
Lomond Safari 88kV Powerline Project: North West Province

Terrestrial Fauna Assessment

February 2022



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Specialist Qualification & Declaration

Barbara Kasl (CV summary attached as Appendix A):

- Holds a PhD in Animal, Plant and Environmental Sciences from the University of the Witwatersrand;
- Is a registered SACNASP Professional Ecological and Environmental Scientist (Pr.Sci.Nat. Registration No.: 400257/09), with expertise in faunal ecology; and
- Has been actively involved in the environmental consultancy field for over 13 years.

I, Barbara Kasl, confirm that:

- I act as independent consultant and specialist in the field of ecology and environmental sciences;
- I have no vested interest in the project other than remuneration for work completed in terms of the Scope of Work;
- I have presented the information in this report in line with the requirements of the Animal Species and Terrestrial Biodiversity Protocols as required under the National Environmental Management Act (107/1998) (NEMA) as far as these are relevant to the specific Scope of Work;
- I have taken NEMA Principals into account as far as these are relevant to the Scope of Work; and
- Information presented is, to the best of my knowledge, accurate and correct within the restraints of stipulated limitations.

01-02-2022

Acronyms

ADU	Animal Demographic Unit
AI(S)	Alien Invasive (Species)
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Areas
EMP	Environmental Management Plan
ESA	Ecological Support Area
IUCN	International Union for Conservation of Nature
NEMA	National Environment Management Act, 1998 (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Area Expansion Strategy
PA	Protected Area
PES	Present Ecological State
QDGS	Quarter Degree Grid Square
RIVCON	River Condition
RL	Red-listed
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern (specifically listed in the SANBI's 2020 Species Guideline)
SEI	Site Ecological Importance
SWSA	Strategic Water Source Area
TOP(S)	Threatened or Protected (Species)
UNESCO	United Nations Educational, Scientific and Cultural Organization
VMUS	Virtual Museum

Executive Summary

General Introduction

The proposed Lomond-Safari 88kV powerline project lies on Portion 0 of the farm Weldaba 567 JQ, within the South African Nuclear Energy Corporation's (NECSA's) Pelindaba Complex off the R104, within the Madibeng Local Municipality (Bojanala District), North West Province.

The project involves the following:

- Construction of a 1x88kV overhead powerline of ± 2.3 km from Lomond MTS to Safari Rural substation. Steel structures will be utilised to build the HV powerline.
- Part of the 2x88kV underground oil-filled cables will be dismantled and sealed off.
- The Safari Rural substation will be refurbished by replacing old and redundant equipment.

The site is ranked as very high for terrestrial biodiversity triggered by the Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Focus Areas for National Protected Area Expansion Strategies (NPAES).

The site is rated as medium sensitivity for animal species, based on potential appropriate habitat for trigger SCCs and a habitat assessment is included for the potential SCCs. No additional detailed species-specific studies are deemed necessary in terms of this study.

A specialist avifauna report will be compiled in line with the relevant requirements and this report excludes all avifauna components.

Site Characterisation

The powerline route was assessed on the 8 December 2021 and the day was ideal for the fauna survey. Most of the area is fairly homogeneous hillside, rocky bushveld of varying degrees of density and also varying degrees of historical disturbance (generally focussed around existing infrastructure along the powerline route). The small stream traversed by the powerline provided some limited exposed surface water with emergent vegetation and marshy, vegetated edges.

Although disturbance was evident along most of the length of the powerline, the bushveld habitat has recovered and the bushveld and rocky bushveld species with distribution over the area cannot be excluded from occurring along the powerline route, although less disturbed habitat is present in the areas surrounding the Pelindaba Complex. It must be stressed that most of the larger species would be excluded from site (unless actively stocked) due to the fences around the Complex. Wetland and aquatic species will be more limited in the proposed powerline route, but small home-range species cannot be excluded where micro-habitat requirements are met within the limited wetland habitat in the area.

Animal Species

The following is relevant in terms of vertebrate fauna species:

- Of the listed vertebrate SCCs, the site has appropriate habitat for Sensitive Species 12 and the species is likely to utilise the general rocky bushveld habitat. The conspicuous species was not noted within the surveyed meander. The following can be stated regarding the species:
 - The status of the species: IUCN status is Vulnerable (2017) (criterion A – population reduction due to habitat loss).
 - No species were confirmed during the survey meander of the powerline route and no information can be provided on the local distribution, location, viability and population size of the SCC on site. The species is fairly conspicuous and should be easily noted if contractors and staff are vigilant and therefore the species can easily be spared any direct impact.
 - It is more likely that the reproductive populations are present in the surrounding areas. If the species does occur in the immediate area it means it can tolerate the disturbed nature of the current habitat and would be likely to do so into the future, and in the long term should persist in the area if present, if bush management around the powerline route is completed with the same vigilance.
 - The main threats to the species include habitat transformation and collection of species from the wild (trade and bushmeat). Bush clearing by fire is also considered a major threat to the species. Within the Pelindaba Complex the habitat has already been disturbed and the public-related threats should not be significant in the immediate area due to the strict access control to the site.
- In terms of other TOP species recorded in the greater area or with distribution over the area:
 - Rocky bushveld and bushveld species cannot be excluded from site, but less disturbed and more appropriate habitat for such species occurs outside the fenced off Pelindaba Complex.
 - Wetland and aquatic species would be very limited on site with any large home-range species unlikely to utilise the very limited aquatic habitat in the powerline route.
- The site is not within a significant area of faunal endemism.

In terms of invertebrates:

- *Clonia uvarovi* (bush cricket) (Orthoptera: Tettigoniidae) (IUCN Vulnerable) is a SCC for the area.
 - There is no reliable information on the species distribution range or habitat preferences and the species cannot be excluded from site. The site has been historically disturbed by various small developments and populations are more likely to occur in the less disturbed neighbouring areas. If the species has survived the historical impacts on site then it should persist in the area of the proposed powerline route into the future.
- Dung beetles are protected in the North West. They provide essential ecosystem services and impacts to these species would negatively impact the landscape into the long term. The species are relatively closely associated with on-site animal dung which should make the group of beetles fairly easy to manage in terms of impact mitigation.
- A TOP spider and TOP scorpions were recorded in the QDGS. Species are often associated with rockier habitats and cannot be excluded from the area, although the species should persist in the area after the powerlines have been erected.

Terrestrial Biodiversity

The only significant desktop features were the CBAs incorporating critical habitat patches, ecological corridors and nodes to ecological corridors. In terms of the powerline route specifically, the area does not directly fall into these CBA services as far as these may be relevant to the potential terrestrial fauna; the area may, at best, act as a buffer area to neighbouring critical habitats and ecological corridors and may have limited value as a node to the ecological corridor south of site. The buffer capacity of the area must be maintained to prevent edge impacts on nearby habitats and corridors and the site is therefore considered to have moderate sensitivity in terms of terrestrial fauna biodiversity features.

The establishment of the powerline will add to the historical disturbances already present along the powerline route and will alter the immediate habitat by trimming and maintaining the bushveld areas around the powerline but the area will continue to serve as a buffer and minor node if mitigation is applied.

Site Ecological Importance and Impact Statements

Overall site sensitivity is presented below.



The potentially moderately significant impacts assessed in this report include:

- Loss / alteration of habitat through clearance for pylon construction and vegetation management along a 10m buffer area during operations.
- Hampering or killing of fauna, particularly Sensitive Species 12 and provincially protected dung beetles.

- Contamination to land and downstream contamination and / or silt-loading through runoff from site.

Conclusion & recommendations

In terms of the findings if the following is implemented then there is no reason for not authorising the activity in terms of terrestrial fauna:

- Completing species-specific trapping is not likely to provide additional information that would alter these findings, and the cautionary approach is likely to be relevant regardless. Considering the type of activity proposed and the current existing anthropogenic impact on site, no additional species-specific trapping is recommended.
- The managing body of the The Cradle of Humankind World Heritage Site Protected Area must be consulted and any recommendation regarding activities within the PA's buffer zones, as stipulated in the PA's EMP, adhered to.
- Recommendations of the flora and aquatic biodiversity specialist must be implemented on site.
- The mitigation measures stipulated in the impact tables and Section 6 of this report must be included within the environmental management plan report and implemented on site.
- The monitoring plan in Section 6 of this report must be included within the environmental management plan report and implemented on site.

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1. Introduction & Desktop Setting

The proposed Lomond-Safari 88kV powerline project lies on Portion 0 of the farm Weldaba 567 JQ, within the South African Nuclear Energy Corporation's (NECSA's) Pelindaba Complex off the R104, within the Madibeng Local Municipality (Bojanala District), North West Province.

The project involves the following:

- Construction of a 1x88kV chickadee powerline of ± 2.3 km from Lomond MTS to Safari Rural substation. Steel structures will be utilised to build the HV powerline.
- Part of the 2x88kV underground oil-filled cables will be dismantled and sealed off.
- The Safari Rural substation will be refurbished by replacing old and redundant equipment.

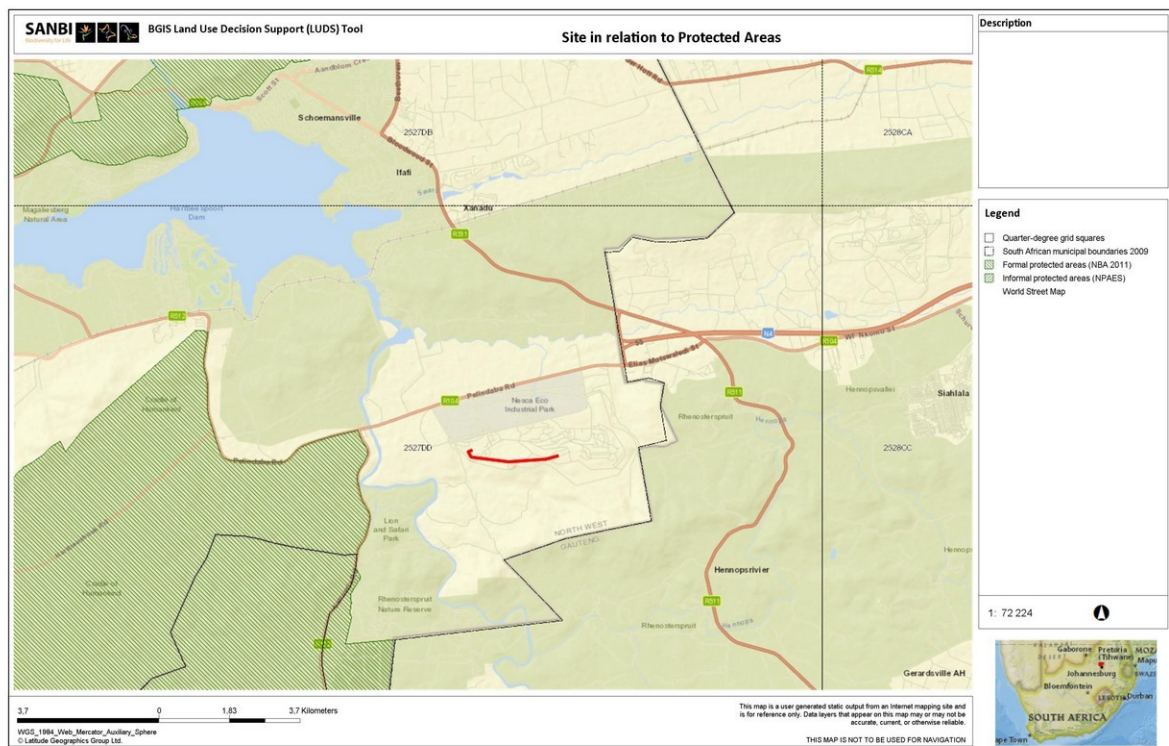
The term site, as used in this report, refers to the general bushveld areas between the Lomond and Safari Rural substations and within the Pelindaba Complex. The powerline route / area is stated when referring specifically to the powerline and potential activity area (approximately 50m buffer) around the powerline. Plan 1 indicates the proposed powerline within the Pelindaba Complex. Table 1 provides a summary of desktop ecological features relevant to the site.

