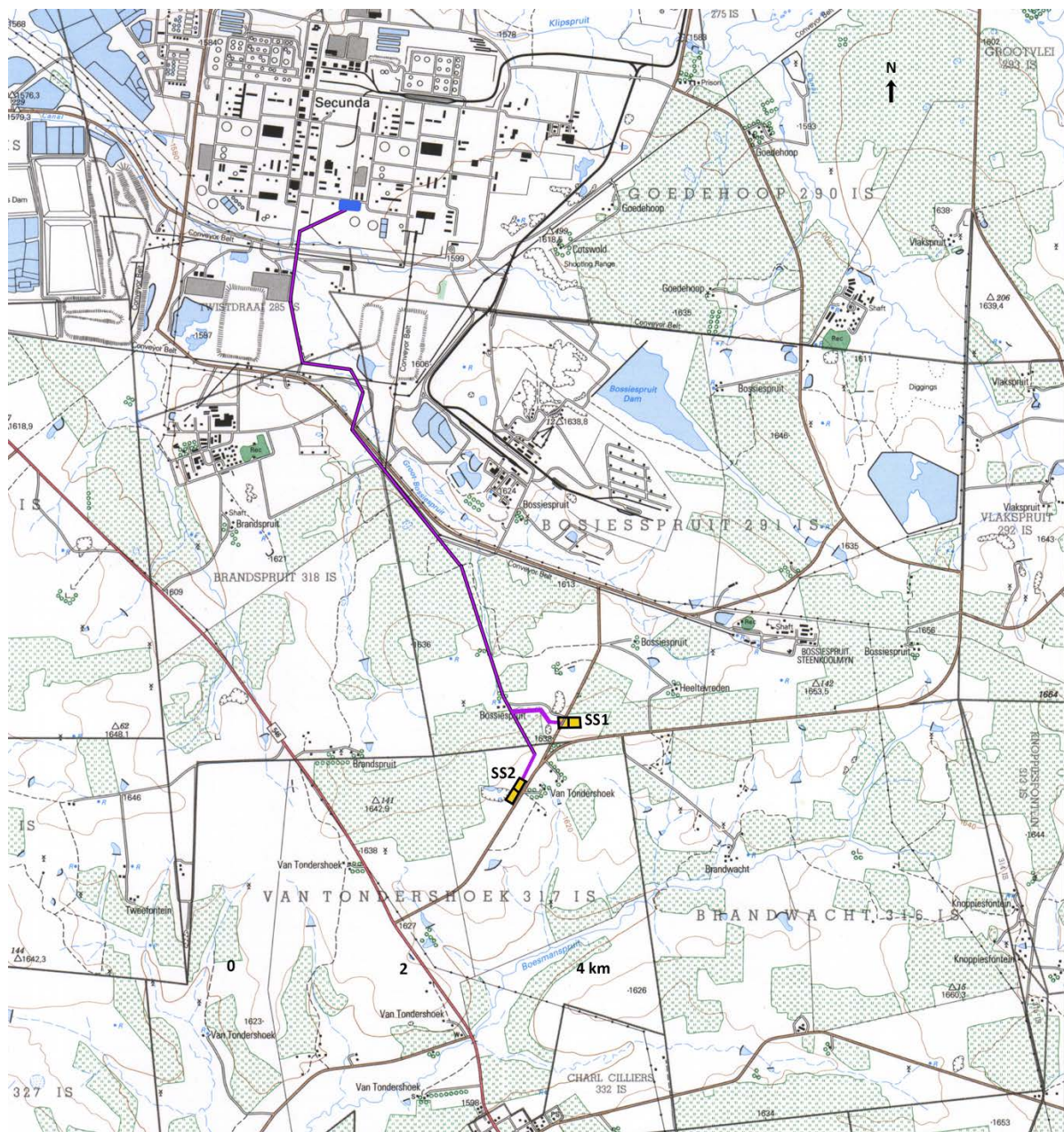


Figure 1: Topocadastral map of the Mukondeleli gridline route (2629CA Secunda 1996; 2629CB Baanbreker 1996). Yellow rectangles = on-site substations SS1 (preferred) and SS2; blue rectangle = step-down substation; purple line = powerline.

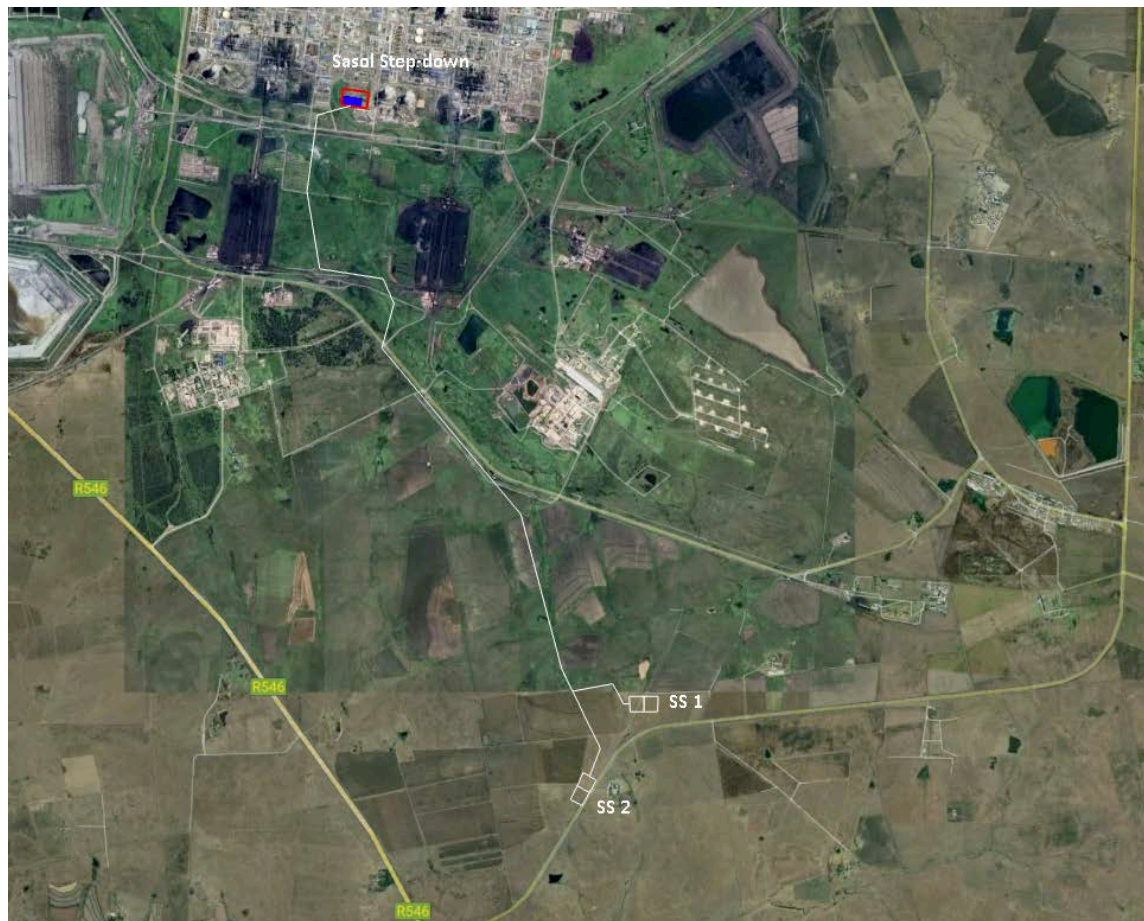


Figure 2: Google image of the Mukondeleli gridline route. White squares = on-site substation SS 1 (preferred) and alternative substation SS 2; red and blue square = step-down substation at Sasol; white line = powerline.

4.2 Terrain morphology and drainage

The site is characterised by grassland on the gentle undulating plains. The altitude ranges from about 1600 m to 1646 m above sea level (Figure 1). The site is drained in the north from east to west by the Klipspruit and its tributaries and by the Boesmanspruit and its tributaries in the south.

4.3 Climate

4.3.1 Regional climate (Mucina & Rutherford 2006)

The site falls in a strongly seasonal summer-rainfall, cool-temperate region, with very dry winters. The mean annual precipitation of the Soweto Highveld Grassland is 662 mm with a peak in rainfall from November to January. The annual precipitation coefficient of variation is 27%. Mean annual potential evaporation is 2060 mm, while the mean annual soil moisture stress is 75%. Mean annual temperature is 14.8°C and frost is frequent in winter with a mean of 41 days per annum.

4.3.2 Rainfall

The mean annual rainfall in the region ranges from 667 mm at the farm Zandfontein to 738 mm at the farm Driefontein, both close to Secunda (Table 1). The mean annual rainfall as measured at Secunda is 693 mm (Table 1 & 2, Figure 3). The total annual rainfall at Secunda during dry and wet years respectively may range from 558 mm to 965 mm, indicating a moderate variation in the annual rainfall. The rainy season at Secunda is predominantly from October to March when about 86% of the annual rainfall occurs. December and January are the wettest months and the driest period is from May to August, when less than 15 mm of rain per month is recorded. Maximum rainfall measured over a 24-hour period at Secunda was 82 mm, recorded in November. The highest monthly rainfall recorded was 241 mm, also measured in November.

Table 1: Rainfall at some weather stations in the environs of the Mukondeleli site (Weather Bureau 1998)

| Month | Mean Annual Rainfall (mm) | | | | |
|-------|---------------------------|-------------|-------------|--------|------------|
| | Secunda | Zandfontein | Driefontein | Bethal | Standerton |
| Jan | 114 | 125 | 121 | 146 | 122 |
| Feb | 93 | 97 | 100 | 75 | 87 |
| Mar | 64 | 84 | 80 | 61 | 66 |
| Apr | 35 | 34 | 44 | 48 | 44 |
| May | 8 | 24 | 21 | 14 | 12 |
| June | 14 | 6 | 7 | 7 | 9 |
| July | 2 | 12 | 9 | 6 | 7 |
| Aug | 8 | 5 | 10 | 13 | 12 |
| Sep | 33 | 24 | 27 | 28 | 29 |
| Oct | 82 | 62 | 71 | 78 | 86 |
| Nov | 104 | 100 | 116 | 129 | 117 |
| Dec | 136 | 116 | 118 | 106 | 104 |
| Year | 693 | 667 | 738 | 711 | 695 |

Table 2: Maximum rainfall (mm) in 24 hours, highest maximum and lowest monthly minimum rainfall at Secunda: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)

| Month | Rainfall (mm) | | | |
|-------|---------------|----------|---------------|---------------|
| | Mean (month) | 24 h max | Max per month | Min per month |
| Jan | 114 | 66 | 168 | 50 |
| Feb | 93 | 69 | 142 | 41 |
| Mar | 64 | 55 | 121 | 31 |
| Apr | 35 | 56 | 119 | 2 |
| May | 8 | 12 | 18 | 0 |
| June | 14 | 41 | 75 | 0 |
| July | 2 | 6 | 13 | 0 |
| Aug | 8 | 24 | 24 | 0 |
| Sep | 33 | 26 | 107 | 0 |
| Oct | 82 | 59 | 146 | 0 |
| Nov | 104 | 82 | 241 | 0 |
| Dec | 136 | 76 | 200 | 89 |
| Year | 693 | 82 | 965 | 558 |

4.3.3 Temperature

The mean annual temperature for Secunda is 15.8°C (Table 3) with the extreme maximum and minimum temperatures 33.0°C and -4.3°C respectively. The mean daily maximum for January is 27.2°C and for July it is 18.1°C, whereas the mean daily minimum for January is 13.5°C and for July it is 0.9°C. Frost may occur anytime from April to October.

Table 3: Temperature data (°C) for the Secunda region: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)

| | Temperature (°C) | | | | | | | | | | | | Year |
|-----------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | |
| Max | 27.2 | 25.9 | 25.2 | 23.0 | 20.8 | 17.3 | 18.1 | 21.5 | 22.3 | 24.3 | 23.8 | 26.0 | 27.2 |
| *Ext. Max | 33.0 | 32.5 | 30.0 | 30.6 | 25.5 | 25.3 | 25.3 | 27.0 | 31.0 | 32.0 | 31.0 | 31.5 | 33.0 |
| Min | 13.5 | 12.9 | 12.0 | 9.8 | 5.9 | 2.3 | 0.9 | 4.1 | 6.9 | 10.0 | 11.1 | 13.6 | 0.9 |
| *Ext. Min | 10.1 | 10.5 | 7.1 | 4.2 | 2.0 | -2.6 | -4.3 | -1.5 | 1.1 | 4.3 | 6.3 | 8.8 | -4.3 |
| Mean | 20.4 | 19.3 | 18.6 | 16.3 | 13.4 | 9.8 | 9.5 | 12.8 | 14.6 | 17.1 | 17.5 | 19.9 | 15.8 |

Max = mean daily maximum temperature for the month
 *Ext. Max = extreme maximum temperature recorded per month
 Min = mean daily minimum temperature for the month
 *Ext. Min = extreme minimum temperature recorded per month
 Mean = mean monthly temperature for each month and for the year

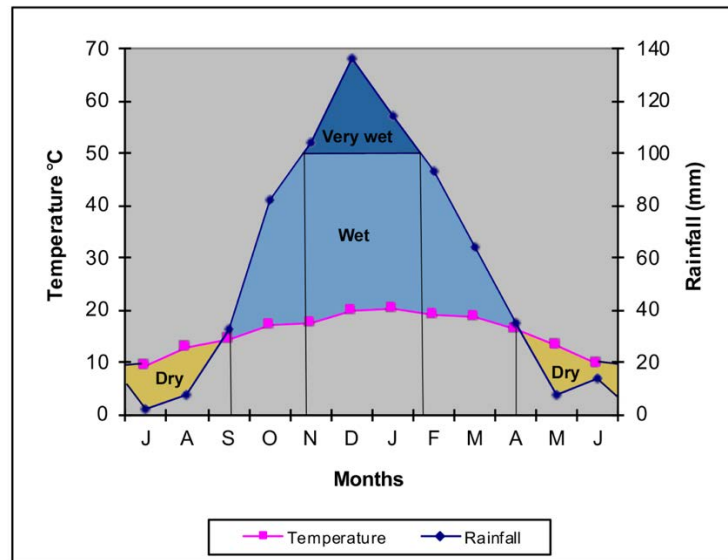


Figure 3: Climate diagram for the Secunda region. Months on X-axis are from July to June. When the rainfall curve is below the temperature curve, it indicates a dry period and when the monthly rainfall is higher than 100 mm it indicates a very wet period.

4.3.4 Cloudiness and relative air humidity

At Bethal weather station, approximately 25 km east of Secunda, cloud cover at 14:00 is the highest from November to January (5.1 – 5.3 eights) and the lowest in June, July and August (1.5 – 1.9 eights) (Table 4). The highest mean relative air humidity (%) at 08:00 occurs during the late summer and autumn months (February to April; 83 – 84%) and the lowest relative air humidity at 14:00 (31%) occurs in early spring (August) (Weather Bureau 1998).

Table 4: Cloud cover at 14:00 and percentage relative air humidity at 08:00 and 14:00 at Bethal: 26° 27' S; 29° 29' E; 1663 m (Weather Bureau 1998)

| | Cloud (0-8) | Relative air humidity % | |
|------|-------------|-------------------------|-------|
| | 14:00 | 08:00 | 14:00 |
| Jan | 5.2 | 80 | 51 |
| Feb | 4.9 | 83 | 48 |
| Mar | 4.9 | 83 | 44 |
| Apr | 4.1 | 84 | 41 |
| May | 2.4 | 80 | 34 |
| June | 1.6 | 81 | 34 |
| July | 1.5 | 79 | 33 |
| Aug | 1.9 | 75 | 31 |
| Sept | 3.1 | 74 | 33 |
| Oct | 4.6 | 75 | 41 |
| Nov | 5.3 | 77 | 49 |
| Dec | 5.1 | 77 | 48 |
| Year | 3.7 | 80 | 41 |

4.4 Geology

The geology of the site is depicted in the 1:250 000 geological map 2626 East Rand (1986) (Figure 4). The southern and central part of the routes are underlain by dolerite (Jd), while sandstone, shale and coal beds of the Vryheid Formation, Ecca Group (Pv) cover the northern section of the gridline. Some alluvium occurs along the drainage lines.

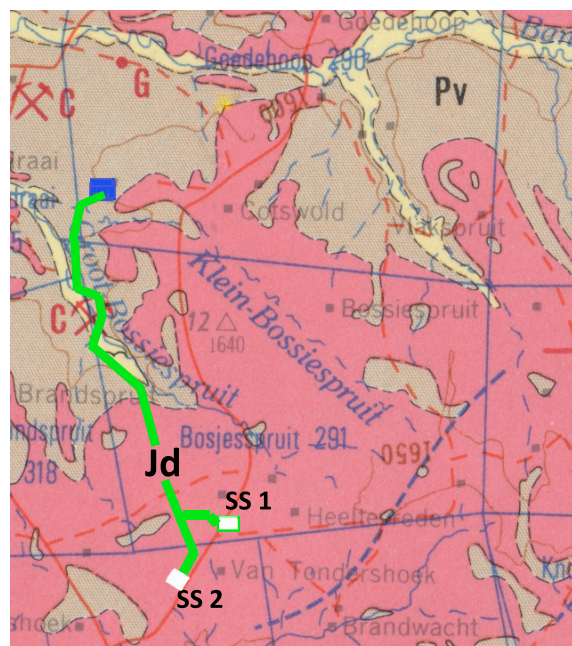


Figure 4. Geology of the Mukondeleli gridline site (2628 East Rand Geological Survey 1986). White squares = on-site substation SS 1 (preferred) and alternative substation SS 2; blue square = step-down substation at Sasol; green line = powerline.

Legend:

Jd = Dolerite

Pv = Sandstone, shale and coal beds (Vryheid Formation, Ecca Group)

Yellow = Alluvium

4.5 Land types

Land types denote areas that display a marked degree of uniformity with respect to terrain form, soil pattern and climate. A terrain unit within a land type is any part of the land surface with homogeneous form and slope. The site is covered by the Ea 17e Land Type (2628 East Rand Land Type Series 1979). The Ea Land Type occurs on undifferentiated soils and consists of one or more vertic, melanic, red structured diagnostic horizons.

5. VEGETATION

5.1 Introduction

The site falls in the Grassland Biome and more specifically in the Mesic Highveld Grassland Bioregion. The site does not fall within any Centre of Plant Endemism according to Van Wyk and Smith (2001).

5.2 Broad-scale vegetation types

Soweto Highveld Grassland (Gm 8)

The Mukondeleli site is located within the Soweto Highveld Grassland (Gm8) vegetation type (SANBI 2006-2018). This vegetation type covers 14 513 km² of Mpumalanga and Gauteng (and to a very small extent also in the neighbouring Free State and North-West provinces) and occurs at an altitude ranging from 1420 m to 1760 m above sea level (Mucina & Rutherford 2006).

The landscape is gently to moderately undulating on the Highveld plateau, supporting dense tufted grassland dominated by *Themeda triandra*. Other common grass species include *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In undisturbed places, scattered wetlands, narrow stream alluvia, pans and occasional ridges interrupt the grassland cover. Frost and frequent grass fires during winter play an important role in limiting the occurrence of trees and shrubs in the region.

The most prominent grass species include *Andropogon appendiculatus*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Elionurus muticus*, *Eragrostis capensis*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Eragrostis plana*, *Heteropogon contortus*, *Setaria sphacelata*, *Themeda triandra* and *Tristachya leucothrix*. The forb layer is characterised by *Hermannia depressa*, *Acalypha angustata*, *Berkheya setifera*, *Dicoma anomala*, *Haplocarpha scaposa*, *Helichrysum nudifolium*, *Helichrysum rugulosum*, *Justicia anagalloides*, *Selago densiflora*, *Senecio coronatus*, *Hilliardiella elaeagnoides* and *Wahlenbergia undulata*.

Although the conservation status of this vegetation type was listed as “Endangered” by Mucina & Rutherford (2006) it is listed as “Vulnerable” by NEMA (2011) and the National Biodiversity Assessment (Skowno *et al.* 2018). Very few statutorily conserved areas occur in this vegetation type and almost half of it has been transformed, mostly by cultivation, plantations, mining and urbanisation.

5.3 Description of habitats (plant communities)

During the field survey, 34 sampling sites were surveyed at the proposed Mukondeleli WEF. However, a further 46 sample plots were surveyed on the Vhuvhili and Impumelelo sites in the nearby region and the total of 80 sample plots were used to improve the identification and description of habitat types in the area. Based on species composition, six habitats (plant communities) were distinguished, described and mapped on the Mukondeleli site (Figure 5). A further four units were also distinguished, i.e. croplands, infrastructure, disturbed areas and dams.

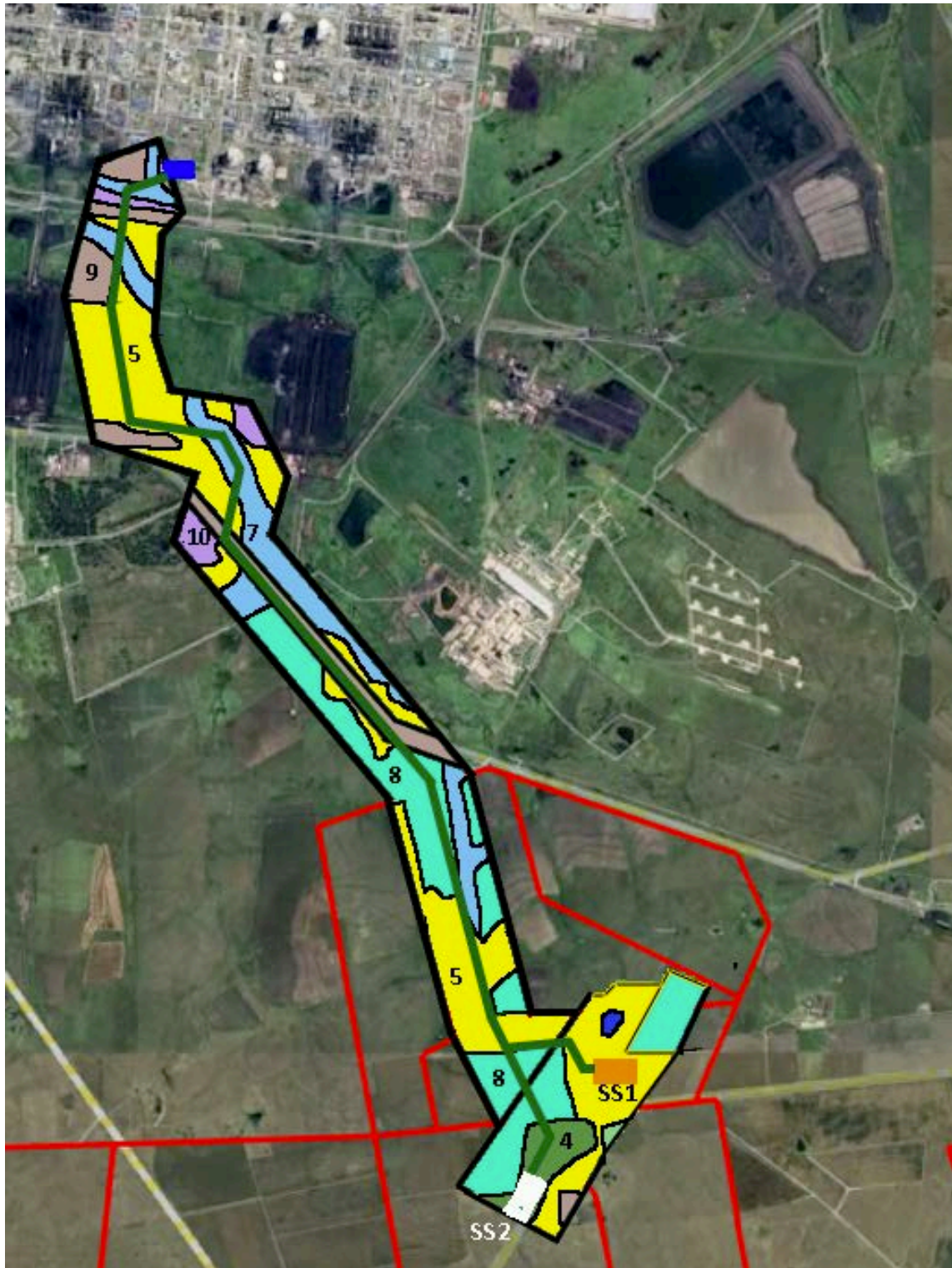
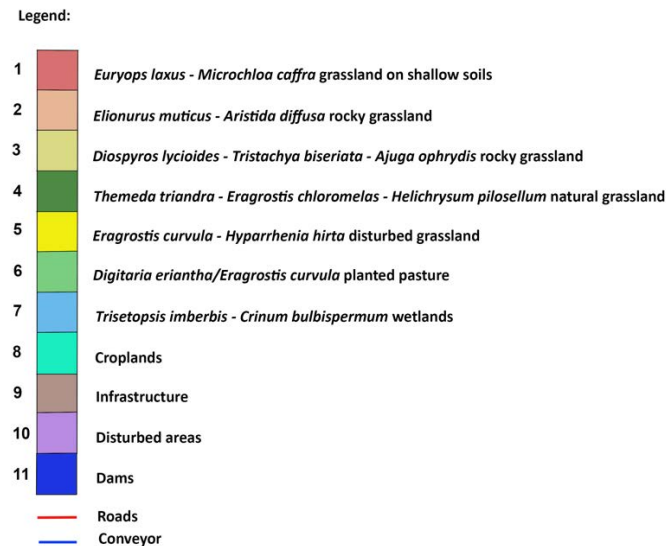


Figure 5. Vegetation map of the Mukondeleli powerline route. Orange rectangle = Substation 1 (SS1); White rectangle = Substation 2 (SS2); blue rectangle = step-down substation at Sasol; green line = powerline.



List of plant communities and other units identified in the region (Habitats 1, 2 & 3 were not distinguished on the Mukondeleli gridline site)

1. *Euryops laxus* - *Microchloa caffra* grassland on shallow soils
2. *Elionurus muticus* - *Aristida diffusa* rocky grassland
3. *Diospyros lycioides* - *Tristachya biseriata* - *Ajuga ophrydis* rocky grassland (not on Mukondeleli)
4. *Themeda triandra* - *Eragrostis chloromelas* - *Helichrysum pilosellum* natural grassland
5. *Eragrostis curvula* - *Hyparrhenia hirta* disturbed grassland
6. *Digitaria eriantha*/*Eragrostis curvula* planted pasture
7. *Trisetopsis imberbis* - *Crinum bulbispermum* wetlands
 - 7a. *Trisetopsis imberbis* - *Leersia hexandra* wetlands
 - 7b. *Andropogon appendiculatus* - *Cyperus longus* wetlands
 - 7c. *Typha capensis* - *Phragmites australis* wetlands
8. Cropland
9. Infrastructure
10. Disturbed areas
11. Dams

Habitat 1. *Euryops laxus* - *Microchloa caffra* grassland on shallow soils

Not represented on the Mukondeleli gridline site.

Habitat 2. *Elionurus muticus* - *Aristida diffusa* rocky grassland

Not represented on the Mukondeleli gridline site.

Habitat 3. *Diospyros lycioides* - *Tristachya biseriata* - *Ajuga ophrydis* rocky grassland

Not represented on the Mukondeleli gridline site.

Habitat 4. *Themeda triandra* - *Eragrostis chloromelas* - *Helichrysum pilosellum* natural grassland

This natural grassland occurs on the plains and gentle footslopes of the site (Figures 5 & 6). Surface rocks and gravel

are absent and the deep, dark-brown, clayey soils are derived from dolerite.

There is no diagnostic species group that differentiates this community. However, the presence of species groups 6, 7 & 8 and the absence of species groups 1 – 5 differentiate this community (Appendix A).

- The grass layer is well developed and covers approximately 88% of the area. The dominant grass species include *Themeda triandra*, *Eragrostis chloromelas*, *Setaria incrassata*, *Elionurus muticus* and *Brachiaria serrata*. Other common grass species include *Eragrostis curvula*, *Eragrostis planiculmis*, *Hyparrhenia hirta*, *Setaria nigrirostris*, *Eragrostis plana*, *Lolium perenne* and *Cynodon dactylon*.
- Herbaceous species have a mean canopy cover of approximately 8%. The most common species include *Helichrysum pilosellum*, *Gazania krebsiana*, *Scabiosa columbaria*, *Indigofera hedyantha*, *Berkheya radula*, *Berkheya setifera*, *Helichrysum rugulosum*, *Ipomoea crassipes*, *Asclepias stellifera*, *Jamesbrittenia aurantiaca*, *Oenothera rosea*, *Oenothera tetraptera*, *Senecio inaequidens*, *Conyza podocephala*, *Senecio erubescens*, *Hermannia erodioides*, *Pseudognaphalium luteo-album* and *Convolvulus saggitatus*.
- The succulent species recorded were *Aloe transvaalensis* and *Euphorbia clavarioides*.
- The most common geophytes include *Hypoxis rigidula*, *Hypoxis acuminata*, *Hypoxis hemerocallidea*, *Pelargonium minimum* and *Ledebouria cf. revoluta*.
- Sedges include *Bulbostylis humilis*, *Cyperus esculentus*, *Kyllinga erecta* and *Abildgaardia ovata*.
- The following alien invasive plant species were recorded in this community: *Cirsium vulgare*, *Verbena bonariensis*, *Verbena brasiliensis*, *Solanum elaeagnifolium*, *Cuscuta campestris* and *Datura ferox*.



Figure 6: Community 4 – *Themeda triandra* - *Eragrostis chloromelas* - *Helichrysum pilosellum* natural grassland.

