General Biodiversity Assessment and Site Sensitivity Verification Compliance Statement (Animal Theme) For The Ferrum-Mookodi 400kV Powerline within the Northern Cape and North West Provinces

NTCSA

Client: National Transmission Company South Africa Holdings SOC Limited

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EXECUTIVE SUMMARY

SENSITIVITY VERIFICATION COMPLIANCE STATEMENT - Animal Biodiversity Theme

Animal Species Theme

1. The site is listed **"high sensitivity"** with regards to the animal assessment in the screening tool.
    a. **This was related to the avifaunal component and this aspect is addressed in a separate report**.
2. For the **mammals, amphibia and reptiles**, no species were listed in the STR and therefore the sensitivity rating for these animals were **"low".**
3. The development will have limited negative impacts on the animal populations in the area (site and around it), as the area is already developed.
    a. The new tower footprint will have a negligible increased impact on the animals in the area.
    b. Animals will move away from the construction areas but can return during the operational phase.
4. The habitat and vegetation can support some resident and migrating individuals or family groups.
5. Impacts have been identified with proposed mitigation measures.
6. All these should be adhered to ensure all impacts are mitigated in the area associated with the development.
7. A few red data species were recorded from the general animal list compiled for the area.
    a. These include:
        - ***Hippotragus equinus*** **(EN) -** Inhabit savannah woodlands and grasslands within the bushveld and Lowveld of southern Africa and prefer habitats with a cover of high grasses and woody plants which play an important role for both grazing and calving. As such, they may be especially sensitive to changes in grass height and composition, as Roan Antelope rely on grass to camouflage their young and for foraging.
            - Outside natural distribution range.
            - No free roaming animals in the area, none were noted on any of the properties evaluated.
        - ***Hippotragus niger*** **(VU) –** A species that frequents the woodland/grassland ecotone and they are selective feeders with a preference for fresh growth grasses (40 - 140 mm) and are dependent on drinking water, travelling to water at 2 - 4-day intervals. Burns that provide green re-growth and/or vleis are key resource areas in the dry season.
            - Outside natural distribution range.
            - No free roaming animals in the area, none were noted on any of the properties evaluated.
        - ***Lycaon pictus*** **(EN)** - Wild Dogs can survive in most habitat types as long as the habitat is large enough, contains sufficient suitable prey and is free from direct threats such as accidental and deliberate persecution.

- Outside natural distribution range.
- No free roaming animals in the area, none were noted on any of the properties evaluated.

- ***Atelerix frontalis*** **(NT)** - Distribution mainly falls within savannah and grassland vegetation types, within which it is found in a wide variety of semi-arid and sub-temperate habitats, including scrub brush, western Karoo, grassland and suburban gardens. They require ample ground cover for cover, nesting and insect food sources.
    - None observed during the assessment.
    - Can occur in villages, town or in gardens on farms.
- ***Acinonyx jubatus*** **(VU)** - Cheetahs are habitat generalists and as such can survive where sufficient food is available and threats are tolerable. In South Africa, the free-roaming population and the two largest protected populations (KNP and KTP) occur in the Savannah biome. In addition, metapopulation reserves are in Savannah, Thicket, Grasslands, Nama Karoo, Fynbos and Succulent Karoo.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Felis nigripes*** **(VU)** - It is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds. It inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m asl. It is not found in the driest and sandiest parts of the Namib and Kalahari Deserts.
    - Suitable habitat present in the study area.
    - None observed during the assessment.
- ***Panthera pardus*** **(VU)** – has a wide habitat tolerance, including woodland, grassland savannah and mountain habitats but also occur widely in coastal scrub, shrubland and semi-desert. Densely wooded and rocky areas are preferred as choice habitat types.
    - Edge of natural distribution range.
    - No evidence seen of the species in the area.
- ***Crocuta crocuta*** **(NT)** – This is predominantly a savannah species and occur in most habitat types including semi-desert, open woodland and dense dry woodlands. In many parts of its range, it occurs in close association with human habitation.
    - Edge of natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Smutsia temminckii*** **(VU)** – This solitary, terrestrial species is present in various woodland and savannah habitats, preferring arid and mesic savannah and semi-arid environments at lower altitudes, often with thick undergrowth, where average annual rainfall ranges between 250 and 1,400 mm, It also

occur in floodplain grassland, rocky slopes and sandveld up to 1,700 m, but are absent from Karroid regions, tropical and coastal forests, Highveld grassland and coastal regions.

- Can occur in the area, but it is known to have been persecuted by illegal hunting.

- ***Otomys auratus*** **(NT)** - This species is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water. In the Drakensberg Range, *O. angoniensis* occurs on the lower slopes in savannah habitats, *O. auratus* and *O. laminatus* occur at mid-elevation in grasslands and *O. sloggetti* at the highest elevations in alpine heath habitats.
  - No suitable habitat observed during the assessment.
- ***Rhinolophus denti*** **(NT)** – A species associated with arid savannah habitats where suitable roosting sites occur, typically restricting it to broken country with rocky outcrops or suitable caves and even the most southeasterly record in Africa comes from the drier southwestern part of the Free State Province. Colonies are largely dependent on caves, caverns, crevices in rocky outcrops, abandoned mines
  - Edge of natural distribution range.
  - Can occur in the area, limited habitat associated with the corridor assessed.
- ***Miniopterus schreibersii*** **(NT)** - A species found to roost in caves, rock clefts, culverts, caverns, and galleries.
  - Can occur in the area, limited habitat associated with the corridor assessed.

Red data species not listed but recorded on other databases.