Table 1: Ecologically significant features relevant to the site ("as-crow-flies" distances indicated)

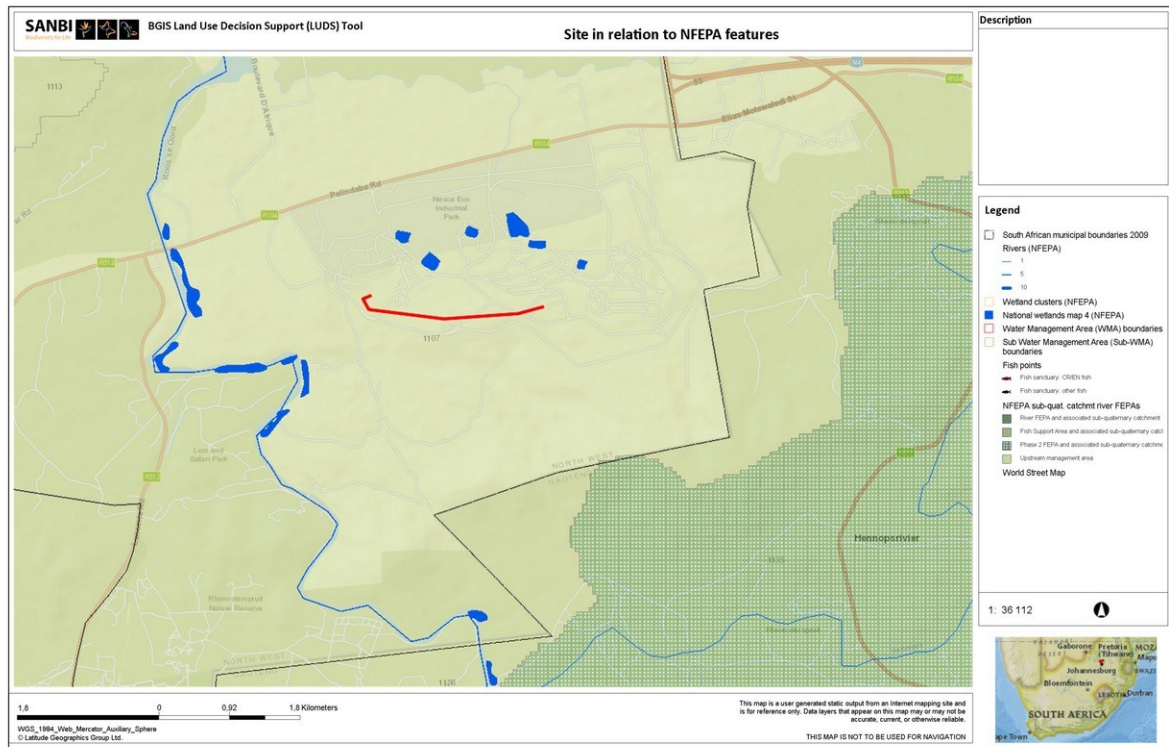
Ecological area	Description of feature relevant to the site
International Conservation	The Cradle of Humankind World Heritage Site (and Protected Area) is approximately 2.5km south-west of site. No RAMSAR wetlands occur within 50km of the site. The site is outside the Magaliesberg Biosphere.
Protected Areas (PA) (Plan 2)	Only the World Heritage Site is within 10km of site. The Magaliesberg Protected Natural Environment (Formal Protected Area) lies >10km north of the proposed powerline project. National Protected Area Expansion Strategy (NPAES) targeting conservation of Vaal Grasslands occur <600m south of the powerline.
National Freshwater Ecology Priority Areas (NFEPAs) (Plan 3)	The site is within an Upstream NFEPa water management sub-catchment. The Moderately modified (PES C) Crocodile River is the nearest NFEPa River, just over 1km west of the powerline. No Rank 1 or 2 NFEPa wetlands occur on or near site.
SWSAs	The Westrand Karst Belt groundwater resource lies approximately 2.5km south of site and the Eastern Karst Belt groundwater resource lies approximately 5.5km east of site.
Biome and Ecosystem	The site falls within the Gauteng Shale Mountain Bushveld vegetation unit to the north (the Savanna Biome) and the Carletonville Dolomite Grassland vegetation unit to the south (the Grassland Biome). Neither is listed as a TOP ecosystem (NEM:BA, GN1002, 2011).
North West Conservation Plan (Plan 4)	The bulk of the site is within CBA2 (Critical Corridor Linkages; Corridor Nodes), linked to CBA1 (Critical Patches, Kloofs). One small tributary is traversed by the powerline and is designated as an Aquatic ESA1. No other significant aquatic areas have been designated along the length of the powerline.
Quarter Degree Grid Square (QDGS)	The site falls within QDGS 2527DD. All desktop data obtained from the citizen science sites have been sourced for this QDGS.



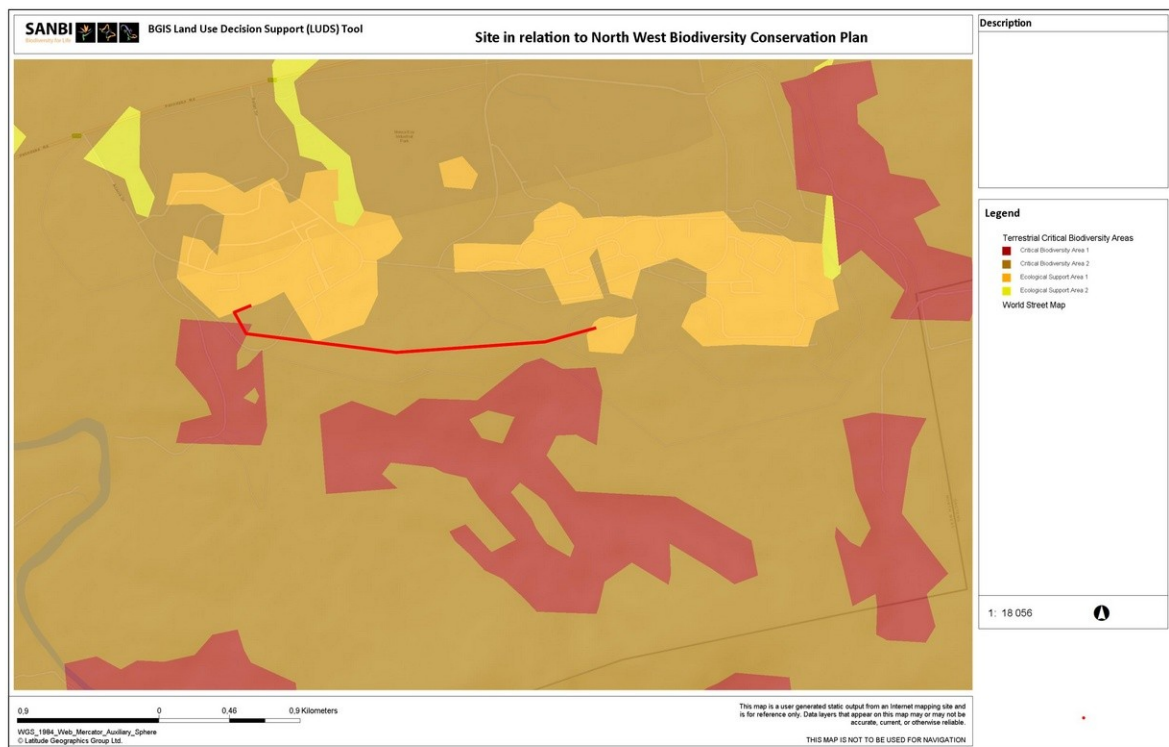
Plan 1: Google Earth satellite imagery (September 2021) of the proposed powerline and substations



Plan 2: Powerline in relation to Protected Areas (SANBI, BGIS Map Viewers)



Plan 3: Powerline in relation to National Freshwater Priority Area Features (SANBI, BGIS Map Viewers)



Plan 4: Powerline and the provincial terrestrial biodiversity conservation plan (SANBI, BGIS Map Viewers)

1.1 Scope of Work

The site is ranked as very high for terrestrial biodiversity triggered by the Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Focus Areas for Protected Area Expansion Strategies, discussed in Table 1.

The site is rated as medium sensitivity for animal species, based on potential appropriate habitat for trigger SCCs (2 mammal, 1 invertebrate and 1 Sensitive Species 12). A habitat assessment is included for the potential SCCs, as well as detailed discussion on the SCCs likely to occur on site as relevant.

A specialist avifauna report will be compiled in line with the relevant requirements and this report includes only the mammals, reptiles, frogs and a synopsis of TOP invertebrates.

As per NEMA EIA Regulations (GNR982, 2017) and the requirements of the EIA Screening Tool Protocols for the Assessment and Reporting of Environmental Themes (GN320 & GN1150 of 2020), the following is relevant regarding the scope of work considering the site status:

- Assess and comment on the significance of the terrestrial fauna habitat components and current general conservation status of the property in terms of SANBI BGIS data (Table 1).
- Comment on the likelihood of threatened or protected (TOP) fauna occurring on site.
- Discuss important ecological drivers, processes and services as may be relevant.
- Address site sensitivity based on site survey findings in relation to regional ecological setting.
- Complete an impact statement and an impact assessment for any potentially significant impacts.
- Provide management recommendations to mitigate negative impacts of the activities on terrestrial fauna.

1.2 Relevant Legislation

Several Acts govern the environment and development in relation to the environment within South Africa. In terms of this study the following are relevant:

- The National Environment Management Act, 1998 (Act No. 107 of 1998); and
- The National Environmental Management Biodiversity Act, 2004. (Act 10 of 2004) (NEM:BA).

NEM:BA and its regulations are of particular importance in terms of the fauna and flora ecosystems. The principal regulations considered within this report are:

- The National Environmental Management: Biodiversity Act (10/2004): Threatened or Protected Species Regulations. General Notice 152 of the 23/02/2007;
- The National Environmental Management: Biodiversity Act (10/2004): Publication of lists of species that are threatened or protected, activities that are prohibited and exemption from restriction. General Notice 151 of the 23/02/2007;
- The National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Lists. General Notice 1003 of 18 September 2020; and
- National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations. General Notice Regulation 1020 of 18 September 2020.

The North West Biodiversity Management Act, Act No. 4 of 2016 was used for the list of protected species. The species were previously protected under the relevant Northern Cape, Transvaal and Boputhatswana Nature Conservation Ordinances, all very out-dated and impossible to work with considering updated species nomenclature and associated habitats and distribution. As the activity / development does not intend any specific scheduled activities involving animals the provincially protected species are not discussed further in detail in the report. Should any animal need to be trapped, handled or transported in any way then the Act must be consulted and adhered to as relevant.

2. Methodology

2.1 Desktop Ecological Status

The desktop assessment utilised predominantly SANBI BGIS data as detailed above, accompanied by Google Earth satellite imagery.

2.2 TOP Species Desktop Lists

A high level Threatened and Protected (TOP) species assessment was undertaken and incorporated the listed trigger SCCs from the Environmental Screening Tool. The term TOP species (TOPS) was coined in terms of the threatened and protected species lists published under NEM:BA's General Notice 151 of 2007 (GN151, 2007). In this report TOPS also includes threatened (Vulnerable, Endangered, Critically Endangered) Red-listed and IUCN (IUCNredlist.org) species (Near Threatened species are not included, but status is indicated where species is included as TOPS under other listings). Distribution and general information as presented in this report were sourced for:

- Mammals [sourced from Child, *et al.* (2016) as presented in the mammal Red-list on SANBI.org.za, and the Endangered Wildlife Trust Red-listed mammal fact sheets on ewt.org.za/reddata; supplemented by Stuart and Stuart (2013), Stuart and Stuart (2015), Murray (2011), Monadjem *et al.* (2010a) and Monadjem *et al.* (2010b)].
- Birds [Taylor *et al.* (2015); supplemented by Chittenden *et al.* (2016), Sinclair *et al.* (2011) and the Roberts Multimedia Android Application].
- Reptiles [Bates, *et al.* (2014). Although an Atlas Project and not strictly a Red-listed species book, provides recent taxonomic names and more recent listings to the prior outdated Red-Data Book of 1988. Reptile information was supplemented by Tolley and Burger (2012)].
- Frogs [sourced from Minter, *et al.* (2004) as presented in the frog Red-lists on FrogMap.adu.org.za and supplemented by du Preez and Carruthers (2009)].
- Invertebrates [also supplemented by Picker *et al.* (2012), Woodhall (2005) and SANBI Biodiversity Advisor Animal Checklists for ants, millipedes, Orthoptera and scarabs]:
 - Butterflies [Mecenero *et al.* (2013) as obtained from the South African Butterfly Conservation Association lists].
 - Dragonflies (Samways & Simaika, 2016).
 - Spiders (Dippenaar-Schoeman *et al.*, 2010).