Threatened (red listed) and/or protected species recorded in plant community 4:

| | |
|-------------------------------|--|
| IUCN list: | None |
| NEM:BA (ToPS): | None |
| NFA: | None |
| MNCA: | <i>Aloe ecklonis</i> , <i>Aloe transvaalensis</i> , <i>Gladiolus crassifolius</i> , <i>Gladiolus dalenii</i> , <i>Boophone disticha</i> |
| Mpumalanga Rare species list: | <i>Hypoxis hemerocallidea</i> |
| CITES: | <i>Euphorbia clavarioides</i> , <i>Aloe transvaalensis</i> , <i>Aloe ecklonis</i> |
| Endemic species: | None |

Habitat 5. *Eragrostis curvula* - *Hyparrhenia hirta* disturbed grassland

This community consists of a mixture of degraded natural grassland and old abandoned croplands. It is found on the plains and gentle footslopes of the undulating countryside (Figures 5 & 7). Surface rocks and gravel are absent and the deep, dark-brown to black, clayey soils are derived from dolerite.

There is no diagnostic species group that differentiates this community. However, the presence of species groups 9, 10 & 11 and the absence of species groups 1 – 8 differentiate this community from the others (Appendix A).

- Dwarf shrubs cover less than 1% of the habitat and include *Seriphium plumosum*.
- The grass layer is well developed and covers approximately 83% of the area. The dominant grass species include *Eragrostis curvula*, *Hyparrhenia hirta*, *Themeda triandra*, *Setaria incrassata*, *Eragrostis plana*, *Eragrostis chloromelas* and *Paspalum dilatatum*. Other common grass species include *Setaria nigrirostris*, *Setaria sphacelata*, *Cynodon dactylon*, *Hyparrhenia tamba*, *Elionurus muticus*, *Brachiaria serrata*, *Aristida bipartita* and *Eragrostis planiculmis*.
- Herbaceous species have a mean canopy cover of approximately 14%. The most common species are *Senecio erubescens*, *Oenothera tetraptera*, *Hermannia erodioides*, *Solanum elaeagnifolium*, *Pseudognaphalium luteo-album*, *Schkuhria pinnata*, *Ranunculus multifidus*, *Senecio inaequidens*, *Oenothera rosea*, *Asclepias stellifera*, *Asclepias* cf. *gibba*, *Berkheya setifera*, *Berkheya radula*, *Helichrysum rugulosum*, *Helichrysum aureo-nitens*, *Leobordea divaricata* and *Scabiosa columbaria*.
- The only succulent species recorded in Habitat 5 was *Aloe transvaalensis*.
- Geophytes include *Gladiolus crassifolius*, *Cyrtanthus stenanthus*, *Hypoxis rigidula*, *Hypoxis argentea*, *Ledebouria* cf. *revoluta*, *Haemanthus humilis*, *Pelargonium luridum* and *Boophone disticha*.
- Sedges include *Abildgaardia ovata*, *Kyllinga erecta* and *Cyperus esculentus*.
- The following alien invasive plant species were recorded in this community: *Cirsium vulgare*, *Verbena bonariensis*, *Verbena brasiliensis*, *Solanum elaeagnifolium* and *Cuscuta campestris*.



Figure 7: Community 5 – *Eragrostis curvula* - *Hyparrhenia hirta* disturbed grassland.

Threatened (red listed) and/or protected species recorded in plant community 5:

| | |
|----------------|------|
| IUCN list: | None |
| NEM:BA (ToPS): | None |
| NFA: | None |

| | |
|-------------------------------|--|
| MNCA: | <i>Aloe transvaalensis</i> , <i>Crinum bulbispermum</i> , <i>Cyrtanthus stenanthus</i> , <i>Gladiolus crassifolius</i> |
| Mpumalanga Rare species list: | <i>Hypoxis hemerocallidea</i> |
| CITES: | <i>Euphorbia clavarioides</i> , <i>Aloe transvaalensis</i> |
| Endemic species: | None |

Habitat 6. *Digitaria eriantha/Eragrostis curvula* planted pasture

Only a small section of the gridline traverses pastured pastures (Figures 5 & 8). Surface rocks and gravel are absent and the deep, dark-brown, clayey soils are derived from dolerite.



Figure 8: Community 6 – *Eragrostis curvula* planted pasture.

There is no diagnostic species group that differentiates this community. However, the presence of species groups 11 and the absence of species groups 1 – 10 differentiate this community (Appendix A).

- The grass layer is dominated by either *Digitaria eriantha* or *Eragrostis curvula* and covers more than 90% of the community. Other grass species include *Eragrostis chloromelas*, *Hyparrhenia hirta*, *Setaria sphacelata* and *Paspalum dilatatum*.
- Herbaceous species have a mean canopy cover of approximately 3%. The most common species include *Senecio erubescens*, *Pseudognaphalium luteo-album*, *Hibiscus trionum*, *Cosmos bipinnatus* and *Nasturtium officinale*.
- The following alien invasive plant species were recorded in this community: *Solanum elaeagnifolium* and *Cuscuta campestris*.

Threatened (red listed) and/or protected species recorded in plant community 6:

| | |
|------------------|------|
| IUCN list: | None |
| NEM:BA (ToPS): | None |
| NFA: | None |
| MNCA: | None |
| CITES: | None |
| Endemic species: | None |

Habitat 7. *Trisetopsis imberbis* - *Crinum bulbispermum* wetlands

These streams, wetlands, vleis and floodplains are associated mostly with the Klipspruit, Groot-Bossiespruit and the Boesmanspruit and their tributaries and occur across most of the Mukondeleli site (Figures 5 & 9). Surface rocks are occasionally present. The alluvial soils are mostly deep, dark-brown to black, clayey soils.



Figure 9: Community 7 – *Trisetopsis imberbis* - *Crinum bulbispermum* wetlands.

The diagnostic species of this habitat (community) include *Ischaemum fasciculatum*, *Andropogon appendiculatus*, *Fingerhuthia sesleriiformis* and *Galium capense* (species group 12, Appendix A).

- The grass layer is well developed and covers approximately 90% of the area. The dominant grass species include *Trisetopsis imberbis*, *Leersia hexandra*, *Paspalum dilatatum*, *Setaria nigrirostris*, *Ischaemum fasciculatum* and *Andropogon appendiculatus*. Other grass species include *Eragrostis plana*, *Fingerhuthia sesleriiformis*, *Bromus catharticus*, *Themeda triandra*, *Eragrostis curvula*, *Harpechloa falx* and *Pennisetum clandestinum*.
- Herbaceous species have a mean canopy cover of approximately 10%. The most common species are *Galium capense*, *Plantago lanceolata*, *Oenothera rosea*, *Oenothera tetraptera*, *Berkheya radula*, *Haplocarpha*

scaposa, *Ranunculus multifidus*, *Gomphocarpus fruticosus*, *Cosmos bipinnatus* and *Lepidium africanum*.

- Common geophytes include *Crinum bulbispermum*, *Ledebouria* cf. *revoluta* and *Hypoxis argentea*.
- Sedges include, amongst others, *Cyperus longus*, *Cyperus esculentus* and *Schoenoplectus* cf. *muricinux*.
- The following alien invasive plant species were recorded in this community: *Cirsium vulgare*, *Verbena bonariensis*, *Verbena brasiliensis*, *Solanum elaeagnifolium* and *Datura ferox*.

Threatened (red listed) and/or protected species recorded in plant community 7:

| | |
|------------------|---|
| IUCN list: | None |
| NEM:BA (ToPS): | None |
| NFA: | None |
| MNCA: | <i>Boophone disticha</i> , <i>Crinum bulbispermum</i> , <i>Haemanthus humilis</i> * |
| CITES: | None |
| Endemic species: | None |

Three subcommunities are distinguished on the Mukondeleli site (Appendix A):

7a. *Trisetopsis imberbis* - *Leersia hexandra* wetlands

The species characterising this subcommunity include *Trisetopsis imberbis*, *Paspalum dilatatum*, *Bromus catharticus*, *Eragrostis curvula*, *Leersia hexandra* and *Ischaemum fasciculatum*.

7b. *Andropogon appendiculatus* - *Cyperus longus* wetlands

The dominant species in this subcommunity are *Andropogon appendiculatus*, *Fingerhuthia sesleriiformis*, *Setaria incrassata*, *Harpechloa falx*, *Dimorphotheca caulescens*, *Crinum bulbispermum* and *Haplocarpha scaposa*.

7c. *Typha capensis* – *Phragmites australis* wetlands

The species that characterise this subcommunity include *Typha capensis*, *Phragmites australis*, *Schoenoplectus* cf. *muricinux*, *Eragrostis plana*, *Paspalum dilatatum*, *Setaria nigrirostris*, *Ranunculus multifidus* and *Crinum bulbispermum*.

Other units that were distinguished on the Mukondeleli site include the following:

8. Cropland

These croplands are currently utilised mainly for maize production. These croplands cover large sections of the gridline routes.

9. Infrastructure

These include farm houses and associated infrastructure as well as industrial areas.

10. Disturbed areas

These sites include mine dumps, diggings and areas disturbed by farming activities.

11. Dams

6. ALIEN INVASIVE PLANT SPECIES

6.1 Introduction

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

The Alien and Invasive Species (AIS) Regulations and the Alien and Invasive Species (AIS) list were published in 2020 (NEM:BA 2020a & b).

Forty-seven alien plant species were recorded on the three Enertrag sites of which 12 are currently declared alien invasive species and 35 naturalised alien species (Appendix B). Another four naturalised alien species were listed by NewPosa for the region.

The following categories of declared weeds and invader plants are recognised in South Africa:

Category 1a Listed Invasive Species refers to species that must be combatted or eradicated. Landowners are obliged to take immediate steps to combat or eradicate Category 1a species.

Category 1b Listed Invasive Species refers to species that must be controlled. If an Invasive Species Management Programme has been developed, landowners are obliged to control the species in accordance with such programme. The following species were recorded in the area:

| | |
|---------------------------|-------------------------------|
| <i>Arundo donax</i> | <i>Opuntia ficus-indica</i> |
| <i>Cereus jamacaru</i> | <i>Solanum elaeagnifolium</i> |
| <i>Cirsium vulgare</i> | <i>Verbena bonariensis</i> |
| <i>Cuscuta campestris</i> | <i>Verbena brasiliensis</i> |
| <i>Datura ferox</i> | <i>Xanthium spinosum</i> |

Category 2 Listed Invasive Species refer to species that require a permit to carry out a restricted activity e.g. cultivation, within an area specified in the Notice or an area specified in the permit, as the case may be. Category 2 includes plant species that have economic, recreational, aesthetic or other valued properties, notwithstanding their invasiveness. It is important to note that a Category 2 species that falls outside the demarcated area specified in the permit, becomes a Category 1b invasive species. Permit-holders must take all the necessary steps to prevent the escape and spread of the species outside of the land or the area specified in the Notice or permit.

| |
|---------------------------------|
| <i>Acacia mearnsii</i> |
| <i>Eucalyptus camaldulensis</i> |

These species are exempted for existing plantations.

Category 3 Listed Invasive Species refer to species that are subject to exemptions and prohibitions as specified in the Notice. Category 3 species are less-transforming invasive species that are regulated by activity. The principal focus with these species is to ensure that they are not introduced, sold or transported. However, a Category 3 plant species becomes a Category 1b species within riparian areas.

6.2 Prevention and control of alien invasive plant species

There are a number of strategies that can be employed to prevent the introduction of new invasive plant species:

- Limiting their introductions by humans;
- Creating a buffer zone of alien-free vegetation around the site;
- Integrated catchment management with the surrounding neighbours because areas around and upstream of the site provide an unlimited source of seed which invade downstream areas; and
- Maintaining a healthy grass cover by sound veld management and judicious burning of the grass sward.

Alien invaders should be controlled by mechanical and/or chemical means. Mechanical means include ringbarking (girdling), uprooting, chopping, slashing and felling. An axe, chain saw or brush cutter can be used. Stumps or ringbarked stems should be treated immediately with a chemical weed killer. Follow-up treatment is usually needed.

7. FLORA: CHECKLISTS AND RED-LISTED AND/OR PROTECTED SPECIES

A list of plant species (the term species is used here in a general sense to denote species, subspecies and varieties) that could be found in the region (quarter degree grids: 2628 DB; 2629 CA; 2629 CB) was downloaded from the South African Biodiversity Institute's website (SANBI: newposa.sanbi.org – accessed November 2021) (Appendix B). The NewPosa data search yielded 147 plant species. During the field surveys, 290 plant species were recorded on the Enertrag sites (Appendix A) and additionally eight species were listed for the region (data supplied by M. Lötter, MTPA). Combined, these sources yielded 396 species for the region of which 30 are protected species according to the MNCA (1998).

The South African Threatened Species Programme website (redlist.sanbi.org) of SANBI; the National Forests Act (Act No. 84 of 1998) (NFA 2021); the National Environmental Management: Biodiversity Act (NEMBA 2007c) (ToPS list); CITES (2021) appendices and the lists of red listed or protected plant species of MNCA (1998) were consulted to classify the species in the study area into the relevant IUCN or protected categories (Appendix B).

7.1 Species listed by the Screening Tool

Neither of the three species listed by the Screening Tool were encountered on site.

7.2 IUCN Red-listed species

For the IUCN Categories, the following definitions were applied (see Figure 10). **The colours in Figure 10 were applied to the checklist of plants and animals in this section as well as in Appendices B and C.**

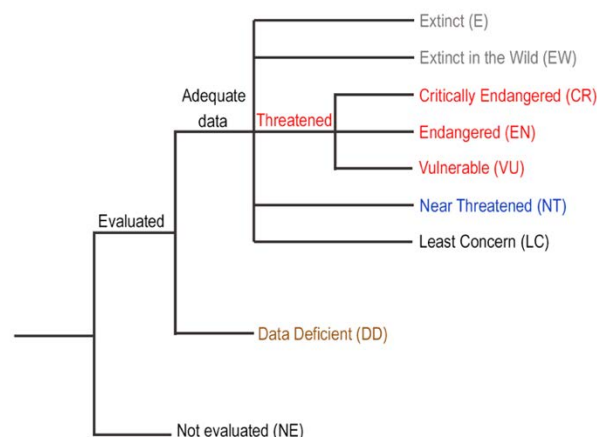


Figure 10: Schematic representation of the relationship between the various IUCN Red List Categories.

Extinct Categories:

- **Extinct (E):** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW):** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalised population (or populations) well outside the past range.

Threatened Categories:

- **Critically Endangered (CR):** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.

- **Endangered (EN):** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that it is facing a very high risk of extinction.
- **Vulnerable (VU):** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that it is facing a high risk of extinction.

Not Threatened Categories but regarded as SCC by SANBI:

- **Near Threatened (NT):** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable, and is therefore likely to become at risk of extinction in the near future.
- **Data Deficient (DD):** A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. In this case the species would be classified as DDD. If however, taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible, the species is classified as DDT. The latter category cannot be considered as SCC.
- **Additional categories recognised by SANBI:** Although not threatened categories, SANBI have added the species classified as Critically Rare, Rare and Declining to their SCC.

Not Threatened Categories and not considered as SCC by SANBI

- **Least Concern (LC):** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.
- **Not Evaluated (NE):** A taxon is Not Evaluated when it has not yet been evaluated against the five IUCN criteria. This category often applies to alien species.

Khadia beswickii and *Nerine gracilis* are the only IUCN threatened species occurring in the region according to Appendix B. Near Threatened (NT), Data Deficient (DDD) and Data Deficient (Taxonomically) (DDT) species are not classified as threatened according to the IUCN classification.

7.3 SANBI: Species of Conservation Concern

According to the South African National Biodiversity Institute (SANBI 2020), SCCs include all species that have been assessed according the IUCN Threatened or Red-List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Data Deficient (DD), as well as range-restricted species which are not declining and are nationally listed as Rare or Critically Rare. The DD category is split into those that are taxonomically unresolved (DDT) and those where insufficient data (DDD) are available to make a judgement on endangered status. The Taxonomically Data Deficient (DDT) species were excluded as SCC since taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of extinction risk is not possible.

The SCC species listed for the region are:

| | |
|-----------------------------------|---------------------------------------|
| <i>Argyrobium campicola</i> | NT |
| <i>Gladiolus robertsoniae</i> | NT |
| <i>Habenaria barbertoni</i> | NT |
| <i>Khadia beswickii</i> | VU (data supplied by M. Lötter, MTPA) |
| <i>Kniphofia typhoides</i> | NT (data supplied by M. Lötter, MTPA) |
| <i>Nerine gracilis</i> | VU (data supplied by M. Lötter, MTPA) |
| <i>Stenostelma umbelluliferum</i> | NT |

None of these species were recorded on the Mukondeleli site although *Gladiolus robertsoniae* was noted at the Impumelelo site.

7.4 Protected species

7.4.1 Mpumalanga Nature Conservation Act (No. 10 of 1998) (MNCA 1998)

A total of thirty (30) plant species are listed as Schedule 11 Protected plant species in the region according to the MNCA (1998) (Appendix B). Most of these species are members of the Amaryllidaceae and Orchidaceae. Twelve of the 30 protected plant species (Schedule 11) were recorded during the site survey in December 2021.

The 12 species recorded on all three Enertrag sites:

Aloe ecklonis
Aloe transvaalensis
Boophone disticha
Crinum bulbispermum
Cyrtanthus stenanthus
Eucomis autumnalis
Gladiolus crassifolius
Gladiolus dalenii
Gladiolus robertsoniae
Haemanthus humilis
Haemanthus sp.
Huernia hystrix

Another five species are on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga. These species were not recorded on the Mukodeleli site.

| | |
|----------------------------------|----|
| <i>Drimia angustifolia</i> | LC |
| <i>Hypoxis hemerocallidea</i> | LC |
| <i>Khadia beswickii</i> | VU |
| <i>Nerine gracilis</i> | VU |
| <i>Trachyandra erythrorrhiza</i> | NT |

Some provisions are given in terms of Schedule 11 Protected plants and Schedule 12 Specially Protected plants (Chapter 6, MNCA 1998):

- No person shall pick a Protected plant without a permit.
- No person shall pick an indigenous plant in a nature reserve without a permit.
- No person shall pick an indigenous plant on a public road, land next to a public road within a distance of 100 meters from the centre of the road without a permit.
- No person shall pick an indigenous plant which is not a Protected plant or Specially Protected plant on land which he or she is not the owner or occupier.
- No person shall donate, sell or export or remove from the province a Protected plant without a permit.
- No person shall possess, pick, sell, purchase, donate or receive as a donation, import or export or remove from the Province a Specially Protected plant without a permit.

7.5 ToPS list (NEM:BA 2007c)

No species classified as protected within the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA 2007c) is listed for the study area and none were found at the Mukondeleli site.

7.6 CITES appendices

Appendix II of CITES lists species that are not necessarily now threatened with extinction, but that may become so unless trade is closely controlled. Thirteen (13) Appendix II species are listed for the region including mostly (10) species of the Orchidaceae. *Aloe ecklonis*, *Aloe transvaalensis* and *Euphorbia clavarioides* are CITES-listed species that were recorded on the Mukondeleli site.

7.7 Protected Tree Species - National Forests Act (Act No. 84 of 1998)

No nationally protected tree species is listed for the site (NFA 2021) and none were recorded during the site visit.

7.8 Endemic species

No endemic species were listed for the Soweto Highveld Grassland Vegetation Type (Mucina & Rutherford 2006).

8. FAUNA: CHECKLISTS AND RED-LISTED AND/OR PROTECTED SPECIES

Species lists (the term species is used here in a general sense to denote species, subspecies and varieties) of the faunal component were sourced for the study area from the Animal Demography Unit, University of Cape Town website (<http://vmus.adu.org.za>), and species listed for the region (data supplied by M. Lötter, MTPA) and supplemented by relevant literature to determine the conservation status. The faunal species listed by the Screening Tool are given below (Section 8.1). **Note: The avifaunal and bat components will be addressed by the avifaunal and bat specialists.**

8.1 Mammals

The site falls within the distribution range of 52 mammal species (<http://vmus.adu.org.za>) (Appendix C).

8.1.1 Screening Tool

The screening tool rated the sensitivity of the Animal Species Theme as high and highlighted the following mammal species:

Mammalia - *Crocidura maquassiensis* Maquassie Musk Shrew

The Maquassie Musk Shrew *Crocidura maquassiensis*, classified as Vulnerable (Taylor *et al.* 2016), was not listed in the ADU mammal species list or the MNCA (1998) lists for the Mpumalanga province. It was not recorded on site during the survey. It depends on wetlands as suitable habitat in savanna and grasslands. Although it has a wide inferred extent of occurrence, it appears to be patchily distributed. The main threats are the loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable habitat. *Crocidura maquassiensis* has not been reported from Gauteng, North West Province or Mpumalanga post-1999 and thus there is a very low probability for it to occur on site.

8.1.2 IUCN threatened mammal species

Three IUCN threatened mammal species were listed for the environs of the Mukondeleli site on the website of the Animal Demography Unit, University of Cape Town (Appendix C):

| | | |
|------------------------|------------------|----|
| <i>Ourebia ourebi</i> | Oribi | EN |
| <i>Panthera pardus</i> | Leopard | VU |
| <i>Felis nigripes</i> | Black-footed cat | VU |

Seven mammal species were listed for the environs of the Mukondeleli site as Near Threatened (a category that is not a threatened category in the IUCN classification, but qualifies as SCC) (Appendix C):

| | | |
|-----------------------------------|---------------------------|----|
| <i>Amblysomus septentrionalis</i> | Highveld Golden mole | NT |
| <i>Atelerix frontalis</i> | Southern African hedgehog | NT |
| <i>Leptailurus serval</i> | Serval | NT |
| <i>Otomys auratus</i> | Southern African vlei rat | NT |
| <i>Aonyx capensis</i> | African Clawless otter | NT |

| | | |
|------------------------------|------------------------|----|
| <i>Poecilogale albinucha</i> | African Striped weasel | NT |
| <i>Crocidura mariquensis</i> | Swamp musk shrew | NT |

All mammals that were either sighted or confirmed by the landowners are indicated in Appendix C.

8.1.3 Mpumalanga: provincially protected mammal species (MNCA 1998)

Six of the 52 mammal species listed in Appendix C are Schedule 2: Protected Game in Mpumalanga. The steenbok *Raphicerus campestris* and the Southern African hedgehog, *Atelerix frontalis*, were the mammal species that were recorded on the Mukondeleli site.

8.1.3 Nationally Threatened or Protected Species: ToPS (NEMBA 2007c)

According to ToPS legislation (NEMBA 2007c), one mammal species is listed as Endangered, one mammal species is listed as Vulnerable and six species are Protected (Appendix C).

Endangered: Indigenous species facing a high risk of extinction in the wild in the medium-term future, although they are not critically endangered.

Ourebia ourebi Oribi

Vulnerable: Indigenous species facing a high risk of extinction in the wild in the medium-term future, although they are not critically endangered or endangered.

Panthera pardus Leopard

Protected species: Indigenous species of high conservation value or national importance that require national protection.

| | |
|---------------------------|----------------------------|
| <i>Aonyx capensis</i> | African clawless otter |
| <i>Atelerix frontalis</i> | Southern African hedgehog* |
| <i>Connochaetes gnou</i> | Black wildebeest |
| <i>Felis nigripes</i> | Black-footed cat |
| <i>Leptailurus serval</i> | Serval* |
| <i>Vulpes chama</i> | Cape fox |

*Mammals that were either sighted or confirmed by the landowners (Appendix C)

8.1.4 CITES

The following mammal species occurring in the region are CITES listed:

| | | |
|---------------------------|------------------------|-------------|
| <i>Aonyx capensis</i> | African Clawless Otter | Appendix II |
| <i>Caracal caracal</i> | Caracal | Appendix II |
| <i>Leptailurus serval</i> | Serval* | Appendix II |
| <i>Panthera pardus</i> | Leopard | Appendix I |

*Mammals that were either sighted or confirmed by the landowners (Appendix C)

8.2 Reptiles

Thirty-two (32) reptile species are listed for the region (Appendix C). The list includes one IUCN threatened (Vulnerable) species, i.e. the **Giant girdled lizard (*Smaug giganteus*)** and one Near-threatened species, i.e. ***Chamaesaura aenea* (coppery grass lizard)**.

Provincially protected reptile species include 15 Schedule 2 Protected reptiles and 17 Schedule 5 reptiles. The giant girdled lizard (*Smaug giganteus*) is listed as Endangered according to the ToPS list (NEMBA 2007c). The only reptile that has been recorded on the Mukondeleli site is the rinkhals *Hemachatus haemachatus*.

Two CITES-listed species are listed for the region surveyed:

| | |
|--------------------------------------|-------------------------------|
| Giant girdled lizard (Ouvolk) | <i>Smaug giganteus</i> |
| Common girdled lizard | <i>Cordylus vittifer</i> |

8.3 Frogs

Fourteen species were listed for the region and all have an IUCN status of Least Concern. None of the frog species listed for the region has a MNCA or ToPS protected status (MNCA 1998, NEMBA 2007c).

8.4 Lepidoptera

Only one of the 62 species of the Lepidoptera listed for the region is IUCN listed as Endangered, i.e. ***Chrysoritis aureus* (Golden opal)**.

The Screening Tool listed *Lepidochrysops procera* as a sensitive species for the site. However, it was not listed in the ADU website (<http://vmus.adu.org.za>), the MNCA (1998) provincial species lists or the NEMBA (2007c) ToPS lists. Although *Lepidochrysops procera* has a IUCN status of Least Concern, it is a habitat specialist and is rated as Rare. It is not regarded as sensitive in the National Sensitive Species List of SANBI and is not exploited, collected, traded or utilised in a targeted manner (<http://nssl.sanbi.org.za/species/lepidochrysops-procera> accessed October 2021). Its habitat is rocky areas in grassland (and grassy areas in savanna), where its larval host plant, *Ocimum obovatum*, occurs. Rocky areas are limited along the gridline routes.

8.5 Scorpions

One scorpion species *Uroplectes triangulifer* is listed for the 2629C and 2628D locus.

8.6 Spiders

All baboon spiders are provincially Schedule 7 protected (Appendix C). The listed baboon spider *Harpactira hamiltoni* is a ToPS protected species (NEMBA 2007c).

9. CONSERVATION

9.1 National Environmental Management: Protected Areas Act (Act No. 10 of 2003)

The study site is not located in a protected area.

9.2 National Protected Areas Expansion Strategy (NPAES)

The study site does not form part of the NPAES (NPAES 2010). It is also not earmarked for expansion in the 5-year plan of the Mpumalanga PAES.

9.3 National list of ecosystems that are threatened and in need of protection

The site is located in the Soweto Highveld Grassland vegetation type (Mucina & Rutherford 2006, SANBI 2006-2018) which is classified as "Vulnerable" (NEMA 2011, Skowno *et al.* 2018).

9.4 Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Other Natural Areas (ONAs)

Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species or ecological processes. CBAs are regarded as areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species. The definitions for CBAs are (SANBI 2018):

- CBA 1: Areas that are irreplaceable for meeting biodiversity targets. There are no other options for conserving the ecosystems, species or ecological processes in these areas (SANBI 2018).
- CBA 2: Areas that are the best option for meeting biodiversity targets, in the smallest area, while avoiding conflict with other land uses.

It is assumed that the terms 'CBA irreplaceable' in the MBSP is equivalent of a CBA1 and a 'CBA optimal' refers to a CBA2. The CBA map in Figure 11 indicates the presence of CBA1 and a CBA2 across a large section of especially the farm Bosjesspruit. The Mukondeleli on-site substations are located in a CBA. These sites must be micro-sited prior to approval of final layout such that the site can be groundtruthed and any sensitivity areas avoided. The powerline crosses some CBA areas but could be positioned to limit coverage of such areas (Figure 12).

The main reasons provided for the mapping of the CBAs on Mukondeleli were (data provided by M. Lötter, MTPA):

- Soweto Highveld Grassland
- Mesic Highveld Grassland (wetlands) – Groups 1 – 3
- Wetland clusters
- Intact grassland patches
- African bullfrog *Pyxicephalus adspersus*
- African Grass Owl *Tyto capensis*
- Climate change land facets
- Critical linkages
- Macro, core and supporting corridors

It should be noted that these reasons are applicable to the entire Mpumalanga planning units wherein the Mukondeleli site is located and not necessarily applicable to the site.

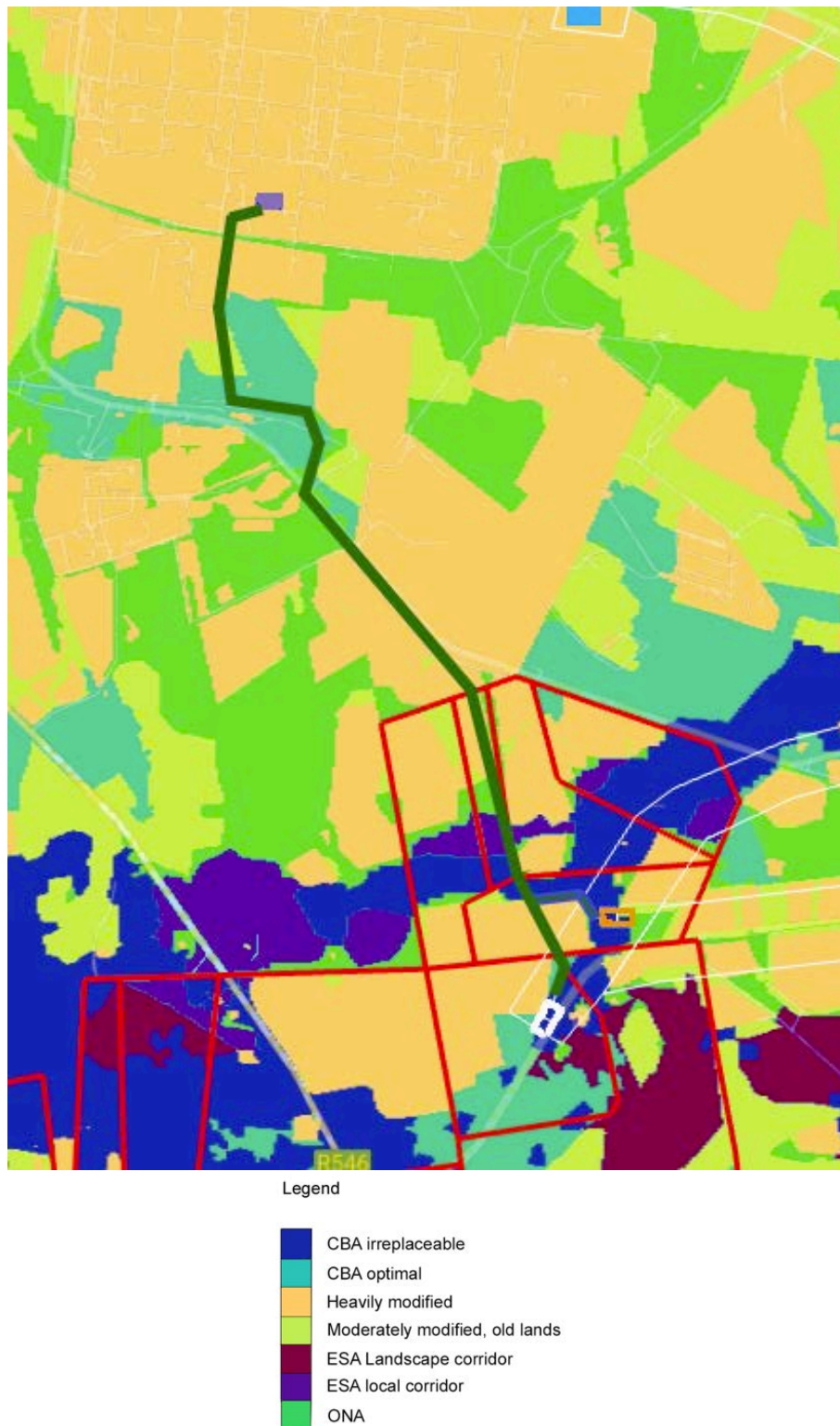


Figure 11: Critical Biodiversity Areas (CBAs), Ecological Support Areas (corridors), Other Natural Areas (ONAs), and moderately and heavily modified areas of the Mukondeleli gridline sites (MBSP 2014; biodiversityadvisor.sanbi.org). Orange square = on-site substation SS1; White square = alternative on-site substation SS2; purple squares = step-down substation at Sasol in the north; green line = powerline.