- ***Aonyx capensis*** **(NT)** - Cape Clawless Otters are predominantly aquatic and seldom found far from permanent water. Fresh water is an essential habitat requirement, not only for drinking but also for rinsing their fur.
  - Not listed but a roadkill was recorded in April 2024 on the N14 near Vryburg.

- The sensitivity rating can be maintained at a **"low sensitivity"** for the project area only.

Conditions and mitigating measurements have been provided to be included in the EMPr.

Declaration of Independence

The Environmental Impact Assessment Regulations (Regulation 17 of Government Notice No R354 of 2010; National Environmental Management Act, 1998 (Act No. 107 of 1998); Environmental Impact Assessment Regulations, 2014), requires that certain information is included in specialist reports i.e. the terms of reference, purpose of the report, methodologies, assumptions/limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below:

Expertise of author:

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

Declaration of independence:

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

In addition I, Wynand Vlok, as the appointed biodiversity specialist, hereby declare/affirm the correctness of the information provided in this compliance statement, and that I:

- Meet the general requirements to be independent and
- Have no business, financial, personal or other interest in the proposed development and that no circumstances have occurred that may have compromised my objectivity; and
- Am aware that a false declaration is an offence in terms of regulation 48 of the EIA Regulations (2014).

Disclosure:

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

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

_____ 29 October 2024

Dr Wynand Vlok Date

Assumptions and limitations

Availability of baseline information

Baseline information for the study of the site was obtained from historic maps, photographs and reports. The desktop survey provided adequate baseline information for the area and therefore this was not a constraint.

Constraints

The survey was conducted during daytime only. All the different habitats at the site were investigated and it was therefore possible to complete a rapid survey and obtain information on the protected and red data animals that are present along the proposed corridor.

It is important to note that no trapping of small animals or reptiles were conducted (time constraint for the project).

Bio-physical constraints

Weather conditions during the period were cool/cold with a light to moderate wind blowing. The region has received little rainfall prior to the site visit in September 2024 and rain has occurred during the survey. This will have obvious implications on the biodiversity (not applicable for this study) that are likely to occur in the area. Nevertheless, the conditions during the survey were suitable for a survey of this nature.

Confidentially constraints

There were no confidentially constraints.

Implications for the study

Apart from the prevailing weather conditions at the site, there were no other significant constraints that would negatively impact upon the study. Access to all areas of the study site was possible. There is sufficient good quality data available in the literature that partially negates the negative effect that the type of survey had on the quality of the assessment.

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1 INTRODUCTION

The proposed project entails the construction of the 260km, 400 kV powerline between the existing Mookodi and Ferrum substations and associated substations upgrades as part of the of the Kimberly Strengthening Phase 3 scheme. The survey completed to identify buffers, sensitive sites and no-go areas.

The survey (9 – 27 September 2024) aimed to map sensitive and to make recommendations regarding changes in the pylon positions to lower the impacts to the receiving environment. All animal encounters or signs of recent presence (i.e. scat, burrowing or other visible signs) were noted.

When carrying out a study of this nature, the aim is to identify the protected species in the corridor, sensitive habitat for animals and plants, map the positions of the protected species and make recommendation for the placement of the pylons to avoid the more sensitive areas.

A separate report for the protected plants is compiled.

1.1 Terms of Reference

BioAssets CC was appointed by the DIGES Group (on behalf of National Transmission Company South Africa (NTCSA) SOC Ltd) to conduct a walk-through assessment of the corridor for the proposed new Ferrum/Mookodi 400 kV power line between the Mookodi Substation (Kathu) and the Mookodi Substation (Vryburg) (Figure 1.1). The aim of the assessment was to evaluate the general habitat related to the biodiversity community in the area. Sightings of animals or signs of activity of the animals (e.g. active burrows, scat, bones or quills) was noted and recorded. Activity outside the corridor was noted, as the animals normally cover larger area for foraging of food.

1.2 Objectives of fauna mapping

The objectives were:

- To conduct a walkdown of the 260 km corridor for the proposed 400 kV powerline between the Ferrum Substation and the Mookodi Substation.
- To assess the substation upgrade footprints at the Ferrum and Mookodi substations.
- Map where possible the protected animal to assist with recommendations for the construction and operational phases,
    - Identification of species that are protected (Threatened or Protected Species (TOPS) by the Northern Cape Environment and Nature Conservation (NCENC) or considered threatened (CR, EN, VU) on the South African Red Data List.

1.3 The Study Area

The locality map for the study area is depicted in Figure 1.1 and 1.2. This was the information received from the client prior to the assessment and it was used to plot the corridor and pylon positions for the survey.

Figure 1.1 depicts the route corridor in grey from the Ferrum Substation (near Kathu) to the Mookodi Substation (near Vryburg) and Figure 1.2 is an aerial image of the route.

Figure 1.1: Map of the study area from the Ferrum Substation (Kathu in the west) to the Mookodi Substation (Vryburg in the east) in the Northern Cape Province.

Figure 1.2: Aerial view of the study area.

1.4 Screening Tool Report

A Screening Tool Report (STR) was generated for the proposed development intentions in the context of the proposed 400 kV power line project (Figure 1.1).

The STR generated listed the animal sensitivities (excluding the avifaunal component – a separate report) that will be addressed in this report.

- No animals were listed in the STR, only bird species.

1.3 Specialist reporting requirements

In terms of the National Environmental Management Act (NEMA; Act 107 of 1998, as amended) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN)

R982, R983, R984 and R985, as amended], various aspects of the proposed developments may have an impact on the environment and are considered to be listed activities. These activities require authorisation from the National Competent Authority (CA), namely the Department of Forestry, Fisheries and the Environment (DFFE), prior to the commencement thereof.