- Scorpions (Leeming, 2019).

Endemic species for mammals, birds, reptiles and frogs (supplemented by information on iNaturalist.org) were also indicated where relevant. Variation between sources on endemic species (just South Africa or South Africa, Lesotho and Swaziland) is not seen as critical in terms of this report.

In order to determine recent TOP fauna diversity data, various citizen science sites were consulted:

- Mammal, amphibian, reptile and available invertebrate species lists for the QDGS over the last 10 year period from the Virtual Museum of the Animal Demographic Unit (VMUS.ADU.org).
- Bird lists for the pentad (5° x 5° grid square) were obtained from the South African Bird Atlas Project (SABAP2.org).
- Furthermore, iNaturalist (iNaturalist.org) was also consulted for presence of potential TOP species.

Exotic and / or Alien Invasive (AI) Species (AIS) recorded in the area as per the citizen science sites are also discussed where relevant.

2.3 Site Assessment

The powerline route was followed as far as possible. Main habitats, micro-habitats, fauna and signs of fauna were noted along the powerline transect.

2.4 Likelihood of TOP Species

For the desktop TOP species, a probability assessment to determine the likelihood of species occurring on site was completed. The probability assessment should be seen as a ranking system rather than an absolute and is designed to reduce subjectivity of results. Likelihood of occurrence was generally assessed as follows:

- Likely: Distribution of the species occurs over the site; the site and immediate surrounds provide habitat, roosting and food requirements of the specific species. There is nothing to prevent the species from residing on site for a length of time (season or year).
- Possible: Distribution of the species occurs over the sites but the specific habitat or roosting requirements are absent or sparse on site, but are present in the greater surrounds. Species are not likely to reside on site, but may forage over or traverse the site. Species population is at low density over site.
- Unlikely: Distribution is on the edge of or just outside the site and habitat, roosting and/or food requirements are absent or sparse on the site and surrounds. Species population is at low density and erratic over site. No recent records occur in the area.

2.5 Biodiversity Characterisation and Fauna Sensitivity Mapping

Comment and discussion is provided on the important ecological features, including ecological drivers, processes and services where these are relevant to terrestrial fauna. The site sensitivity in

terms of fauna biodiversity is discussed in relation to the ecological features identified during the assessment.

The site ecological importance (SEI) in terms of fauna SCCs is mapped as per the requirements of the Animal Species Environmental Assessment Guideline (SANBI, 2020). The assessment criteria and matrices are detailed in Table 2, Table 3 and Table 4. SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g. species of conservation concern or the fauna community) and Receptor Resilience (RR) defined as the intrinsic capacity of the receptor to resist major damage from disturbance and / or to recover to its original state with limited or no human intervention (**SEI = BI + RR**). BI is a function of Conservation Importance (CI) (evaluated in accordance with recognised criteria as detailed in Table 2) and the Functional Integrity (FI) of the receptor (e.g. the fauna community or habitat type) defined as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions (**BI = CI + FI**).

Table 2: Criteria for assessing CI, FI and RR

	Conservation Importance	Functional Integrity	Receptor Resilience
Very high	Species confirmed / likely AND restricted (< 10 km ²) CR, EN, VU or Extremely / Critically Rare. Globally significant populations of congregatory species (>10% of global population).	Very large (>100 ha) intact natural area. High connectivity and functional ecological corridors. No / minimal ecological impact with no signs of major past disturbance (e.g. ploughing).	Species very likely to remain during impact / return after impact ceases.
High	Confirmed / likely CR, EN, VU listed under criterion (B-E; if A then only if at <10 locations or <10 000 adults). Globally significant populations of congregatory species (1% - <10% of global population).	Large (20 – 100ha) intact natural area. Good connectivity with potentially functional ecological corridors. Minor ecological impacts (e.g. few livestock) with no signs of major past disturbance (e.g. ploughing); good rehabilitation potential.	Species highly likely to remain during impact / return after impact ceases.
Medium	Confirmed or highly likely NT species. Presence of range-restricted species. More than 50 % contains natural habitat for species of conservation concern (SCC).	Medium (5 – 20ha) semi-intact natural area. Narrow corridors of good connectivity / larger areas of poor connectivity. Minor ecological impacts; some major impacts (e.g. AIS) and signs of minor past disturbance; moderate rehabilitation potential.	Species moderately likely to remain during impact / return after impact ceases.
Low	No confirmed or highly likely SCC or range-restricted species. Less than 50 % contains natural habitat with limited potential to support SCC.	Small (1 – 5ha) area. Almost no connectivity but migration still possible across transformed / degraded habitat; very busy surrounds. Several minor and major ecological impacts. Low rehabilitation potential.	Low likelihood of species remaining during the impact / returning after impact ceases.
Very low	No confirmed and highly unlikely SCC or range-restricted species. No natural habitat remaining.	Very small (<1 ha) area. No connectivity except for flying species. Several major current ecological impacts.	Species unlikely to remain during the impact / return once impact ceases.

Table 3: Matrix for determining BI

Biodiversity Importance		CI				
		Very High	High	Medium	Low	Very Low
FI	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 4: Matrix for determining SEI

SEI (Mitigation)		BI				
		Very High	High	Medium	Low	Very Low
RR	Very Low	Very High (Avoid)	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)
	Low	Very High (Avoid)	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Very Low (Minimise)
	Medium	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)
	High	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)	Very Low (Minimise)
	Very High	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)	Very Low (Minimise)	Very Low (Minimise)

The SEI ranks are utilised to generate the fauna sensitivity plan. This plan must be considered along with the floral sensitivity map to obtain an overall species sensitivity plan. In addition, the SEI ranks will inform mitigation as follows:

- Very High – Avoidance mitigation: No destructive development activities should be considered. Offset mitigation not acceptable / not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems / unique species assemblages. Destructive impacts for species / ecosystems where persistence target remains.
- High – Avoidance mitigation wherever possible and Minimization mitigation: Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
- Medium – Minimization and restoration mitigation: Development activities of medium impact acceptable followed by appropriate restoration activities.
- Low – Minimization and restoration mitigation: Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Very Low – Minimization mitigation: Development activities of medium to high impact acceptable and restoration activities may not be required.

2.6 Fauna Impact Assessment

Impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development / activity plan. This does not mean that the impact will occur at the predicted significance.

The impact assessment methodology used is based on NEMA requirements [Appendix 3 of the Environmental Impact Assessment (EIA Regulations)] and is presented under the impact assessment section. The following has been included:

- Impact assessment in terms of the activities / development on terrestrial fauna biodiversity and species, including discussion on cumulative and residual impacts where relevant.
- Presentation of mitigation measures for identified impacts. The mitigation actions considered the following:
 - **STOP**: These are activities that cannot continue until the necessary additional authorisations / legal requirements are obtained / met or the necessary operating procedures are compiled. Also includes activities that are considered fatal flaws where stipulated as such. These **MUST** be implemented.
 - **MODIFY**: These are development / activity aspects that must be considered for alteration or modification in order to reduce the impact on fauna.
 - **CONTROL**: These are mitigation actions that must be implemented to reduce the overall impact significance on fauna.

2.7 Limitations

Specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the report is accurate at high certainty levels, but there exists a low probability that some aspects have not been identified / captured during the studies. Such situations cannot be avoided simply due to the nature of field work.

Habitat units identified in this report are approximations extrapolated from Google Earth satellite imagery. It must be kept in mind that changes between habitat units are gradual with transitional zones rather than hard edges.

Sections of the powerline were impenetrable and the bushveld vegetation was dense providing limited access. Habitat units were fairly homogeneous across site and this is not considered an issue.

The SEI assessment proposed in SANBI's guideline (SANBI, 2020) must be understood in terms of the activity (it is not a stand-alone assessment):

- Not all the necessary information is available for all SCCs (particularly invertebrates) to adequately complete SEI methodology as per the guideline requirements.
- SEI has been developed to assess discrete habitat units and is difficult to apply to generalist fauna that may utilise more than one specific habitat unit or large home-range or migrant species.

- Unfortunately the SEI assessment requires a post-impact assessment (requires an activity to take place within the area in order to obtain the ecological importance of the area) which means that the ecological importance of an area varies depending on the type of activity and the level or density of activity that takes place in the specified area. It is not a baseline rank assessment of the site, which would be more useful in terms of impact assessment.
- Due to the above, the ecological importance of a site that will not be directly or indirectly impacted (where receptor resilience is very high) can only attain SEI scores of very low, low or medium, regardless of the habitat type (for example areas of endemism, streams and rivers, ridges).
- Due to the fact that the SEI is activity-dependent, a sensitive habitat that is spared direct and indirect impact is likely to score a lower SEI than a general/slightly disturbed habitat that will be fully and permanently developed.
- **All persons reading this report must understand that the SEI rank in no way relates to the preference of the site for development (lower SEI ranks do not mean the site is preferred for development) and only goes to inform the level of mitigation and management required in respect of the specific activity being assessed.**

The animal species guidelines (SANBI, 2020) requires assessment of potential areas of influence. Although visual assessment is completed of neighbouring open space areas, this reports does explore larger areas of influence where relevant (for example downstream and catchment level impacts to potential fauna habitats and ecological corridors, or the migration / dispersion pathways of animals from conservation areas). Working with various fauna means the area of influence varies, but the discussion within this report is deemed to more than adequately address the areas of potential influence, although they are not necessarily mapped.

The Animal Species Guidelines (SANBI, 2020) only requires the assessment of SCCs (largely IUCN species), which excludes many of our nationally protected and Red-listed species. This report therefore also includes a synopsis of other potential TOP species that may be relevant to site based on citizen science databases, distribution data and broader habitat requirements.

It must be stressed that the survey area is a much smaller area within the larger QDGS and Pentad areas utilised for desktop species, and species presented in these databases may not have been recorded at the specific site.

Larger herbivores have not been fully evaluated within this report as these species are actively fenced in and managed within selected areas. Where they are historically recorded TOP species they are included in the relevant tables, but are not further discussed at length. This is further extended to large carnivore predators of such species (e.g. Lion and Cheetah). Rhinos and elephants are completely excluded due to sensitivity of information. As these species are largely restricted to reserves and farms this is not seen as a significant omission.

Some species are confirmed through signs rather than actual sightings. This is not always ideal as the age of the signs are not always known and many species have similar scat / tracks / marks on the environment and species cannot always be fully determined. The more signs the more confidence in the identification of the animal. This limitation must be kept in mind where species are discussed based on signs.

There are inherent errors in mapping programmes which must be considered with all mapping information presented.

Citizen Science projects were used for bird (SABAP2) and animal (ADU) baseline data. When utilising data from Citizen Science projects, the following must be kept in mind:

- Public interest in sites may be fickle, and may wane and increase, which could have a direct effect on the number of records available and therefore the number of species recorded.
- Populated areas or popular tourist destinations may have more participants and therefore higher biodiversity data than less populated areas.
- Misidentification of species by the public cannot be excluded, but is not seen as a major problem as this is likely to be a consistent issue from year to year, and a degree of vetting does take place.
- It must also be considered that animals observed in captivity may be recorded by citizens. Such animals should not be considered part of the natural biodiversity but as the data provided by citizen science sites do not make such distinctions, it cannot be separated from the biodiversity data presented in this report.