Development within Critical Biodiversity Areas is not encouraged. According to the Western Cape Biodiversity Spatial Plan Handbook (Pool-Stanvliet *et al.* 2017) permissible land uses in CBAs are those that are compatible with maintaining the natural vegetation cover of CBAs in a healthy ecological state, and that do not result in loss or degradation of natural habitat. Undesirable land uses in terrestrial CBAs are those that cause loss of natural habitat or ecosystem functionality, such as: (i) mining or prospecting; (ii) intensive agriculture (cultivation) or plantation forestry; (iii) residential, commercial or industrial developments; (iv) game-proof fences in CBA corridors; (v) linear infrastructure that disrupts the connectivity of CBA corridors; and (vi) extensive or intensive grazing that results in species diversity being lost through selective or over-grazing (Pool-Stanvliet *et al.* 2017). The preferred and alternative on-site substations occur in CBAs and must be micro-sited prior to approval of final layout such that the site can be groundtruthed and any sensitivity areas avoided.

There are some small Ecological Support Areas (ESA)(local corridors) demarcated along the Mukondeleli gridlines (Figure 11; MBSP 2014; biodiversityadvisor.sanbi.org). An ESA is not essential for meeting biodiversity targets, but plays an important role in supporting the ecological functioning in a CBA. ESAs need to be maintained in at least a functional and often natural state, but some limited habitat loss may be acceptable. It is important that the project should not compromise the functional (natural) state of the ESAs (Pool-Stanvliet *et al.* 2017). The gridline has small sections of ESAs falling in the servitude. The service route could be positioned such that it avoids the ESA.

Other Natural Areas (ONAs) have not been identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Land use guidelines for Terrestrial Other Natural Areas (ONAs) are not required to meet biodiversity targets. Some ONAs were demarcated along the Mukondeleli gridline route (Figure 11; MBSP 2014; biodiversityadvisor.sanbi.org), however power lines are permissible in ONAs.

Large portions of the site are demarcated as either 'Heavily modified' or 'Moderately modified – old lands', especially in the east and north (Figure 11). These MBSP categories, do not have equivalent categories in the SANBI CBA classification system and must be assumed to degraded to such an extent that they cannot qualify as ESAs or ONAs. Wherever possible, the gridlines should be placed in these units.

9.5 Freshwater Ecosystem Priority Areas (FEPAs)

Freshwater Ecosystem Priority Area (FEPA) are priority areas for conserving freshwater ecosystems and supporting sustainable use of water resources and upstream management areas (Driver *et al.* 2012). The entire Mukondeleli site is contained in an Upstream Management Area as river FEPA (biodiversityadvisor.sanbi.org). Upstream Management Areas are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. However, the area mapped as river FEPA did not emerge as being highly sensitive in the current assessment and the sensitivity model that was applied, classified only the drainage lines in the FEPA as being of high sensitivity with most of the site classified as low sensitivity and a small spot of medium sensitivity .

Channelled valley-bottom wetlands, seeps and dams are indicated in Figure 12 (MPHG 2014). The preferred and alternative on-site substations are located in a seep and some sections of the gridlines do traverse some seeps and valley-bottom wetlands. Buffer zones as indicated by the aquatic specialist should be observed. The 'flat' unit indicated in Figure 12 is an example of a severely degraded area that was once a pan type wetland (depression or 'flat') (MBSP 2014).

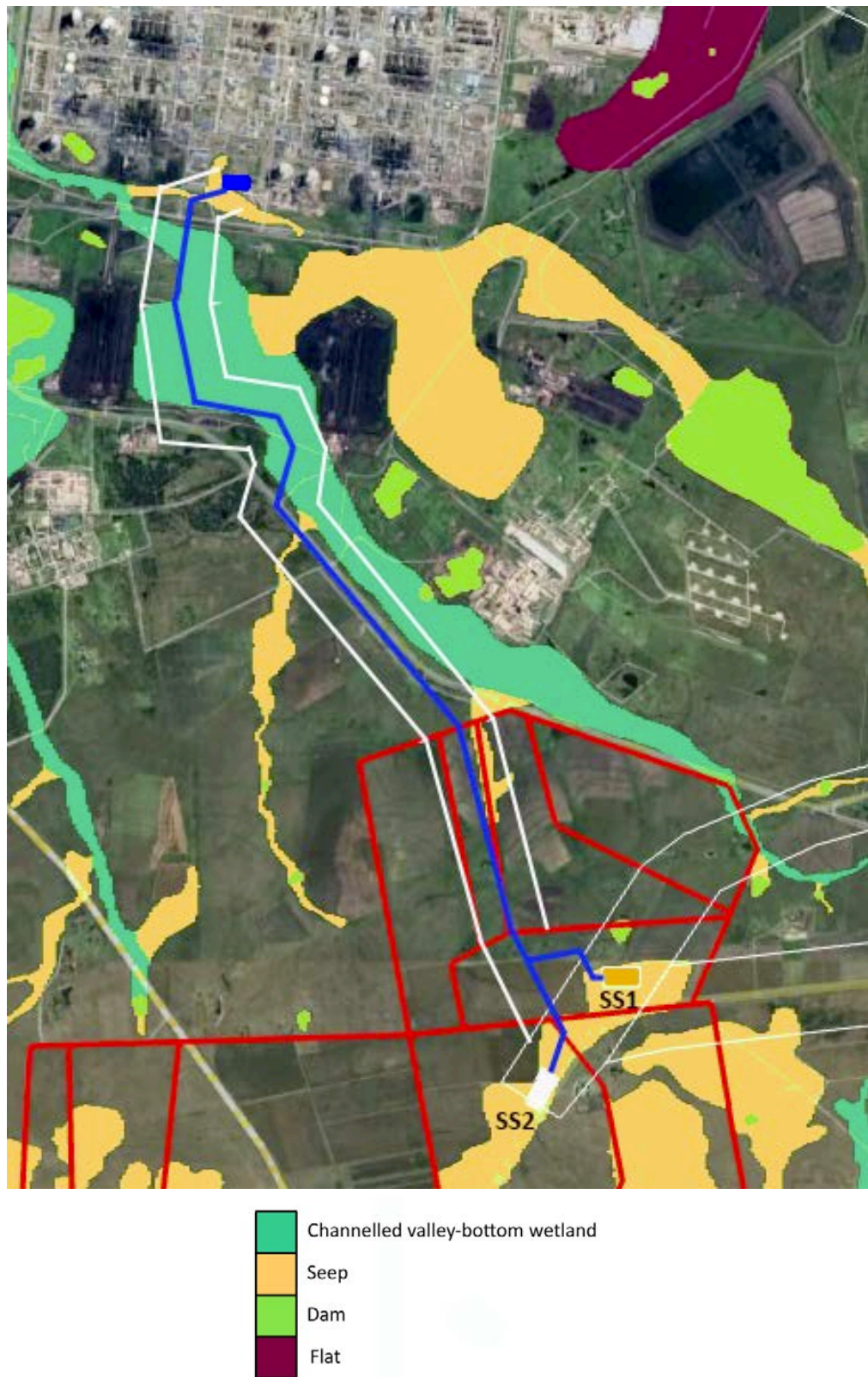


Figure 12: Mpumalanga Highveld Wetlands in the Mukondeleli gridline site (MPHG 2014; biodiversityadvisor.sanbi.org). Orange square = on-site substation SS1; white square = alternative on-site substation site SS2; blue square = step-down substation at Sasol; maroon = flat (pan or depression type wetland); blue line = powerline.

9.6 Ecological processes, functioning and drivers

Ecological processes include primary production, decomposition, nutrient cycling and fluxes of nutrients and energy. These processes will be altered by the clearing of the vegetation at the footprint of the gridline infrastructure. However, the impact is expected to be fairly small. Since grasses are wind pollinated, pollination of the grass component should not be unduly affected by the development, although the forbs will depend on pollinators. Roads required for operation are likely to still be of a natural surface such as gravel and would experience low traffic volumes, thus migration of ground-dwelling organisms will be hindered locally during construction, but ecological connectivity should not be disrupted during the operational phase. Overall, broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions should be able to continue due to the small footprint of the development. The infrastructure, if properly planned, should not cut off ecological corridors and habitat fragmentation due to the development should not be an issue.

The disturbance caused during construction will inevitably create conditions favourable for invasion by alien species. Since, the level of alien infestation at the site was moderate, an alien invasive plant species monitoring and control programme needs to be initiated to control invasions.

Fire is considered an important driver of vegetation dynamics in the Grassland and Savanna Biomes. Should fire be suppressed on site this could have long-term effects on the vegetation dynamics.

9.7 Indigenous forests

No indigenous forests occur on the site (NFA 2021).

9.8 Strategic Water Source Areas (SWSA)

The Mukondeleli gridline site is not located within a SWSA (biodiversityadvisor.sanbi.org).

10. ECOLOGICAL SENSITIVITY ANALYSIS: VEGETATION

10.1 Introduction

Sensitivity is the vulnerability of a plant community or habitat to an impact, for example a wetland or ridge system would be more vulnerable to development than would a sandy plain. Several features of a site can be assessed to derive a sensitivity score, such as:

1. Threatened status of the regional vegetation types wherein the proposed site is situated.
2. Percentage of IUCN threatened (red-listed) plant species per habitat.
3. Number of protected tree species per habitat.
4. Percentage of provincially protected plant species per habitat.
5. Presence of endemic plant species per habitat or site (endemic to vegetation type).
6. Conservation value of plant community (habitat).
7. Species richness per habitat or per sample plot (number of plant species).
8. Degree of connectivity and/or fragmentation of the habitat, i.e. high connectivity and low fragmentation infers a low rating.
9. Soil erosion potential.
10. Resilience (this is a measure of the ability of a particular habitat to recover after an impact, i.e. high resilience infers low rating).

10.2 Sensitivity model

The following **sensitivity model** (Table 5, Figure 13) was applied to the data for each habitat on site. This was achieved by weighting each criterion and calculating the sum for the habitat, which reflects the sensitivity and sensitivity ranking. A brief description of the sensitivity rating of the parameters is provided below:

1. **Threatened status of the ecosystem** (depends on the percentage area intact, or degree of transformation) (Mucina & Rutherford 2006, NEM:BA 2011, Skowno *et al.* 2018). The ecosystems are classified into the following categories:
 - Low sensitivity: If "Least Concern", the vegetation type has most of its habitat intact, i.e. more than 80%; or the vegetation type is adequately statutory or formally conserved in parks and reserves.
 - Medium sensitivity: If "Vulnerable", the vegetation type has from 60% to 80% of the ecosystem intact; less than 40% has been transformed which could result in some ecosystem functioning being altered, and/or the ecosystem is statutory poorly conserved. For example, the vegetation type is rich in plant species, but is not a pristine example of a vegetation type, therefore some transformation or disturbance occurred, such as human structures and degraded veld due to overgrazing and/or bush encroachment.
 - High sensitivity: If "Endangered", the vegetation type has from 40% to 60% of the ecosystem intact; or 40% to 60% transformed due to disturbance, cultivation or alien species; or the ecosystem is statutory poorly conserved e.g. less than about 3% conserved.
 - Very high sensitivity: If "Critically Endangered", the vegetation type has only 16% to 36% of the ecosystem intact. The richer the ecosystem is in terms of species, the higher the percentage threshold.

Category rating:

| | | |
|-----------|------|-----|
| Low | (LC) | = 1 |
| Medium | (VU) | = 2 |
| High | (EN) | = 3 |
| Very high | (CE) | = 4 |

2. **Percentage of IUCN (red-listed) plant species** (IUCN status higher than least Concern): The rating is determined by the presence of red-listed flora in a habitat (calculated as percentage of the total number of species per habitat).

Category rating:

| | | |
|--------|-----------|-----|
| None | (0%) | = 0 |
| Low | (>0 – 2%) | = 1 |
| Medium | (>2 – 5%) | = 2 |
| High | (>5%) | = 3 |

3. **Presence of protected tree species** (NFA 2021): The presence protected tree species in a habitat is rated as follows:

Category rating:

| | | |
|--------|-----------------|-----|
| None | (0 species) | = 0 |
| Low | (1 - 2 species) | = 1 |
| Medium | (3 – 4 species) | = 2 |
| High | (>4 species) | = 3 |

4. **Percentage of Mpumalanga protected plant species:** The rating depends on the percentage of protected species in relation to the total plant species per habitat.

Category rating:

| | | |
|--------|-------------|-----|
| None | (0%) | = 0 |
| Low | (>0 - 10%) | = 1 |
| Medium | (>10 – 20%) | = 2 |
| High | (>20%) | = 3 |

5. **Percentage of plant species endemic to the particular vegetation type of Mucina & Rutherford (2006):** Refers to the number of species expressed as a percentage of the total number of species per habitat.

Category rating:

| | | |
|--------|-----------|-----|
| None | (0%) | = 0 |
| Low | (>0 - 2%) | = 1 |
| Medium | (2–5%) | = 2 |
| High | (>5%) | = 3 |

6. **Species richness per habitat:** Expressed as mean number of species per plot in a habitat.

Category rating:

| | | |
|--------|-----------|-----|
| Low | (<40) | = 1 |
| Medium | (40 – 60) | = 2 |
| High | (>60) | = 3 |

7. **Conservation value of the habitat:** The assessment is made for the habitat in the broader region. The criteria are low, medium and high. The presence of e.g. quartz outcrops, ridges, wetlands and dunes should be considered to have a medium to high conservation value. However, this should be seen in the context of the presence of representative habitat in the broader region or in conservation areas.

Category rating:

| | | |
|--------|--|-----|
| Low | | = 1 |
| Medium | | = 2 |
| High | | = 3 |

8. **Degree of connectivity and/or fragmentation of the ecosystem:** The degree of connectivity with surrounding or adjacent natural areas and/or fragmentation of habitats, thus high degree of connectivity and low degree of fragmentation infer a high rating.

Category rating (note reverse order):

| | | |
|--------|--|-----|
| Low | | = 3 |
| Medium | | = 2 |

High = 1

9. **Erosion potential of the soil:** The erosion potential of the soil is indicated as low, medium or high, e.g. coarse sandy soils on plains have a low erosion potential.

Category rating:

Low = 1
Medium = 2
High = 3

10. **Resilience:** Is a measure of the ability of a particular habitat to recover to its current state after an impact, i.e. high resilience infers low rating.

Category rating (note reverse order):

Low = 3
Medium = 2
High = 1

Each criterium is weighted as follows in the model:

| | |
|--|----|
| Threatened status of the vegetation type | x5 |
| Percentage of threatened plant species | x4 |
| Presence of protected tree species | x3 |
| Percentage of Mpumalanga protected species | x4 |
| Percentage of endemic species to vegetation type | x2 |
| Species richness | x2 |
| Conservation value (habitat) | x4 |
| Degree of connectivity/fragmentation of habitat | x2 |
| Erosion potential | x2 |
| Resilience | x3 |

10.2.1 Sensitivity rating

The sum of all criteria is obtained per habitat and the sensitivity rating interpreted as follows:

| | | | |
|---------|-------------|------|--------------------|
| ≤ 40 | = low | (L) | (rating scale = 1) |
| 41– 50 | = medium | (M) | (rating scale = 2) |
| 51 – 65 | = high | (H) | (rating scale = 3) |
| > 65 | = very high | (VH) | (rating scale = 4) |

In general, these sensitivity ratings are interpreted as follows:

- **Low** sensitivity means the sensitivity should not have an influence on the decision about the project. It is usually applicable to habitats that have been transformed, especially by human activities. However, no protected species may be removed/destroyed without a permit.
- **Medium** means a sensitivity rating that is real and sufficiently important to require management, e.g. mitigation measures, management or protection of the rare/threatened fauna and flora, protection of a specific habitat on the property and/or rehabilitation.
- **High** means a sensitivity rating where the habitat should be excluded from any development.
- **Very high** means a sensitivity rating that should influence the decision whether or not to proceed with the project.

Table 5: Sensitivity of the different habitats (plant communities) identified on site (see Figure 13). Habitats 1, 2 & 3 did not occur on the Mukondeleli gridline site.

| Community/Habitat | 4 | 5 | 6 | 7 |
|--------------------------------|----|----|----|----|
| Threatened status (x5) | 10 | 10 | 10 | 10 |
| % Threatened species (x4) | 0 | 0 | 0 | 0 |
| Number of protected trees (x3) | 0 | 0 | 0 | 0 |
| Mpumalanga species (x4) | 8 | 12 | 0 | 8 |
| Endemic species (x2) | 0 | 0 | 0 | 0 |
| Species richness (x2) | 2 | 2 | 2 | 2 |
| Conservation value (x4) | 8 | 4 | 4 | 12 |
| Connectivity (x2) | 2 | 2 | 2 | 4 |
| Erosion (x2) | 4 | 2 | 4 | 6 |
| Resilience (x3) | 3 | 3 | 3 | 9 |
| Sum: | 37 | 35 | 25 | 51 |
| Sensitivity rating: | L | L | L | H |

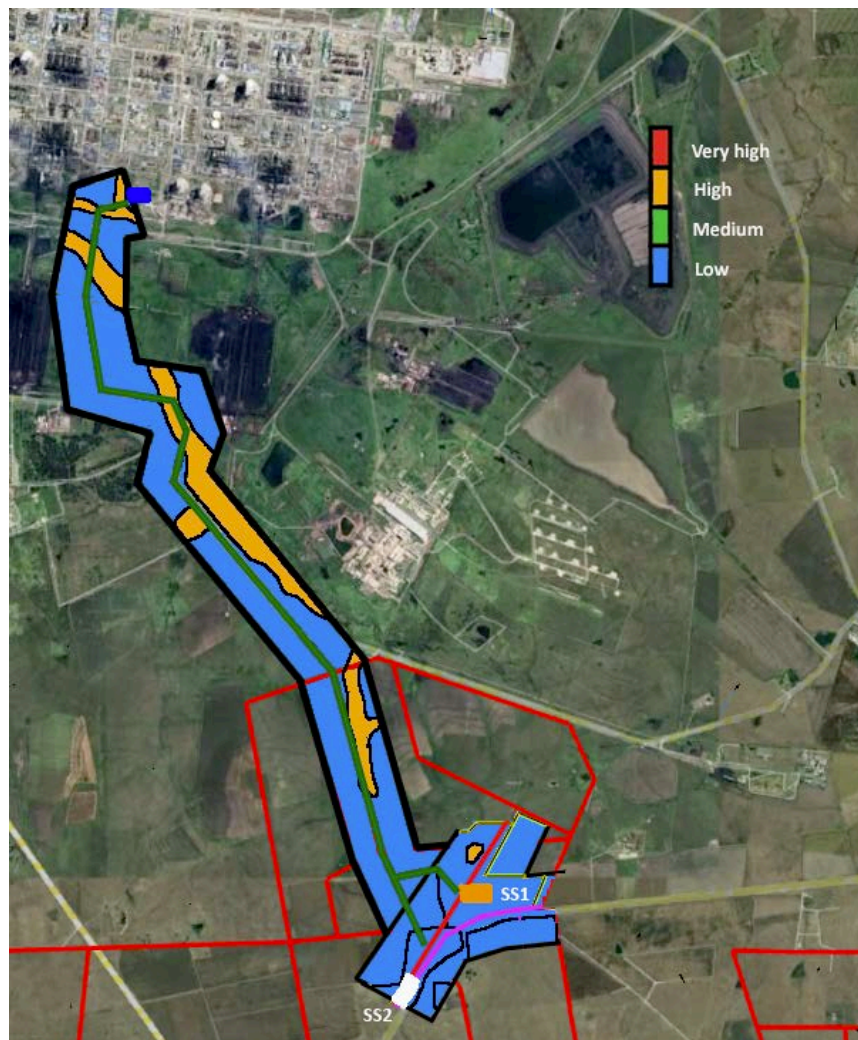


Figure 13: Sensitivity map of the Mukondeleli gridline site. Orange square = on-site substation SS1; white square = alternative on-site substation SS2; blue square = step-down substation at Sasol; green line = powerline. The sensitivity map is additionally provided as a .kmz file.

Overall, the drainage lines (including dams) (Habitat 7 – high sensitivity) were more sensitive than the other habitats on site. Habitats 1, 2 & 3 did not occur on the Mukondeleli gridline sites. Habitats 8, 9 & 10 are man-made habitats with a low sensitivity rating, e.g. cropland, planted pasture, plantations, wind breaks and diggings.

Pylon positioning should avoid the high sensitivity drainage lines (Habitat 7). The on-site substations currently seems to be located in a CBA1, although the sensitivity of the site was rated as low in the current assessment. These sites must be micro-sited prior to approval of final layout such that the site can be groundtruthed and any sensitivity areas avoided.

Along the water courses, buffers are applicable to the development. A buffer zone of 32 m is usually applied to drainage lines, but the aquatic specialists may apply wider buffer zones along these habitats. **No buffer has been applied in Figure 13, since it is advised to follow the recommendations of the aquatic specialist in this regard.**

Apart from the drainage lines, with high sensitivity, the CBAs did not emerge as being highly sensitive in the sensitivity model that was applied. The areas mapped as FEPAs were largely incorporated into the CBAs and likewise did not emerge as being highly sensitive in the sensitivity model that was applied.

11. SCREENING TOOL REPORT

11.1 Summary of screening tool results

11.1.1 Plant Species Theme

The Screening Tool rated the sensitivity of the Plant Species Theme as **medium** (Figure 14) and highlighted three species with an IUCN status of Vulnerable as being of concern.

| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|-----------------------|------------------|--------------------|-----------------|
| | | X | |

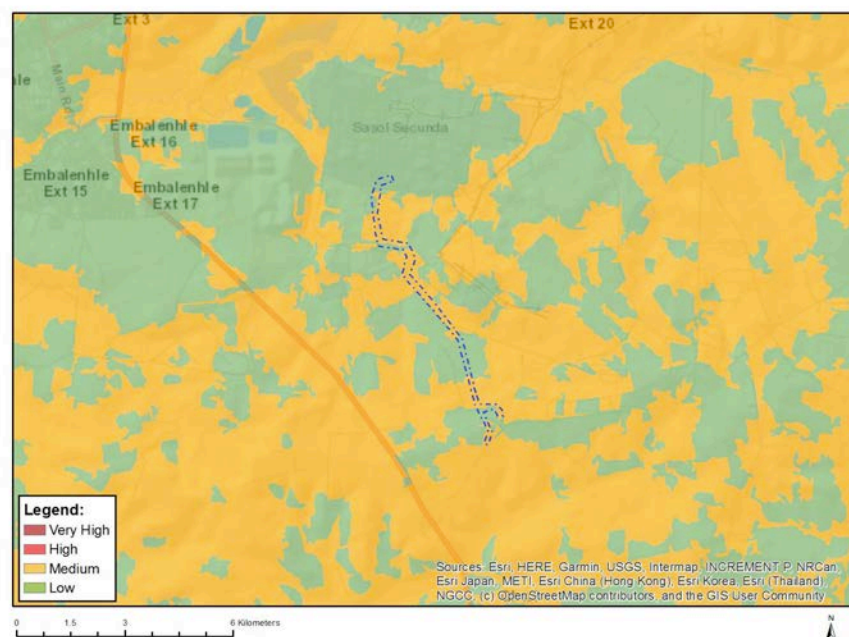


Figure 14: Map and outcome of the Plant Species Theme sensitivity generated by the screening tool.

The following plant species were highlighted as being of concern:

| Sensitivity | Feature(s) |
|-------------|------------------------|
| Medium | Sensitive species 1252 |
| Medium | Sensitive species 691 |

Please take note of the following email communication from SANBI: ‘As per the best practise guideline that accompanies the protocol and screening tool, please, remember that the **name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain**. It should be referred to as *sensitive plant* or *sensitive animal* and its threat status may be included, e.g. *critically endangered sensitive plant* or *endangered sensitive animal*.’ It should be noted that the numeric code of the sensitive species is not an unique identifier, since the numbers are randomised from time to time.

11.1.2 Animal Species Theme

The Screening Tool rated the sensitivity of the Animal Species Theme as **medium** (Figure 15).

| Very high sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|-----------------------|------------------|--------------------|-----------------|
| | | X | |

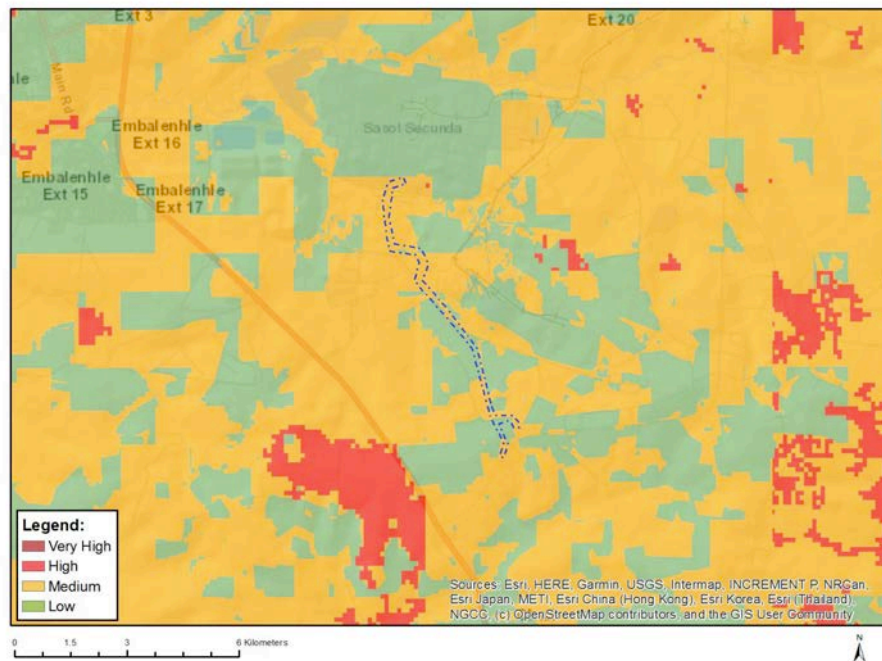


Figure 15: Map and outcome of Animal Species Theme sensitivity generated by the screening tool.

Animal species highlighted by the screening tool for the region:

| Sensitivity | Feature(s) |
|-------------|---|
| Medium | <i>Aves-Sagittarius serpentarius</i> |
| Medium | <i>Insecta-Lepidochrysops procera</i> |
| Medium | <i>Mammalia-Crocidura maquassiensis</i> |

11.1.3 Relative Terrestrial Biodiversity theme

The screening tool rated the sensitivity of the Relative Terrestrial Biodiversity theme as **very high** (Figure 16).

| Very high sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|-----------------------|------------------|--------------------|-----------------|
| X | | | |

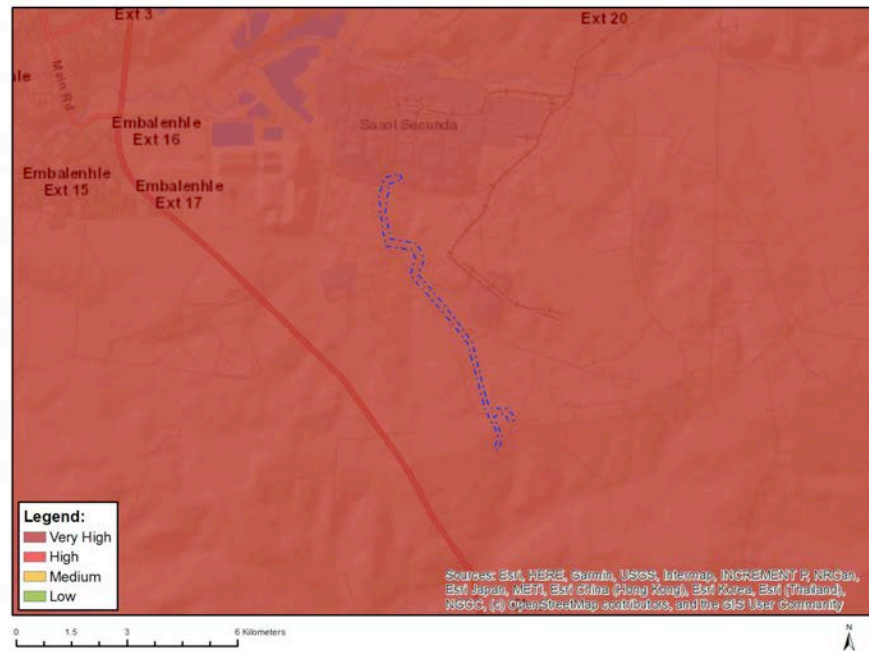


Figure 16: Map and outcome of Relative Terrestrial Biodiversity sensitivity generated by the screening tool.