In accordance with GN 320 and GN 1150 (20 March 2020) of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National web-based Environmental Screening Tool (i.e. the Screening Tool).

The specialist is requested to compile the following reports, in line with Appendix 6 of the EIA Regulations, 2014 (as amended) and any specific Gazetted specialist protocols (if required or applicable):

- Site Sensitivity Verification Report (SSVR); and
- Specialist Impact Assessment Report (TASSAR); or if applicable
- Compliance Statement (TASCS).

1.4 Identified Theme Sensitivities

The site sensitivity as identified by the National Web-Based Environmental Screening Tool (Table 1.1) shows that the **animal species theme** over the extent of the project varies form **high** (in the west), to **medium** and **low** in the east. All the species listed for the medium and high sensitivity rating are birds that will be addressed in a separate report.

Table 1.1: Summary of the "Site Sensitivity" as determined by the National Web-Based Environmental Screening Tool. This report focusses on the Animal Species Theme (shaded). The "high sensitivity rating" relates to the birds in the area (not included in this report).

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme				X
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

1.5 Animals of the larger study region

The region has a diverse animal population and Table 2.2 is a list of the animals (amphibia, mammals, reptiles and scorpions) associated with the geographic area associated with the power line corridor and include the QDS: 2724BA, 2724AB, 2724AA, 2723BB,2723BD, 2723BC, 2723AB, 2723AD, 2723AA, 2722BB, 2722BD, 2723 CA and 2723AC. A short description of the red data species listed is given in this section.

1.5.1 Distribution records of the animals

Various literature and electronic data sources were examined to gather locality records.

- SANBI: Re-assessment of the conservation status of southern African animals
- MammalMAP: http://vmus.adu.org.za/.
- iNaturalist: https://www.inaturalist.org/home.

Table 2.2: List of mammals associated with the larger study area (Virtual Museum, 2024).

Family	*Genus and species*	Common name	Status
Amphibia			
Brevicipitidae	*Breviceps adspersus*	Bushveld Rain Frog	Least Concern
Bufonidae	*Sclerophrys garmani*	Olive Toad	Least Concern
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	Least Concern
Bufonidae	*Sclerophrys poweri*	Power's Toad	Least Concern
Bufonidae	*Vandijkophrynus gariepensis gariepensis*	Karoo Toad	Least Concern
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	Least Concern
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	Least Concern
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	Least Concern
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog	Least Concern
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	Least Concern
Mammals			
Bathyergidae	*Cryptomys hottentotus*	Southern African Mole-rat	Least Concern
Bathyergidae	*Fukomys damarensis*	Damara Mole-rat	Least Concern
Bovidae	*Aepyceros melampus*	Impala	Least Concern
Bovidae	*Alcelaphus buselaphus caama*	Red Hartebeest	Least Concern
Bovidae	*Antidorcas marsupialis*	Springbok	Least Concern
Bovidae	*Connochaetes gnou*	Black Wildebeest	Least Concern
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	Least Concern
Bovidae	*Hippotragus equinus*	Roan Antelope	Endangered
Bovidae	*Hippotragus niger niger*	Sable	Vulnerable
Bovidae	*Kobus ellipsiprymnus*	Waterbuck	Least Concern
Bovidae	*Oryx gazella*	Gemsbok	Least Concern
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern
Bovidae	*Sylvicapra grimmia*	Bush Duiker	Least Concern
Bovidae	*Syncerus caffer*	African Buffalo	Least Concern
Bovidae	*Taurotragus oryx*	Common Eland	Least Concern
Bovidae	*Tragelaphus angasii*	Nyala	Least Concern
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern
Canidae	*Canis mesomelas*	Black-backed Jackal	Least Concern
Canidae	*Lycaon pictus*	African wild dog	Endangered
Canidae	*Otocyon megalotis*	Bat-eared Fox	Least Concern
Canidae	*Vulpes chama*	Cape Fox	Least Concern
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	Least Concern
Cercopithecidae	*Papio ursinus*	Chacma Baboon	Least Concern
Equidae	*Equus quagga*	Plains Zebra	Least Concern
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog	Near Threatened