SANBI's Biodiversity Advisor Animal Checklist website stipulates specifically that the Checklist author and the SANBI website must be cited in order to ensure that the intellectual input of scientists is acknowledged. The checklists are utilised solely for distribution information for invertebrate SCCs and TOP invertebrates and thus only the web-site and name of the list is referenced. The site can be visited for the specific authors of the species discussed in this report as may be relevant.

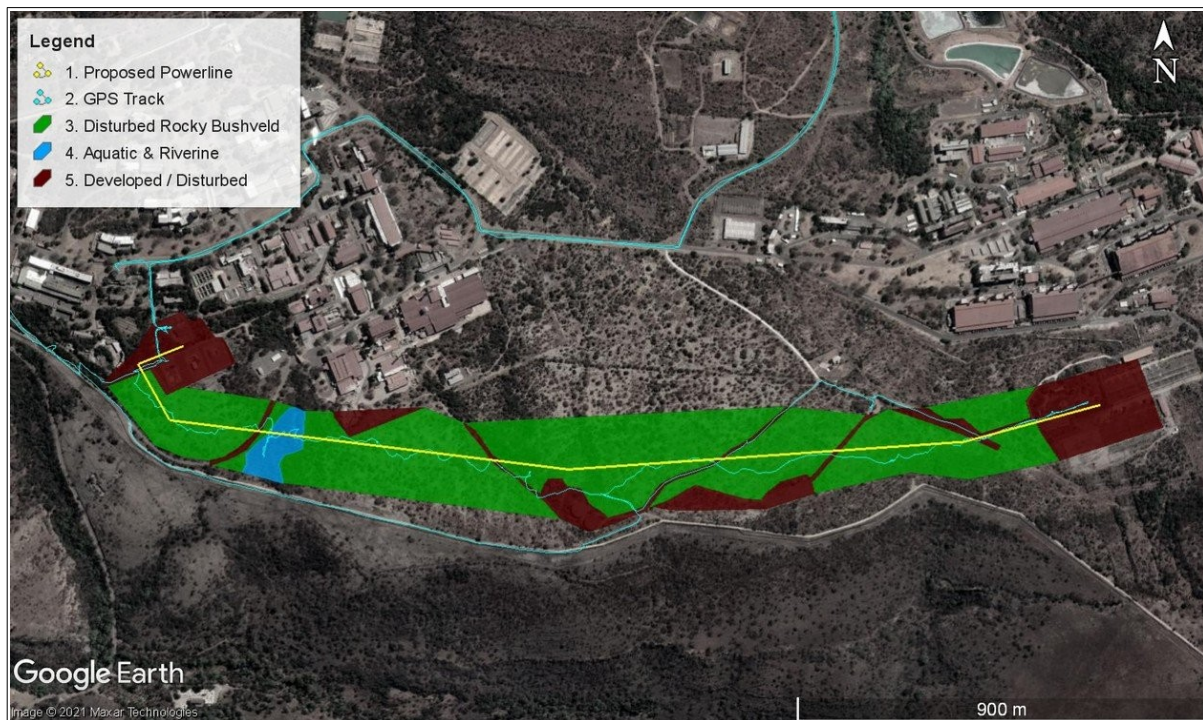
Due to the low resolution of some distribution maps and the mobility of animals, distribution data utilised to present animal lists are not 100% accurate. Proper distribution data for the TOP invertebrates is scant and it is difficult to conclusively state if every species does or does not occur in the area.

3. Results

From Table 1 the only significant desktop features were the CBAs incorporating critical habitat patches, ecological corridors and nodes to ecological corridors. The length of the proposed powerline has been historically disturbed and cannot be considered a critical habitat patch, although rocky bushveld habitat persists. The more significant ecological corridors in the area are associated with the cliffs and ridges just south of site and the Olifants River west of site. The area is connected (barring fences) to the natural areas surrounding the Pelindaba Complex, but serves more as a buffer to these areas.




The powerline route was assessed on the 8 December 2021, following good summer rainfalls. The weather was warm and sunny with cloudy cover towards noon and ideal for the fauna survey. Table 5 provides a description of the main discernible habitat features noted along the route (Plan 5). The area is fairly homogeneous hillside, rocky bushveld of varying degrees of density and also varying degrees of historical disturbance (generally focussed around existing infrastructure on site). The Aquatic ESA is a small stream which provided some limited exposed surface water with emergent vegetation and marshy, vegetated edges.

Although disturbance was evident along most of the length of the powerline, the bushveld habitat has recovered and the bushveld and rocky bushveld species with distribution over the area cannot be excluded from occurring along the powerline route, although less disturbed habitat is present in the areas surrounding the Pelindaba Complex. It must be stressed that most of the larger species would be excluded from site (unless deliberately stocked) due to the fences established around the Pelindaba Complex. However, in terms of distribution and habitat, it means that most of the ADU species historically recorded in the QDGS cannot be excluded from occurring in the area (depending on the game stocking and management on site; see limitations). Most TOP and endemic species with distribution over the area also cannot be excluded from powerline route for the same reasons. Wetland and aquatic species will be more limited in the proposed powerline route, but small home-range species cannot be excluded if micro-habitat requirements are met within the limited wetland habitat in the area.



Plan 5: Google Earth satellite image (September 2021) and on-site habitat units (Table 5)

Table 5: Site habitat characterisation

Habitat Unit	Description & Discussion
 <p data-bbox="175 813 536 875">Open (top) and Dense (bottom) Disturbed Rocky Bushveld</p>	<p data-bbox="644 315 1417 551">The bulk of the site is open, rocky bushveld, with sections of denser bushveld. Basal cover was generally sparse over the shale covered slopes, but areas with denser grass cover occurred in scattered patches along the route. Little burrowing activity was noted, which is to be expected in the predominantly shale and rock-dominated landscape. Scattered termite mounds were noted along the powerline route.</p>
 <p data-bbox="175 1126 579 1189">Aquatic habitat with fringe wetland and riverine habitat</p>	<p data-bbox="644 887 1417 1016">The small Aquatic ESA supplied the only open water and associated fringe wetland and riverine habitat along the powerline route. The wetland provided some muddy banks with emergent vegetation and was well-sheltered by tall, dense, arboreal habitat.</p>
 <p data-bbox="175 1442 504 1473">Disturbed / Developed areas</p>	<p data-bbox="644 1202 1417 1368">Disturbed / Developed areas were largely devoid of natural habitat. Such areas provide limited habitat, refuge and forage areas for fauna and would only be utilised by more generalist species adapted to man-made / man-modified habitats and accustomed to anthropogenic activity and impact.</p>

The complete desktop vertebrate fauna list, as extracted from the various citizen science sites, is included in Appendix B. The TOP and endemic species extracted from this list are further discussed below. Each faunal vertebrate group discusses, as relevant, the SCCs, other TOP species and endemic species focussing on species that are highly likely to occur on site for extended periods and therefore most likely to be exposed to the development and potential impacts. Invertebrates are discussed more generally.

To prevent the disclosure of detailed information of Sensitive Species 12 to the general public (of particular concern are species threatened by various trades), the sensitive species are labelled as per the environmental screening report and the full names are only disclosed in the confidential Appendix C which must not be disclosed to the public.

3.1 Mammals

In terms of the ADU list and historical species (Appendix B), the following is relevant:

- Unidentified species on the ADU list have not been included in this report.
- Species names are indicated as per the latest mammal Red-Lists (Child *et al.*, 2016).
- *Mastomys natalensis* is included to represent the ADU *Mastomys* sp.
- *Rhabdomys dilectus* replaces the ADU *Rhabdomys pumilio* which does not occur in the area.
- *Genetta maculata* replaces the ADU *Genetta tigrina* which does not occur in the area.

3.1.1 Site Species

The site is extensively utilised by antelope as evidenced by scat and tracks. Some small mammal activity was also noted on site (limited burrows and feeding digs). None of the species considered confirmed are SCCs or TOP species. One Near-Threatened species and two endemic species are considered confirmed on site (Table 6).

3.1.2 Historical & Likely TOP & Endemic Species

The previously recorded TOP and endemic mammals for the relevant QDGS and general surrounding area and those with distributions across the area are indicated in Table 6.

The Environmental Screening Report lists two mammal SCCs. The Maquassie Musk Shrew and Robert's Marsh Rat are both wetland habitat species and are considered as unlikely / possible species on site as the site is on the edge of the distribution range for the species, their preferred mesic habitats are disturbed, very limited and not well connected within the powerline route and no recent records for the species occur in the QDGS.

As stated none of the bushveld and rocky habitat ADU species or species with distribution squarely over the area can be excluded from site, unless they are deliberately excluded (by fencing or game management) or they are dependent on specific aquatic or wetland habitats.

The provincially protected species have not been discussed as the activity does not intend any scheduled activities targeted at fauna, but as the province lists several bat species, a synopsis is provided in terms of these small mammals. In terms of site findings, bats that roost within bushveld trees are most likely to occur on site; these tend to be more common species (not TOP species) that will easily retreat from site if disturbed to neighbouring, less disturbed bushveld habitat. Bats that roost amid boulders and crevices are likely to forage on site as some rocky hills in the greater area provide some roosts for such species. No known caves occur in the immediate area but do occur in greater area and species utilising caves or caverns as roosts are unlikely to be roosting in the immediate area (roosts are unlikely to be disturbed) but are also likely to forage in the area. Bats are nocturnal and foraging habits should not be impacted by the activities on site.

None of the endemic mammals recorded or likely in the greater area are restricted and the area is not an area of mammal endemism.

3.1.3 Alien & Exotic Species

The Domestic Cat has been recorded for the QDGS and cannot be excluded from site.

3.1.4 Ecological Services

The various ecosystem services provided by the historically recorded species and likely TOP fauna are fairly typical and include:

- Regulator of prey and / or predator numbers.
- Significant prey-base for predators / raptors.
- Bulk grazers / browsers facilitate graze and browse for more selective feeders.
- Bulk / cumulative browsers aid in managing bush encroachment.
- Control of potential vermin, pests and AI species, including potential vectors for disease.
- Seed dispersal.
- Pollination.
- Eco-engineers Burrowers and diggers create micro-habitats that facilitates the existence of other vertebrate species, create traps for moisture, seeds and nutrients which create localised micro-habitats and source points of habitat regeneration. Create refugia for other species to escape fire.
- Scavengers cleans up carrion and contribute to nutrient recycling and also reduce health risks associated with carrion.
- Pioneer species are the first species to inhabit and utilise previously disturbed habitats, promoting nutrient turnover in soils and grasses and assisting in the restoration of habitats.