The following features were highlighted:

| Sensitivity | Feature(s) |
|-------------|---|
| Very high | Critical Biodiversity Area 1 |
| Very high | Critical Biodiversity Area 2 |
| Very high | Ecological support area: local corridor |
| Very high | Vulnerable ecosystem |
| Very high | Protected Areas Expansion Strategy |

11.2 Screening tool in relation to background study and site verification

11.2.1 Plant Species Theme

Our field survey and application of a sensitivity model indicated that most of site had a **low** sensitivity. None of the SCC highlighted by the screening tool were recorded on site.

- Sensitive species 691 occurs in damp depressions in shallow soil over rock sheets. This type of habitat is not present along the gridline.
- The habitats on site do not present suitable habitat for sensitive species 1252 because of a lack of wooded habitat.
- We recommend a **low** sensitivity rating for the Plant Species Theme.

11.2.2 Animal Species Theme

- **The avifaunal and bat components will be addressed by the avifaunal and bat specialists.**
- The Screening Tool listed *Lepidochrysops procera* (Lepidoptera) as a SCC for the site. However, it was not listed in the ADU database, the MNCA (1998) provincial species lists or the NEMBA (2007c) ToPS lists. *Lepidochrysops procera* was not recorded on site and is unlikely to occur there because its host plant (*Ocimum obovatum*) was not present on site.
- The Maquassie Musk Shrew *Crocidura maquassiensis* was not listed in the ADU mammal species list or the MNCA (1998) lists for the Mpumalanga province and was not recorded on site during the survey. The Maquassie Musk Shrew depends on wetlands as suitable habitat in savanna and grasslands. Although it has a wide inferred extent of occurrence, it appears to be patchily distributed. *Crocidura maquassiensis* has not been reported from Mpumalanga Province post-1999 and thus there is a very low probability for it to occur on site.
- What the screening tool did not highlight was the possible presence of the Giant girdled lizard, a species with a Vulnerable IUCN status. The species has been reported by one of the landowners on the Mukondeleli WEF site.
- Overall sensitivity of animal theme (avifaunal and bat components excluded) is thus rated as **medium**. However, if the suggested mitigation measures are followed the animal SCC should not be negatively affected.

11.2.3 Relative Terrestrial Biodiversity Theme

This theme considers the presence of protected areas, National Protected Area Expansion Strategy (NPAES), CBAs, ESAs and National Freshwater Ecosystem Priority Areas (NFEPAs).

- The study area is not located in a protected area nor does it fall in an area earmarked for the NPAES (NPAES 2010). It is also not earmarked for expansion in the 5-year plan of the Mpumalanga PAES.
- Our background study confirms that the Soweto Highveld Grassland vegetation type on site is listed as 'Vulnerable'.
- Our background study indicated that although there are CBAs present on site, our sensitivity analysis rated most of these areas as being of low sensitivity. Nevertheless if possible, the gridline should preferably not be located within the area demarcated as CBA.
- There are ESA Local corridors indicated on site (Figure 15), but the presence of the gridline would not impact negatively on them.
- Freshwater Ecosystem Priority Areas (FEPAs) or water catchments were not flagged by the screening tool. Based on the site assessment of the vegetation most of the area mapped as upstream river FEPA was rated as having a low or medium sensitivity, with only the drainage lines having a high sensitivity. Several Highveld wetland are present on site (see aquatic specialist report), but these were also not highlighted by the Screening Tool.

Unfortunately, the screening tool on site limits the sensitivity outcome of the Relative Terrestrial Biodiversity Theme to either very high or low. This is an issue which should be revisited by DFFE since it does not give a proper representation of the site conditions. Although we agree with the presence of the CBA, the entire site does not qualify as CBA, since a large proportion of the site is degraded and under cropland or abandoned cropland. Thus if the same 4-tiered scale were to be applied to this theme, as in the case of the other themes, we would rate it as **medium to low**.

12. ENVIRONMENTAL IMPACTS

12.1 Introduction

In this section the issues, risks and impacts associated with the project from a terrestrial biodiversity and species viewpoint are presented.

12.2 Key issues

- The key issues are that parts of the site have been identified as CBAs. Infrastructure positioning should be modified/amended to avoid the CBAs.
- Furthermore, the site falls within a Vulnerable national vegetation type.

12.3 Impacts during the construction phase

12.3.1 Direct impacts during the construction phase

- Potential impact 1: The clearing of natural vegetation
- Potential impact 2: The loss of threatened, protected, CITES listed and/or endemic plants/animals
- Potential impact 3: Loss of faunal habitat
- Potential impact 4: Direct faunal mortalities due to construction and increased traffic
- Potential impact 5: Increased dust deposition
- Potential impact 6: Increased human activity and noise

12.3.2 Indirect impacts during the construction phase

- Potential impact 1: Establishment of alien vegetation

12.4 Impacts during the operational phase

12.4.1 Direct impacts during the operational phase

- Potential impact 1: Refer to avifaunal assessment

12.4.2 Indirect impacts during the operational phase

- Potential impact 1: Establishment of alien vegetation

12.5 Impacts during the decommissioning phase

12.5.1 Direct impacts during the decommissioning phase

- Potential impact 1: Direct faunal mortalities
- Potential impact 2: Increased dust deposition

12.5.2 Indirect impacts during the decommissioning phase

- Potential impact 1: Establishment of alien vegetation

12.6 Cumulative impacts

- Cumulative impact 1: Vegetation loss and habitat destruction
- Cumulative impact 2: Compromising integrity of CBAs, ESAs and NPAES
- Cumulative impact 3: Reduced ability to meet conservation obligations & targets
- Cumulative impact 4: Loss of landscape connectivity and disruption of broad-scale ecological processes

13. ASSESSMENT OF SIGNIFICANCE OF ENVIRONMENTAL IMPACT

13.1 Introduction

The impacts of the proposed development on the terrestrial biodiversity and species were assessed based on the knowledge gained during the site visit and literature review. Each of the impacts is briefly described below in terms of the nature; proposed mitigation measures; and the significance of the impact without and with the mitigation measures applied. The methodology follows the guidelines provided by the CSIR as set out below (DEAT Guideline 5: Assessment of Alternatives and Impacts (DEAT 2006)), and the following methodology is applied to the prediction and assessment of impacts and risks:

Potential impacts and risks have been rated in terms of the direct, indirect and cumulative impacts:

- **Direct impacts:** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts:** are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts:** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts. The cumulative impacts are assessed by identifying other wind and solar energy project proposals and other applicable projects, such as construction and upgrade of electricity generation, and transmission or distribution facilities within 55 km of the proposed Mukondeleli gridline site that have been approved (i.e. positive EA has been issued) or is currently underway.

The impact assessment methodology includes the following aspects (methodology provided by CSIR):

- **Nature of impact/risk** - The type of effect that a proposed activity will have on the environment.
- **Status** - Whether the impact/risk on the overall environment will be
 - Positive - environment will benefit overall from the impact/risk.
 - Negative - environment will be adversely affected overall by the impact/risk.
 - Neutral - environment overall will not be affected.
- **Spatial extent** – The size of the area that will be affected by the impact/risk:
 - Site specific.
 - Local (<10 km from site).
 - Regional (<100 km of site).
 - National.
 - International (e.g. Greenhouse Gas emissions or migrant birds).
- **Duration** – The timeframe during which the impact/risk will be experienced:
 - Very short term – instantaneous.
 - Short term - less than 1 year.

- Medium term - 1 to 10 years.
 - Long term - the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration).
 - Permanent - mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning).
- **Consequence (Severity)** – The anticipated consequence of the risk/impact:
 - Extreme - extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease.
 - Severe - severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease.
 - Substantial - substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease.
 - Moderate - notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function, but in a modified manner.
 - Slight - negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected.
 - **Reversibility of the Impacts** - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
 - High reversibility - impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment.
 - Moderate reversibility of impacts.
 - Low reversibility of impacts.
 - Impacts are non-reversible - impact is permanent, i.e. this is the least favourable assessment for the environment.
 - **Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks** – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):
 - High irreplaceability of resources - project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment.
 - Moderate irreplaceability of resources.
 - Low irreplaceability of resources.
 - Resources are replaceable - the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment.

Using the criteria above, the impacts are further assessed in terms of the following:

- **Probability** – The probability of the impact/risk occurring:
 - Extremely unlikely (little to no chance of occurring)
 - Very unlikely (<30% chance of occurring)
 - Unlikely (30– 50% chance of occurring)
 - Likely (51 – 90% chance of occurring)
 - Very Likely (>90% chance of occurring regardless of prevention measures).

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure 17).

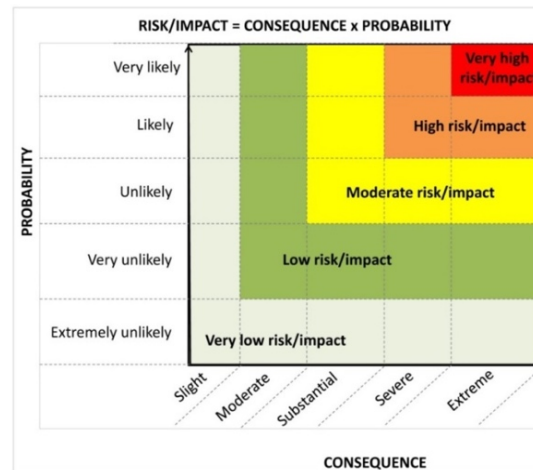


Figure 17: Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
 - Very low - the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making.
 - Low - the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making.
 - Moderate - the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated.
 - High - the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making.
 - Very high - the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating).

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- Very low = 5
- Low = 4
- Moderate = 3
- High = 2
- Very high = 1.

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- Low
- Medium
- High

13.2 Impacts during the construction phase and their significance

13.2.1 Direct impacts during the construction phase

The clearing of natural vegetation

Nature: Natural vegetation will be cleared for the pylons, new access roads and substations. The removal of indigenous vegetation may cause a loss of individuals of threatened, protected and/or endemic species and will also be accompanied by a loss of faunal habitat. However, no threatened or endemic plant species were found on site and all provincially protected plant species have a Least Concern status. None of the SCC listed by the Screening Tool, were recorded on site.

Since the pylon footprint is relatively small, the loss of prime habitat within the Soweto Highveld Grassland vegetation type will be minimal. Service roads generally have a larger impact on vegetation clearance, however since the roads will have a gravel surface animal movement should still be possible. Beyond the permanent infrastructure footprint, environmental functions and processes should however, not be altered.

Proposed mitigation measures:

- Vegetation clearance should be confined to the footprint of the development and unnecessary clearance should be avoided. The severity of the vegetation clearance can be mitigated if only a service road would be cleared and a vegetative groundlayer would be retained in the rest of the servitude.
- Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. This includes awareness as to remaining within demarcated construction areas, no littering, handling of pollution and chemical spills, avoiding fire hazards and minimising wildlife interactions.
- Ensure that all temporary use areas e.g. laydown areas and construction camp, are located in areas of low sensitivity.
- Footprints of the pylons, roads and substation locations should be clearly demarcated.
- Water courses and wetlands should be avoided by placing pylons outside the buffer zones (Habitat 7) (see Environmental Impact Report of aquatic specialist).
- All vehicles are to remain on demarcated roads and no driving through the veld should be allowed.
- The ECO is to provide supervision on vegetation clearing activities and other activities that may cause damage to the environment, especially when construction commences and most vegetation clearing is taking place.
- No plants may be translocated or otherwise uprooted or disturbed without express permission from the ECO.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|------------------------------------|------------------------------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Long-term | Medium term |
| Consequence (Severity) | Moderate (considering entire site) | Moderate (considering entire site) |
| Probability | Very likely | Likely |
| Reversibility | Low | Moderate |
| Irreplaceability | Moderate | Low |
| Significance | Low | Low |
| Confidence level of assessment | Medium | Medium |

The loss of threatened, protected & endemic plant species

Nature: The loss of the vegetation when erecting the pylons, new access roads, upgrading of existing tracks and substation may cause a loss of individuals of threatened, protected or endemic plant species. The site survey did however, not reveal the presence of any plant species with an **IUCN threatened status and no endemic species are listed for the Soweto Highveld Grassland**. Twelve provincially protected plant species were encountered in the region during the site survey, although all have a Least Concern status, except *Gladiolus robertsoniae* which is Near Threatened. However, *Gladiolus robertsoniae* occurs in Habitat 1, which is not affected by the development and furthermore was not recorded on Mukondeleli. As the other protected plant species at the site are not threatened, the loss of a small number of individuals (if any) is not likely to threaten the local or regional populations of these species. The loss of some individuals of protected species is unlikely to alter the patterns or processes of the natural system, in the sense that environmental functions and processes will temporarily or permanently cease. Nevertheless, permits need to be obtained for the destruction of provincially specially protected or protected species.

Proposed mitigation measures:

- Placement of infrastructure should be done in such a way as to minimise the impact on protected species.
- The construction crew should undergo environmental training (induction) to make them aware of the importance of protected species.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Slight | Slight |
| Probability | Likely | Unlikely |
| Reversibility | Low | Low |
| Irreplaceability | Moderate | Moderate |
| Significance | Very low | Very Low |
| Confidence level of assessment | Medium | Medium |

Loss of faunal habitat

Nature: The loss of the vegetation due to the gridline, new access roads, upgrading of existing tracks and substation will be accompanied by a loss of faunal habitat. Although none of the species listed by the screening tool (avifaunal component excluded) were noted on site, several rare species were reported for the region by the landowners. These include the Near Threatened Serval *Leptailurus serval*, Southern African hedgehog *Atelerix frontalis* and the Southern African vlei rat *Otomys auratus*.

The screening report refers to *Crocidura maquassiensis* (Maquassie musk shrew) as the species of concern. However, there is a very low probability for it to occur on site. The Lepidopteran species is unlikely to occur on site because its host plant was not recorded there.

Proposed mitigation measures:

- Vegetation clearance should be confined to the smallest possible footprint of the development and unnecessary clearance should be avoided.
- Construction crew should undergo environmental training (induction) to increase their awareness of environmental concerns.
- Speed limits should be set on all roads and strictly adhered to.

- Development should avoid wetlands and drainage channels and buffer zones along drainage lines should be observed.
- Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the sites.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Moderate | Moderate |
| Probability | Likely | Likely |
| Reversibility | Low | Moderate |
| Irreplaceability | Moderate | Moderate |
| Significance | Moderate | Low |
| Confidence level of assessment | Medium | Medium |

Direct faunal mortalities due to construction and increased traffic

Nature: Faunal mortalities may be caused by construction at the footprint of the infrastructure, construction vehicles or other operational activities and by electrical fences, should they be erected around the substation. In particular slow-moving species such as tortoises, might be prone to these mortalities. When animals ingest waste material or become ensnared in wires, fatalities might also occur.

Larger more mobile fauna such as antelope and larger predators will most likely move away from areas of high activity during the construction phase. Smaller and less-mobile animals are not as capable of moving away and may seek shelter down burrows and other shelter sites. None of the SCC reported in the ADU database for the region were encountered during the site survey and generally these species occur at a low density and thus it is unlikely that they would be directly encountered by people on the Mukondeleli gridline route.

Proposed mitigation measures:

- Construction crew, in particular the drivers, should undergo environmental training to increase their awareness of environmental concerns in order to reduce the number of kills during construction and on roads. The crew should also be made aware of not harming or collecting species such as snakes, tortoises and owls.
- Proper waste management procedures should be in place to avoid litter, food or other foreign material from lying around and to remove all waste material from the site.
- No activity, including night driving, should be allowed at the site after sunset.
- Speed limits should be set on all roads on site and strictly adhered to.
- Personnel should not be allowed to roam into the veld.
- Ensure that cabling and electrical infrastructure at the site are buried sufficiently deeply to avoid being excavated by fauna and that where such infrastructure emerges above-ground that it is sufficiently protected from gnawing animals.
- Any dangerous fauna (e.g. snakes, scorpions) that are encountered during construction should not be handled or molested by construction staff and the ECO (or other suitably qualified person) should be contacted to remove the animals to safety.
- Holes and trenches should not be left open for extended periods of time and should only be dug when needed for immediate construction. Trenches that may stand open for some days, should have an escape ramp to allow any fauna that fall in to escape.

- If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals.
- Should electrical fences be erected it must be done according to the norms and standards of the Nature Conservation Authorities in Mpumalanga.
- Access to the site should be regulated to reduce the opportunities for poaching.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Short-term | Short-term |
| Consequence (Severity) | Slight | Slight |
| Probability | Likely | Likely |
| Reversibility | Low | Low |
| Irreplaceability | Moderate | Moderate |
| Significance | Very Low | Very Low |
| Confidence level of assessment | Medium | Medium |

Increased dust deposition

Nature: Increased dust deposition may harm physiological processes of plants and a reduction in the photosynthetic capacity of the plants may occur. The dust layer on the vegetation may also discourage herbivores from grazing or browsing. The increased dust levels will however be temporary.

Proposed mitigation measures:

- Excessive dust can be reduced by spraying water onto the exposed soil surface.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Short-term | Short-term |
| Consequence (Severity) | Moderate | Slight |
| Probability | Likely | Unlikely |
| Reversibility | High | High |
| Irreplaceability | - | - |
| Significance | Low | Very Low |
| Confidence level of assessment | High | High |

Increased human activity, noise and light levels

Nature: Construction activities will increase human presence, noise and light levels at the site. These activities may affect animal behaviour. However, increased noise associated with the construction phase is temporary.

Proposed mitigation measures:

- The SANS standards should be adhered to in terms of noise levels.
- No construction should be done at night.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Short-term | Short-term |
| Consequence (Severity) | Substantial | Moderate |
| Probability | Likely | Likely |
| Reversibility | High | High |
| Irreplaceability | - | - |
| Significance | Moderate | Low |
| Confidence level of assessment | High | High |

13.2.2 Indirect impacts during the construction phase

Establishment of alien vegetation

Nature: As a result of the clearance of indigenous vegetation and resulting degradation, alien species might invade the area. Twelve declared alien invasive plant species were recorded on the three Enertrag sites and 35 naturalised species (Appendix B). Another four naturalised alien species were listed by NewPosa for the region.

Six declared invasive species were noted on the Mukondeleli site and increased vehicle traffic may further facilitate the introduction of seeds of alien species. Infestation by invasive alien species may cause changes to the structure and functioning of the ecosystem which often exacerbate the further loss of indigenous vegetation. Bare areas that are not actively rehabilitated and areas receiving runoff are particularly vulnerable to alien infestation.

Proposed mitigation measures:

- Implement a monitoring program for the early detection of alien invasive plant species.
- A control program should be employed to combat declared alien invasive plant species in the most environmentally friendly manner that does not result in undesirable secondary impacts.
- Herbicides for the control of alien species should be applied according to the relevant instructions and by appropriately trained personnel.
- No alien species should be used in rehabilitation or landscaping.
- Use only plants and seed collected on-site for revegetation.
- Cleared areas may need to be fenced-off during rehabilitation to exclude livestock and wildlife.
- Material brought onto site e.g. building sand should be regularly checked for the germination of alien species.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Local | Local |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Moderate | Slight |
| Probability | Likely | Unlikely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Low | Very low |
| Confidence level of assessment | Medium | Medium |

13.3 Impacts during the operational phase and their significance

13.3.1 Direct impacts during the operational phase

Refer to avifaunal assessment.

13.3.2 Indirect impacts during the operational phase

Establishment of alien vegetation

Nature: As a result of the loss of indigenous vegetation and resulting degradation, primarily during the construction phase, alien species might invade the area. Alien invasive species are generally more common along roads than the adjacent undisturbed farmland. The invasion by alien species will continue unless controlled. Increased vehicle traffic may further facilitate the introduction of seeds of alien species. Infestation by invasive alien species may eventually cause changes to the structure and functioning of the ecosystem which often exacerbate the further loss of indigenous vegetation.

Proposed mitigation measures:

- Implement a monitoring program for the early detection of alien invasive plant species and a control program to combat declared alien invasive plant species should be employed.
- No alien species should be used for landscaping, rehabilitation or any other purpose.
- Clearing of alien species should be done on a regular basis.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Local | Local |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Moderate | Slight |
| Probability | Likely | Likely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Low | Very Low |
| Confidence level of assessment | Medium | Medium |

13.4 Impacts during the decommissioning phase and their significance

13.4.1 Direct impacts during the decommissioning phase

Faunal mortalities

Nature: Faunal mortalities may be caused by vehicles or other decommissioning activities and waste. In particular slow-moving species such as tortoises, might be prone to road mortalities. When animals ingest waste material or become ensnared in it fatalities might also occur.

Proposed mitigation measures:

- Decommissioning crew should undergo environmental training to increase their awareness of environmental concerns.
- Speed limits should be adhered to.

- Proper waste management procedures should be in place and no material should be left on site in order to prevent instances of ensnarement or ingestion of foreign material.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Short-term | Short-term |
| Consequence (Severity) | Slight | Slight |
| Probability | Likely | Unlikely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Very Low | Very low |
| Confidence level of assessment | Medium | Medium |

Increased dust deposition

Nature: Increased dust deposition may harm physiological processes of plants and a reduction in the photosynthetic capacity of the plants may occur. The dust layer on the vegetation may also discourage herbivores from grazing or browsing the dust covered vegetation. The increased dust levels will be temporary.

Proposed mitigation measures:

- Excessive dust can be reduced by spraying water onto the soil.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Site specific | Site specific |
| Duration | Short-term | Short-term |
| Consequence (Severity) | Slight | Slight |
| Probability | Likely | Unlikely |
| Reversibility | High | High |
| Irreplaceability | - | - |
| Significance | Low | Very low |
| Confidence level of assessment | High | High |

13.4.2 Indirect impacts during the decommissioning phase

Establishment of alien vegetation

Nature: As a result of the decommissioning activities, areas will be disturbed and alien species might invade. Increased vehicle traffic may facilitate the introduction of seeds of alien species.

Proposed mitigation measures:

- Implement a monitoring program for at least three years after decommissioning to document vegetation recovery and alien infestation across the site.
- A control program to combat declared alien invasive plant species should be employed.
- Areas where infrastructure is removed, must be revegetated with indigenous plant species.
- No alien species should be used for rehabilitation/revegetation or any other purpose.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Local | Local |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Moderate | Slight |
| Probability | Likely | Likely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Low | Very low |
| Confidence level of assessment | Medium | Medium |

13.5 Cumulative impacts

Two renewable energy developments occur within 50 km from the site and were taken into consideration for cumulative impacts. The one development (Forzando SEF) is in process and the other (Tutuka SEF) has been approved.

Vegetation loss and habitat destruction

Nature: Vegetation loss, habitat destruction and possibly loss of SCC, can occur when considering all developments. The habitat destruction will lead to changes in the physical features of the habitat, with concomitant changes in ecological processes. Secondary vegetation will develop at sites where the vegetation was cleared or the soil compacted. The species composition may change and alien species might invade. Vegetation loss will also constitute the loss of animal habitat. It should however be noted that if a ground layer is maintained along the roads in the servitude, vegetation loss will be minimal and the contribution by the Mukondeleli gridline site to the cumulative impact will be small.

Proposed mitigation measures:

- All projects should adhere to the site-specific recommendations of the ecologists to ensure that impacts are mitigated where possible.
- Placement of infrastructure should be done in such a way that no SCC are affected and CBAs avoided.
- Location of the pylons in the most environmentally responsible manner is crucial.
- Maintain a vegetation ground layer along the roads in the servitude.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Regional | Regional |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Substantial | Moderate |
| Probability | Likely | Likely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Moderate | Low |
| Confidence level of assessment | Medium | Medium |

Compromising integrity of CBA, ESA and NPAES

Nature: According to the mapping of CBAs in Mpumalanga, some sections of the gridline are located/partially located within CBAs in the current layout. Development within CBAs is not encouraged as such development may result in biodiversity loss and therefore compromise the integrity of the CBA. Although there are currently only two projects within 50 km from the Mukondeleli site, this could in future change and the integrity of the CBAs could be compromised and consequently the biodiversity target for the ecosystem could be affected. The development does not affect a NPAES (2010) and is not earmarked for expansion in the Mpumalanga PAES within a 5-year span. The contribution of the Mukondeleli gridline to this cumulative impact will be small.

It is assumed that authorisation would only be granted to projects that have similarly avoided CBAs.

Proposed mitigation measures:

- Placement of infrastructure should strive to avoid CBAs.
- Minimise the development footprint as far as possible.
- Maintain a vegetation ground layer in the gridline servitude.
- Stringent construction-phase monitoring of activities at the site to ensure that mitigation measures are adhered to and that the overall ecological impact of the development is maintained at a low level.
- Align roads and other infrastructure so that transformation within the CBAs is minimised.
- The use of structures which may inhibit movement of fauna, e.g. mesh or electric fencing should be avoided, where feasible.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Regional | Regional |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Substantial | Moderate |
| Probability | Likely | Unlikely |
| Reversibility | Low to moderate | Low to moderate |
| Irreplaceability | Low | Low |
| Significance | Moderate | Low |
| Confidence level of assessment | Medium | Medium |

Reduced ability to meet conservation obligations & targets

Nature: The loss of unprotected vegetation types on a cumulative basis from the area may impact the countries' ability to meet its conservation targets. Very few statutorily conserved areas occur in the Vulnerable Soweto Highveld Grassland and almost half of it has been transformed mostly by cultivation, plantations, mining and urbanisation. It has a conservation target of 24% and was classified as Not Protected (0.6%) in the 2018 National Biodiversity Assessment (Skowno *et al.* 2018). The layout of the Mukondeleli gridline should preferably fall within the heavily and moderately transformed areas. These areas have already been included as lost in the transformed % for the vegetation type and will thus not affect its conservation status. The Mukondeleli gridline site is not located in a protected area nor does it fall within a protected area expansion strategy and thus will not have an impact on the expansion of Protected Areas.

Proposed mitigation measures:

- Avoid highly sensitive habitats and CBAs.
- Minimise the development footprint as far as possible.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Regional | Regional |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Substantial | Moderate |
| Probability | Likely | Likely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Moderate | Low |
| Confidence level of assessment | Medium | Medium |

Loss of landscape connectivity and disruption of broad-scale ecological processes

Nature: The gridline could pose a minimal threat to the connectivity of the landscape. For fauna the disruption would depend largely on whether a ground layer of vegetation will be maintained in the servitude or not. Subterranean species that have to emerge from the soil to cross roads will be affected. The severity of these impacts for subterranean species is likely to be relatively low as the roads required for operation are likely to still be of a natural surface such as gravel and would experience low traffic volumes.

If a ground layer of vegetation is maintained beneath the gridline, the facility is unlikely to disrupt pollination and dispersal processes that could cause spatial fragmentation of populations.

Proposed mitigation measures:

- Minimising the development footprint wherever possible.
- Revegetation of all cleared and bare areas created by the facility with local plant species.
- Fences and other structures which impede faunal movement should be avoided.
- Roads should not have steep curbs.

Significance without and with mitigation measures:

| Parameter | Without mitigation | With mitigation |
|--------------------------------|--------------------|-----------------|
| Status | Negative | Negative |
| Spatial extent | Regional | Regional |
| Duration | Long-term | Long-term |
| Consequence (Severity) | Moderate | Moderate |
| Probability | Likely | Unlikely |
| Reversibility | Moderate | Moderate |
| Irreplaceability | Low | Low |
| Significance | Low | Low |
| Confidence level of assessment | Medium | Medium |

13.6 Impact assessment summary

Tables 6-9 summarise the impact assessment across all phases of the development and the integrated assessment post-mitigation per phase is provided in Table 9.