Felidae	*Acinonyx jubatus*	Cheetah	Vulnerable
Felidae	*Caracal caracal*	Caracal	Least Concern
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable
Felidae	*Felis silvestris*	Wildcat	Least Concern
Felidae	*Panthera leo*	Lion	Least Concern
Felidae	*Panthera pardus*	Leopard	Vulnerable
Giraffidae	*Giraffa giraffa giraffa*	South African Giraffe	Least Concern
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	Least Concern
Herpestidae	*Herpestes sanguineus*	Slender Mongoose	Least Concern
Herpestidae	*Suricata suricatta*	Meerkat	Least Concern
Hyaenidae	*Crocuta crocuta*	Spotted Hyaena	Near Threatened
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern
Leporidae	*Lepus capensis*	Cape Hare	Least Concern
Leporidae	*Lepus saxatilis*	Scrub Hare	Least Concern
Leporidae	*Pronolagus rupestris*	Smith's Red Rock Hare	Least Concern
Macroscelididae	*Elephantulus brachyrhynchus*	Short-snouted Elephant Shrew	Least Concern
Macroscelididae	*Elephantulus myurus*	Eastern Rock Elephant Shrew	Least Concern
Macroscelididae	*Elephantulus rupestris*	Western Rock Elephant Shrew	Least Concern
Macroscelididae	*Macroscelides proboscideus*	Short-eared Elephant Shrew	Least Concern
Manidae	*Smutsia temminckii*	Ground Pangolin	Vulnerable
Molossidae	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	Least Concern
Muridae	*Aethomys chrysophilus*	Red Veld Aethomys	Least Concern
Muridae	*Aethomys ineptus*	Tete Veld Aethomys	Least Concern
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	Least Concern
Muridae	*Desmodillus auricularis*	Cape Short-tailed Gerbil	Least Concern
Muridae	*Gerbilliscus brantsii*	Highveld Gerbil	Least Concern
Muridae	*Gerbilliscus leucogaster*	Bushveld Gerbil	Least Concern
Muridae	*Gerbilliscus paeba*	Paeba Hairy-footed Gerbil	Least Concern
Muridae	*Lemniscomys rosalia*	Single-Striped Lemniscomys	Least Concern
Muridae	*Mastomys coucha*	Southern African Mastomys	Least Concern
Muridae	*Mastomys natalensis*	Natal Mastomys	Least Concern
Muridae	*Mus (Nannomys) minutoides*	Southern African Pygmy Mouse	Least Concern
Muridae	*Otomys angoniensis*	Angoni Vlei Rat	Least Concern
Muridae	*Otomys auratus*	Southern African Vlei Rat (Grassland type)	Near Threatened
Muridae	*Parotomys brantsii*	Brants's Whistling Rat	Least Concern
Muridae	*Rhabdomys pumilio*	Four-striped Grass Mouse	Least Concern
Muridae	*Thallomys nigricauda*	Black-tailed Thallomys	Least Concern
Muridae	*Thallomys paedulcus*	Acacia Thallomys	Least Concern
Muridae	*Zelotomys woosnami*	Woosnam's Zelotomys	Least Concern
Mustelidae	*Ictonyx striatus*	Striped Polecat	Least Concern
Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern
Nesomyidae	*Dendromus melanotis*	Gray African Climbing Mouse	Least Concern
Nesomyidae	*Malacothrix typica*	Large-eared African Desert Mouse	Least Concern
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	Least Concern
Nycteridae	*Nycteris thebaica*	Egyptian Slit-faced Bat	Least Concern
Orycteropodidae	*Orycteropus afer*	Aardvark	Least Concern
Pedetidae	*Pedetes capensis*	South African Spring Hare	Least Concern
Procaviidae	*Procavia capensis capensis*	Cape Rock Hyrax	Least Concern
Rhinolophidae	*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	Least Concern
Rhinolophidae	*Rhinolophus damarensis*	Damara horseshoe bat	Least Concern
Rhinolophidae	*Rhinolophus denti*	Dent's Horseshoe Bat	Near Threatened
Sciuridae	*Xerus inauris*	South African Ground Squirrel	Least Concern
Soricidae	*Crocidura cyanea*	Reddish-gray Musk Shrew	Least Concern
Soricidae	*Crocidura hirta*	Lesser Red Musk Shrew	Least Concern
Suidae	*Phacochoerus africanus*	Common Warthog	Least Concern
Vespertilionidae	*Eptesicus (Eptesicus) hottentotus*	Long-tailed Serotine	Least Concern
Vespertilionidae	*Miniopterus natalensis*	Natal Long-fingered Bat	Least Concern
Vespertilionidae	*Miniopterus schreibersii*	Schreibers's Long-fingered Bat	Near Threatened
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	Least Concern
Viverridae	*Genetta genetta*	Common Genet	Least Concern
Viverridae	*Genetta tigrina*	Cape Genet (Cape Large-spotted Genet)	Least Concern
Reptiles			
Agamidae	*Agama aculeata aculeata*	Common Ground Agama	Least Concern
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern

Amphisbaenidae	*Dalophia pistillum*	Blunt-tailed Worm Lizard	Least Concern
Amphisbaenidae	*Monopeltis infuscata*	Dusky Worm Lizard	Least Concern
Amphisbaenidae	*Zygaspis quadrifrons*	Kalahari Dwarf Worm Lizard	Least Concern
Chamaeleonidae	*Chamaeleo dilepis*	Common Flap-neck Chameleon	Least Concern
Chamaeleonidae	*Chamaeleo namaquensis*	Namaqua Chameleon	Least Concern
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern
Colubridae	*Dispholidus typus viridis*	Northern Boomslang	Least Concern
Colubridae	*Telescopus semiannulatus semiannulatus*	Eastern Tiger Snake	Least Concern
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	Least Concern
Elapidae	*Aspidelaps scutatus scutatus*	Speckled Shield Cobra	Least Concern
Elapidae	*Naja nivea*	Cape Cobra	Least Concern
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	Least Concern
Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	Least Concern
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	Least Concern
Lacertidae	*Heliobolus lugubris*	Bushveld Lizard	Least Concern
Lacertidae	*Meroles squamulosus*	Common Rough-scaled Lizard	Least Concern
Lacertidae	*Nucras intertexta*	Spotted Sandveld Lizard	Least Concern
Lacertidae	*Pedioplanis inornata*	Plain Sand Lizard	Least Concern
Lacertidae	*Pedioplanis lineoocellata lineoocellata*	Spotted Sand Lizard	Least Concern
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Least Concern
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater	Least Concern
Lamprophiidae	*Atractaspis bibronii*	Bibron's Stiletto Snake	Least Concern
Lamprophiidae	*Atractaspis duerdeni*	Duerden's Stiletto Snake	Least Concern
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake	Least Concern
Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake	Least Concern
Lamprophiidae	*Psammophis leightoni*	Cape Sand Snake	Least Concern
Lamprophiidae	*Psammophylax tritaeniatus*	Striped Grass Snake	Least Concern
Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake	Least Concern
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	Least Concern
Pythonidae	*Python natalensis*	Southern African Python	Least Concern
Scincidae	*Acontias gracilicauda*	Thin-tailed Legless Skink	Least Concern
Scincidae	*Panaspis wahlbergii*	Wahlberg's Snake-eyed Skink	Least Concern
Scincidae	*Trachylepis capensis*	Cape Skink	Least Concern
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern
Scincidae	*Trachylepis spilogaster*	Kalahari Tree Skink	Least Concern
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	Least Concern
Scincidae	*Trachylepis variegata*	Variegated Skink	Least Concern
Testudinidae	*Psammobates oculifer*	Serrated Tent Tortoise	Least Concern
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	Least Concern
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	Least Concern
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Least Concern
Viperidae	*Bitis arietans arietans*	Puff Adder	Least Concern
Scorpions			
Buthidae	*Parabuthus raudus*	Kalahari Thicktail Scorpion	Least Concern
Buthidae	*Pseudolychas ochraceus*	pygmy thicktail	Least Concern
Buthidae	*Uroplectes carinatus*	Common Lesser-Thicktail Scorpion	Least Concern
Scorpionidae	*Opistophthalmus carinatus*	Radiant Burrower	Least Concern
Scorpionidae	*Opistophthalmus fitzsimonsi*	FitzSimons' Burrowing Scorpion	Least Concern
Scorpionidae	*Opistophthalmus pluridens*	Ghaap Burrowing Scorpion	Least Concern