Table 6: TOP and Endemic Mammals (trigger SCCs as per the Environmental Screening Report indicated in bold)

Family	Common name	Scientific name	Endemism	GN151	Red-list	IUCN
Site species						
Cetartiodactyla	Blesbok (sighted)	<i>Damaliscus pygargus phillipsi</i>	Endemic			
Cetartiodactyla	Warthog, Common (sighted)	<i>Phacochoerus africanus</i>				
Cetartiodactyla	Duiker, Common (scat & tracks)	<i>Sylvicapra grimmia</i>				
Lagomorpha	Hare, Savanna (sighted – ID assumed)	<i>Lepus victoriae</i>				
Perissodactyla	Zebra, Plains (sighted)	<i>Equus quagga</i>				NT
Primata	Baboon, Chacma (scat)	<i>Papio ursinus</i>				
Rodentia	Mole-rat, Pretoria (soil mounds)	<i>Cryptomys pretoriae</i>	Endemic			
Rodentia	Porcupine, Cape (feeding signs)	<i>Hystrix africaeaustralis</i>				
TOP and Endemic Species historically recorded within the greater area / QDGS						
Carnivora	Serval	<i>Leptailurus serval</i>		PR	NT	
Carnivora	Wild Dog, African	<i>Lycaon Pictus</i>		EN	EN	EN
Carnivora	Honey Badger (Ratel)	<i>Mellivora capensis</i>		PR		
Carnivora	Leopard	<i>Panthera pardus</i>		VU	VU	VU
Carnivora	Hyaena, Brown	<i>Parahyaena brunnea</i>		PR	NT	NT
Cetartiodactyla	Wildebeest, Black	<i>Connochaetes gnou</i>	Endemic	PR		
Cetartiodactyla	Blesbok	<i>Damaliscus pygargus phillipsi</i>	Endemic			
Cetartiodactyla	Giraffe	<i>Giraffa camelopardalis giraffa</i>				VU
Cetartiodactyla	Antelope, Roan	<i>Hippotragus equinus</i>		VU	EN	
Cetartiodactyla	Antelope, Sable	<i>Hippotragus niger niger</i>			VU	
Cetartiodactyla	Reedbuck, Southern Mountain	<i>Redunca fulvorufula</i>			EN	EN
Chiroptera	Bat, Percival's Trident	<i>Clootis percivali</i>			EN	
Rodentia	Rat, Tete Veld	<i>Aethomys ineptus</i>	Possible Endemic			
Rodentia	Mole-rat, Common (African)	<i>Cryptomys hottentotus</i>	Endemic			
Likely TOP and Endemic species						
Carnivora	Cat, Black-footed	<i>Felis nigripes</i>		PR	VU	VU
Eulipotyphla	Hedgehog, Southern African	<i>Atelerix frontalis</i>		PR	NT	

Family	Common name	Scientific name	Endemism	GN151	Red-list	IUCN
Possible TOP and Endemic Species						
Eulipotyphla	Shrew, Forest	<i>Myosorex varius</i>	Endemic			
Rodentia	Rat, Robert's Marsh	<i>Dasymys robertsii</i>			VU	
Rodentia	Mouse (Rat), White-tailed	<i>Mystromys albicaudatus</i>			VU	VU
Unlikely TOP and Endemic Species						
Carnivora	Fox, Cape	<i>Vulpes chama</i>		PR		
Cetartiodactyla	Tsessebe	<i>Damaliscus lunatus lunatus</i>		EN	VU	
Cetartiodactyla	Hippopotamus	<i>Hippopotamus amphibius</i>				VU
Cetartiodactyla	Reedbuck, Southern	<i>Redunca arundinum</i>		PR		
Eulipotyphla	Shrew, Maquassie Musk	<i>Crocidura maquassiensis</i>			VU	
Pholidota	Pangolin	<i>Smutsia temminckii</i>		VU	VU	VU
AIS / Exotic Species recorded in the area						
Carnivora	Domestic Cat	<i>Felis catus</i>	Domesticated species			

CR: Critically Endangered; EN: Endangered; V: Vulnerable; PR: Protected; NT: Near Threatened

3.2 Herpetofauna

In terms of the ADU list (Appendix B) the following is relevant:

- Omitted species are excluded from this report.
- The species names used in this report are as per Bates *et al.* (2014) and du Preez and Carruthers (2009).
- *Leptotyphlops distanti*, *L. incognitus* and *L. scutifrons* all have distribution over the area of interest and are included in appendix B to represent the ADU *Leptotyphlops* sp.

3.2.1 Site Species

The rocky bushveld is likely to support several reptiles, but only the carcass of one Leopard Tortoise (*Stigmochelys pardalis*) was confirmed on site. No frogs are confirmed for site (Table 7), but frogs (most likely Cacos) were heard and activity noted around pools of water with emergent vegetation.

3.2.2 Historical & Likely TOP & Endemic Species

Previously recorded and likely TOP and endemic herpetofauna for the area are indicated in Table 7.

Only two TOP reptiles (one is the trigger SCC Sensitive Species 12) have distribution over site and both have been recorded in the QDGS in the last decade. The site has appropriate habitat for both and both are likely to occur in rocky bushveld areas. Neither of these two conspicuous species were noted by the author or other visiting ecologists to site.

One TOP frog was recorded in the QDGS, but appropriate habitat for the species was limited within the powerline route:

- Giant Bullfrog (*Pyxicephalus adspersus*) (GN151 Protected). Species is threatened by loss and degradation of its wetland and neighbouring terrestrial habitat through increased urbanisation and agricultural activity.

No other TOP reptiles or frogs are expected to occur on site.

No restricted endemics are likely on site and the area is not an area of herpetofauna endemism.

3.2.3 Alien & Exotic Species

No AIS or exotic species were identified from ADU lists or iNaturalist.

3.2.4 Ecological Services

Many of the herpetofauna species feed on arthropods and will cumulatively contribute to control of invertebrate numbers, including aquatic invertebrates that may be vectors for disease. Many reptiles and frogs are also food source to many birds and mammals, as well as other reptile species.

Table 7: TOP and Endemic Herpetofauna (trigger SCCs as per the Environmental Screening Report indicated in bold)

Family	Common name	Scientific name	Endemism	GN151	Red-list	IUCN
Site species						
Testudinidae	Tortoise, Leopard / Mountain	<i>Stigmochelys pardalis</i>				
TOP and Endemic Species historically recorded within the greater area / QDGS						
Sensitive Species	Sensitive Species 12	Sensitive Species 12				V
Gekkonidae	Gecko, Transvaal Thick-toed	<i>Pachydactylus affinis</i>	Endemic			
Pythonidae	Python, Southern African	<i>Python natalensis</i>		PR		
Bufoidea	Toad, Raucous	<i>Amietophrynus rangeri</i>	Endemic			
Pyxicephalidae	Bullfrog, Giant	<i>Pyxicephalus adspersus</i>		PR	NT	
Likely TOP and Endemic species						
Agamidae	Agama, Eastern Ground	<i>Agama aculeata distanti</i>	Endemic			
Colubridae	Snake, Western Natal Green	<i>Philothamnus natalensis occidentalis</i>	Endemic			
Possible TOP and Endemic Species						
Cordylidae	Lizard, Coppery Grass	<i>Chamaesaura aenea</i>	Endemic		NT	
Gekkonidae	Gecko, Spotted Dwarf	<i>Lygodactylus ocellatus ocellatus</i>	Endemic			
Lacertidae	Lizard, Delalande's Sandveld	<i>Nucras lalandii</i>	Endemic			
Lamprophiidae	Slug-eater, Common	<i>Duberria lutrix lutrix</i>	Endemic			
Lamprophiidae	Snake, Striped Harlequin	<i>Homoroselaps dorsalis</i>	Endemic		NT	
Lamprophiidae	Snake, Aurora House	<i>Lamprophis aurora</i>	Endemic			
Scincidae	Skink, Thin-tailed Legless	<i>Acontias gracilicauda</i>	Endemic			
Unlikely TOP and Endemic Species						
Cordylidae	Lizard, Cape Grass	<i>Chamaesaura anguina anguina</i>	Endemic			
Cordylidae	Lizard, Common Crag	<i>Pseudocordylus melanotus melanotus</i>	Endemic			
Lamprophiidae	Snake, Spotted Harlequin	<i>Homoroselaps lacteus</i>	Endemic			
Lamprophiidae	Snake, Olive Ground	<i>Lycodonormorphus inornatus</i>	Endemic			
Pyxicephalidae	Bullfrog, African	<i>Pyxicephalus edulis</i>		PR		

CR: Critically Endangered; EN: Endangered; V: Vulnerable; PR: Protected; NT: Near Threatened

3.3 Invertebrates

Clonia uvarovi (bush cricket) (Orthoptera: Tettigoniidae) (IUCN Vulnerable) is listed as a trigger species for the area.

- There is no information provided on the SANBI Species database on the species distribution range or habitat preferences so as to determine the likelihood of the species on site. According to the IUCN distribution data, the project area is just in the northern extent of the species main distribution range, and the species cannot be excluded from site.

The ADU listed no TOP butterflies, but the following provincially protected butterflies are confirmed for the QDGS:

- *Charaxes brutus natalensis* (Lepidoptera: Nymphalidae).
- *Charaxes jahlusa rex* (Lepidoptera: Nymphalidae).

The ADU listed no TOP dragonflies and none are expected on site.

The ADU listed three TOP scorpions in the QDGS (also provincially protected):

- *Hadogenes gunningi* (Scorpiones: Liochelidae) (GN151 Protected).
- *Opisththalmus glabrifrons* (Scorpiones: Scorpionidae) (GN151 Protected).
- *Opisththalmus pugnax* (Scorpiones: Scorpionidae) (GN151 Protected).

The ADU confirmed the following TOP spider (also provincially protected):

- *Harpactira hamiltoni* (Araneae: Theraphosidae) (GN151 Protected).

The North West Province lists all dung beetles as protected. Scarabs were very active in the area and not all species were captured for records. The ADU lists 8 species for the QDGS. As coprophages scarabs provide the essential ecosystem service of cleaning up dung and thereby contribute to nutrient recycling and reduce terrestrial eutrication and reduce health risks associated with dung accumulation.

A few invertebrate species that were noted, recorded and identified included:

- Unknown butterfly species (Lepidoptera: Crambidae).
- *Danaus chrysippus aegyptius* (Lepidoptera: Nymphalidae) (African Monarch).
- *Eurema brigitta brigitta* (Lepidoptera: Pieridae) (Broad-bordered Grass Yellow).
- Unknown preying mantis species (Mantodea: Thespidae).
- *Kepher* sp. (Coleoptera: Scarabaeidae) (Dung Beetle) (Provincially Protected) (Identification facilitated through iNaturalist).
- *Garreta wahlbergi* (Coleoptera: Scarabaeidae) (Dung Beetle) (Provincially Protected) (Identification facilitated through iNaturalist).
- *Anisorrhina algoensis* (Coleoptera: Scarabaeidae) (Epauletted Fruit Chafer) (Identification facilitated through iNaturalist).
- Darkling Beetle species (Coleoptera: Tenebrionidae) (Darkling Beetle).

4. Terrestrial Biodiversity and Fauna Species

This section must be read together with the floral and wetland sensitivity plan to ensure a comprehensive terrestrial fauna biodiversity sensitivity plan.

4.1 Terrestrial Biodiversity

Table 8 summarises the terrestrial fauna biodiversity findings as required under the terrestrial biodiversity protocol.

Table 8: Terrestrial fauna biodiversity features and preliminary impact statements

Aspect	Fauna findings
Ecological processes	<p>The main ecological process is the plant-based primary production of ‘food’ through photosynthesis, which also absorbs CO₂ and releases O₂ and forms the principal base of the food-chain in a terrestrial environment. Secondly, the associated contribution to the water cycle through evapotranspiration is also a significant ecological process provided by the plant life. Another important process is that of natural fires. As the natural fire cycles in South Africa’s grassland and savanna have already been impacted by humans, this is not evaluated further.</p> <p><u>Impact:</u> No impact will occur in terms of refurbishment of Safari Rural substation. In the pylon footprints these process will cease, but surrounding vegetation will be retained, albeit modified through vegetation maintenance around the powerline, and processes will continue. The loss in the isolated pylon areas s considered a negligible impact to ecological processes.</p>
Ecological drivers: climate change, AIS infestation & habitat changes.	<p>The site represents disturbed rocky bushveld habitat with limited wetland area. The area already supports AI species common and widespread in South Africa.</p> <p><u>Impact:</u> No impact will occur in terms of refurbishment of Safari Rural substation. Rocky habitat is considered as unique and sensitive habitat, but along the powerline route, the habitat has been historically impacted and is disturbed; with more natural and less disturbed habitats locally available to fauna. In the pylon footprints the habitat will be lost but the footprint is very limited in terms of the surrounding vegetation. The vegetation within the powerline route will be modified through vegetation maintenance around the powerline area (10m buffer either side at most). The development is not expected to significantly alter the AI species dynamics.</p>
Ecological services	<p>No special or critical ecological services provided by fauna were identified for the area and were largely related to the usual services provided by fauna (soil enrichment through burrowing, invertebrate control, prey-base in food chain, pest control, pollination and seed dispersal). One ecological service, the clearance of dung and the recycling of nutrients from dung offered by the dung beetles is specifically mentioned as the species are provincially protected.</p> <p><u>Impact:</u> Services will cease in the immediate construction footprint but will continue in the surrounds and impact and is not considered highly significant. In terms of the dung beetles specifically, impact is only expected in terms of the various proposed activities (substation, pylons and powerline), largely associated with the movement of people and machinery in the area intersecting dung beetle populations and must be managed on site.</p>
Ecological Corridors	<p>The site is, at best, a buffer to the existing ecological corridor south of site and has limited value in terms of mass movement of terrestrial fauna.</p> <p><u>Impact:</u></p>