Table 6: Summary assessment of (a) direct and (b) indirect impacts and their mitigation measures during the construction phase

(a) Direct impacts

| <i>Impact</i> | <i>Impact Criteria (after mitigation)</i> | | <i>Significance and Ranking (Pre-Mitigation)</i> | <i>Potential mitigation measures</i> | <i>Significance and Ranking (Post-Mitigation)</i> | <i>Confidence Level</i> |
|---|---|------------------------------------|--|---|---|-------------------------|
| CONSTRUCTION PHASE: DIRECT IMPACTS | | | | | | |
| The clearing of natural vegetation | Status | Negative | Low | <ul style="list-style-type: none"> A preconstruction walk-through of the development footprint for the purpose of turbine and crane pad micro-siting could ensure that no SCC are present at these sites. Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. This includes awareness as to remaining within demarcated construction areas, no littering, handling of pollution and chemical spills, avoiding fire hazards and minimising wildlife interactions. Ensure that all temporary use areas e.g. laydown areas and construction camp, are located in areas of low sensitivity. Footprints of the substation location and roads should be clearly demarcated. Vegetation clearance should be confined to the footprint of the development and unnecessary clearance should be avoided. Water courses, wetlands, rocky outcrops/sheets should be avoided (Habitats 1 & 7). Observe buffer zones along drainage lines (see report of aquatic specialist). All vehicles are to remain on demarcated roads and no driving through the veld should be allowed. The ECO is to provide supervision on vegetation clearing activities and other activities that may cause damage to the environment, especially when construction commences and most vegetation clearing is taking place. River/stream crossings should be placed in areas without extensive wetlands and preferably in areas where the risk of disruption and erosion is low. All river/stream crossings should be inspected by the aquatic specialist to ensure that optimal and acceptable locations have been chosen for river crossings. River/stream crossings should be specifically designed not to impede or disrupt the direction and flow of the water. Specific guidelines of the aquatic specialist should be followed. No plants may be translocated or otherwise uprooted or disturbed without express permission from the ECO. | Low - 4 | Medium |
| | Spatial Extent | Site specific | | | | |
| | Duration | Medium term | | | | |
| | Consequence | Moderate (considering entire site) | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |
| The loss of threatened, protected & | Status | Negative | Very low | <ul style="list-style-type: none"> Placement of infrastructure should be done in such a way as to minimise the impact on protected species. | Very low - 5 | Medium |
| | Spatial Extent | Site specific | | | | |
| | Duration | Long-term | | | | |

| | | | | | | |
|----------------------------------|------------------|---------------|----------|--|--------------|--------|
| endemic plant and animal species | Consequence | Slight | | <ul style="list-style-type: none"> The construction crew should undergo environmental training (induction) to make them aware of the importance of protected species. | | |
| | Probability | Unlikely | | | | |
| | Reversibility | Low | | | | |
| | Irreplaceability | Moderate | | | | |
| Loss of faunal habitat | Status | Negative | Moderate | <ul style="list-style-type: none"> A preconstruction walk-through to each of the demarcated construction site, substation, turbines and crane pads and access roads, to assess the presence of giant girdled lizard burrows is proposed. Placement of infrastructure should be done in such a way as to minimise the impact on protected species. Vegetation clearance should be confined to the smallest possible footprint of the development and unnecessary clearance should be avoided. Construction crew should undergo environmental training (induction) to increase their awareness of environmental concerns. Speed limits should be set on all roads and strictly adhered to. Development should avoid water courses, wetlands and rocky outcrops/sheets. Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the sites. Observe buffer zones along drainage lines. | Low - 4 | Medium |
| | Spatial Extent | Site-specific | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Moderate | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Moderate | | | | |
| Direct faunal mortalities | Status | Negative | Very low | <ul style="list-style-type: none"> Construction crew, in particular the drivers, should undergo environmental training to increase their awareness of environmental concerns in order to reduce the number of kills during construction and on roads. The crew should also be made aware of not harming or collecting species such as snakes, tortoises and owls. Proper waste management procedures should be in place to avoid litter, food or other foreign material from lying around and to remove all waste material from the site. No activity, including night driving, should be allowed at the site after sunset. Speed limits should be set on all roads on site and strictly adhered to. Personnel should not be allowed to roam into the veld. Ensure that cabling and electrical infrastructure at the site are buried sufficiently deeply to avoid being excavated by fauna and that where such infrastructure emerges above-ground that it is sufficiently protected from gnawing animals. Any dangerous fauna (e.g. snakes, scorpions) that are encountered during construction should not be handled or molested by construction staff and the ECO (or other suitably qualified person) should be contacted to remove the animals to safety. Holes and trenches should not be left open for extended periods of time and | Very low - 5 | Medium |
| | Spatial Extent | Site specific | | | | |
| | Duration | Short-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Low | | | | |
| | Irreplaceability | Moderate | | | | |

| | | | | | | |
|------------------------------------|----------------|---------------|----------|---|--------------|------|
| | | | | <p>should only be dug when needed for immediate construction. Trenches that may stand open for some days, should have an escape ramp to allow any fauna that fall in to escape.</p> <ul style="list-style-type: none"> If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals. Should electrical fences be erected it must be done according to the norms and standards of the Nature Conservation Authorities in Mpumalanga. Access to the site should be regulated to reduce the opportunities for poaching. | | |
| Increased dust deposition | Status | Negative | Very low | <ul style="list-style-type: none"> Excessive dust can be reduced by spraying water onto the soil. | Very low - 5 | High |
| | Spatial Extent | Site specific | | | | |
| | Duration | Short-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Unlikely | | | | |
| | Reversibility | High | | | | |
| Irreplaceability | - | | | | | |
| Increased human activity and noise | Status | Negative | Moderate | <ul style="list-style-type: none"> The SANS standards should be adhered to in terms of noise levels. No construction should be done at night. If there is any part of the site that needs to be lit at night for security reasons, then appropriate lighting should be installed to minimise negative effects on nocturnal animals. | Low - 4 | High |
| | Spatial Extent | Site specific | | | | |
| | Duration | Short-term | | | | |
| | Consequence | Moderate | | | | |
| | Probability | Likely | | | | |
| | Reversibility | High | | | | |
| Irreplaceability | - | | | | | |

(b) Indirect impacts

| Impact | Impact Criteria (after mitigation) | Significance and Ranking (Pre-Mitigation) | Potential mitigation measures | Significance and Ranking (Post-Mitigation) | Confidence Level | |
|---|---|--|--------------------------------------|--|-------------------------|--------|
| CONSTRUCTION PHASE: INDIRECT IMPACTS | | | | | | |
| Establishment of alien vegetation | Status | Negative | Low | <ul style="list-style-type: none"> Implement a monitoring program for the early detection of alien invasive plant species. A control program should be employed to combat declared alien invasive plant species in the most environmentally friendly manner that does not result in undesirable secondary impacts. Herbicides for the control of alien species should be applied according to the relevant instructions and by appropriately trained personnel. No alien species should be used in rehabilitation or landscaping. Use only plants and seed collected on-site for revegetation. Cleared areas may need to be fenced-off during rehabilitation to exclude livestock and wildlife. Material brought onto site e.g. building sand should be regularly checked for the germination of alien species. | Very low - 5 | Medium |
| | Spatial Extent | Local | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Unlikely | | | | |
| | Reversibility | Moderate | | | | |
| Irreplaceability | Low | | | | | |

Table 7: Summary assessment of (a) direct and (b) indirect impacts and their mitigation measures during the operational phase

(a) Direct impacts

| <i>Impact</i> | <i>Impact Criteria (after mitigation)</i> | <i>Significance and Ranking (Pre-Mitigation)</i> | <i>Potential mitigation measures</i> | <i>Significance and Ranking (Post-Mitigation)</i> | <i>Confidence Level</i> |
|--|---|--|--------------------------------------|---|-------------------------|
| OPERATIONAL PHASE: DIRECT IMPACTS | | | | | |
| Refer to avifaunal assessment. | | | | | |

(b) Indirect impacts

| <i>Impact</i> | <i>Impact Criteria (after mitigation)</i> | <i>Significance and Ranking (Pre-Mitigation)</i> | <i>Potential mitigation measures</i> | <i>Significance and Ranking (Post-Mitigation)</i> | <i>Confidence Level</i> | |
|--|---|--|--------------------------------------|---|-------------------------|--------|
| OPERATIONAL PHASE: INDIRECT IMPACTS | | | | | | |
| Establishment of alien vegetation | Status | Negative | Low | <ul style="list-style-type: none"> Implement a monitoring program for the early detection of alien invasive plant species and a control program to combat declared alien invasive plant species should be employed. No alien species should be used for landscaping, rehabilitation or any other purpose. Clearing of alien species should be done on a regular basis. | Very low - 5 | Medium |
| | Spatial Extent | Local | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |

Table 8: Summary assessment of (a) direct and (b) indirect impacts and their mitigation measures during the decommissioning phase

(a) Direct impacts

| <i>Impact</i> | <i>Impact Criteria (after mitigation)</i> | <i>Significance and Ranking (Pre-Mitigation)</i> | <i>Potential mitigation measures</i> | <i>Significance and Ranking (Post-Mitigation)</i> | <i>Confidence Level</i> | |
|--|---|--|--------------------------------------|--|-------------------------|--------|
| DECOMMISSIONING PHASE: DIRECT IMPACTS | | | | | | |
| Increased dust deposition | Status | Negative | Low | <ul style="list-style-type: none"> Excessive dust can be reduced by spraying water onto the soil. | Very low - 5 | High |
| | Spatial Extent | Site specific | | | | |
| | Duration | Short-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Unlikely | | | | |
| | Reversibility | High | | | | |
| | Irreplaceability | - | | | | |
| Direct faunal mortalities | Status | Negative | Very low | <ul style="list-style-type: none"> Decommissioning crew should undergo environmental training to increase their awareness of environmental concerns. Speed limits should be adhered to. Proper waste management procedures should be in place and no material should be left on site in order to prevent instances of ensnarement or ingestion of foreign material. | Very low - 5 | Medium |
| | Spatial Extent | Site specific | | | | |
| | Duration | Short-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Unlikely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |

(b) Indirect impacts

| <i>Impact</i> | <i>Impact Criteria (after mitigation)</i> | <i>Significance and Ranking (Pre-Mitigation)</i> | <i>Potential mitigation measures</i> | <i>Significance and Ranking (Post-Mitigation)</i> | <i>Confidence Level</i> | |
|--|---|--|--------------------------------------|--|-------------------------|--------|
| DECOMMISSIONING PHASE: INDIRECT IMPACTS | | | | | | |
| Establishment of alien vegetation | Status | Negative | Low | <ul style="list-style-type: none"> Implement a monitoring program for at least three years after decommissioning to document vegetation recovery and alien infestation across the site. | Very low - 5 | Medium |
| | Spatial Extent | Local | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Slight | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |

| | | | | | | |
|--|------------------|-----|--|---|--|--|
| | Irreplaceability | Low | | <ul style="list-style-type: none"> A control program to combat declared alien invasive plant species should be employed. Areas where infrastructure is removed, must be revegetated with indigenous plant species. No alien species should be used for rehabilitation/revegetation or any other purpose. | | |
|--|------------------|-----|--|---|--|--|

Table 9: Summary assessment of cumulative impacts

| Impact | Impact Criteria (after mitigation) | | Significance and Ranking (Pre-Mitigation) | Potential mitigation measures | Significance and Ranking (Post-Mitigation) | Confidence Level |
|---|---|-----------------|--|---|---|-------------------------|
| Loss of vegetation, habitat and threatened species | Status | Negative | Moderate | <ul style="list-style-type: none"> All projects should adhere to the site-specific recommendations of the ecologists to ensure that impacts are mitigated where possible. Placement of infrastructure should be done in such a way that no SCC are affected and CBAs avoided. Positioning of the wind turbines in the most environmentally responsible manner is crucial. | Low - 4 | Medium |
| | Spatial Extent | Regional | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Moderate | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |
| Compromising integrity of CBA, ESA and NPAES | Status | Negative | Moderate | <ul style="list-style-type: none"> Avoid placing of turbines and other large infrastructure in CBAs. Preconstruction walk-through of the facility, especially the roads and turbine locations to ensure that sensitive habitats are avoided. Minimise the development footprint as far as possible. Stringent construction-phase monitoring of activities at the site to ensure that mitigation measures are adhered to and that the overall ecological impact of the development is maintained at a low level. Align roads and other infrastructure so that transformation within the CBAs is minimised. The use of structures which may inhibit movement of fauna, e.g. mesh or electric fencing should be avoided, where feasible. | Low - 4 | Medium |
| | Spatial Extent | Regional | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Moderate | | | | |
| | Probability | Unlikely | | | | |
| | Reversibility | Low to Moderate | | | | |
| | Irreplaceability | Low | | | | |
| Reduced ability to meet conservation obligations & targets | Status | Negative | Moderate | <ul style="list-style-type: none"> Preconstruction walk-through of the facility, especially the roads and turbine locations to ensure that sensitive habitats are avoided. Minimise the development footprint as far as possible. | Low - 4 | Medium |
| | Spatial Extent | Regional | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Moderate | | | | |
| | Probability | Likely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |
| Loss of landscape connectivity and disruption of broad-scale ecological processes | Status | Negative | Low | <ul style="list-style-type: none"> Preconstruction walk-through of the facility infrastructure to ensure that sensitive areas are avoided and least-impact locations are identified for river/stream crossings. Minimising the development footprint wherever possible. Revegetation of all cleared and bare areas created by the facility with local plant species. Fences and other structures which impede faunal movement should be avoided. Roads should not have steep curbs. | Low - 4 | Medium |
| | Spatial Extent | Regional | | | | |
| | Duration | Long-term | | | | |
| | Consequence | Moderate | | | | |
| | Probability | Unlikely | | | | |
| | Reversibility | Moderate | | | | |
| | Irreplaceability | Low | | | | |

Table 10: Overall Impact Significance (**Post Mitigation**)

| Phase | Overall Impact Significance after mitigation |
|-----------------|---|
| Construction | Low to Very low |
| Operational | Very low |
| Decommissioning | Very low |
| Cumulative | Low |

14. LEGISLATIVE AND PERMIT REQUIREMENTS

The following legislation is relevant to the development and may require permits from the relevant authority.

14.1 National Forest Act (Act No. 84 of 1998)(NFA 2021)

The National Forest Act provides for the protection of forests, as well as for specific tree species. In the case where a protected tree would have to be destroyed by the development an application for a license would have to be made. However, **no protected trees**, according to the protected tree list (NFA 2021), were observed and it is unlikely that any such species occur within the development footprint.

14.2 National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (ToPS list) (NEMBA 2007c)

The NEMBA ToPS list deals with endangered, threatened and otherwise controlled species, under the ToPS Regulations (Threatened or Protected Species Regulations). A ToPS permit is required for any activities involving a ToPS listed species.

No threatened or protected plant species (ToPS; NEMA 2007c) were recorded during the Mukondeleli gridline site survey. None of the ToPs listed plant species are expected to be negatively affected by the development.

The following protected **threatened or protected faunal species** (ToPS) are listed for the general region:

Mammals:

| | | |
|---------------------------|---------------------------|------------|
| <i>Aonyx capensis</i> | African Clawless otter | Protected |
| <i>Atelerix frontalis</i> | Southern African hedgehog | Protected |
| <i>Connochaetes gnou</i> | Black wildebeest | Protected |
| <i>Felis nigripes</i> | Black-footed cat | Vulnerable |
| <i>Leptailurus serval</i> | Serval | Protected |
| <i>Ourebia ourebi</i> | Oribi | Endangered |
| <i>Panthera pardus</i> | Leopard | Vulnerable |
| <i>Vulpes chama</i> | Cape fox | Protected |

The hedgehog and serval are likely to occur on site.

Reptiles:

The giant girdled lizard (*Smaug giganteus*) is listed for the region on the ADU database, but was not highlighted by the Screening Tool. No individuals were recorded on site.

Amphibians:

None of the listed amphibians for the region are ToPS protected species.

14.3 Conservation of Agricultural Resources Act (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species.

Six declared invasive alien species were noted on the Mukondeleli gridline site. Disturbance associated with the construction phase would encourage alien invasion and the alien invasive species would need to be cleared on a regular basis. No permitting would be required for such activities, but an alien invasive species control programme should be initiated. Invasive alien species (and their category) likely to occur on site are listed in Chapter 6 and Appendix B.

14.4 Mpumalanga Nature Conservation Act (No. 10 of 1998)(MNCA 1998) – permit requirements

The Mpumalanga Tourism and Parks Agency (MTPA) is the regulatory authority in Mpumalanga for the issuing of permits for fauna, flora, hunting and CITES.

14.4.1 Flora (see Appendix B):

Subject to some of the provisions in terms of Schedule 11 Protected plants and Schedule 12 Specially Protected plants of the Mpumalanga Nature Conservation Act (No. 10 of 1998) (Chapter 6):

- No person shall pick a Protected plant without a permit.
- No person shall pick an indigenous plant in a nature reserve without a permit.
- No person shall pick an indigenous plant on a public road, land next to a public road or within a distance of 100 meters from the centre of the road without a permit.
- No person shall pick an indigenous plant which is not a Protected plant or Specially Protected plant on land which he or she is not the owner or occupier.
- No person shall donate, sell, export or remove from the Province a Protected plant without a permit.
- No person shall possess, pick, sell, purchase, donate or receive as a donation, import or export or remove from the Province a Specially Protected plant without a permit.

Schedule 11: Protected Plants (Section 69(1)(a) of the MNCA 1998)

A total of thirty (30) plant species are listed as Schedule 11 Protected plant species in the region according to the MNCA (1998) (Appendix B). Most of these species are members of the Amaryllidaceae and Orchidaceae. Twelve of the 30 protected plant species (Schedule 11) were recorded during the site survey in December 2021 of which only five species were recorded on Mukondeleli.

The 12 species recorded on all three Enertrag sites are:

Aloe ecklonis

Aloe transvaalensis

Boophone disticha

Crinum bulbispermum

Cyrtanthus stenanthus

Eucomis autumnalis

Gladiolus crassifolius

Gladiolus dalenii

Gladiolus robertsoniae

Haemanthus humilis

Haemanthus sp.

Huernia hystrix

Another five species are on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga:

| | |
|----------------------------------|----|
| <i>Drimia angustifolia</i> | LC |
| <i>Hypoxis hemerocallidea</i> | LC |
| <i>Khadia beswickii</i> | VU |
| <i>Nerine gracilis</i> | VU |
| <i>Trachyandra erythrorrhiza</i> | NT |

Schedule 12: Specially Protected Plants (Section 69(1)(b) of the MNCA 1998)

No Schedule 12 plant species are listed or were recorded during the site survey.

Schedule 13: Invader weeds and plants (MNCA 1998)

Ten Schedule 13 species were recorded on site (Appendix B). No person shall possess, sell, purchase, donate or receive as a donation, convey, import or cultivate a Schedule 13 declared invader weed or plant without a permit.

14.4.2 Fauna (see Appendix C)

Schedule 1: Specially Protected Game (Section 4 (1)(a) of MNCA 1998)

No Schedule 1 species are listed or were recorded on site during the site survey.

Schedule 2: Protected Game (Section 4 (1)(a) of MNCA 1998)

Under the provincial Act (MNCA 1998), the majority of mammals, reptiles and amphibians are listed as Schedule 2: Protected Game (see Appendix C). Four species (black wildebeest, steenbok, Southern African hedgehog, Southern African vlei rat and serval) were recorded on the Enertrag sites or confirmed by the landowners (Appendix C).

Schedule 3: Ordinary Game (Section 4(1)(c) of MNCA 1998)

Three species (springbok, blesbok and scrub hare) were recorded on site or confirmed by the landowners for Mukondeleli (Appendix C).

Schedule 4: Protected Wild Animals (Section 4(1)(d) of MNCA 1998)

No species were recorded on site (Appendix C).

Schedule 5: Wild Animals to which Section 33 apply (MNCA 1998)

Provisions of Section 33 apply (MNCA 1998): No person shall import into the province, keep, possess, sell, purchase, donate or receive as a donation or convey a Schedule 5 live wild animal without a permit. Nine species were recorded on site or confirmed by the landowners (Appendix C): serval, Egyptian mongoose, yellow mongoose, slender mongoose, common genet, meerkat, springhare, civet and rinkhals.

Schedule 6: Exotic Animals to which the provisions of Section 34 apply (MNCA 1998)

Provisions of Section 34 apply (MNCA 1998): No person shall keep, possess, sell, donate or receive as a donation or convey a Schedule 6 live exotic animal without a permit. No species were recorded on site (Appendix C).

Schedule 7: Invertebrates (Section 35 (1) of the MNCA 1998)

Provisions of Section 35(1) apply (MNCA 1998): No person shall collect, catch, kill, keep, purchase, sell, donate or receive as a donation, convey, import or export a Schedule 7 invertebrate without a permit.

Schedule 8: Problem Animals (Section 44(1) of the MNCA 1998)

One species (black-backed jackal) was recorded on site (Appendix C).

No permits are required for animal species since none should be harmed by the development.

14.5 CITES (Convention on the International Trade in Endangered Species of Wild Fauna and Flora)

South Africa is a signatory to CITES and as such must comply with the import, export and re-export procedure as stipulated by CITES. MTPA is the CITES Management and Scientific Authority for exports out of and imports into the respective province from or to other countries. Therefore no person shall import into or export or remove from the Province an endangered species or a rare species, unless he is the holder of a permit which authorises him to do so. No permits are required for animal species since none should be harmed by the development on Mukondeleli.

The following species occurring on site are CITES listed fauna (Appendix C):

Fauna:

| | | |
|-----------|-----------------------|---------------------|
| Mammal: | Serval | (CITES Appendix II) |
| Reptiles: | Giant girdled lizard | (CITES Appendix II) |
| | Common girdled lizard | (CITES Appendix II) |

Flora:

Aloe ecklonis, *Aloe transvaalensis* and *Euphorbia clavarioides* were the CITES species recorded on the Mukondeleli site. Ten species of the Orchidaceae are also listed for the region but were not recorded on site.

15. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUT

| Impact | Mitigation / Management Objectives | Mitigation / Management actions | Monitoring | | |
|--|--|---|--|--|---|
| | | | Methodology | Frequency | Responsibility |
| A. IMPACTS ON TERRESTRIAL BIODIVERSITY AND SPECIES | | | | | |
| A. DESIGN PHASE | | | | | |
| Potential impact on terrestrial biodiversity and species as a result of the proposed gridline. | Avoid or minimise impacts on terrestrial biodiversity and species on site regarding the placement of the infrastructure. Avoiding wetlands, rocky sheets and rocky outcrops will reduce the chances of loss of protected species. Avoid areas delineated as CBA. | Ensure that the placing of infrastructure takes the sensitivity mapping of the ecological assessment into account to avoid and reduce impacts on sensitive habitats and protected species. Avoid areas delineated as CBA. | Ensure that this is taken into consideration during the planning and design phase. | During design cycle and before construction commences. | Project Developer and Appointed Ecological Specialist. |
| B. CONSTRUCTION PHASE | | | | | |
| Clearance of vegetation | Confine vegetation clearance to footprint and minimise disturbance of adjacent areas. | Demarcate all infrastructure sites clearly to avoid unnecessary clearance of the vegetation. Permits have to be obtained for the removal of Mpumalanga protected species within the footprint of the development. | Ensure that mitigation measures are enforced. | Daily | The Environmental Control Officer (ECO) should monitor and report any incidents to the Holder of the EA |
| Impact on animal species | Avoid or minimise impacts that could potentially affect animal behaviour. | Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns.. Holes and trenches should not be left open for long periods of time. These should be regularly inspected for the presence of trapped animals. Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site. Speed limits should be strictly adhered to. No activity should be allowed on site at night. | Ensure compliance with these mitigation measures. | Daily | The ECO should monitor and report to the Holder of the EA. |
| Increased dust levels | Avoid or minimise increased dust levels. | Dust control measures should be implemented. | Ensure that dust control measures are in place. | Daily | The ECO should monitor and report to the Holder of the EA. |
| Alien species invasion | Avoid invasion by alien species. | Implement a monitoring program for the early detection of alien invasive plant species. Employ a control program to combat declared alien invasive plant species. | Ensure implementation of a control programme to combat alien invasive plants. | Daily | The ECO should monitor and report to the Holder of the EA. |
| C. OPERATIONAL PHASE | | | | | |

| Impact | Mitigation / Management Objectives | Mitigation / Management actions | Monitoring | | |
|---------------------------------|---|--|--|--------------------|--|
| | | | Methodology | Frequency | Responsibility |
| Impact on animal species | Avoid or minimise impacts that could potentially affect animal species. | Proper waste management procedures should be put in place. | Ensure compliance with these mitigation measures. | Monthly | The ECO should monitor and report to the Holder of the EA. |
| Alien species invasion | Avoid invasion by alien species. | Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species. | Ensure implementation of a monitoring and control programme to combat alien invasive plants. | Every three months | The ECO should monitor and report to the Holder of the EA. |
| C. DECOMMISSIONING PHASE | | | | | |
| Clearance of vegetation | Minimise disturbance and clearance of vegetation. | Unnecessary clearance of natural vegetation should be avoided. | Ensure that mitigation measures are enforced. | Every three months | The ECO should monitor and report to the Holder of the EA. |
| Impact on animal species | Avoid or minimise impacts that could potentially affect animal behaviour. | Proper waste management procedures should be in place. | Ensure compliance with these mitigation measures. | Monthly | The ECO should monitor and report to the Holder of the EA. |
| Alien species invasion | Avoid invasion by alien species. | Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species. | Ensure implementation of a monitoring and control programme to combat alien invasive plants. | Every three months | The ECO should monitor and report to the Holder of the EA. |

16. SUMMARY OF ISSUES IDENTIFIED DURING THE PUBLIC PARTICIPATION PROCESS

To be completed after comments have been received from Stakeholders during the Public Consultation Phase

17. Final Specialist Statement and Authorisation Recommendation

Our findings related to the Terrestrial Ecology and Species are the following:

Provided the positioning of gridline infrastructure takes sensitive habitats, i.e. drainage lines and wetlands and CBAs into consideration, the resulting low sensitivity rating and low impact significance for many of the habitats means the project could go ahead, provided all mitigation measures and management actions proposed to conserve protected fauna and flora on the site, are taken into consideration. **We thus recommend authorisation of the project provided all mitigation measures are implemented.**

A brief summary of the most important considerations is provided below:

Vegetation and flora:

- **Vegetation types:** The Soweto Highveld Grassland vegetation type is listed as “Vulnerable” and consequently the gridline infrastructure should give preference to the habitats on site where past disturbance has occurred e.g. disturbed areas, cultivated cropland or abandoned cropland (old lands).
- **Screening Tool:** The species that were highlighted by the Screening tool were not encountered on site.
- **Threatened plant species:** No IUCN threatened or red-listed plant species were encountered during the field survey.
- **Protected plant species:** No ToPS species or protected tree species were recorded on site. A number of Mpumalanga protected species were recorded on site, but none with a threatened IUCN status.
- **CITES:** *Aloe ecklonis*, *Aloe transvaalensis* and *Euphorbia clavarioides* were the CITES species recorded on the Mukondeleli WEF site.
- **Habitats:** Three of the four habitats on site had a low sensitivity rating, while the wetland habitat (Habitat 7, including dams) had a high sensitivity rating. All other habitats (mostly man-made) had a low sensitivity rating.
- **Overall sensitivity of plant theme based on the status of the habitats (plant communities):** Rated as **low**, provided some infrastructure is repositioned to avoid CBAs, drainage lines and wetlands. The Soweto Highveld Grassland has a Vulnerable threat status and to minimise the impact on the vegetation a ground cover should be maintained in the servitude along the gridline.

Fauna (avifaunal and bat components excluded):

- **Screening Tool:** The species that were highlighted by the Screening tool, viz. the Maquassie musk shrew (*Crocidura maquassiensis*) and *Lepidochrysops procerus* were not encountered on site and are not listed on the ADU database for the region or the MNCA (1998) provincial species lists.
- **Threatened animal species:** The giant girdled lizard (*Smaug giganteus*), a reptile with a Vulnerable IUCN status, has been noted on Mukondeleli according to one of the landowners. As a precautionary measure, it is recommended that a survey should be done for this reptile once the proposed final layout has been established. This species was however not highlighted by the Screening Tool.
- **Near Threatened species:** Three Near Threatened mammal species are reported for the region, according to the landowners in the vicinity of the gridline, i.e. the serval (*Leptailurus serval*), Southern African hedgehog (*Atelerix frontalis*) and Southern African vlei rat *Otomys auratus*. None of these species were however highlighted by the Screening Tool.
- **Overall sensitivity of animal theme (avifaunal and bat components excluded):** This is rated as **medium**. If the suggested mitigation measures are followed the animal SCC should not be negatively affected.

Conservation:

- **Protected Areas:** The study area is not located in a protected area.
- **National Protected Areas Expansion Strategy (NPAES):** The development will not interfere with the protected areas expansion strategy according to the NPAES spatial data of 2010 and it is also not earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA).
- **Critical Biodiversity Areas (CBAs):** According to the current layout, the gridline crosses some CBAs, however pylon positions can be selected to avoid drainage lines. The preferred and alternative on-site substations are currently located in the CBA area, however the particular site was classified as having a low sensitivity in the current assessment. These sites must be micro-sited prior to approval of final layout such that the site can be groundtruthed and any sensitivity areas avoided.
- **Ecological Support Areas (ESAs):** There are ESAs (local corridors) distinguished along the gridline route. However, the development would not impact negatively on these units.
- **Freshwater Ecosystem Priority Area (FEPA):** Although the entire site is classified as an upstream management area, the site assessment of the vegetation and the application of a sensitivity model rated most of the river FEPA area as being of low to medium sensitivity, with only the drainage lines having a high sensitivity.
- **Mpumalanga Highveld wetlands:** These wetlands were largely incorporated into the delineation of the CBAs (refer to aquatic specialist report for wetlands).

Ecological processes, function and drivers:

- Overall, it is unlikely that the development will contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions.
- The disturbance caused by the construction of the infrastructure will inevitably create conditions favourable for invasion by alien species and thus a programme for the early detection as well as control of alien invasive plant species must be implemented.
- Fire is an important driver of vegetation dynamics in the Grassland Biome and can occur when the fuel load is high. To avoid damage to the infrastructure, fire will have to be suppressed. If the grass layer is regularly mowed/brush cut, it should prevent grasses from becoming moribund in the absence of fire, although regular mowing could affect seed set.

Significance of environmental impacts:

Overall the significance of the environmental impacts was rated as very low to low. In summary:

- Since the development footprint is expected to be relatively small, the loss of habitat within the Soweto Highveld Grassland vegetation type will be fairly small. However, our impact assessment was based on the assumptions (i) only a service track would be cleared and a vegetative groundlayer would be retained beneath the rest of the servitude; and (ii) where the vegetation was destroyed at the pylon sites during construction, that it will be rehabilitated and allowed to recover.
- **From an ecological point of view**, large portions of the site have been heavily modified (compare CBA map) and are no longer prime examples of the Soweto Highveld Grassland. If the development is thus primarily contained within the heavily or moderately modified areas it would not affect the status of the vegetation type since these modified area were already considered as lost for the allocation of a vulnerable status of the vegetation type.
- Habitat 7 was rated as highly sensitive in the current assessment.
- Most of the habitats traversed by the proposed gridline were rated as having a low sensitivity.
- None of the species highlighted by the screening tool were encountered on site, thus the impact on populations of threatened or protected species will be negligible if all mitigation measures are applied. Although not mentioned by the screening tool, the giant girdled lizard has been reported by one of the landowners. As a precautionary measure once the footprint has been amended to take all specialist

assessments into consideration, a survey of the footprint could be undertaken to establish the presence/absence of the species.

- Depending on the type of fencing to be erected at some of the infrastructure, the gridline infrastructure will contribute minimally to obstruction of animal movement.

Key environmental mitigation and management actions proposed

- Ensure that the placing of infrastructure takes the sensitivity mapping of the ecological assessment into account to avoid and reduce impacts on species and habitats of conservation concern.
- Demarcate all infrastructure sites clearly to avoid unnecessary clearance of the vegetation.
- Avoid or minimise impacts that could potentially affect animal behaviour.
- Trenches should not be left open for long periods of time. Trenches should regularly be inspected for the presence of trapped animals.
- Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns.
- Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site.
- Speed limits should be strictly adhered to.
- Dust control measures should be implemented.
- Permits have to be obtained for the removal of Mpumalanga protected species.
- Implement a monitoring program for the early detection of alien invasive plant species.
- Employ a control program to combat declared alien invasive plant species.