The red data species listed (Table 2.2) are:

- ***Hippotragus equinus*** **(EN) -** Inhabit savannah woodlands and grasslands within the bushveld and Lowveld of southern Africa and prefer habitats with a cover of high grasses and woody plants which play an important role for both grazing and calving. As such, they may be

especially sensitive to changes in grass height and composition, as Roan Antelope rely on grass to camouflage their young and for foraging.
    - Outside natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Hippotragus niger*** **(VU) –** A species that frequents the woodland/grassland ecotone and they are selective feeders with a preference for fresh growth grasses (40 - 140 mm) and are dependent on drinking water, travelling to water at 2 - 4-day intervals. Burns that provide green re-growth and/or vleis are key resource areas in the dry season.
    - Outside natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Lycaon pictus*** **(EN)** - Wild Dogs can survive in most habitat types as long as the habitat is large enough, contains sufficient suitable prey and is free from direct threats such as accidental and deliberate persecution.
    - Outside natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Atelerix frontalis*** **(NT)** - Distribution mainly falls within savannah and grassland vegetation types, within which it is found in a wide variety of semi-arid and sub-temperate habitats, including scrub brush, western Karoo, grassland and suburban gardens. They require ample ground cover for cover, nesting and insect food sources.
    - None observed during the assessment.
    - Can occur in villages, town or in gardens on farms.
- ***Acinonyx jubatus*** **(VU)** - Cheetahs are habitat generalists and as such can survive where sufficient food is available and threats are tolerable. In South Africa, the free-roaming population and the two largest protected populations (KNP and KTP) occur in the Savannah biome. In addition, metapopulation reserves are in Savannah, Thicket, Grasslands, Nama Karoo, Fynbos and Succulent Karoo.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Felis nigripes*** **(VU)** - It is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds. It inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m asl. It is not found in the driest and sandiest parts of the Namib and Kalahari Deserts.
    - Suitable habitat present in the study area.
    - None observed during the assessment.
- ***Panthera pardus*** **(VU)** – has a wide habitat tolerance, including woodland, grassland savannah and mountain habitats but also occur widely in coastal scrub, shrubland and semi-desert. Densely wooded and rocky areas are preferred as choice habitat types.
    - Edge of natural distribution range.
    - No evidence seen of the species in the area.

- ***Crocuta crocuta* (NT)** – This is predominantly a savannah species and occur in most habitat types including semi-desert, open woodland and dense dry woodlands. In many parts of its range, it occurs in close association with human habitation.
    - Edge of natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Smutsia temminckii* (VU)** – This solitary, terrestrial species is present in various woodland and savannah habitats, preferring arid and mesic savannah and semi-arid environments at lower altitudes, often with thick undergrowth, where average annual rainfall ranges between 250 and 1,400 mm, It also occur in floodplain grassland, rocky slopes and sandveld up to 1,700 m, but are absent from Karroid regions, tropical and coastal forests, Highveld grassland and coastal regions.
    - Can occur in the area, but it is known to have been persecuted by illegal hunting.
- ***Otomys auratus* (NT)** - This species is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water. In the Drakensberg Range, *O. angoniensis* occurs on the lower slopes in savannah habitats, *O. auratus* and *O. laminatus* occur at mid-elevation in grasslands and *O. sloggetti* at the highest elevations in alpine heath habitats.
    - No suitable habitat observed during the assessment.
- ***Rhinolophus denti* (NT)** – A species associated with arid savannah habitats where suitable roosting sites occur, typically restricting it to broken country with rocky outcrops or suitable caves and even the most southeasterly record in Africa comes from the drier southwestern part of the Free State Province. Colonies are largely dependent on caves, caverns, crevices in rocky outcrops, abandoned mines
    - Edge of natural distribution range.
    - Can occur in the area, limited habitat associated with the corridor assessed.
- ***Miniopterus schreibersii* (NT)** - A species found to roost in caves, rock clefts, culverts, caverns, and galleries.
    - Can occur in the area, limited habitat associated with the corridor assessed.

Red data species not listed but recorded on other databases.

- ***Aonyx capensis* (NT)** - Cape Clawless Otters are predominantly aquatic and seldom found far from permanent water. Fresh water is an essential habitat requirement, not only for drinking but also for rinsing their fur.
    - Not listed but a roadkill was recorded in April 2024 on the N14 near Vryburg.