Aspect	Fauna findings
	The establishment of the powerline will add additional disturbance to the already disturbed bushveld habitat. The area should, however, continue to serve in its current capacity as a buffer, as the vegetation will be largely retained within the powerline route, although modified through vegetation maintenance. No significant impact is expected in terms of ecological connectivity or ecological corridors.
CBA's & ESAs	The entire powerline route and substations are within terrestrial CBAs (Critical Corridor Linkages; Corridor Nodes, Critical Patches and Kloofs) and the powerline route also traverses an aquatic ESA. <u>Impact:</u> No impact will occur in terms of refurbishment of Safari Rural substation. As stipulated above, the site has some buffer function, but is not considered a critical ecological corridor. The main habitat unit within the powerline route is already disturbed (is not considered a critical habitat patch), and although some additional disturbance will take place (pylon construction and long-term vegetation maintenance), the impact is not expected to significantly impair the area as habitat to existing fauna or as a buffer to existing ecological corridors. The aquatic ESA may be impacted through contaminated / silt-loaded runoff from the nearby pylon construction sites immediately upstream of the aquatic habitat and activities must be managed to reduce such impacts.
International Conservation	The Cradle of Humankind World Heritage Site (and Protected Area) is approximately 2.5km south-west of site. <u>Impact:</u> No impacts are expected to international conservation areas.
PA's	Only the protected area associated with the cradle of humankind World Heritage Site is within 10km of site. <u>Impact:</u> No impacts are expected to the protected area, but the PA managing body must be consulted in terms of potential additional restrictions or management measures that may be relevant to the PA's buffer zone.
NPAES	National Protected Area Expansion Strategy (NPAES) targeting conservation of Vaal Grasslands occur <600m south of the powerline. <u>Impact:</u> No impacts are expected to the NPAES.
SWSA	Only Strategic Groundwater Source Areas occur within 10km of site; groundwater specialist recommendations must be implemented to protect groundwater resources.
NFEPA features	The site is within an Upstream NFEPA water management sub-catchment. The Moderately modified (PES C) Crocodile River is the nearest NFEPA river, just over 1km west of the powerline. No Rank 1 or 2 NFEPA wetlands occur on or near site. <u>Impact:</u> The clearing and construction activities could contribute to increased risk of contaminated and silt-loaded runoff. This could enter the natural streams during heavy rainfalls and activities must be managed to reduce the risk of such impacts.

4.1.1 Site Sensitivity

From Table 1 the only significant desktop features were the CBAs incorporating critical habitat patches, ecological corridors and nodes to ecological corridors. In terms of the powerline route specifically, the area does not directly fall into these CBA services as far as these may be relevant to the potential terrestrial fauna; the area may, at best, act as a buffer area to neighbouring critical habitats and ecological corridors and may have limited value as a node to the ecological corridor

south of site. The buffer capacity of the area must be maintained to prevent edge impacts on nearby habitats and corridors and the site is therefore considered to have moderate sensitivity in terms of terrestrial fauna biodiversity features. The establishment of the powerline will add to the historical disturbances already present along the powerline route and will alter the immediate habitat by trimming and maintaining the bushveld areas around the powerline but the area will continue to serve as a buffer and minor node if mitigation is applied.

4.2 Fauna Species

The following is relevant in terms of vertebrate fauna species:

- Of the listed vertebrate SCCs, the site has appropriate habitat for Sensitive Species 12 and the species is likely to utilise the general rocky bushveld habitat. The conspicuous species was not noted within the surveyed meander. The following can be stated regarding the species:
 - The status of the species: IUCN status is Vulnerable (2017) (criterion A – population reduction due to habitat loss).
 - No species were confirmed during the survey meander of the powerline route and no information can be provided on the local distribution, location, viability and population size of the SCC on site. The species is fairly conspicuous and should be easily noted if contractors and staff are vigilant and therefore the species can easily be spared any direct impact.
 - It is more likely that the reproductive populations are present in the surrounding areas. If the species does occur in the immediate area it means it can tolerate the disturbed nature of the current habitat and would be likely to do so into the future, and in the long term should persist in the area if present, if bush management around the powerline route is completed with the same vigilance.
 - The main threats to the species include habitat transformation and collection of species from the wild (trade and bushmeat). Bush clearing by fire is also considered a major threat to the species. Within the Pelindaba Complex the habitat has already been disturbed and the public-related threats should not be significant in the immediate area due to the strict access control to the site.
- In terms of other TOP species recorded in the greater area or with distribution over the area:
 - Rocky bushveld and bushveld species cannot be excluded from site, but less disturbed and more appropriate habitat for such species occurs outside the fenced off Pelindaba Complex.
 - Wetland and aquatic species would be very limited on site with any large home-range species unlikely to utilise the very limited aquatic habitat in the powerline route.
- The site is not within a significant area of faunal endemism.

In terms of invertebrates:

- *Clonia uvarovi* (bush cricket) (Orthoptera: Tettigoniidae) (IUCN Vulnerable) is a SCC for the area.
 - There is no reliable information on the species distribution range or habitat preferences and the species cannot be excluded from site. The site has been historically disturbed by various small developments and populations are more likely to occur in the less disturbed neighbouring areas. If the species has survived the historical impacts on site then it should persist in the area of the proposed powerline route into the future.
- Dung beetles are protected in the North West. They provide essential ecosystem services and impacts to these species would negatively impact the landscape into the long term. The species are relatively closely associated with on-site animal dung which should make the group of beetles fairly easy to manage in terms of impact mitigation.

- A TOP spider and TOP scorpions were recorded in the QDGS. Species are often associated with rockier habitats and cannot be excluded from the area, although the species should persist in the area after the powerlines have been erected.

4.2.1 Site Ecological Importance

The only trigger SCCs that cannot be excluded from site is Sensitive Species 12 and *Clonia uvarovi* (cautiously assumed to be present). The SEI assessment has been completed in terms of the these species (SANBI, 2020) (Table 9 and Plan 6), but the limited information, particularly for the invertebrate, requires that some assumptions be made. The SEI plan must be read together with the flora SEI plan and the following noted:

- The CI rank of high has been given to the most appropriate habitat (Rocky Bushveld) for Sensitive Species 12 (also assumed to be the main habitat for *C. uvarovi*), but the habitat unit is disturbed within the powerline route and Sensitive Species 12 does not fully fulfil the IUCN category requirements as detailed in Table 2.
- In terms of the aquatic habitat, it is assumed that no direct impact will take place and powerlines will be suspended over this area and most species are likely to remain within the habitat unit (Very High RR).

Table 9: Overall Site Ecological Importance (SEI) assessment

Evaluation unit	CI	FI	BI	RR	SEI
Disturbed Rocky Bushveld	High	Medium	Medium	High	Low (Minimise & Restore)
Aquatic & Wetland	Low	Medium	Low	High	Very Low (Minimise)
Disturbed Areas	Very low	Very low	Very low	Very high	Very Low (Minimise)



Plan 6: Site Ecological Importance in terms of terrestrial fauna SCCs

5. Fauna Impact Assessment

In terms of the impact statements above, the potentially more significant impacts further assessed in this report include:

- Loss / alteration of habitat through clearance and vegetation management.
- Hampering or killing of fauna, particularly Sensitive Species 12 and provincially protected dung beetles.
- Contamination to land and downstream contamination and / or silt-loading through runoff from site.

Impact assessment criteria considered include:

The duration of the impact		
Score	Duration	Description
1	Short term	0 – 1 years
2	Short to medium term	2 – 5 years
3	Medium term	5 – 15 years
4	Medium to long term	15+ years
5	Permanent	Permanent
The extent of the impact		
Score	Extent	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world
The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description
0	None	No effect – No disturbance/benefit
2	Slight	Little effect – negligible disturbance/benefit
4	Slight to moderate	Effects observable – environmental impacts reversible with time
6	Moderate	Effects observable – impacts reversible with rehabilitation
8	Moderate to high	Extensive effects – irreversible alteration to the environment
10	High	Extensive permanent effects with irreversible alteration
The probability of the impact		
Score	Rating	Description
1	Very Improbable	Probably won't occur
2	Improbable	Low likelihood of occurring
3	Probable	Distinct possibility of occurring
4	Highly Probable	Very likely to occur
5	Definite	Will occur, regardless of any intervention
The Significance = (Magnitude + Spatial Scale + Duration) x Probability		
Low (score of 1 to 29)		Impact will not significantly change fauna biodiversity and requires no significant mitigation measures.
Moderate (score of 30 to 60)		Impact will change fauna biodiversity and requires some mitigation measures.
High (Score of 61 to 100)		Impact will significantly change fauna biodiversity and significant mitigation measures and management is required. Potential fatal flaw.

1) Nature: Loss and alteration of faunal habitat		
The site has been historically disturbed and, although the rocky bushveld habitat on site is adequate habitat for most bushveld and rocky habitat species, the surrounding areas outside the fence line of Pelindaba Complex provide less disturbed habitat, more likely to be utilised by fauna. The area is considered a buffer zone to the more natural surrounds and the powerline should be constructed and maintained in a manner that will allow the area to continue to serve as a buffer area.		
	Without Mitigation	With Mitigation
Construction Phase – Clearance of vegetation for pylon and storage areas		
Probability	Definite (5)	Probable (3)
Duration	Permanent (5)	Permanent (5)
Extent	Site specific (1)	Site specific (1)
Magnitude	Moderate (6)	Slight (2)
Significance	Moderate (60)	Low (24)
Status	-ve	-ve
Operational Phase – Maintaining vegetation within a 20m area along the powerline		
Probability	Probable (3)	Improbable (2)
Duration	Permanent (5)	Medium (3)
Extent	Site specific (1)	Site specific (1)
Magnitude	Slight-Moderate (4)	Slight (2)
Significance	Moderate (30)	Low (12)
Status	-ve	-ve
Is Impact Reversible?	Moderately reversible as the re-instatement of vegetation requires some rehabilitation.	
Irreplaceable loss of resource?	Moderate: Loss of the buffer capacity of the site means that more natural neighbouring areas to the south will experience more edge impact, affecting quality of habitat and the ecological corridor.	
Can impact be mitigated?	Yes	
Mitigation:		
STOP: The aquatic habitat and associated wetland and riverine area should not be targeted for any physical development or activity (pedestrian or otherwise). No activity may proceed within the aquatic habitat, the associated wetland or its buffer zone without the necessary Water Use authorisation. Fires are not allowed as a means to implement vegetation maintenance along the powerline route once established.		
MODIFY: Arrange for storage areas within existing cleared areas only. Do not clear vegetation for any other purpose than the dedicated footprints of the pylons. Where pylons can be shifted, select areas near existing infrastructure (existing light masts, solar panels and reservoirs) to keep activity footprints within a single area. Where possible, select areas devoid of vegetation for pylons. Vegetation maintenance along the powerline route, once established, should focus on trimming the existing bushveld vegetation rather than removing the shrubs and scrubs where this is possible.		
CONTROL: Demarcate pylon areas and keep these areas as compact as possible. Mark out dedicated routes (for machinery, vehicles and pedestrians) to each pylon construction site. When moving through the area to access construction sites, utilise these paths only.		
REMEDY: Where areas not targeted for development and / or neighbouring areas are inadvertently impacted and / or damaged, clear any material dumped in the area, fill any excavation, and rehabilitate the site as soon as possible.		
Cumulative Impact: The disturbed nature of the area and the limited buffer value of the site in terms of terrestrial fauna means that cumulative impacts are considered negligible.		
Residual Impacts: Edge effects are expected through the operational maintenance activities, but are not considered as significant residual impacts due to the existing status of the site.		