Preferred infrastructure locations

On-site substation (SS 1): The site location is acceptable in terms of our sensitivity findings and falls in a habitat with low sensitivity. However, the site falls in an area demarcated as CBA1 according to the Mpumalanga Biodiversity Sector Plan (2014) and therefore should be micro-sited to a more acceptable location.

Alternative on-site substation (SS 2): The site location is acceptable in terms of our sensitivity findings and falls in a habitat with low sensitivity. However, the site falls in an area demarcated as CBA1 according to the Mpumalanga Biodiversity Sector Plan (2014) and therefore should be micro-sited to a more acceptable location. The substation site also falls in an area demarcated as seep.

Gridline: The powerline covers some CBAs, ESAs and wetlands. Pylon positions can be selected to avoid drainage lines.

Sasol step-down substations & BESS: Both sites are located in totally degraded areas.

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APPENDIX A

SYNOPTIC TABLE OF THE HABITATS
(PLANT COMMUNITIES)

| Plant community/Habitat | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
|--------------------------------------|---|---|---|---|---|---|----|----|----|
| | | | | | | | 7a | 7b | 7c |
| Species group 1 | | | | | | | | | |
| <i>Euryops laxus</i> | 5 | | | | 1 | | | | |
| <i>Microchloa caffra</i> | 5 | | | 1 | 1 | | | | |
| <i>Dipcadi ciliare</i> | 5 | | | 1 | | | | | |
| <i>Euphorbia inaequilatera</i> | 5 | | | 1 | | | | | |
| <i>Panicum repens</i> | 5 | | | 1 | 1 | | 1 | 3 | |
| <i>Jamesbrittenia stricta</i> | 5 | | | | | | | | |
| <i>Tragus berteronianus</i> | 4 | | | | | | | | 3 |
| <i>Hermannia cf coccocarpa</i> | 4 | | | 1 | 1 | | | | |
| <i>Colchicum striatum</i> | 3 | | | | | | | | |
| <i>Oropetium capense</i> | 3 | | | | | | | | |
| <i>Trachyandra saltii</i> | 3 | | | | | | | | |
| <i>Gladiolus robertsoniae</i> | 2 | | | | | | | | |
| <i>Huernia hystrix</i> | 2 | | | | | | | | |
| <i>Sporobolus discosporus</i> | 2 | | | | | | | | |
| <i>Albucca sp. 1</i> | 2 | | | | | | | | |
| <i>Cotula sp.</i> | 2 | | | | | | | | |
| Species group 2 | | | | | | | | | |
| <i>Kohautia amatymbica</i> | | 3 | | | | | | | |
| <i>Melinis repens</i> | | 3 | | | | | | | |
| <i>Pellaea calomelanos</i> | | 2 | | | | | | | |
| Species group 3 | | | | | | | | | |
| <i>Cyperus rupestris</i> | 4 | 3 | | 1 | | | | | |
| <i>Aristida diffusa</i> | 3 | 5 | | 1 | | | | | |
| <i>Tulbaghia acutiloba</i> | 3 | 2 | | | | | | | |
| <i>Euphorbia clavarioides</i> | 2 | 2 | | 1 | 1 | | | | |
| Species group 4 | | | | | | | | | |
| <i>Diospyros lycioides</i> | | 2 | 3 | | | | | | |
| <i>Ajuga ophrydis</i> | | | 3 | | | | | | |
| <i>Tephrosia capensis</i> | | | 3 | 1 | | | | | |
| <i>Acalypha angustata</i> | | | 3 | | 1 | | | | |
| <i>Indigofera hiliaris</i> | | | 2 | 1 | | | | | |
| <i>Aloe ecklonis</i> | | | 2 | 1 | | | | | |
| <i>Tristachya biseriata</i> | | | 3 | | | | | | |
| <i>Erythrina zeyheri</i> | | | 2 | 1 | | | | | |
| <i>Turbina oblongata</i> | | | 3 | | | | | | |
| <i>Afrosciadium magalismsontanum</i> | | | 3 | | | | | | |
| <i>Eucomis autumnalis</i> | | | 2 | | | | | | |
| <i>Polygala hottentotta</i> | | | 2 | | | | | | |
| <i>Artemisia afra</i> | | | 2 | | | | | | |
| <i>Ledebouria graminifolia</i> | | | 2 | | | | | | |
| <i>Oxalis obliquifolia</i> | | | 2 | | | | | | |
| Species group 5 | | | | | | | | | |
| <i>Searsia rigida</i> | | 2 | 2 | | | | | | |
| <i>Ziziphus zeyheriana</i> | | 2 | 1 | | | | | | |
| <i>Senecio othonniflorus</i> | | 2 | 3 | 1 | 1 | | | | |
| <i>Euphorbia striata</i> | | 2 | 3 | 1 | | | | 2 | |
| Species group 6 | | | | | | | | | |
| <i>Cymbopogon pospischilii</i> | 2 | 4 | 1 | 2 | 1 | | | | |
| <i>Cyperus semitrifidus</i> | 4 | 3 | | 1 | 1 | | | | |
| <i>Felicia muricata</i> | 2 | 5 | | 1 | 1 | | | | |
| <i>Chaetacanthus costatus</i> | 2 | | | 1 | | | | | |
| <i>Heteropogon contortus</i> | 1 | 2 | 1 | 1 | | | | | |

| | | | | | | | |
|---------------------------------------|---|---|---|---|---|---|-----|
| <i>Gazania krebsiana</i> | 1 | 2 | 1 | 2 | | | |
| Species group 7 | | | | | | | |
| <i>Hibiscus microcarpus</i> | | | 2 | 2 | | | |
| <i>Hypoxis acuminata</i> | | | 1 | 2 | 1 | | |
| <i>Hibiscus aethiopicus</i> | | | 2 | 1 | | | |
| <i>Asclepias</i> sp. | | | 1 | 1 | 1 | | |
| <i>Rhynchosia adenodes</i> | | | 2 | 1 | 1 | | |
| Species group 8 | | | | | | | |
| <i>Dianthus mooiensis</i> | | | 4 | 3 | 2 | 1 | |
| <i>Hermannia depressa</i> | | | 4 | 3 | 2 | 1 | |
| <i>Eragrostis capensis</i> | | | 3 | 3 | 2 | | |
| <i>Eragrostis racemosa</i> | | | 5 | | 1 | 1 | |
| <i>Cynodon incompletus</i> | | | 2 | 1 | 1 | 1 | |
| <i>Helichrysum nudifolium</i> | | | 2 | 2 | 1 | 1 | |
| Species group 9 | | | | | | | |
| <i>Scabiosa columbaria</i> | | | 3 | 3 | 4 | 2 | 3 3 |
| <i>Elionurus muticus</i> | 1 | | 5 | 2 | 3 | 2 | |
| <i>Indigofera hedyantha</i> | | | 3 | 2 | 3 | 2 | |
| <i>Nemesia</i> cf. <i>umbonata</i> | | | 2 | 3 | 3 | 1 | 1 |
| <i>Helichrysum pilosellum</i> | | | 2 | | 4 | 1 | |
| <i>Hilliardiella elaeagnoides</i> | | | 4 | 3 | 2 | 1 | |
| <i>Abildgaardia ovata</i> | 1 | | | 1 | 3 | 1 | |
| <i>Kyllinga erecta</i> | | | | 3 | 2 | 1 | |
| <i>Crabbea acaulis</i> | | | | 1 | 2 | 1 | |
| <i>Polygala amatymbica</i> | | | | 2 | 1 | 1 | |
| <i>Hypoxis hemerocallidea</i> | | | | 1 | 1 | 1 | |
| <i>Gladiolus crassifolius</i> | | | | 1 | 1 | 1 | |
| Species group 10 | | | | | | | |
| <i>Berkheya setifera</i> | | | 1 | 4 | 5 | 4 | 3 |
| <i>Helichrysum rugulosum</i> | | | 1 | 5 | 5 | 4 | 3 |
| <i>Ipomoea crassipes</i> | | | 3 | 3 | 3 | 5 | 2 |
| <i>Brachiaria serrata</i> | | | 2 | 4 | 4 | 5 | 1 |
| <i>Commelina africana</i> | | | 4 | 3 | 5 | 2 | 2 |
| <i>Hypoxis rigidula</i> | | | 1 | 2 | 3 | 4 | 1 |
| <i>Crassula lanceolata</i> | | | 1 | 2 | 3 | 1 | 2 |
| <i>Cyanotis speciosa</i> | | | 3 | 3 | 3 | 2 | 1 |
| <i>Geigeria burkei</i> | | | 3 | 2 | | 2 | 1 |
| <i>Sonchus oleraceus</i> | | | 1 | | 2 | 1 | 2 |
| <i>Eragrostis planiculmis</i> | | | | | | 3 | 1 |
| <i>Gomphrena celosioides</i> | | | 1 | 2 | 1 | 1 | 1 |
| <i>Bulbine abyssinica</i> | | | 2 | 2 | | 1 | 1 |
| <i>Setaria pumila</i> | | | 1 | 3 | | 1 | 1 |
| <i>Hermannia grandistipula</i> | | | 1 | 2 | 3 | 1 | 1 |
| <i>Monsonia angustifolia</i> | | | 3 | | | 1 | 1 |
| <i>Selago densiflora</i> | | | | 2 | 2 | 2 | 1 |
| Species group 11 | | | | | | | |
| <i>Eragrostis chloromelas</i> | | | 5 | 5 | 5 | 5 | 4 |
| <i>Hyparrhenia hirta</i> | | | 1 | 3 | 3 | 4 | 4 |
| <i>Digitaria eriantha</i> | | | 3 | | 1 | 1 | 1 |
| <i>Setaria sphacelata</i> | | | 1 | 2 | 3 | 2 | 2 |
| <i>Aristida bipartita</i> | | | 1 | | 1 | 1 | 3 |
| Species group 12 | | | | | | | |
| <i>Ischaemum fasciculatum</i> | | | | | | 3 | 3 |
| <i>Andropogon appendiculatus</i> | | | | | | 2 | 4 |
| <i>Fingerhuthia sesleriiformis</i> | | | | | | 2 | 2 |
| <i>Trifolium pratense</i> | | | 2 | 3 | 1 | 1 | 1 |
| <i>Galium capense</i> | | | | 2 | 1 | 1 | 1 |
| <i>Salix babylonica</i> | | | | | | 1 | 2 |
| <i>Schizoglossum bidens</i> | | | | | | 1 | 3 |
| Species group 13 | | | | | | | |
| <i>Setaria incrassata</i> | | | 2 | 2 | 5 | 4 | 4 |
| <i>Asclepias stellifera</i> | | | 1 | 3 | 4 | 4 | 3 |
| <i>Chlorophytum fasciculatum</i> | | | 3 | 3 | 2 | 5 | 3 |
| <i>Jamesbrittenia aurantiaca</i> | | | 2 | | 2 | 4 | 3 |
| <i>Salvia</i> sp. | | | 1 | 2 | 3 | 2 | 2 |
| <i>Ledebouria</i> cf. <i>revoluta</i> | | | 3 | | 2 | 2 | 2 |
| <i>Hypoxis argentea</i> | | | 3 | | 2 | 1 | 2 |
| Species group 14 | | | | | | | |
| <i>Typha capensis</i> | | | | | | 1 | 5 |
| <i>Phragmites australis</i> | | | | | | | 5 |

| | | | | | | | |
|------------------------------------|---|---|---|---|---|---|---|
| <i>Senecio coronatus</i> | 2 | | | | | | |
| <i>Hemizygia pretoriae</i> | 2 | | | | | | |
| <i>Lessertia stricta</i> | 2 | | | | | | |
| <i>Leobordea divaricata</i> | | 1 | 1 | 1 | | | |
| <i>Oxalis corniculata</i> | | 1 | 1 | 1 | | | |
| <i>Solanum nigrum</i> | | 2 | | | | 1 | |
| <i>Trachyandra asperata</i> | | 1 | 1 | | 2 | | |
| <i>Solanum campylacanthum</i> | | 1 | 1 | | | | |
| <i>Gladiolus dalenii</i> | | 1 | 1 | | | | |
| <i>Xysmalobium undulatum</i> | | 1 | | | 2 | | |
| <i>Conyza albida</i> | | | 1 | 1 | 2 | 1 | |
| <i>Cyclosporum leptophyllum</i> | | | 1 | 1 | | 1 | 2 |
| <i>Senecio sp.</i> | | | 1 | 1 | | | |
| <i>Helichrysum aureonitens</i> | | | 1 | 1 | | | |
| <i>Ruellia sp.</i> | | | 1 | 1 | | | |
| <i>Portulaca quadrifida</i> | | | 1 | 1 | | | |
| <i>Cuscuta campestris</i> | | | 1 | 1 | 2 | | |
| <i>Datura ferox</i> | | | 1 | | | 1 | 3 |
| <i>Ruellia patula</i> | | | 1 | | | | |
| <i>Galinsoga parviflora</i> | | | 1 | 1 | | | |
| <i>Vigna vexillata</i> | | | 1 | | | 1 | |
| <i>Senecio isatideus</i> | | | 1 | | | 1 | |
| <i>Trachyandra sp.</i> | | | 1 | 1 | | | |
| <i>Physalis viscosa</i> | | | 1 | | | | 3 |
| <i>Ipomoea sp.</i> | | | 1 | 1 | | | |
| <i>Pennisetum clandestinum</i> | | | | 1 | 2 | 2 | |
| <i>Amaranthus hybridus</i> | | | | 1 | | 1 | |
| <i>Wahlenbergia sp.</i> | | | | 1 | | | |
| <i>Cyrtanthus stenanthus</i> | | | | 1 | | | |
| <i>Ipomoea bathycolpos</i> | | | | 1 | | | 2 |
| <i>Amaranthus sp.</i> | | | | 1 | | | 3 |
| <i>Guilleminea densa</i> | | | | | 2 | | |
| <i>Harpochloa falx</i> | | | | | | | 2 |
| <i>Veronica anagallis-aquatica</i> | | | | | | | 2 |
| <i>Haemanthus humilis</i> | | | | | | | 2 |
| <i>Leptochloa fusca</i> | | | | | | | 2 |
| <i>Ascolepis sp.</i> | | | | | | | 3 |
| <i>Cheilanthes sp.</i> | 1 | | | | | | |
| <i>Crassula sp.</i> | 1 | | | | | | |
| <i>Crassula cf. setulosa</i> | 1 | | | | | | |
| <i>Eriospermum flagelliforme</i> | 1 | | | | | | |
| <i>Portulaca hereroensis</i> | 1 | | | | | | |
| <i>Corchorus asplenifolius</i> | 1 | | | | | | |
| <i>Lapeirousia sp.</i> | 1 | | | | | | |
| <i>Kohautia cynanchica</i> | 1 | | | | | | |
| <i>Ledebouria sp.</i> | 1 | | | | | | |
| <i>Chaenostoma calycina</i> | 1 | | | | | | |
| <i>Eriospermum sp.</i> | 1 | | | | | | |
| <i>Portulaca kermesina</i> | 1 | | | | | | |
| <i>Chaenostoma sp.</i> | 1 | | | | | | |
| <i>Aristida adscensionis</i> | 1 | | | | | | |
| <i>Eragrostis inamoena</i> | 1 | | | | | | |
| <i>Cyperus capensis</i> | 1 | | | | | | |
| <i>Indigofera sp.</i> | 1 | | | | | | |
| <i>Cynoglossum hispidum</i> | | 1 | | | | | |
| <i>Gnidia sp.</i> | | 1 | | | | | |
| <i>Tribulus terrestris</i> | | 1 | | | | | |
| <i>Albuca sp. 3</i> | | 1 | | | | | |
| <i>Asparagus cooperi</i> | | 1 | | | | | |
| <i>Berkheya pinnatifida</i> | | 1 | | | | | |
| <i>Ledebouria cooperi</i> | | 1 | | | | | |
| <i>Searsia magalismsontana</i> | | 1 | | | | | |
| <i>Sphenostylis angustifolium</i> | | 1 | | | | | |
| <i>Aster harveyanus</i> | | 1 | | | | | |
| <i>Rhynchosia monophylla</i> | | 1 | | | | | |
| <i>Vernonia glabra</i> | | 1 | | | | | |
| <i>Athrixia elata</i> | | 1 | | | | | |
| <i>Cephalaria zeyheriana</i> | | 1 | | | | | |
| <i>Opuntia ficus-indica</i> | | 1 | | | | | |
| <i>Pelargonium alchemilloides</i> | | 1 | | | | | |

| | | | |
|---|---|---|---|
| <i>Thesium cf. goetzeanum</i> | 1 | | |
| <i>Tragopogon dubius</i> | 1 | | |
| <i>Ocimum obovatum</i> | 1 | | |
| <i>Osteospermum muricatum</i> | 1 | | |
| <i>Cannabis sativa</i> | | 1 | |
| <i>Cymbopogon caesius</i> | | 1 | |
| <i>Lotononis sp.</i> | | 1 | |
| <i>Haplocarpha lyrata</i> | | 1 | |
| <i>Verbena rigida</i> | | 1 | |
| <i>Rhynchosia caribaea</i> | | 1 | |
| <i>Chamaesyce hirta</i> | | 1 | |
| <i>Pelargonium minimum</i> | | 1 | |
| <i>Capsella bursa-pastoris</i> | | 1 | |
| <i>Lolium perenne</i> | | 1 | |
| <i>Blepharis integrifolia</i> | | 1 | |
| <i>Eragrostis superba</i> | | 1 | |
| <i>Plectranthu cf. madagascariensis</i> | | | 1 |
| <i>Seriphium plumosum</i> | | | 1 |
| <i>Hemizygia sp.</i> | | | 1 |
| <i>Becium species</i> | | | 1 |
| <i>Echinochloa colona</i> | | | 1 |
| <i>Panicum sp.</i> | | | 1 |
| <i>Indigofera sp.</i> | | | 1 |
| <i>Senecio consanguineus</i> | | | 1 |
| <i>Senna italica</i> | | | 1 |
| <i>Leucas sp.</i> | | | 1 |
| <i>Nidorella hottentotica</i> | | | 1 |
| <i>Pelargonium luridum</i> | | | 1 |
| <i>Haemanthus sp.</i> | | | 1 |
| <i>Panicum natalense</i> | | | 1 |
| <i>Trifolium cf. africanum</i> | | | 1 |
| <i>Cyperus sp.</i> | | | 1 |
| <i>Alternanthera sessilis</i> | | | 1 |
| <i>Schoenoplectus sp.</i> | | | 1 |
| <i>Oxalis sp.</i> | | | 1 |

APPENDIX B

PLANT SPECIES CHECKLIST

¹Newposa list (SANBI)²Plants observed during January 2022 site survey³MBSP = Mpumalanga Biodiversity Sector Plan redlist⁴IUCN category⁵MBSP = Mpumalanga Biodiversity Sector Plan redlist status⁶MNCA (1998) Schedules⁷CITES = Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES 2020)⁸NAT = Naturalised alien species¹⁰AIS = Alien and invasive species

| Family | Species | New Posa ¹ | Current survey ² | MBSP ³ | IUCN ⁴ | MBSP status ⁵ | MNCA ⁶ | CITES ⁷ | ToPS ⁸ | Naturalised ⁹ | IAS ¹⁰ |
|---------------|--|-----------------------|-----------------------------|-------------------|-------------------|--------------------------|-------------------|--------------------|-------------------|--------------------------|-------------------|
| Cyperaceae | <i>Abildgaardia ovata</i> | | X | | LC | | | | | | |
| Fabaceae | <i>Acacia mearnsii</i> | | X | | | | | | | | 1b |
| Euphorbiaceae | <i>Acalypha angustata</i> | | X | | LC | | | | | | |
| Euphorbiaceae | <i>Acalypha caperonioides var. caperonioides</i> | X | | | DD | | | | | | |
| Lamiaceae | <i>Aeollanthus buchnerianus</i> | X | | | LC | | | | | | |
| Apiaceae | <i>Afroscidium magalismontanum</i> | | X | | LC | | | | | | |
| Asparagaceae | <i>Agave americana</i> | | X | | | Sch 13 | | | | | |
| Lamiaceae | <i>Ajuga ophrydis</i> | X | X | | LC | | | | | | |
| Hyacinthaceae | <i>Albuca sp. 1</i> | | X | | | | | | | | |
| Hyacinthaceae | <i>Albuca sp. 2</i> | | X | | | | | | | | |
| Hyacinthaceae | <i>Albuca sp. 3 geel</i> | | X | | | | | | | | |
| Hyacinthaceae | <i>Albuca virens subsp. virens</i> | X | | | LC | | | | | | |
| Orobanchaceae | <i>Alectra orobanchoides</i> | X | | | LC | | | | | | |
| Asphodelaceae | <i>Aloe ecklonis</i> | | X | | LC | Sch 11 | App II | | | | |
| Asphodelaceae | <i>Aloe transvaalensis</i> | | X | | LC | Sch 11 | App II | | | | |
| Amaranthaceae | <i>Alternanthera sessilis</i> | | X | | | | | | | Nat | |
| Amaranthaceae | <i>Amaranthus hybridus</i> | | X | | | | | | | Nat | |
| Amaranthaceae | <i>Amaranthus sp.</i> | | X | | | | | | | Nat | |
| Poaceae | <i>Andropogon appendiculatus</i> | | X | | LC | | | | | | |
| Poaceae | <i>Andropogon schirensis</i> | X | | | LC | | | | | | |
| Rubiaceae | <i>Anthospermum rigidum subsp. pumilum</i> | X | | | LC | | | | | | |
| Asteraceae | <i>Arctotis arctotoides</i> | | X | | LC | | | | | | |
| Fabaceae | <i>Argyrolobium campicola</i> | X | | | NT | | | | | | |
| Poaceae | <i>Aristida adscensionis</i> | X | X | | LC | | | | | | |
| Poaceae | <i>Aristida bipartita</i> | X | X | | LC | | | | | | |
| Poaceae | <i>Aristida diffusa</i> | | X | | LC | | | | | | |
| Poaceae | <i>Aristida sp.</i> | | X | | | | | | | | |
| Asteraceae | <i>Artemisia afra var. afra</i> | X | X | | LC | | | | | | |
| Poaceae | <i>Arundo donax</i> | | X | | | Sch 13 | | | | | 1b |
| Apocynaceae | <i>Asclepias albens</i> | X | | | LC | | | | | | |
| Apocynaceae | <i>Asclepias gibba var. gibba</i> | X | X | | LC | | | | | | |
| Apocynaceae | <i>Asclepias multicaulis</i> | X | | | LC | | | | | | |
| Apocynaceae | <i>Asclepias sp.</i> | | X | | | | | | | | |
| Apocynaceae | <i>Asclepias stellifera</i> | | X | | LC | | | | | | |
| Apocynaceae | <i>Ascolepis sp.</i> | | X | | | | | | | | |
| Asparagaceae | <i>Asparagus cooperi</i> | | X | | LC | | | | | | |
| Asparagaceae | <i>Asparagus setaceus</i> | X | | | LC | | | | | | |
| Apocynaceae | <i>Aspidoglossum lamellatum</i> | X | | | LC | | | | | | |
| Aspleniaceae | <i>Asplenium adiantum-nigrum var. solidum</i> | X | | | LC | | | | | | |

| | | | | | | | | |
|------------------|---|---|---|---|----|--------|--------|-----|
| Aspleniaceae | <i>Asplenium aethiopicum</i> | X | | | LC | | | |
| Asteraceae | <i>Aster harveyanus</i> | | X | | LC | | | |
| Asteraceae | <i>Athrix elata</i> | | X | | LC | | | |
| Lamiaceae | <i>Becium obovatum</i> | | X | | LC | | | |
| Lamiaceae | <i>Becium sp.</i> | | X | | | | | |
| Asteraceae | <i>Berkheya pinnatifida</i> | | X | | LC | | | |
| Asteraceae | <i>Berkheya radula</i> | | X | | LC | | | |
| Asteraceae | <i>Berkheya setifera</i> | | X | | LC | | | |
| Asteraceae | <i>Bidens bipinnata</i> | | X | | | | | Nat |
| Asteraceae | <i>Bidens pilosa</i> | X | X | | | Sch 13 | | Nat |
| Acanthaceae | <i>Blepharis integrifolia</i> | | X | | LC | | | |
| Orchidaceae | <i>Bonatea porrecta</i> | X | | | LC | Sch 11 | App II | |
| Amaryllidaceae | <i>Boophone disticha</i> | | X | X | LC | Dec | Sch 11 | |
| Poaceae | <i>Brachiaria advena</i> | X | | | | | | Nat |
| Poaceae | <i>Brachiaria eruciformis</i> | X | | | LC | | | |
| Poaceae | <i>Brachiaria serrata</i> | | X | | LC | | | |
| Apocynaceae | <i>Brachystelma foetidum</i> | X | | | LC | | Sch 11 | |
| Poaceae | <i>Bromus catharticus</i> | | X | | | | | Nat |
| Asphodelaceae | <i>Bulbine abyssinica</i> | | X | | LC | | | |
| Asphodelaceae | <i>Bulbine capitata</i> | X | | | LC | | | |
| Cyperaceae | <i>Bulbostylis humilis</i> | | X | | LC | | | |
| Cannabaceae | <i>Cannabis sativa</i> | | X | | | | | Nat |
| Brassicaceae | <i>Capsella bursa-pastoris</i> | | X | | | | | Nat |
| Cyperaceae | <i>Carex glomerabilis</i> | X | X | | LC | | | |
| Poaceae | <i>Catalepis gracilis</i> | X | | | LC | | | |
| Dipsacaceae | <i>Cephalaria zeyheriana</i> | | X | | LC | | | |
| Cactaceae | <i>Cereus jamacaru</i> | | X | | | Sch 13 | | 1b |
| Scrophulariaceae | <i>Chaenostoma calycina</i> | | X | | LC | | | |
| Scrophulariaceae | <i>Chaenostoma patrioticum</i> | X | | | LC | | | |
| Scrophulariaceae | <i>Chaenostoma sp.</i> | | X | | | | | |
| Acanthaceae | <i>Chaetacanthus costatus</i> | | X | | LC | | | |
| Fabaceae | <i>Chamaecrista mimosoides</i> | | X | | LC | | | |
| Euphorbiaceae | <i>Chamaesyce hirta</i> | | X | | LC | | | |
| Pteridaceae | <i>Cheilanthes sp.</i> | | X | | | | | |
| Poaceae | <i>Chloris virgata</i> | X | | | LC | | | |
| Agavaceae | <i>Chlorophytum cooperi</i> | X | | | LC | | | |
| Agavaceae | <i>Chlorophytum fasciculatum</i> | | X | | LC | | | |
| Asteraceae | <i>Cineraria geraniifolia</i> | X | | | LC | | | |
| Asteraceae | <i>Cirsium vulgare</i> | | X | | | Sch 13 | | 1b |
| Peraceae | <i>Clutia pulchella var. pulchella</i> | X | | | LC | | | |
| Colchicaceae | <i>Colchicum striatum</i> | X | X | | LC | | | |
| Commelinaceae | <i>Commelina africana var. africana</i> | X | X | | LC | | | |
| Convolvulaceae | <i>Convolvulus multifidus</i> | X | | | LC | | | |
| Convolvulaceae | <i>Convolvulus sagittatus</i> | X | X | | LC | | | |
| Asteraceae | <i>Conyza albida</i> | | X | | | | | Nat |
| Asteraceae | <i>Conyza podocephala</i> | | X | | LC | | | |
| Malvaceae | <i>Corchorus asplenifolius</i> | | X | | LC | | | |
| Apocynaceae | <i>Cordylogyne globosa</i> | X | | | LC | | | |
| Asteraceae | <i>Cosmos bipinnatus</i> | X | X | | | | | Nat |
| Asteraceae | <i>Cotula sp.</i> | | X | | | | | |
| Acanthaceae | <i>Crabbea acaulis</i> | | X | | LC | | | |
| Crassulaceae | <i>Crassula cf. setulosa</i> | | X | | LC | | | |
| Crassulaceae | <i>Crassula lanceolata</i> | | X | | LC | | | |
| Crassulaceae | <i>Crassula sp.</i> | | X | | | | | |
| Amaryllidaceae | <i>Crinum bulbispermum</i> | | X | X | LC | DEC | Sch 11 | |
| Amaryllidaceae | <i>Crinum graminicola</i> | X | | | LC | | Sch 11 | |
| Amaryllidaceae | <i>Crinum lugardiae</i> | X | | | LC | | Sch 11 | |
| Cucurbitaceae | <i>Cucumis hirsutus</i> | X | | | LC | | | |
| Cucurbitaceae | <i>Cucumis zeyheri</i> | X | | | LC | | | |
| Convolvulaceae | <i>Cuscuta campestris</i> | | X | | | Sch 13 | | 1b |
| Commelinaceae | <i>Cyanotis speciosa</i> | | X | | LC | | | |