2 SITE SENSITIVITY VERIFICATION METHODOLOGY

The field survey was done after the desktop assessment (review of the screening report, listed sensitive species and detail of the site) and aerial images. The regional context and desktop analysis were used as the point of departure. After the desktop assessment a site visit was undertaken by BioAssets CC on 9 – 27 September 2024. The information gathered during the desktop assessment was used to confirm the sensitivity of this site.

Table 2.2 is a list of the expected mammals and reptiles for the area (2724BA, 2724AB, 2724AA, 2723BB,2723BD, 2723BC, 2723AB, 2723AD, 2723AA, 2722BB, 2722BD, 2723 CA and 2723AC) associated with the study site. The conservation status is included and species not flagged in the STR, but listed and of conservation concern, are included in the assessment for this report.

3 METHODOLOGY

- The field survey was preceded by a desktop assessment to determine which animals are associated with the study area.
- The focus during the 9 – 27 September 2024 survey was to map the protected animals associated in or near the corridor for the proposed new 400kV power line (Figure 1.1 and 1.2).
- In addition, a general animal list was compiled that will be consolidated in the final report after the walkdown assessment.

4 RESULTS and DISCUSSION

4.1 General Survey

The study was conducted when a physical site walk-down was conducted on 9 – 27 September 2024. The survey was done by the team with vehicle support to cover the full 260 km in the time available. Prior to the survey, some rain had occurred but had no direct impact on the survey.

The important aspect to note is that many of the game animals (apart from livestock) in the study area are farmed intensively. These include many of the plain's animals such as springbok, eland blesbok and gemsbok and predators in some areas.

4.2 Animals

During the assessment, the animals observed were recorded. Most of the observations were active dens and include the *Hystrix africaeaustralis, Orycteropus afer* and *Xerus inauris*. Many of the active den sites are close to proposed tower positions and it is recommended that these dens must be marked prior to construction. Where possible, the dens must not be disturbed. It is probable that the animals will move from the dens once activity start.

It will be important to limit deep excavations to areas where construction is starting. The concern is that animals can fall into the excavated holes. Many of the animals in the area are active at dusk or dawn or during the night. Safety nets must be placed around the excavated areas to lower the risk of animals entering the area. It is suggested to use shade netting to ensure small animals such as small mammals and rodents can't get through the nets. It is recommended that a ramp is left to help animals to escape during the night. Part of the daily routine must be to remove any animals trapped at night and release it away from the active site. It will be important to ensure that none of the trapped animals are killed and used as bushmeat. Any dead animals must be removed off site and dispersed at predetermined sites.

Animals observed (sightings, scat, tracks or dens) during the walkdown include*: Cryptomys hottentotus, Fukomys damarensis, Tragelaphus strepsiceros, Canis mesomelas, Antidorcas marsupialis,*

Raphicerus campestris, Sylvicapra grimmia, Cynictis penicillata, Herpestes sanguineus, Hystrix africaeaustralis, Lepus capensis, Lepus saxatilis, Orycteropus afer, Elephantulus brachyrhynchus, Pedetes capensis, Procavia capensis, Xerus inauris, Phacochoerus africanus, Stigmochelys pardalis, Agama aculeata aculeata, Caracal caracal, Pedioplanis namaquensis, Bitis arietans, Acraea spp. and *Stegodyphus dumicola*.

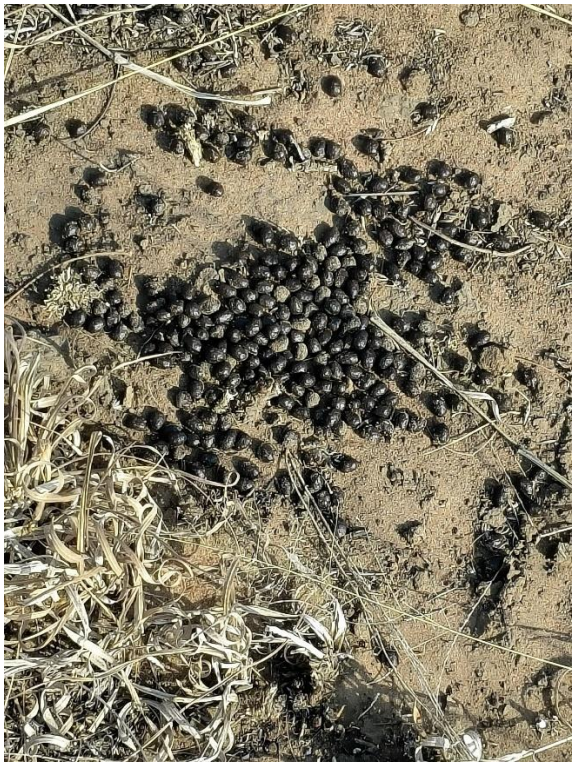
4.3 Habitat assessment

The larger part of the study area is modified by historic and current land use activities. The main impacts are over grazing, trampling, erosion, poor fire regimes and wood harvesting. The activity related to farming has impacted on the animal population is the area. Competition for food and hunting with rifles, snares and dogs have impacted on the larger animals in the area. The smaller animals are present but there are areas where little activities e.g. observation, dens of scat were noted. Game fences are increasing and many fences with jackal proof fencing limit the migration of many species. Only one tortoise was observed during the survey which is a concern.

The area has many tree clumps that are considered to be important habitat for animals in general. When looking at the larger landscape, the tree clumps are small “islands” in the larger grassland landscape. These clumps have originated on termite mound and have utilised the higher presence of nutrients to establish the trees. When looking at these areas, it is noted that many species utilise the mounds as habitat, i.e. for dens, food resources and cover from predators. It is recommended that the areas must be left intact where possible.