2) Nature: Hindrance, trapping, killing of fauna, focussing on TOP species, particularly Sensitive Species 12 and provincially protected dung beetles.		
TOP species cannot be excluded from site if unhindered by the Pelindaba Complex fences. Two SCCs cannot be excluded from site (Sensitive Species 12 and <i>Clonia uvarovi</i>), the one a conspicuous species which must be monitored and the latter expected to persist if present in the area and unlikely to be permanently impacted if habitat in surrounds is maintained as per Impact 1 above.		
	Without Mitigation	With Mitigation
Construction Phase		
Probability	Highly Probable (4)	Improbable (2)
Duration	Medium-long (4)	Medium-long (4)
Extent	Local (2)	Local (2)
Magnitude	Moderate-high (8)	Slight-moderate (4)
Significance	Moderate (56)	Low (20)
Status	-ve	-ve
Operational Phase – Maintaining vegetation within a 20m area along the powerline		
Probability	Probable (3)	Improbable (2)
Duration	Medium-long (4)	Medium-long (4)
Extent	Local (2)	Local (2)
Magnitude	Moderate-high (8)	Slight-moderate (4)
Significance	Moderate (42)	Low (20)
Status	-ve	-ve
Is Impact Reversible?	Moderately Reversible as ideal habitat must be avoided to ensure populations recover.	
Irreplaceable loss of resource?	Moderate: Species will recover with intervention over time if existing species are protected from harm and habitat in surrounds is maintained.	
Can impact be mitigated?	Yes	
Mitigation:		
STOP: No deliberate killing / handling of indigenous fauna (vertebrates and invertebrates) is allowed. Fires are not allowed to implement vegetation maintenance along the powerline route once established. Electrified fences are only allowed at the perimeter of the Safari Rural substation; interventions will need to be implemented if high fauna mortalities are noted around electrified fences.		
MODIFY: Ensure unhindered access on site to allow fauna to leave the area on their own. If Sensitive Species 12 is noted on site, then consider stopping activity (construction and maintenance) in the specific area until the specimen has moved off and return to complete activities later. Where this is not possible appoint permitted specialists to move the species from site.		
CONTROL: All contractors on site must undergo environmental awareness training which must include the prohibition of any harm or hindrance to any indigenous fauna species and explicitly indicate consequences of any such deliberate action. At the start of every day (construction and maintenance) walk the demarcated routes and the pylon construction footprints and gently remove all dung from these areas to neighbouring areas (approximately 10m from activity areas) to prevent the attraction of dung beetles to activity areas. Ensure safe speed limits and safe working conditions in the development area.		
REMEDY: Should any fauna be trapped within the development area, activities will cease and specialists brought in to safely remove the animals from site. This must be done in line with NEM:BA and the North West Biodiversity Management Act.		
Cumulative Impact: No significant cumulative impacts expected in terms of the proposed project if faunal mortalities are kept to an absolute minimum.		
Residual Impact: Destruction of any TOPS (or prey-base of TOPS) could cause a cascade affect on populations and, in extreme circumstances, local extinctions. Predicting the extent and significance of such changes is not possible, but is not expected to be significant in terms of this project on this site.		

3) Nature: Contamination of fauna environment through use and storage of hazardous substances, littering and dumping of waste		
The project is largely on hill slopes, which means that any contamination along the powerline route will find its way into the streams and downstream environments quickly during a high rainfall event. All contaminating substances, including waste, must be stored and handled properly on site.		
	Without Mitigation	With Mitigation
Construction Phase		
Probability	Highly Probable (4)	Improbable (2)
Duration	Medium (3)	Short-medium (2)
Extent	Local (2)	Local (2)
Magnitude	Moderate-high (8)	Slight-moderate (4)
Significance	Moderate (52)	Low (16)
Status	-ve	-ve
Operational Phase – will be very limited to minor potential contamination contributed by diesel power equipment, vehicles and litter.		
Probability	Improbable (2)	Very improbable (1)
Duration	Medium (3)	Short-medium (2)
Extent	Local (2)	Local (2)
Magnitude	Slight to moderate (4)	Slight (2)
Significance	Low (18)	Low (6)
Status	-ve	-ve
Is Impact Reversible?	Moderately Reversible as clean-up requires active mitigation and rehabilitation.	
Irreplaceable loss of resource?	Moderate: Habitat and fauna will recover over time once the contaminant is removed.	
Can impact be mitigated?	Yes	
Mitigation:		
STOP: Discontinue use of all faulty machinery / equipment on site until properly repaired.		
MODIFY: Facilities will be provided for storage of all hazardous substances, waste, equipment and cement within the existing development areas (within the existing footprints of the substations) to prevent the exposure of these substances to the environment.		
If possible, completed pylon construction during the dry season. Otherwise implement local and temporary storm-water management within each footprint to prevent downstream sedimentation.		
CONTROL: All equipment / machinery will be serviced and maintained within operating specifications to prevent the risks of leaks.		
All hazardous substances and waste must be properly stored and handled according to prescribed manner and must in no way be exposed to the environmental elements.		
Collect all waste from site before departing the area and dispose of appropriately.		
Cement bags will be stored under a tarpaulin and on an impervious sheet. Cement mixing will take place within a designated area only, preferably within the existing development footprint.		
REMEDY: All hydrocarbons spills on bare ground will be cleared immediately.		
Inspect and clear all litter and waste from the site and surrounds.		
All dry and wet cement spills on bare ground will be cleared immediately.		
Cumulative Impact: Large or continuous leaks / spills and dumping will enter the environment through run-off or leachate and contaminate the environment and poison the fauna. The likelihood of this occurring is considered low, but must be managed on site.		
Residual Impact: If toxic substances and waste are not properly handled or spills not cleared immediately, the environment will suffer extended residual impacts, particularly if toxins seep into the soils or are washed to downstream environments and impact is considered significant if not managed.		

6. Fauna Management & Monitoring Plan

The objectives of the management plan are as follows:

- To prevent the unnecessary destruction of natural habitat and animal life within the development area.
- Not to unnecessarily or deliberately alienate or hinder the movement of fauna in the area or to harm any animal life found on the property.
- To maintain existing fauna biodiversity and prevent the skewing of fauna communities as far as possible.

Fauna are mobile and reactive and therefore the monitoring and management plan must also be adaptive in order to ensure effective mitigation measures are applied at all times. The specific mitigation measures are highlighted in the various tables above and the minimum monitoring plan is indicated in Table 10. In addition to the measures above, the following general measures must also be applied during the development:

- Do not feed wild life and ensure that all food and food waste, including domestic waste, is placed in sealed containers and not exposed on site.
- Ensure that the outside areas are kept clean and tidy and provide adequate waste removal services to prevent the attraction of rats and other alien scavenging species to the site.

An Environmental Officer (EO) must be appointed to ensure construction activities are in line with environmental management plan and authorisation requirements, including the mitigation and management measures stipulated within this report. Inspection, records of issues and corrective measures and sign-off will form part of the EO's responsibilities.

Table 10: Monitoring plan to be undertaken by EO

Monitoring Action	Frequency
Ensure all proposed mitigation measures detailing proposed modifications have been incorporated into the final plans.	Once-off
Inform all staff and contractors to be vigilant of and report sightings of Sensitive Species 12 and other potential TOP species that may enter the area and ensure species are not under threat from activities.	Daily if species are observed on site during construction.
Inspect the demarcated pathways and construction sites for animal dung and remove gently from the pathway / activity area. Replace more than 10m from path or activity area.	At the beginning of every day during construction phase and during maintenance activities.
Inspect demarcated pathways, construction and storage areas for litter, waste, cement spills and hydrocarbon spills and clean up immediately.	At the end of every day during construction phase.
Perimeters of electrified fences will be checked for faunal casualties and adaptive management applied to actively reduce any excessive faunal mortalities noted or any mortalities of Sensitive Species 12. The measures will be species dependent and may require consultation with a specialist.	Weekly once fences are actively electrified. If no mortalities are noted in the first year of monitoring then monthly.
Apply monitoring and auditing requirements stipulated in NWA & NEMA authorisations as relevant.	As stipulated in the authorisations

7. Conclusion and Recommendations

The site did provide rocky bushveld habitat, although current and historical disturbance was evident along most of the powerline route. The area is fenced off within the Pelindaba Complex and larger animals will only be present if actively stocked in the area. Other bushveld and rocky habitat species previously recorded in the QDGS or with distribution over the area cannot be conclusively excluded from site, although less disturbed and more natural habitat is present in the neighbouring areas where species are more likely to reside.

The powerline route does not entirely fulfil any of the CBA features specifically (kloof, critical habitat patch, critical corridor linkage or corridor node) and is at best a buffer area to the neighbouring southern area which does form part of a critical cliff corridor. The activity can, however, proceed in a manner to maintain the area as a buffer as long as mitigation measures are applied.

Potential SCCs that cannot be excluded from site include a fairly conspicuous species (Sensitive Species 12) that can be easily monitored, avoided and protected with good on-site communication and reporting and an invertebrate that, if already present in the area, will very likely persist in the area if mitigation measures to reduce habitat disturbances are appropriately applied.

In terms of the findings if the following is implemented then there is no reason for not authorising the activity in terms of terrestrial fauna:

- Completing species-specific trapping is not likely to provide additional information that would alter these findings, and the cautionary approach is likely to be relevant regardless. Considering the type of activity proposed and the current existing anthropogenic impact on site, no additional species-specific trapping is recommended.
- The managing body of the The Cradle of Humankind World Heritage Site Protected Area must be consulted and any recommendation regarding activities within the PA's buffer zones, as stipulated in the PA's EMP, adhered to.
- Recommendations of the flora and aquatic biodiversity specialist must be implemented on site.
- The mitigation measures stipulated in the impact tables and Section 6 of this report must be included within the environmental management plan report and implemented on site.
- The monitoring plan in Table 10 must be included within the environmental management plan report and implemented on site.

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Appendix A: CV, Qualification, SACNASP registration

Curriculum Vitae

BARBARA KASL

Personal Information

- Full Name: Barbara Kasl
- Qualifications: PhD (Animal, Plant and Environmental Science)
- E-mail: bk.zoology@gmail.com

Education – ±10 years

Tertiary Institute: University of the Witwatersrand

- 2002-2004: PhD (Animal, Plant and Environmental Sciences)
- 1999-2001: MSc (upgraded to PhD)
- 1998: B.Sc. Hon. (Zoology and Botany)
- 1995-1998: BSc (Zoology and Botany)

MSc AND PhD - South African Sugar Experiment Station (SAHRA) – On site research for MSc and PhD degree to determine habitat management strategies to control sugarcane borer (*Eldana saccharina*) in South African sugarcane (Mnt. Edgcombe, R. S. A.).

- Systematic and orderly work habits, which extended into the field, greenhouse and laboratory experiments, and associated data capturing.
- Gained competency on statistical programmes (Statistica, Origin and Excel).
- Data assessment, presentation and discussion of findings through written reports, presentations and posters.
- Good computer literacy and fully competent in MS Office.

Professional Experience – ±12 years

02/2017 - Current: Self-employed as fauna specialist & environmental consultant

- Fauna impact assessments and management and monitoring plans for various developments requiring NEMA authorisation.
- Terrestrial alien invasive fauna management plans.
- Working closely with ecologists on a variety of projects requiring specialists terrestrial fauna input.
- Gauteng & North West Provincial Biodiversity Outlook Reports – Terrestrial Fauna input.
- Generic environmental management plans for the Working for Ecosystems and Landcare projects (ongoing).
- Consulting on projects requiring Environmental Authorisation, including Mineral Authorisations.

- Review of various environmental documentation.

01/2008 – 02/2017: CABANGA CONCEPTS: Environmental Scientist / Principal Consultant

Requested to join the company as an environmental consultant specialising in all environmental authorisation processes and related documents. I am one of three principal members/shareholders of Cabanga Concepts.