| | | | | | | | | | |
|----------------|---|---|---|---|---|--|--|----|------------------|
| Cyperaceae | <i>Fimbristylis complanata</i> | X | | | | | | LC | |
| Poaceae | <i>Fingerhuthia sesleriiformis</i> | | | X | | | | LC | |
| Asteraceae | <i>Galinsoga parviflora</i> | | | X | | | | | Nat |
| Rubiaceae | <i>Galium capense</i> | | | X | | | | LC | |
| Asteraceae | <i>Garuleum woodii</i> | X | | | | | | LC | |
| Asteraceae | <i>Gazania krebsiana</i> | | | X | | | | LC | |
| Asteraceae | <i>Gazania sp.</i> | | | X | | | | | |
| Asteraceae | <i>Geigeria burkei</i> | | | X | | | | LC | |
| Asteraceae | <i>Geigeria burkei subsp. burkei var. burkei</i> | X | | | | | | NE | |
| Asteraceae | <i>Geigeria burkei subsp. burkei var. zeyheri</i> | X | | | | | | NE | |
| Iridaceae | <i>Gladiolus crassifolius</i> | X | X | | | | | LC | Sch 11 |
| Iridaceae | <i>Gladiolus dalenii</i> | | | X | | | | LC | Sch 11 |
| Iridaceae | <i>Gladiolus elliotii</i> | X | | | | | | LC | Sch 11 |
| Iridaceae | <i>Gladiolus longicollis subsp. longicollis</i> | X | | | | | | LC | Sch 11 |
| Iridaceae | <i>Gladiolus robertsoniae</i> | X | X | x | | | | NT | NT Sch 11 |
| Thymelaeaceae | <i>Gnidia gymnostachya</i> | X | | | | | | LC | |
| Thymelaeaceae | <i>Gnidia sp.</i> | | | X | | | | | |
| Apocynaceae | <i>Gomphocarpus fruticosus subsp. fruticosus</i> | X | X | | | | | LC | |
| Apocynaceae | <i>Gomphocarpus rivularis</i> | X | | | | | | LC | |
| Amaranthaceae | <i>Gomphrena celosioides</i> | | | X | | | | | Nat |
| Malvaceae | <i>Grewia flava</i> | X | | | | | | LC | |
| Amaranthaceae | <i>Guilleminia densa</i> | | | X | | | | | Nat |
| Orchidaceae | <i>Habenaria barbertoni</i> | X | | x | | | | NT | NT Sch 11 App II |
| Orchidaceae | <i>Habenaria epipactidea</i> | X | | | | | | LC | Sch 11 App II |
| Amaryllidaceae | <i>Haemanthus humilis</i> | | | X | | | | LC | Sch 11 |
| Amaryllidaceae | <i>Haemanthus montanus</i> | X | | | | | | LC | Sch 11 |
| Amaryllidaceae | <i>Haemanthus sp.</i> | | | X | | | | | Sch 11 |
| Asteraceae | <i>Haplocarpha lyrata</i> | X | X | | | | | LC | |
| Asteraceae | <i>Haplocarpha scaposa</i> | | | X | | | | LC | |
| Poaceae | <i>Harpochloa falx</i> | X | X | | | | | LC | |
| Asteraceae | <i>Helichrysum aureonitens</i> | | | X | | | | LC | |
| Asteraceae | <i>Helichrysum lepidissimum</i> | X | | | | | | LC | |
| Asteraceae | <i>Helichrysum nudifolium</i> | | | X | | | | LC | |
| Asteraceae | <i>Helichrysum pilosellum</i> | | | X | | | | LC | |
| Asteraceae | <i>Helichrysum rugulosum</i> | | | X | | | | LC | |
| Poaceae | <i>Trisetopsis imberbis</i> | | | X | | | | LC | |
| Lamiaceae | <i>Hemizygia pretoriae</i> | | | X | | | | LC | |
| Lamiaceae | <i>Hemizygia sp.</i> | | | X | | | | | |
| Malvaceae | <i>Hermannia coccocarpa</i> | X | X | | | | | LC | |
| Malvaceae | <i>Hermannia cristata</i> | X | | | | | | LC | |
| Malvaceae | <i>Hermannia depressa</i> | | | X | | | | LC | |
| Malvaceae | <i>Hermannia erodioides</i> | | | X | | | | LC | |
| Malvaceae | <i>Hermannia grandistipula</i> | | | X | | | | LC | |
| Poaceae | <i>Heteropogon contortus</i> | | | X | | | | LC | |
| Malvaceae | <i>Hibiscus aethiopicus</i> | | | X | | | | LC | |
| Malvaceae | <i>Hibiscus microcarpus</i> | | | X | | | | LC | |
| Malvaceae | <i>Hibiscus trionum</i> | X | X | | | | | | Nat |
| Asteraceae | <i>Hilliardiella elaeagnoides</i> | | | X | | | | LC | |
| Apocynaceae | <i>Huernia hystrix</i> | | | X | | | | LC | Sch 11 |
| Poaceae | <i>Hyparrhenia anamesa</i> | X | | | | | | LC | |
| Poaceae | <i>Hyparrhenia hirta</i> | | | X | | | | LC | |
| Poaceae | <i>Hyparrhenia tamba</i> | | | X | | | | LC | |
| Hypoxidaceae | <i>Hypoxis acuminata</i> | X | X | | | | | LC | |
| Hypoxidaceae | <i>Hypoxis argentea</i> | | | X | | | | LC | |
| Hypoxidaceae | <i>Hypoxis hemerocallidea</i> | | | X | X | | | LC | DEC |
| Hypoxidaceae | <i>Hypoxis rigidula</i> | | | X | | | | LC | |
| Hypoxidaceae | <i>Hypoxis rigidula var. rigidula</i> | X | | | | | | LC | |
| Poaceae | <i>Imperata cylindrica</i> | | | X | | | | LC | |
| Fabaceae | <i>Indigofera dregeana</i> | X | | | | | | LC | |
| Fabaceae | <i>Indigofera hedyantha</i> | X | X | | | | | LC | |
| Fabaceae | <i>Indigofera hilaris</i> | | | X | | | | LC | |

| | | | | | | | | |
|------------------|---|---|---|---|----|----|--------|--------|
| Fabaceae | <i>Indigofera sp.</i> | | X | | | | | |
| Fabaceae | <i>Indigofera sp.</i> | | X | | | | | |
| Convolvulaceae | <i>Ipomoea bathycolpos</i> | | X | | LC | | | |
| Convolvulaceae | <i>Ipomoea bolusiana</i> | | X | | LC | | | |
| Convolvulaceae | <i>Ipomoea crassipes</i> | | X | | LC | | | |
| Convolvulaceae | <i>Ipomoea oblongata</i> | X | | | LC | | | |
| Convolvulaceae | <i>Ipomoea sp.</i> | | X | | | | | |
| Poaceae | <i>Ischaemum fasciculatum</i> | | X | | LC | | | |
| Scrophulariaceae | <i>Jamesbrittenia aurantiaca</i> | | X | | LC | | | |
| Scrophulariaceae | <i>Jamesbrittenia stricta</i> | | X | | LC | | | |
| Aizoaceae | <i>Khadia beswickii</i> | | | X | VU | VU | | |
| Asphodelaceae | <i>Kniphofia typhoides</i> | | | X | NT | NT | Sch 11 | |
| Poaceae | <i>Koeleria capensis</i> | X | | | LC | | | |
| Rubiaceae | <i>Kohautia amatymbica</i> | | X | | LC | | | |
| Rubiaceae | <i>Kohautia cynanchica</i> | | X | | LC | | | |
| Cyperaceae | <i>Kyllinga erecta</i> | | X | | LC | | | |
| Asteraceae | <i>Lactuca inermis</i> | | X | | | | | Nat |
| Iridaceae | <i>Lapeirousia sp.</i> | | X | | | | | |
| Asteraceae | <i>Launaea rarifolia var. rarifolia</i> | X | | | LC | | | |
| Hyacinthaceae | <i>Ledebouria burkei subsp. burkei</i> | X | | | LC | | | |
| Hyacinthaceae | <i>Ledebouria cf. minima</i> | | X | | LC | | | |
| Hyacinthaceae | <i>Ledebouria cf. revoluta</i> | | X | | LC | | | |
| Hyacinthaceae | <i>Ledebouria cooperi</i> | | X | | LC | | | |
| Hyacinthaceae | <i>Ledebouria graminifolia</i> | | X | | LC | | | |
| Hyacinthaceae | <i>Ledebouria sp.</i> | | X | | | | | |
| Poaceae | <i>Leersia hexandra</i> | | X | | LC | | | |
| Fabaceae | <i>Leobordea divaricata</i> | X | X | | LC | | | |
| Fabaceae | <i>Leobordea mucronata</i> | X | | | LC | | | |
| Brassicaceae | <i>Lepidium africanum</i> | | X | | LC | | | |
| Poaceae | <i>Leptochloa fusca</i> | | X | | LC | | | |
| Fabaceae | <i>Lessertia stricta</i> | | X | | LC | | | |
| Lamiaceae | <i>Leucas sp.</i> | | X | | LC | | | |
| Poaceae | <i>Lolium perenne</i> | | X | | | | | Nat |
| Fabaceae | <i>Lotononis sp.</i> | | X | | | | | |
| Fabaceae | <i>Medicago laciniata var. laciniata</i> | X | | | NE | | | Nat |
| Poaceae | <i>Melinis nerviglumis</i> | X | | | LC | | | |
| Poaceae | <i>Melinis repens</i> | | X | | LC | | | |
| Fabaceae | <i>Melolobium calycinum</i> | X | X | | LC | | | |
| Lamiaceae | <i>Mentha longifolia</i> | | X | | LC | | | |
| Poaceae | <i>Microchloa caffra</i> | | X | | LC | | | |
| Geraniaceae | <i>Monsonia angustifolia</i> | | X | | LC | | | |
| Brassicaceae | <i>Nasturtium officinale</i> | | X | | | | | Nat |
| Scrophulariaceae | <i>Nemesia cf. umbonata</i> | | X | | LC | | | |
| Amaryllidaceae | <i>Nerine graciis</i> | | | X | VU | NT | | |
| Amaryllidaceae | <i>Nerine krigei</i> | X | | | LC | | | |
| Asteraceae | <i>Nidorella hottentotica</i> | | X | | LC | | | |
| Asteraceae | <i>Nidorella resedifolia subsp. resedifolia</i> | X | | | LC | | | |
| Asteraceae | <i>Nolletia jeanettae</i> | X | | | LC | | | |
| Onagraceae | <i>Oenothera rosea</i> | | X | | | | | Nat |
| Onagraceae | <i>Oenothera tetraptera</i> | X | X | | | | | Nat |
| Cactaceae | <i>Opuntia ficus-indica</i> | | X | | | | Sch 13 | 1b |
| Apocynaceae | <i>Orbea cooperi</i> | X | | | LC | | Sch 11 | |
| Poaceae | <i>Oropetium capense</i> | | X | | LC | | | |
| Orchidaceae | <i>Orthochilus leontoglossus</i> | X | | | LC | | Sch 11 | App II |
| Asteraceae | <i>Osteospermum muricatum</i> | | X | | LC | | | |
| Oxalidaceae | <i>Oxalis corniculata</i> | | X | | | | | Nat |
| Oxalidaceae | <i>Oxalis obliquifolia</i> | | X | | LC | | | |
| Oxalidaceae | <i>Oxalis sp.</i> | | X | | | | | |
| Poaceae | <i>Panicum natalense</i> | | X | | LC | | | |
| Poaceae | <i>Panicum repens</i> | | X | | LC | | | |
| Poaceae | <i>Panicum sp.</i> | | X | | | | | |

| | | | | | |
|------------------|--|---|---|----|---------------|
| Poaceae | <i>Paspalum dilatatum</i> | | X | LC | |
| Poaceae | <i>Paspalum distichum</i> | X | | LC | Nat |
| Geraniaceae | <i>Pelargonium alchemilloides</i> | | X | LC | |
| Geraniaceae | <i>Pelargonium luridum</i> | X | X | LC | |
| Geraniaceae | <i>Pelargonium minimum</i> | | X | LC | |
| Pteridaceae | <i>Pellaea calomelanos</i> | | X | LC | |
| Poaceae | <i>Pennisetum clandestinum</i> | | X | LC | |
| Polygonaceae | <i>Persicaria lapathifolia</i> | | X | | Nat |
| Poaceae | <i>Phragmites australis</i> | | X | LC | |
| Phyllanthaceae | <i>Phyllanthus parvulus var. garipensis</i> | X | | LC | |
| Solanaceae | <i>Physalis viscosa</i> | | X | | Nat |
| Plantaginaceae | <i>Plantago lanceolata</i> | | X | LC | |
| Lamiaceae | <i>Plectranthus cf. madagascariensis</i> | | X | LC | |
| Lamiaceae | <i>Plectranthus ramosior</i> | X | | LC | |
| Polygalaceae | <i>Polygala amatymbica</i> | | X | LC | |
| Polygalaceae | <i>Polygala hottentotta</i> | | X | LC | |
| Poaceae | <i>Polypogon viridis</i> | X | | | Nat |
| Portulacaceae | <i>Portulaca hereroensis</i> | | X | LC | |
| Portulacaceae | <i>Portulaca kermesina</i> | | X | LC | |
| Portulacaceae | <i>Portulaca quadrifida</i> | | X | LC | |
| Potamogetonaceae | <i>Potamogeton thunbergii</i> | | X | LC | |
| Rosaceae | <i>Prunus persica</i> | | X | | Alien |
| Molluginaceae | <i>Psammotropha myriantha</i> | X | | LC | |
| Asteraceae | <i>Pseudognaphalium luteo-album</i> | | X | LC | |
| Orchidaceae | <i>Pterygodium nigrescens</i> | X | | LC | Sch 11 App II |
| Cyperaceae | <i>Pycneus cooperi</i> | X | | LC | |
| Ranunculaceae | <i>Ranunculus multifidus</i> | | X | LC | |
| Apocynaceae | <i>Raphionacme sp.</i> | | X | | |
| Fabaceae | <i>Rhynchosia adenodes</i> | | X | LC | |
| Fabaceae | <i>Rhynchosia caribaea</i> | | X | LC | |
| Fabaceae | <i>Rhynchosia monophylla</i> | | X | LC | |
| Acanthaceae | <i>Ruellia patula</i> | | X | LC | |
| Acanthaceae | <i>Ruellia sp.</i> | | X | | |
| Polygonaceae | <i>Rumex crispus</i> | | X | | Nat |
| Polygonaceae | <i>Rumex lanceolatus</i> | X | | LC | |
| Salicaceae | <i>Salix babylonica</i> | | X | | Alien |
| Lamiaceae | <i>Salvia sp.</i> | | X | | |
| Orchidaceae | <i>Satyrium stenopetalum subsp. brevicealcaratum</i> | X | | LC | Sch 11 App II |
| Caprifoliaceae | <i>Scabiosa columbaria</i> | | X | LC | |
| Hyacinthaceae | <i>Schizocarphus nervosus</i> | X | | LC | |
| Apocynaceae | <i>Schizoglossum bidens</i> | | X | LC | |
| Asteraceae | <i>Schkuhria pinnata</i> | X | X | | Nat |
| Cyperaceae | <i>Schoenoplectus cf. muricinux</i> | | X | LC | |
| Cyperaceae | <i>Schoenoplectus decipiens</i> | X | | LC | |
| Cyperaceae | <i>Schoenoplectus sp.</i> | | X | | |
| Anacardiaceae | <i>Searsia discolor</i> | X | | LC | |
| Anacardiaceae | <i>Searsia lancea</i> | | X | LC | |
| Anacardiaceae | <i>Searsia magalismsontana</i> | | X | | |
| Anacardiaceae | <i>Searsia rigida</i> | | X | LC | |
| Gentianaceae | <i>Sebaea leiostyla</i> | X | | LC | |
| Selaginellaceae | <i>Selaginella caffrorum var. caffrorum</i> | X | | LC | |
| Scrophulariaceae | <i>Selago densiflora</i> | | X | LC | |
| Scrophulariaceae | <i>Selago tenuifolia</i> | | X | LC | |
| Asteraceae | <i>Senecio consanguineus</i> | | X | LC | |
| Asteraceae | <i>Senecio coronatus</i> | | X | LC | |
| Asteraceae | <i>Senecio erubescens</i> | | X | LC | |
| Asteraceae | <i>Senecio inaequidens</i> | | X | LC | |
| Asteraceae | <i>Senecio inornatus</i> | | X | LC | |
| Asteraceae | <i>Senecio isatideus</i> | | X | LC | |
| Asteraceae | <i>Senecio othonniflorus</i> | | X | LC | |
| Asteraceae | <i>Senecio sp.</i> | | X | LC | |

| | | | | | | |
|----------------|---|---|---|----|--------|-----|
| Fabaceae | <i>Senna italica</i> | | X | LC | | |
| Asteraceae | <i>Seriphium plumosum</i> | X | X | LC | | |
| Poaceae | <i>Setaria incrassata</i> | | X | LC | | |
| Poaceae | <i>Setaria nigrirostris</i> | X | X | LC | | |
| Poaceae | <i>Setaria pumila</i> | | X | LC | | |
| Poaceae | <i>Setaria sphacelata</i> | | X | LC | | |
| Poaceae | <i>Setaria sphacelata var. sericea</i> | X | | LC | | |
| Poaceae | <i>Setaria sphacelata var. sphacelata</i> | X | | LC | | |
| Brassicaceae | <i>Erucastrum austroafricanum</i> | | X | | | Nat |
| Solanaceae | <i>Solanum campylacanthum</i> | | X | LC | | |
| Solanaceae | <i>Solanum elaeagnifolium</i> | | X | | | 1b |
| Solanaceae | <i>Solanum nigrum</i> | | X | | | Nat |
| Asteraceae | <i>Sonchus oleraceus</i> | | X | | | Nat |
| Fabaceae | <i>Sphenostylis angustifolium</i> | | X | LC | | |
| Poaceae | <i>Sporobolus africanus</i> | X | | LC | | |
| Poaceae | <i>Sporobolus discosporus</i> | | X | LC | | |
| Apocynaceae | <i>Stenostelma periglossoides</i> | X | | LC | | |
| Apocynaceae | <i>Stenostelma umbelluliferum</i> | X | | NT | | |
| Orobanchaceae | <i>Striga elegans</i> | | X | LC | | |
| Lamiaceae | <i>Syncolostemon canescens</i> | X | | LC | | |
| Asteraceae | <i>Tagetes minuta</i> | X | X | | | Nat |
| Fabaceae | <i>Tephrosia capensis</i> | X | X | LC | | |
| Poaceae | <i>Themeda triandra</i> | X | X | LC | | |
| Santalaceae | <i>Thesium cf. goetzeanum</i> | | X | LC | | |
| Asphodelaceae | <i>Trachyandra asperata</i> | | X | LC | | |
| Asphodelaceae | <i>Trachyandra erythrorrhiza</i> | X | | LC | NT | |
| Asphodelaceae | <i>Trachyandra saltii var. saltii</i> | X | X | LC | | |
| Asphodelaceae | <i>Trachyandra sp.</i> | | X | | | |
| Asteraceae | <i>Tragopogon dubius</i> | | X | | | Nat |
| Poaceae | <i>Tragus berteronianus</i> | X | X | LC | | |
| Zygophyllaceae | <i>Tribulus terrestris</i> | | X | LC | | |
| Fabaceae | <i>Trifolium cf. africanum</i> | | X | | | |
| Fabaceae | <i>Trifolium pratense</i> | | X | | | Nat |
| Poaceae | <i>Tristachya biseriata</i> | | X | LC | | |
| Poaceae | <i>Tristachya leucothrix</i> | X | | LC | | |
| Alliaceae | <i>Tulbaghia acutiloba</i> | X | X | LC | | |
| Alliaceae | <i>Tulbaghia leucantha</i> | X | | LC | | |
| Convolvulaceae | <i>Turbina oblongata</i> | | X | LC | | |
| Typhaceae | <i>Typha capensis</i> | | X | LC | | |
| Poaceae | <i>Urochloa panicoides</i> | | X | LC | | |
| Fabaceae | <i>Vachellia karroo</i> | | X | LC | | |
| Verbenaceae | <i>Verbena bonariensis</i> | | X | | | 1b |
| Verbenaceae | <i>Verbena brasiliensis</i> | | X | | | 1b |
| Verbenaceae | <i>Verbena rigida</i> | | X | | | Nat |
| Asteraceae | <i>Vernonia glabra</i> | | X | LC | | |
| Plantaginaceae | <i>Veronica anagallis-aquatica</i> | | X | LC | | |
| Fabaceae | <i>Vigna vexillata</i> | | X | LC | | |
| Campanulaceae | <i>Wahlenbergia sp.</i> | | X | LC | | |
| Asteraceae | <i>Xanthium spinosum</i> | | X | | Sch 13 | 1b |
| Apocynaceae | <i>Xysmalobium undulatum</i> | | X | LC | | |
| Rhamnaceae | <i>Ziziphus zeyheriana</i> | | X | LC | | |

APPENDIX C

FAUNA CHECKLISTS (ADU DATABASE)

¹ADU Database = Animal Demography Unit, University of Cape Town²Landowners reporting³Current survey⁴IUCN red list category⁵MNCA (1998) Schedules⁶MBSP = Mpumalanga Biodiversity Sector Plan redlist⁷NEMBA (ToPS) - Threatened or Protected Species⁸CITES = Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES 2020)

Mammals

| Family | Scientific name | Common name | ADU ¹ | Mukondeleli ² | Current survey ³ | IUCN ⁴ | MNCA ⁵ 1998 | MBSP ⁶ 2629CB | ToPS ⁷ | CITES ⁸ |
|-----------------|--|--|------------------|--------------------------|-----------------------------|-------------------|------------------------|--------------------------|-------------------|--------------------|
| Bathyergidae | <i>Cryptomys hottentotus</i> | Southern African Mole-rat | x | | | LC | | | | |
| Bathyergidae | <i>Cryptomys hottentotus pretoriae</i> | Highveld mole-rat | x | | | NE | | | | |
| Bovidae | <i>Antidorcas marsupialis</i> | Springbok | x | X | X | LC | Sch 3 | Sch 3 LC | | |
| Bovidae | <i>Connochaetes gnou</i> | Black Wildebeest | x | X | X | LC | Sch 2 | Sch 2 LC | Prot | |
| Bovidae | <i>Connochaetes taurinus</i> | Blue Wildebeest | x | | | LC | Sch 3 | | | |
| Bovidae | <i>Damaliscus pygargus phillipsi</i> | Blesbok | x | X | X | LC | Sch 3 | Sch 3 LC | | |
| Bovidae | <i>Oryx gazella</i> | Gemsbok | x | | | LC | Sch 3 | | | |
| Bovidae | <i>Ourebia ourebi</i> | Oribi | x | | | EN | Sch 2 | | EN | |
| Bovidae | <i>Raphicerus campestris</i> | Steenbok | x | X | X | LC | Sch 2 | | | |
| Bovidae | <i>Taurotragus oryx</i> | Cape Eland | x | | | LC | Sch 2 | | | |
| Bovidae | <i>Alcelaphus buselaphus</i> | Red hartebeest | x | X | X | LC | Sch 3 | Sch 3 LC | | |
| Bovidae | <i>Kobus ellipsiprymnus</i> | Waterbuck | x | | | LC | Sch 2 | Sch 2 LC | | |
| Canidae | <i>Canis mesomelas</i> | Black-backed Jackal | x | X | X | LC | Sch 8 | | | |
| Canidae | <i>Vulpes chama</i> | Cape Fox | x | | | LC | Sch 5 | | Prot | |
| Canidae | <i>Panthera pardus</i> | Leopard | x | | | VU | X Sch 4 | Sch 4 VU | VU | App I |
| Chrysochloridae | <i>Amblysomus septentrionalis</i> | Highveld Golden Mole | x | | | NT | | | | |
| Equidae | <i>Equus quagga</i> | Plains Zebra | x | | | LC | Sch 3 | Sch 3 LC | | |
| Erinaceidae | <i>Atelerix frontalis</i> | Southern African Hedgehog | x | X | X | NT | Sch 2 | | Prot | |
| Felidae | <i>Caracal caracal</i> | Caracal | x | | | LC | Sch 8 | | | App II |
| Felidae | <i>Felis catus</i> | Domestic Cat | x | X | X | Introd | | | | |
| Felidae | <i>Felis nigripes</i> | Black-footed Cat | x | | | VU | | | Prot | App I |
| Felidae | <i>Felis silvestris</i> | African Wildcat | x | | | LC | Sch 5 | | | |
| Felidae | <i>Leptailurus serval</i> | Serval | x | X | X | NT | Sch 5 | | Prot | App II |
| Herpestidae | <i>Cynictis penicillata</i> | Yellow Mongoose | x | X | X | LC | Sch 5 | | | |
| Herpestidae | <i>Herpestes ichneumon</i> | Egyptian Mongoose | x | X | | LC | Sch 5 | | | |
| Herpestidae | <i>Herpestes sanguineus</i> | Slender Mongoose | x | X | X | LC | Sch 5 | | | |
| Herpestidae | <i>Ichneumia albicauda</i> | White-tailed Mongoose | x | | | LC | Sch 5 | | | |
| Herpestidae | <i>Suricata suricatta</i> | Meerkat | x | X | X | LC | Sch 5 | | | |
| Hystriidae | <i>Hystrix africaeaustralis</i> | Cape Porcupine | x | X | X | LC | | | | |
| Leporidae | <i>Lepus capensis</i> | Cape Hare | x | | | LC | Sch 3 | | | |
| Leporidae | <i>Lepus saxatilis</i> | Scrub Hare | x | X | X | LC | Sch 3 | | | |
| Muridae | <i>Gerbilliscus brantsii</i> | Highveld Gerbil | x | X | X | LC | | | | |
| Muridae | <i>Mastomys natalensis</i> | Natal Mastomys | x | | | LC | | | | |
| Muridae | <i>Mus (Nannomys) minutoides</i> | Southern African Pygmy Mouse | x | | | LC | | | | |
| Muridae | <i>Mus musculus musculus</i> | House mouse | x | X | X | LC | | | | |
| Muridae | <i>Otomys angoniensis</i> | Angoni Vlei Rat | x | | | LC | | | | |
| Muridae | <i>Otomys auratus</i> | Southern African Vlei Rat (Grassland type) | x | | | NT | | | | |

| | | | | | | | | |
|-------------------|--------------------------------------|---------------------------------------|---|---|---|-----------|-------|--------------------|
| Muridae | <i>Rattus rattus</i> | Roof Rat | x | X | X | LC | | |
| Muridae | <i>Rhabdomys pumilio</i> | Xeric Four-striped Grass Rat | x | X | X | LC | | |
| Mustelidae | <i>Aonyx capensis</i> | African Clawless Otter | x | | | NT | Sch 2 | Prot App II |
| Mustelidae | <i>Ictonyx striatus</i> | Striped Polecat | x | X | X | LC | | |
| Mustelidae | <i>Poecilogale albinucha</i> | African Striped Weasel | x | | | NT | | NT |
| Nesomyidae | <i>Dendromus melanotis</i> | Gray African Climbing Mouse | x | | | LC | | |
| Nesomyidae | <i>Dendromus mystacalis</i> | Chestnut African Climbing Mouse | x | | | LC | | |
| Pedetidae | <i>Pedetes capensis</i> | South African Spring Hare | x | | | LC | Sch 5 | |
| Sciuridae | <i>Xerus inauris</i> | South African Ground Squirrel | x | X | X | LC | | |
| Soricidae | <i>Crociodura mariquensis</i> | Swamp Musk Shrew | x | | | NT | | |
| Suidae | <i>Phacochoerus africanus</i> | Warthog | x | | | LC | Sch 5 | |
| Vespertilionidae | <i>Neoromicia capensis</i> | Cape Serotine | x | | | LC | | |
| Viverridae | <i>Civettictis civetta</i> | African Civet | x | X | X | LC | Sch 5 | |
| Viverridae | <i>Genetta genetta</i> | Common Genet | x | X | X | LC | Sch 5 | |
| Viverridae | <i>Genetta tigrina</i> | Cape Genet (Cape Large-spotted Genet) | x | | | LC | Sch 5 | |

Reptiles

| Family | Scientific name | Common name | Red list | MNCA 1998 | Mpu Redlist 2629CB | ToPS | CITES |
|-------------------|--|-------------------------------|-----------|-----------|--------------------------|-----------|----------|
| Agamidae | <i>Agama aculeata distanti</i> | Distant's Ground Agama | LC | Sch 2 | LC | | |
| Agamidae | <i>Agama atra</i> | Southern Rock Agama | LC | Sch 2 | | | |
| Chamaeleonidae | <i>Bradypodion ventrale</i> | Eastern Cape Dwarf Chameleon | LC | Sch 2 | | | |
| Colubridae | <i>Crotaphopeltis hotamboeia</i> | Red-lipped Snake | LC | Sch 5 | LC | | |
| Colubridae | <i>Dasypeltis scabra</i> | Rhombic Egg-eater | LC | Sch 5 | | | |
| Cordylidae | <i>Chamaesaura aenea</i> | Coppery Grass Lizard | NT | Sch 2 | | | |
| Cordylidae | <i>Cordylus vittifer</i> | Common Girdled Lizard | LC | Sch 2 | | | X |
| Cordylidae | <i>Pseudocordylus melanotus melanotus</i> | Common Crag Lizard | LC | Sch 2 | | | |
| Cordylidae | <i>Smaug giganteus</i> | Giant Girdled Lizard | VU | Sch 2 | | EN | X |
| Elapidae | <i>Hemachatus haemachatus</i> | Rinkhals | LC | Sch 5 | LC (on site Mukondeleli) | | |
| Gekkonidae | <i>Pachydactylus capensis</i> | Cape Gecko | LC | Sch 2 | | | |
| Gekkonidae | <i>Pachydactylus vansonii</i> | Van Son's Gecko | LC | Sch 2 | | | |
| Gerrhosauridae | <i>Gerrhosaurus flavigularis</i> | Yellow-throated Plated Lizard | LC | Sch 2 | | | |
| Lamprophiidae | <i>Amplorhinus multimaculatus</i> | Many-spotted Snake | LC | Sch 5 | | | |
| Lamprophiidae | <i>Aparallactus capensis</i> | Black-headed Centipede-eater | LC | Sch 5 | | | |
| Lamprophiidae | <i>Duberria lutrix lutrix</i> | South African Slug-eater | LC | Sch 5 | | | |
| Lamprophiidae | <i>Homoroselaps lacteus</i> | Spotted Harlequin Snake | LC | Sch 5 | | | |
| Lamprophiidae | <i>Lamprophis aurora</i> | Aurora House Snake | LC | Sch 5 | | | |
| Lamprophiidae | <i>Lycodonomorphus rufulus</i> | Brown Water Snake | LC | Sch 5 | | | |
| Lamprophiidae | <i>Psammophis crucifer</i> | Cross-marked Grass Snake | LC | Sch 5 | | | |
| Lamprophiidae | <i>Psammophylax rhombeatus</i> | Spotted Grass Snake | LC | Sch 5 | | | |
| Lamprophiidae | <i>Psammophylax tritaeniatus</i> | Striped Grass Snake | LC | Sch 5 | | | |
| Leptotyphlopidae | <i>Leptotyphlops scutifrons conjunctus</i> | Eastern Thread Snake | | Sch 5 | LC | | |
| Leptotyphlopidae | <i>Leptotyphlops scutifrons scutifrons</i> | Peters' Thread Snake | | Sch 5 | LC | | |
| Leptotyphlopidae | <i>Leptotyphlops incognitus</i> | Incognito Worm Snake | | Sch 5 | LC | | |
| Scincidae | <i>Acontias gracilicauda</i> | Thin-tailed Legless Skink | LC | Sch 2 | | | |
| Scincidae | <i>Panaspis wahlbergii</i> | Wahlberg's Snake-eyed Skink | LC | Sch 2 | | | |
| Scincidae | <i>Trachylepis capensis</i> | Cape Skink | LC | Sch 2 | | | |
| Scincidae | <i>Trachylepis punctatissima</i> | Speckled Rock Skink | LC | Sch 2 | X | | |
| Scincidae | <i>Trachylepis varia sensu lato</i> | Common Variable Skink Complex | LC | Sch 2 | X | | |
| Typhlopidae | <i>Afrotyphlops bibronii</i> | Bibron's Blind Snake | LC | Sch 5 | LC | | |
| Varanidae | <i>Varanus niloticus</i> | Water Monitor | LC | Sch 5 | LC | | |