Examples of animals or signs found during the survey

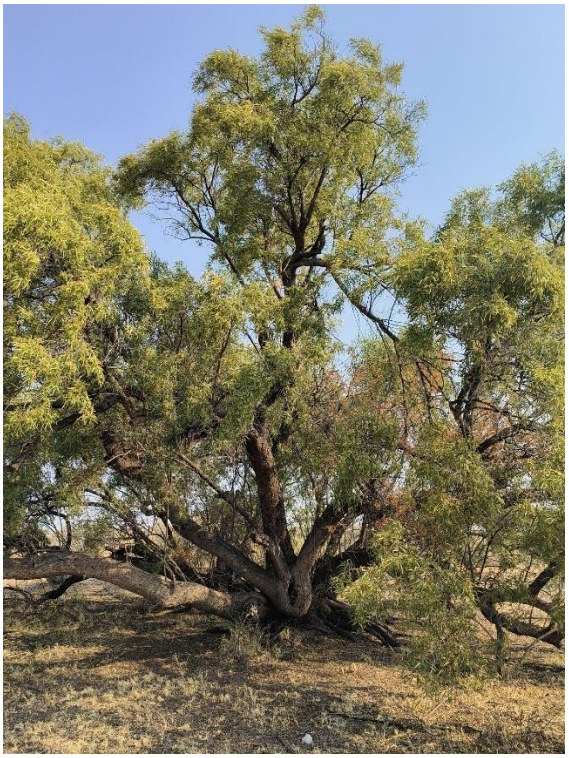
Photos: Cameron Blair



Habitat that animals utilise in the landscape

Areas to be avoided – “no-go” camping sites

Examples of large trees to be avoided – no trimming or cutting



Example of harvesting of protected species (*Vachellia erioloba*) for charcoal production

5 GENERAL COMMENTS and RECOMMENDATIONS

- Many of the larger game animals (apart from livestock) in the study area are farmed intensively and include many of the plain's animals such as springbok, eland, blesbok, gemsbok and predators in some areas.
- During the assessment, the animals observed were recorded.
- Most of the observations were active dens and include the *Hystrix africaeaustralis, Orycteropus afer* and *Xerus inauris*.
- Many of the active den sites are close to proposed tower positions and it is recommended that these dens must be marked prior to construction.
    - Where possible, the dens must not be disturbed. It is probable that the animals will move from the dens once activity start.
- It will be important to limit deep excavations to areas where construction is starting.
    - The concern is that animals can fall into the excavated holes.
    - Many of the animals in the area are active at dusk or dawn or during the night.
    - Safety nets must be placed around the excavated areas to lower the risk of animals entering the area.
    - It is suggested to use shade netting to ensure small animals such as small mammals and rodents can't get through the nets.
    - It is recommended that a ramp is left to help animals to escape during the night.
    - Part of the daily routine must be to remove any animals trapped at night and release it away from the active site.
    - It will be important to ensure that none of the trapped animals are killed and used as bushmeat.
    - Any dead animals must be removed off site and dispersed at predetermined sites.
- The larger part of the study area is modified by historic and current land use activities.
    - The main impacts are over grazing, trampling, erosion, poor fire regimes and wood harvesting.
- The activities related to farming has impacted on the animal population is the area.
    - Competition for food and hunting with rifles, snares and dogs have impacted on the larger animals in the area.
    - The smaller animals are present but there are areas where little activities e.g. observation, dens of scat were noted.
    - Game fences are increasing and many fences with jackal proof fencing limit the migration of many species.
    - Only one tortoise was observed during the survey which is a concern.
- The area has many tree clumps that are considered to be important habitat for animals in general.
    - When looking at the larger landscape, the tree clumps are small "islands" in the larger grassland landscape.
    - These clumps have originated on termite mound and have utilised the higher presence of nutrients to establish the trees.

- When looking at these areas, it is noted that many species utilise the mounds as habitat, i.e. for dens, food resources and cover from predators. It is recommended that the areas must be left intact where possible.

6 SENSITIVITY VERIFICATION COMPLIANCE STATEMENT - Animal Biodiversity Theme

Animal Species Theme

8. The site is listed **"high sensitivity"** with regards to the animal assessment in the screening tool.
    a. **This was related to the avifaunal component and this aspect is addressed in a separate report**.
9. For the **mammals, amphibia and reptiles**, no species were listed in the STR and therefore the sensitivity rating for these animals were **"low".**
10. The development will have limited negative impacts on the animal populations in the area (site and around it), as the area is already developed.
    a. The new tower footprint will have a negligible increased impact on the animals in the area.
    b. Animals will move away from the construction areas but can return during the operational phase.
11. The habitat and vegetation can support some resident and migrating individuals or family groups.
12. Impacts have been identified with proposed mitigation measures.
13. All these should be adhered to ensure all impacts are mitigated in the area associated with the development.
14. A number of red data species were recorded from the general animal list compiled for the area.
    a. These include:
        - ***Hippotragus equinus*** **(EN) -** Inhabit savannah woodlands and grasslands within the bushveld and Lowveld of southern Africa and prefer habitats with a cover of high grasses and woody plants which play an important role for both grazing and calving. As such, they may be especially sensitive to changes in grass height and composition, as Roan Antelope rely on grass to camouflage their young and for foraging.
            - Outside natural distribution range.
            - No free roaming animals in the area, none were noted on any of the properties evaluated.
        - ***Hippotragus niger*** **(VU) –** A species that frequents the woodland/grassland ecotone and they are selective feeders with a preference for fresh growth grasses (40 - 140 mm) and are dependent on drinking water, travelling to water at 2 - 4-day intervals. Burns that provide green re-growth and/or vleis are key resource areas in the dry season.
            - Outside natural distribution range.
            - No free roaming animals in the area, none were noted on any of the properties evaluated.