- One of two **principal report reviewers** of external reports supplied by subcontractors [soil assessments, ecological (terrestrial and aquatic) assessments groundwater and surface water assessments, heritage and cultural resource assessments to name a few] and internal reports compiled by staff.
- Overall **project manager** regarding mineral rights application processes as well as environmental authorisation processes in South Africa, including **management of a team** of external (sub-consultants) and internal specialists. Including **overview of budget** and spending of the budget during the life of the project.
- **Compilation of proposals and associated budgets** for various environmental requirements made by new and existing clients.
- Principal EMP report compiler and reviewer for a **World Bank mining project** in Rwanda, including review of external specialist reports. Familiar with **IFC, Equator Principals**.
- Compilation of **environmental applications and documents** required under the various environmental acts (environmental act, waste act, air quality act and water act) in South Africa. This includes scoping reports, impact assessment reports, environmental management plans, environmental monitoring reports, environmental pre-feasibility reports and bankable feasibility studies, integrated water and waste management plans, audit reports, due diligence assessments, reports on monitoring findings (water quality, dust levels, ambient noise).
- Compilation of various **audit reports** including EMP Audits, Legal Compliance Audits, Due Diligences, Integrated Water and Waste Management Plan Audits, Licence and Permitting Audits.
- Compilation of draft sensitivity plans for internal GIS specialists to refine.
- Compiled a detailed and comprehensive **alien invasive management plan** for principal invasive plant species in the Highveld region of South Africa.
- Keep up-to-date with **environmental legislation** and relevant application processes.
- Keep up-to-date on various **standards, norms** and management requirements released through official organisations and institutes.

09/2004 – 11/2007: DIGBY WELLS & ASSOCIATES (Now DIGBY WELLS ENVIRONMENTAL): Unit Manager / Acting Department Head: Biophysical Department

- Initially hired as entomologist and fauna specialist.
- Responsible in **completion of full fauna assessments** and eventually **compilation of overall ecological reports**.
- Received training in full **environmental authorisation processes** including compilation of EIA and EMP reports.
- Various **sub-Saharan environmental projects** included Etoile Mine in DRC, Randgold Mine in Mali, Valencia uranium green-field mine in Namibia, Mmamabula coal mine and power plant in Botswana.
- **Unit Manager** for the Ecology Unit including management of a flora and wetland specialist.
- **Acting Department Head** and management of the Biophysical Department which included the Ecology Unit and Atmospheric Environment Unit.

2001-2003: Various University and Temp Research Jobs in Entomology

2001: Private Tutor - Private tutoring for first year student.

1993-1998: Part-Time Jobs

Professional Memberships and Affiliations

- **2011 – current:** Registered Professional Environmental And Ecological Scientist
- **2015 – 2017:** EAPSA Certified Environmental Assessment Practitioner
- **1999, 2001 & 2008 – current:** Entomological Society of South Africa
- **2008-2011:** International Association for Impact Assessment
- **1998:** Zoological Society of Southern Africa

Courses Attended

April 2017:	Alien invasive species identification and management course in KZN organised through Kay Montgomery.
October 2010:	NEM: Air Quality Act course through IMBEWU Sustainability Legal Specialists (Pty) Ltd
August 2009:	NEMA and NEMWA course through ECOLAW
November 2007:	Environmental Impact Assessment Training
February/March 2007:	Project Management for Non-Project Managers Course through Astro Tech
September 2006:	Unilever Introduction to Managing Environmental Water Quality - Practical, Theoretical and Policy; through Institute for Water Research – RHODES University.
September 2005:	Non-credited course in River health and SASS5 rapid methodology of water quality assessment through NEPID Consultants
May 2005:	Snake Identification and Snakebite Treatment Course



herewith certifies that
Barbara Kasl
Registration Number: 400257/09
is a registered scientist

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

Effective **11 November 2009** Expires **31 March 2022**



Batha
Chairperson

R. J. ...
Chief Executive Officer

To verify this certificate scan this code



UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG

At a congregation of the University
held on 25 November 2004

Barbara Kasl
was admitted to the Degree of
Doctor of Philosophy



[Signature]
Dean, Faculty of Science

[Signature]
Vice-Chancellor and Principal

[Signature]
Registrar



Appendix B: Desktop and historical fauna records (historical, ADU)

Family	Common name	Taxon name
MAMMALS		
Carnivora	Otter, Cape Clawless	<i>Aonyx capensis</i>
Carnivora	Mongoose, Water (Marsh)	<i>Atilax paludinosus</i>
Carnivora	Jackal, Black-backed	<i>Canis mesomelas</i>
Carnivora	Caracal	<i>Caracal caracal</i>
Carnivora	Mongoose, Yellow	<i>Cynictis penicillata</i>
Carnivora	Zebra, Plains	<i>Equus quagga</i>
Carnivora	Domestic Cat	<i>Felis catus</i>
Carnivora	Genet, Small-spotted	<i>Genetta genetta</i>
Carnivora	Genet, Common Large-spotted	<i>Genetta maculata</i>
Carnivora	Mongoose, Slender	<i>Herpestes sanguineus</i>
Carnivora	Serval	<i>Leptailurus serval</i>
Carnivora	Wild Dog, African	<i>Lycaon Pictus</i>
Carnivora	Honey Badger (Ratel)	<i>Mellivora capensis</i>
Carnivora	Fox, Bat-eared	<i>Otocyon megalotis</i>
Carnivora	Leopard	<i>Panthera pardus</i>
Carnivora	Hyaena, Brown	<i>Parahyaena brunnea</i>
Cetartiodactyla	Impala	<i>Aepyceros melampus</i>
Cetartiodactyla	Hartebeest, Red	<i>Alcelaphus buselaphus caama</i>
Cetartiodactyla	Springbok	<i>Antidorcas marsupialis</i>
Cetartiodactyla	Wildebeest, Black	<i>Connochaetes gnou</i>
Cetartiodactyla	Wildebeest, Blue	<i>Connochaetes taurinus</i>
Cetartiodactyla	Blesbok	<i>Damaliscus pygargus phillipsi</i>
Cetartiodactyla	Giraffe	<i>Giraffa camelopardalis giraffa</i>
Cetartiodactyla	Antelope, Roan	<i>Hippotragus equinus</i>
Cetartiodactyla	Antelope, Sable	<i>Hippotragus niger niger</i>
Cetartiodactyla	Waterbuck	<i>Kobus ellipsiprymnus ellipsiprymnus</i>
Cetartiodactyla	Gemsbok (Southern Oryx)	<i>Oryx gazella</i>
Cetartiodactyla	Warthog, Common	<i>Phacochoerus africanus</i>
Cetartiodactyla	Red River Hog	<i>Potamochoerus orcus</i>
Cetartiodactyla	Steenbok	<i>Raphicerus campestris</i>
Cetartiodactyla	Reedbuck, Southern Mountain	<i>Redunca fulvorufula</i>
Cetartiodactyla	Duiker, Common	<i>Sylvicapra grimmia</i>
Cetartiodactyla	Buffalo, African Savanna	<i>Syncerus caffer</i>
Cetartiodactyla	Eland, Common	<i>Tragelaphus oryx</i>
Cetartiodactyla	Nyala	<i>Tragelaphus angasi</i>
Cetartiodactyla	Kudu, Greater	<i>Tragelaphus strepsiceros</i>
Cetartiodactyla	Bushbuck, Southern	<i>Tragelaphus sylvaticus (scriptus)</i>
Chiroptera	Bat, Percival's (Short-eared) Trident	<i>Cloetotis percivali</i>
Chiroptera	Bat, Natal Long-fingered	<i>Miniopterus natalensis</i>
Chiroptera	Bat, Temminck's Hairy	<i>Myotis tricolor</i>
Chiroptera	Bat, Egyptian Slit-faced	<i>Nycteris thebaica</i>
Chiroptera	Bat, Bushveld Horseshoe	<i>Rhinolophus simulator</i>
Hyracoidae	Hyrax, Rock (Dassie)	<i>Procavia capensis</i>
Primata	Monkey, Vervet	<i>Chlorocebus pygerythrus</i>
Primata	Baboon, Chacma	<i>Papio ursinus</i>
Rodentia	Rat, Tete Veld	<i>Aethomys ineptus</i>

Family	Common name	Taxon name
Rodentia	Mole-rat, Common (African)	<i>Cryptomys hottentotus</i>
Rodentia	Porcupine, Cape	<i>Hystrix africae australis</i>
Rodentia	Mouse, Natal Multimammate	<i>Mastomys natalensis</i>
Rodentia	Mouse, Namaqua Rock	<i>Micaelamys namaquensis</i>
Rodentia	Mouse, Pygmy	<i>Mus minutoides</i>
Rodentia	Rat, Angoni Vlei	<i>Otomys angoniensis</i>
Rodentia	Rat, Vlei	<i>Otomys auratus</i>
Rodentia	Squirrel, Tree	<i>Paraxerus cepapi</i>
Rodentia	Mouse, Mesic Four-striped Grass	<i>Rhabdomys dilectus</i>
Rodentia	Squirrel, Cape Ground	<i>Xerus inauris</i>
REPTILES		
<i>Sensitive Species 12</i>	<i>Sensitive Species 12</i>	<i>Sensitive Species 12</i>
Chamaeleonidae	Chameleon, Common Flap-Neck	<i>Chamaeleo dilepis dilepis</i>
Colubridae	Snake, Herald	<i>Crotaphopeltis hotamboeia</i>
Colubridae	Egg-eater, Common	<i>Dasypeltis scabra</i>
Colubridae	Snake, Spotted Bush	<i>Philothamnus semivariatus</i>
Elapidae	Cobra, Snouted	<i>Naja annulifera</i>
Gekkonidae	Gecko, Common Tropical House	<i>Hemidactylus mabouia</i>
Gekkonidae	Gecko, Cape (Common) Dwarf Day	<i>Lygodactylus capensis capensis</i>
Gekkonidae	Gecko, Transvaal Thick-toed	<i>Pachydactylus affinis</i>
Gerrhosauridae	Lizard, Yellow-throated Plated	<i>Gerrhosaurus flavigularis</i>
Lamprophiidae	Snake, Brown House	<i>Boaedon capensis</i>
Lamprophiidae	Snake, Common Wolf	<i>Lycophidion capense capense</i>
Lamprophiidae	Snake, Short-snouted Grass	<i>Psammophis brevirostris</i>
Lamprophiidae	Snake, Spotted Grass	<i>Psammophylax rhombeatus</i>
Lamprophiidae	Snake, Mole	<i>Pseudaspis cana</i>
Leptotyphlopidae	Snake, Distant's Thread	<i>Leptotyphlops distantis</i>
Leptotyphlopidae	Snake, Incognito Worm	<i>Leptotyphlops incognitus</i>
Leptotyphlopidae	Snake, Peters' Thread	<i>Leptotyphlops scutifrons</i>
Pelomedusidae	Terrapin, Marsh	<i>Pelomedusa galeata</i>
Pythonidae	Python, Southern African	<i>Python natalensis</i>
Scincidae	Skink, Cape	<i>Trachylepis capensis</i>
Scincidae	Skink, Stripe-neck Variable	<i>Trachylepis laevigata</i>
Scincidae	Skink, Speckled Rock	<i>Trachylepis punctatissima</i>
Varanidae	Monitor, Rock	<i>Varanus albigularis albigularis</i>
Varanidae	Monitor, Water	<i>Varanus niloticus</i>
Viperidae	Adder, Puff	<i>Bitis arietans arietans</i>
Viperidae	Adder, Rhombic Night	<i>Causus rhombeatus</i>
FROGS		
Bufo	Toad, Eastern Olive	<i>Amietophrynus garmani</i>
Bufo	Toad, Guttural	<i>Amietophrynus gutturalis</i>
Bufo	Toad, Raucous	<i>Amietophrynus rangeri</i>
Bufo	Toad, Red	<i>Schismaderma carens</i>
Hyperoliidae	Kassina, Bubbling	<i>Kassina senegalensis</i>
Pipidae	Platanna, Common	<i>Xenopus laevis</i>
Pyxicephalidae	River Frog, Delalande's	<i>Amieta (delalandii) queketti</i>
Pyxicephalidae	Caco, Boettger's	<i>Cacosternum boettgeri</i>
Pyxicephalidae	Bullfrog, Giant	<i>Pyxicephalus adspersus</i>
Pyxicephalidae	Sand Frog, Natal	<i>Tomopterna natalensis</i>

Appendix C: Sensitive Species CONFIDENTIAL APPENDIX NOT FOR RELEASE TO THE PUBLIC