Frogs

| Family | Scientific name | Common name | Red list | MNCA (1998) | Mpu Redlist 2629CB | ToPS | CITES |
|-------------------|------------------------------------|------------------------|----------|-------------|-----------------------|------|-------|
| Bufonidae | <i>Poyntonophrynus vertebralis</i> | Southern Pygmy Toad | LC | | | | |
| Bufonidae | <i>Sclerophrys capensis</i> | Raucous Toad | LC | | LC | | |
| Bufonidae | <i>Sclerophrys gutturalis</i> | Guttural Toad | LC | | LC | | |
| Bufonidae | <i>Sclerophrys pusilla</i> | Flatbacked Toad | LC | | | | |
| Hyperoliidae | <i>Kassina senegalensis</i> | Bubbling Kassina | LC | | LC | | |
| Hyperoliidae | <i>Semnodactylus wealii</i> | Rattling Frog | LC | | LC | | |
| Phrynobatrachidae | <i>Phrynobatrachus natalensis</i> | Snoring Puddle Frog | LC | | | | |
| Pipidae | <i>Xenopus laevis</i> | Common Platanna | LC | | LC | | |
| Pyxicephalidae | <i>Amietia delalandii</i> | Delalande's River Frog | LC | | | | |
| Pyxicephalidae | <i>Amietia fuscigula</i> | Cape River Frog | LC | | LC | | |
| Pyxicephalidae | <i>Cacosternum boettgeri</i> | Common Caco | LC | | LC | | |
| Pyxicephalidae | <i>Strongylopus fasciatus</i> | Striped Stream Frog | LC | | | | |
| Pyxicephalidae | <i>Tomopterna cryptotis</i> | Tremelo Sand Frog | LC | | LC | | |
| Pyxicephalidae | <i>Tomopterna natalensis</i> | Natal Sand Frog | LC | | LC | | |

Lepidoptera

| Family | Scientific name | Common name | Red list |
|-------------|---|---------------------------|----------|
| HESPERIIDAE | <i>Afrogegenes letterstedti</i> | Brown dodger | LC |
| HESPERIIDAE | <i>Andronymus neander neander</i> | Nomad dart | LC |
| HESPERIIDAE | <i>Eretis umbra umbra</i> | Small marbled elf | LC |
| HESPERIIDAE | <i>Kedestes barberae barberae</i> | Freckled ranger | LC |
| HESPERIIDAE | <i>Metisella meninx</i> | Marsh sylph | LC |
| HESPERIIDAE | <i>Spialia asterodia</i> | Star sandman | LC |
| HESPERIIDAE | <i>Spialia ferax</i> | Striped sandman | LC |
| HESPERIIDAE | <i>Spialia mafa mafa</i> | Mafa sandman | LC |
| HESPERIIDAE | <i>Spialia spio</i> | Mountain sandman | LC |
| HESPERIIDAE | <i>Tsitana tsita</i> | Dismal sylph | LC |
| LYCAENIDAE | <i>Actizera lucida</i> | Rayed blue | LC |
| LYCAENIDAE | <i>Aloeides aranda</i> | Yellow russet | LC |
| LYCAENIDAE | <i>Aloeides dentatis maseruna</i> | Maluti toothed russet | LC |
| LYCAENIDAE | <i>Aloeides henningi</i> | Hillside russet | LC |
| LYCAENIDAE | <i>Aloeides molomo molomo</i> | Mottled russet | LC |
| LYCAENIDAE | <i>Aloeides trimeni trimeni</i> | Brown russet | LC |
| LYCAENIDAE | <i>Azonus jesous</i> | Topaz babul blue | LC |
| LYCAENIDAE | <i>Azonus ubaldus</i> | Velvet-spotted babul blue | LC |
| LYCAENIDAE | <i>Cacyreus marshalli</i> | Common geranium bronze | LC |
| LYCAENIDAE | <i>Chilades trochylus</i> | Grass jewel blue | LC |
| LYCAENIDAE | <i>Chrysoritis aureus</i> | Golden opal | EN |
| LYCAENIDAE | <i>Chrysoritis chrysaor</i> | Burnished opal | LC |
| LYCAENIDAE | <i>Chrysoritis lycegenes</i> | Mooi river opal | LC |
| LYCAENIDAE | <i>Cigaritis mozambica</i> | Mozambique silverline | LC |
| LYCAENIDAE | <i>Cupidopsis cissus cissus</i> | Meadow blue | LC |
| LYCAENIDAE | <i>Eicochrysops messapus mahallakoena</i> | Cupreous ash blue | LC |
| LYCAENIDAE | <i>Lampides boeticus</i> | Pea blue | LC |
| LYCAENIDAE | <i>Lepidochrysops ketsi ketsi</i> | Ketsi giant cupid | LC |
| LYCAENIDAE | <i>Lepidochrysops letsea</i> | Free State giant cupid | LC |
| LYCAENIDAE | <i>Lepidochrysops patricia</i> | Patrician giant cupid | LC |
| LYCAENIDAE | <i>Lepidochrysops variabilis</i> | Variable giant cupid | LC |
| LYCAENIDAE | <i>Leptomyrina henningi henningi</i> | Plain black-eye | LC |
| LYCAENIDAE | <i>Leptotes pirthous pirthous</i> | Common zebra blue | LC |
| LYCAENIDAE | <i>Lycaena clarki</i> | Eastern sorrel copper | LC |

| | | | |
|--------------|---|-----------------------------|------------|
| LYCAENIDAE | <i>Orachrysops lacrimosa</i> | Restless cupid | LC |
| LYCAENIDAE | <i>Tarucus sybaris sybaris</i> | Dotted pierrot | LC |
| LYCAENIDAE | <i>Thestor basutus basutus</i> | Basuto skolly | LC |
| LYCAENIDAE | <i>Zizeeria knysna knysna</i> | African grass blue | LC |
| LYCAENIDAE | <i>Zizula hylax</i> | Tiny grass blue | LC |
| NYMPHALIDAE | <i>Acraea horta</i> | Garden acraea | LC |
| NYMPHALIDAE | <i>Acraea neobule neobule</i> | Wandering donkey acraea | LC |
| NYMPHALIDAE | <i>Aeropetes tulbaghia</i> | Table mountain beauty | LC |
| NYMPHALIDAE | <i>Byblia lithyia</i> | Spotted joker | LC |
| NYMPHALIDAE | <i>Catacroptera cloanthe cloanthe</i> | Pirate | LC |
| NYMPHALIDAE | <i>Danaus chrysippus orientis</i> | African plain tiger | LC |
| NYMPHALIDAE | <i>Hypolimnas misippus</i> | Common diadem | LC |
| NYMPHALIDAE | <i>Junonia hierta cebrene</i> | Yellow pansy | LC |
| NYMPHALIDAE | <i>Junonia oenone oenone</i> | Dark blue pansy | LC |
| NYMPHALIDAE | <i>Junonia orithya madagascariensis</i> | African blue pansy | LC |
| NYMPHALIDAE | <i>Precis archesia archesia</i> | Garden inspector | LC |
| NYMPHALIDAE | <i>Stygionympha wichgrafi wichgrafi</i> | Wichgraf's hillside brown | LC |
| NYMPHALIDAE | <i>Telchinia rahira rahira</i> | Marsh telchinia | LC |
| NYMPHALIDAE | <i>Vanessa cardui</i> | Painted lady | LC |
| PAPILIONIDAE | <i>Papilio demodocus demodocus</i> | Citrus swallowtail | LC |
| PIERIDAE | <i>Belenois aurota</i> | Pioneer caper white | LC |
| PIERIDAE | <i>Catopsilia florella</i> | African migrant | LC |
| PIERIDAE | <i>Colias electo electo</i> | African clouded yellow | LC |
| PIERIDAE | <i>Eurema brigitta brigitta</i> | Broad-bordered grass yellow | LC |
| PIERIDAE | <i>Pontia helice helice</i> | Southern meadow white | LC |
| SPHINGIDAE | <i>Basiothia medea</i> | | Not listed |

Spiders

| Family | Scientific name | Common name | Red list | MNCA 1998 | ToPS |
|---------------|-----------------------------|------------------|----------|-----------|------|
| Sparassidae | FAMILY Sparassidae | Huntsman spiders | | | |
| Theraphosidae | <i>Brachionopus sp.</i> | | | | |
| Theraphosidae | <i>Harpactira hamiltoni</i> | Baboon spider | | Sch 7 | Prot |

Scorpion

| Family | Scientific name | Common name | Red list | MNCA 1998 | ToPS |
|----------|--------------------------------|--------------------------------------|----------|-----------|------|
| BUTHIDAE | <i>Uroplectes triangulifer</i> | Highveld Lesser-Thickettail scorpion | LC | | |

APPENDIX D

SITE SENSITIVITY VERIFICATION

Prior to commencing with the Terrestrial Biodiversity Specialist Assessment in accordance with the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (Government Notice 320, dated 20 March 2020), a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

The details of the site sensitivity verification are noted below:

| | |
|---|---|
| Date of site visit | January 2021 and December 2021 |
| Specialist name | Dr Noel van Rooyen; Prof. Gretel van Rooyen |
| Professional registration number | 401430/83 Botanical Science (NvR); 400509/14 Ecological Science (GvR) |
| Specialist affiliation / company | Ekotrust cc |

The site sensitivity verification was undertaken using the following means:

- desk top analysis using satellite imagery;
- consulting geological, land type and vegetation type maps of the region;
- consulting provincial datasets on the latest versions of the mapping of CBAs, ESAs, ONAs, NPAES and PAs;
- checking distribution ranges of IUCN red-listed species and species highlighted by the screening tool;
- compiling plant and animal species checklist for the region; and
- on-site inspection.

To verify the site sensitivity of the screening tool, Google satellite images were studied beforehand and the site stratified into relatively homogenous physiographic-physionomic units or habitats. Sites were then selected to represent these habitats. During the field survey, 34 sampling sites were surveyed at the proposed Mukondeleli development. However, a further 46 sample plots were surveyed on the Vhuvhili and Impumelelo sites in the vicinity and the total of 80 sample plots were used to improve the identification and description of habitat types in the area.

Animal Species Theme

Screening tool: The screening tool rated the sensitivity of the Animal Species Theme as high and listed the following species as being SCC.

| Sensitivity | Feature(s) |
|--------------------|----------------------------------|
| High & Medium | Aves-Circus ranivorus |
| High & Medium | Aves-Sagittarius serpentarius |
| Medium | Insecta-Lepidochrysops procera |
| Medium | Mammalia-Crocidura maquassiensis |

Site verification:

- **Note - the avifaunal and bat components will be addressed by the avifaunal and bat specialists.**
- *Lepidochrysops procera* (Lepidoptera) was not listed in the ADU database, the MNCA (1998) provincial species lists or the NEMBA (2007c) ToPS lists for the region. *Lepidochrysops procera* was not recorded on site and is unlikely to occur there because its host plant (*Ocimum obovatum*) was also not present on site.

- The Maquassie Musk Shrew *Crocidura maquassiensis* was not listed in the ADU mammal species list or in the spatial data for the environs of Mukondeleli supplied by MTPA. It was not recorded on site during the survey. The Maquassie Musk Shrew depends on wetlands as suitable habitat in savanna and grasslands. Although it has a wide inferred extent of occurrence, it appears to be patchily distributed. *Crocidura maquassiensis* has not been reported from Mpumalanga Province post-1999 and thus there is a very low probability for it to occur on site.
- Although not listed by the screening tool, the giant girdled lizard (*Smaug giganteus*), a reptile with a Vulnerable IUCN status has been reported for Mukondeleli according to one of the landowners.
- Although not listed by the screening tool the serval (*Leptailurus serval*), Southern African hedgehog (*Atelerix frontalis*) and the Southern African vlei rat *Otomys auratus* are the Near Threatened species (*note this is not a threatened IUCN category*) that occur in the vicinity.

Based on the information provided above, we would rate the sensitivity of the Animal Theme as **Medium**.

Plant Species Theme

Screening tool: The screening tool rated the sensitivity of the Plant Species Theme as medium and provided the following list of plant SCC.

| Sensitivity | Feature(s) |
|-------------|-------------------------------|
| Medium | Sensitive species 1252 |
| Medium | Sensitive species 691 |
| Medium | <i>Pachycarpus suaveolens</i> |

Site verification: Our background study indicated that most of site had a **low** sensitivity. None of the SCC highlighted by the screening tool were recorded on site.

- Sensitive species 691 occurs in damp depressions in shallow soil over rock sheets. This type of habitat occurs on a small area on site, but the species was not encountered during the vegetation survey.
- The habitats on site do not present suitable habitat for sensitive species 1252 because of lack of wooded habitat.
- The third plant species of concern, *Pachycarpus suaveolens*, prefers grassland, but was not recorded during the site survey. It occurs in areas that are currently extensively transformed by urban development, crop cultivation, mining and invasive alien plants. Its distribution records show it to be more common northwards from the Secunda sites, e.g. in the Witbank- Carolina area.

Based on the information provided above, we would rate the sensitivity of the Plant Species Theme as **low**.

Relative Terrestrial Biodiversity Theme

Screening tool: The screening tool rated the sensitivity of the Relative Terrestrial Biodiversity theme as very high and listed the following features of concern:

| Sensitivity | Feature(s) |
|-------------|---|
| Very high | Critical Biodiversity Area 1 |
| Very high | Critical Biodiversity Area 2 |
| Very high | Ecological support area: landscape corridor |
| Very high | Ecological support area: local corridor |
| Very high | Vulnerable ecosystem |
| Very high | Protected Areas Expansion Strategy |

Site verification:

- This theme considers the presence of protected areas, National Protected Area Expansion Strategy (NPAES), CBAs, ESAs and National Freshwater Ecosystem Priority Area (FEPAs). Our background study concurred with the findings of the screening tool on the presence of these features, except for the inclusion in the NPAES (2010). It was also not included in the 5-year plan of the Mpumalanga PAES.
- Although the entire Mukondeleli site is contained in an Upstream Management Area as river FEPA, **the screening tool did not highlight the presence of any FEPAs**. Furthermore, the area mapped as river FEPA did not emerge as being highly sensitive in the current assessment and the sensitivity model that was applied, classified only the drainage lines as being of high sensitivity.
- **The recommendations of the aquatic specialist should be followed when observing buffers around drainage lines as well as for Mpumalange Highveld Wetlands.**

Outcome of the site sensitivity verification:

- We suggest that the Plant Theme's site sensitivity is changed to **Low**.
- We would suggest the Animal Theme's site sensitivity to be rated as **Medium**.
- Unfortunately, the screening tool limits the sensitivity of the Relative Terrestrial Biodiversity Theme to either Very High or Low. This is an issue which should be revisited by DFFE, since it does not give a proper representation of the site conditions. The entire site does not merit a high sensitivity, since a large proportion of the site is degraded and under cropland or abandoned cropland. Thus if the same 4-tiered scale were to be applied to this theme, as in the case of the other themes, we would rate it as **Low to Medium**.

APPENDIX E

COMPLIANCE WITH THE TERRESTRIAL
BIODIVERSITY PROTOCOL (GN 320, 20
MARCH 2020)

| Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity | Section where this has been addressed in the Specialist Report |
|--|---|
| <i>The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:</i> | |
| 2.3.1. <i>a description of the ecological drivers or processes of the system and how the proposed development will impact these;</i> | Chapters 9, Section 9.6; Chapter 17 |
| 2.3.2. <i>ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;</i> | Chapter 9, Section 9.6 |
| 2.3.3. <i>the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;</i> | Chapter 9, Sections 9.4 & 9.6 |
| 2.3.4. <i>the description of any significant terrestrial landscape features (including rare or important flora- faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments;</i> | Chapters 4 – 9 |
| 2.3.5. <i>a description of terrestrial biodiversity and ecosystems on the preferred site, including:</i> | (a) Chapter 5 |
| a) <i>main vegetation types;</i> | (b) Chapters 5 & 9 |
| b) <i>threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;</i> | (c) Chapters 5 & 9 |
| c) <i>ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and</i> | (d) Chapters 5 – 9; Appendix A, B & C |
| d) <i>species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;</i> | |
| 2.3.6. <i>the assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and</i> | Chapter 12, Appendix D |
| 2.3.7. <i>the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:</i> | (a) Chapter 9, Appendix D |
| 2.3.7.1. <i>terrestrial critical biodiversity areas (CBAs), including:</i> | (b) Chapter 9; Section 9.4 |
| a) <i>the reasons why an area has been identified as a CBA;</i> | (c) Chapter 12, 13 & 17 |
| b) <i>an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</i> | (d) Chapter 17 |
| c) <i>the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);</i> | (e) n.a. |
| d) <i>the impact on ecosystem threat status;</i> | (f) Chapters 12 & 13 |
| e) <i>the impact on explicit subtypes in the vegetation;</i> | (g) Chapters 12 & 13 |
| f) <i>the impact on overall species and ecosystem diversity of the site; and</i> | |
| g) <i>the impact on any changes to threat status of populations of species of conservation concern in the CBA;</i> | |
| 2.3.7.2. <i>terrestrial ecological support areas (ESAs), including:</i> | (a) Chapter 9 |
| a) <i>the impact on the ecological processes that operate within or across the site;</i> | (b) Chapter 9 |
| b) <i>the extent the proposed development will impact on the functionality of the ESA; and</i> | (c) Chapter 9 |
| c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i> | |
| 2.3.7.3. <i>protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-</i> | n.a. |
| a) <i>an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;</i> | |
| 2.3.7.4. <i>priority areas for protected area expansion, including-</i> | n.a. |

| Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity | Section where this has been addressed in the Specialist Report |
|---|---|
| a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network; | |
| 2.3.7.5. SWSAs including: a) the impact(s) on the terrestrial habitat of a SWSA; and b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses); | n.a. (Chapter 9 (section 9.8)) |
| 2.3.7.6. FEPA subcatchments, including- a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment; | Chapter 9; Section 9.5 |
| 2.3.7.7. indigenous forests, including: a) impact on the ecological integrity of the forest; and b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas. | n.a. |
| 3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information: | |
| 3.1.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; | Appendix G |
| 3.1.2. a signed statement of independence by the specialist; | p. viii |
| 3.1.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | Chapter 2 |
| 3.1.4. a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant; | Chapter 2 |
| 3.1.5. a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations; | p. xvii |
| 3.1.6. a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant); | Chapters 9, 10, 12, 13; Figures 15 – 18 Sensitivity.kmz file |
| 3.1.7. additional environmental impacts expected from the proposed development; | n.a. |
| 3.1.8. any direct, indirect and cumulative impacts of the proposed development; | Chapters 12 & 13 |
| 3.1.9. the degree to which impacts and risks can be mitigated; | Chapters 12 & 13 |
| 3.1.10. the degree to which the impacts and risks can be reversed; | Chapters 12 & 13 |
| 3.1.11. the degree to which the impacts and risks can cause loss of irreplaceable resources; | Chapters 12 & 13 |
| 3.1.12. proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr); | Chapter 15 |
| 3.1.13. a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate; | n.a. |
| 3.1.14. a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and | Chapter 17 |
| 3.1.15. any conditions to which this statement is subjected. | Chapter 17 |
| 3.2. The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr, where relevant. | For EAP to incorporate |
| 3.2.1. A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | For EAP to append |

APPENDIX F

Photographs of the Mukondeleli gridline

The photographs start at the terrain of the Mukondeleli alternative on-site substation (SS2) and follows the route towards the Sasol facility.



Mukondeleli alternative on-site substation (SS2) locality: farm Van Tondershoek



Alternative substation site on left



Photo taken southwards towards alternative substation location



Photo taken near preferred on-site substation (SS!) northwards towards Sasol: farm Bosjesspruit



Northwards towards the Sasol facility



Northwards towards the Sasol facility



Northwards towards the Sasol facility



Northwards towards the Sasol facility



Sasol facility

APPENDIX G

Curriculum vitae: DR NOEL VAN ROOYEN

1. Biographical information

| | |
|---------------------------|--|
| Surname | Van Rooyen |
| First names | Noel |
| ID number | 501225 5034 084 |
| Citizenship | South African |
| Business address | Ekotrust CC 7 St George Street Lionviham 7130 Somerset West South Africa |
| Mobile | 082 882 0886 |
| e-mail | noel@ekotrust.co.za |
| Current position | Member of Ekotrust cc |
| Professional registration | Botanical Scientist : Pr.Sci.Nat; Reg no. 401430/83 |

Academic qualifications include BSc (Agric), BSc (Honours), MSc (1978) and DSc degrees (1984) in Plant Ecology at the University of Pretoria, South Africa. Until 1999 I was Professor in Plant Ecology at the University of Pretoria and at present I am a member of Ekotrust cc.

2. Publications

I am the author/co-author of 128 peer reviewed research publications in national and international scientific journals and was supervisor or co-supervisor of 9 PhD and 33 MSc students. More than 350 projects were undertaken by Ekotrust cc as consultant over a period of more than 40 years.

Books

VAN ROOYEN, N. 2001. *Flowering plants of the Kalahari dunes*. Ekotrust CC, Pretoria. (In collaboration with H. Bezuidenhout & E. de Kock).

VAN ROOYEN, N. & VAN ROOYEN, M.W. 2019. *Flowering plants of the southern Kalahari*. Somerset West.

Author / co-author of various chapters on the Savanna and Grassland Biomes in:

LOW, B. & REBELO, A.R. 1996. *Vegetation types of South Africa, Lesotho and Swaziland*, Department of Environmental Affairs and Tourism, Pretoria.

KNOBEL, J. (Ed.) 1999, 2006. *The Magnificent Natural Heritage of South Africa*. (Chapters on the Kalahari and Lowveld).

VAN DER WALT, P.T. 2010. *Bushveld*. Briza, Pretoria. (Chapter on Sour Bushveld).

Contributed to chapters on vegetation, habitat evaluation and veld management in the book:

BOTHMA, J. du P. & DU TOIT, J.G. (Eds). 2016. *Game Ranch Management*. 5th edition. Van Schaik, Pretoria.

BOTHMA, J. du P. & DU TOIT, J.G. (Eds). 2021. *Wildplaasbestuur*. 5th edition. Van Schaik, Pretoria.

Co-editor of the book:

BOTHMA, J. du P. & VAN ROOYEN, N. (eds). 2005. *Intensive wildlife production in southern Africa*. Van Schaik, Pretoria.

3. Ekotruster CC: Core Services

Ekotruster CC specializes in vegetation surveys, classification and mapping, wildlife management, wildlife production and economic assessments, vegetation ecology, veld condition assessment, carrying capacity, biodiversity assessments, rare species assessments, carbon pool assessments and alien plant management.

4. Examples of projects previously undertaken

Numerous vegetation surveys and vegetation impact assessments for Baseline, Scoping and Environmental Impact Assessments (BAs & EIA's) were made both locally and internationally.

Numerous projects have been undertaken in game ranches and conservation areas covering aspects such as vegetation surveys, range condition assessments and wildlife management. Of note is the Kgalagadi Transfrontier Park; iSimangaliso Wetland Park, Ithala Game Reserve, Phinda Private Game Reserve, Mabula Game Reserve, Tswalu Kalahari Desert Reserve, Maremani Nature Reserve and Associate Private Nature Reserve (previously Timbavati, Klaserie & Umbabat Private Game Reserve).

Involvement in various research programmes: vegetation of the northern Kruger National Park, Savanna Ecosystem Project at Nylsvley, Limpopo; Kuiseb River Project (Namibia); Grassland Biome Project; Namaqualand and Kruger Park Rivers Ecosystem research programme.

5. Selected references of other projects done by Ekotruster CC

- VAN ROOYEN, N., THERON, G.K., BREDENKAMP, G.J., VAN ROOYEN, M.W., DEUTSCHLÄNDER, M. & STEYN, H.M. 1996. *Phytosociology, vegetation dynamics and conservation of the southern Kalahari*. Final report: Department of Environmental Affairs & Tourism, Pretoria.
- VAN ROOYEN, N. 1999 & 2017. The vegetation types, veld condition and game of Tswalu Kalahari Desert Reserve.
- VAN ROOYEN, N. 2000. Vegetation survey and mapping of the Kgalagadi Transfrontier Park. Peace Parks Foundation, Stellenbosch.
- VAN ROOYEN, N., VAN ROOYEN, M.W. & GROBLER, A. 2004. Habitat evaluation and stocking rates for wildlife and livestock - PAN TRUST Ranch, Ghanzi, Botswana.
- VAN ROOYEN, N. 2004. Vegetation and wildlife of the Greater St Lucia Wetland Park, KZN.
- VAN ROOYEN, N. & VAN ROOYEN, M.W. 2008. Vegetation classification, habitat evaluation and wildlife management of the proposed Royal Big Six Nsubane-Pongola Transfrontier Park, Swaziland. Ekotruster cc.
- VAN ROOYEN, N., VAN DER MERWE, H. & VAN ROOYEN, M.W. 2011. The vegetation of the NECSA Vaalputs site. Report to NECSA.
- VAN ROOYEN, N. & VAN ROOYEN, M.W. 2014. Ecological evaluation and wildlife management on Ndzalama Nature Reserve and adjacent farms, Gravelotte, Limpopo province.
- VAN ROOYEN, N. & VAN ROOYEN, M.W. 2016. Ecological evaluation of the farm Springbokoog in the Van Wyksvlei region of Northern Cape, including a habitat assessment for the introduction of black rhinoceros. Ekotruster.
- VAN ROOYEN, M.W. & VAN ROOYEN, N. & VAN DEN BERG, H. 2016. Kathu Bushveld study: Research offset for first development phase of Adams Solor Energy Facility. Project conducted for Department of Environment and Nature Conservation Northern Cape (DENC) and the Department of Agriculture, Forestry and Fisheries (DAFF).
- VAN ROOYEN, N. & VAN ROOYEN, M.W. 2018. Environmental screening study for the proposed essential oils and Moringa oil enterprise on Ferndale farm, Bathurst, Eastern Cape. Ekotruster cc, Somerset West.
- VAN ROOYEN, M.W., GAUGRIS, J.Y. & VAN ROOYEN, N. 2018. Dish Mountain gold project, Republic of Ethiopia: Natural resource use evaluation - baseline report. FFMES, Report to SRK Consulting.
- VAN ROOYEN, N. & VAN ROOYEN, M.W. 2018. Report on the terrestrial ecology (flora & fauna). Basic assessment report for the proposed development of the 325 MW Kudusberg Wind Energy Facility in the Northern and Western Cape. Ekotruster cc, Somerset West.
- VAN ROOYEN, N. & VAN ROOYEN, M.W. 2019. Proposed amendments to the Ishwati Emoyeni Wind Energy Facility (WEF) of Special Energy Project (PTY) LTD, a subsidiary of Windlab Systems (PTY) LTD. Ekotruster cc, Somerset West.

6. Selected peer-reviewed research publications

- VAN ROOYEN, N. 1978. A supplementary list of plant species for the Kruger National Park from the Pafuri area. *Koedoe* 21: 37 - 46.
- VAN ROOYEN, N., THERON, G.K. & GROBBELAAR, N. 1981. A floristic description and structural analysis of the plant communities of the Punda Milia - Pafuri - Wambiya area in the Kruger National Park, Republic of South Africa. 2. The sandveld communities. *Jl S. Afr. Bot.* 47: 405 - 449.
- VAN ROOYEN, N., THERON, G.K. & GROBBELAAR, N. 1986. The vegetation of the Roodeplaat Dam Nature Reserve. 4. Phenology and climate. *S. Afr. J. Bot.* 52: 159 - 166.
- VAN ROOYEN, N. 1989. Phenology and water relations of two savanna tree species. *S. Afr. J. Sci.* 85: 736 - 740.
- VAN ROOYEN, N., BREDEKAMP, G.J. & THERON, G.K. 1991. Kalahari vegetation: Veld condition trends and ecological status of species. *Koedoe* 34: 61 - 72.
- VAN ROOYEN, M.W., GROBBELAAR, N., THERON, G.K. & VAN ROOYEN, N. 1992. The ephemerals of Namaqualand: effect of germination date on development of three species. *J. Arid. Environ.* 22: 51 - 66.
- VAN ROOYEN, N., BREDEKAMP, G.J., THERON, G.K., BOTHMA, J. DU P. & LE RICHE, E.A.N. 1994. Vegetational gradients around artificial watering points in the Kalahari Gemsbok National Park. *J. Arid Environ.* 26: 349-361.
- STEYN, H.M., VAN ROOYEN, N., VAN ROOYEN, M.W. & THERON, G.K. 1996. The phenology of Namaqualand ephemeral species: the effect of sowing date. *J. Arid Environ.* 32: 407 - 420.
- JELTSCH, F., MILTON, S.J., DEAN, W.R.J. & VAN ROOYEN, N. 1997. Analyzing shrub encroachment in the southern Kalahari: a grid-based modelling approach. *Journal of Applied Ecology* 34 (6): 1497 - 1509.
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Curriculum vitae

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2. Books or book chapters

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