- ***Lycaon pictus* (EN)** - Wild Dogs can survive in most habitat types as long as the habitat is large enough, contains sufficient suitable prey and is free from direct threats such as accidental and deliberate persecution.
    - Outside natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Atelerix frontalis* (NT)** - Distribution mainly falls within savannah and grassland vegetation types, within which it is found in a wide variety of semi-arid and sub-temperate habitats, including scrub brush, western Karoo, grassland and suburban gardens. They require ample ground cover for cover, nesting and insect food sources.
    - None observed during the assessment.
    - Can occur in villages, town or in gardens on farms.
- ***Acinonyx jubatus* (VU)** - Cheetahs are habitat generalists and as such can survive where sufficient food is available and threats are tolerable. In South Africa, the free-roaming population and the two largest protected populations (KNP and KTP) occur in the Savannah biome. In addition, metapopulation reserves are in Savannah, Thicket, Grasslands, Nama Karoo, Fynbos and Succulent Karoo.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.
- ***Felis nigripes* (VU)** - It is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds. It inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m asl. It is not found in the driest and sandiest parts of the Namib and Kalahari Deserts.
    - Suitable habitat present in the study area.
    - None observed during the assessment.
- ***Panthera pardus* (VU)** – has a wide habitat tolerance, including woodland, grassland savannah and mountain habitats but also occur widely in coastal scrub, shrubland and semi-desert. Densely wooded and rocky areas are preferred as choice habitat types.
    - Edge of natural distribution range.
    - No evidence seen of the species in the area.
- ***Crocuta crocuta* (NT)** – This is predominantly a savannah species and occur in most habitat types including semi-desert, open woodland and dense dry woodlands. In many parts of its range, it occurs in close association with human habitation.
    - Edge of natural distribution range.
    - No free roaming animals in the area, none were noted on any of the properties evaluated.

- ***Smutsia temminckii* (VU)** – This solitary, terrestrial species is present in various woodland and savannah habitats, preferring arid and mesic savannah and semi-arid environments at lower altitudes, often with thick undergrowth, where average annual rainfall ranges between 250 and 1,400 mm, It also occur in floodplain grassland, rocky slopes and sandveld up to 1,700 m, but are absent from Karroid regions, tropical and coastal forests, Highveld grassland and coastal regions.
    - Can occur in the area, but it is known to have been persecuted by illegal hunting.
- ***Otomys auratus* (NT)** - This species is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water. In the Drakensberg Range, *O. angoniensis* occurs on the lower slopes in savannah habitats, *O. auratus* and *O. laminatus* occur at mid-elevation in grasslands and *O. sloggetti* at the highest elevations in alpine heath habitats.
    - No suitable habitat observed during the assessment.
- ***Rhinolophus denti* (NT)** – A species associated with arid savannah habitats where suitable roosting sites occur, typically restricting it to broken country with rocky outcrops or suitable caves and even the most southeasterly record in Africa comes from the drier southwestern part of the Free State Province. Colonies are largely dependent on caves, caverns, crevices in rocky outcrops, abandoned mines
    - Edge of natural distribution range.
    - Can occur in the area, limited habitat associated with the corridor assessed.
- ***Miniopterus schreibersii* (NT)** - A species found to roost in caves, rock clefts, culverts, caverns, and galleries.
    - Can occur in the area, limited habitat associated with the corridor assessed.

Red data species not listed but recorded on other databases.

- ***Aonyx capensis* (NT)** - Cape Clawless Otters are predominantly aquatic and seldom found far from permanent water. Fresh water is an essential habitat requirement, not only for drinking but also for rinsing their fur.
    - Not listed but a roadkill was recorded in April 2024 on the N14 near Vryburg.

15. The sensitivity rating can be maintained at a **"low sensitivity"** for the project area only.
16. A list of conditions and mitigating measurements have been provided to be included in the EMPr.

7 REFERENCES

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Wilson, B., Silwa, A. and Drouilly, M. 2016. ***Felis nigripes*** https://speciesstatus.sanbi.org/assessment/last-assessment/2036/ 2024

CURRICULUM VITAE

Brief Curriculum Vitae:

Name:	Wynand Vlok
Date of birth:	30 September 1960
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Nationality:	RSA
Address:	1 Assegai Close Acorn Creek Somerset Wes, 7130 South Africa
Email:	wynand.vlok@gmail.com
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Tertiary academic qualifications (Dates refer to completion, dates on certificates when confirmed):

BSc. (1984), BSc. (Hons) (1985), MSc. (1986), PhD (Zoology): Department of Zoology, Rand Afrikaans University, Johannesburg, South Africa

Magister in Sustainable Agriculture (2003): Faculty of Agriculture, University of the Orange Free State, Bloemfontein, South Africa - emphasis on resource management and sustainable utilization thereof.

Experience

BioAssets (owner of Consultancy CC)
1/01/2007 - current

University of Limpopo (formerly University of the North)
1/10/1996 – 31/12/2006 - Senior lecturer: Department of Zoology/Biology
1/1/1994 - 30/9/1996 - Lecturer: Department of Physiology (University of the North)

Manager
1992 - 1993 - Manager of a citrus farm

Technikon RSA
1989 - 1991- Lecturer: Nature Conservation

Rand Afrikaans University
1985 - 1988 - Research Assistant
1987 - Technician
1986 - 1992 - Researcher PhD studies
1985 - 1988 - Student Demonstrator

BioAssets Consultancy

Owner of BioAssets consultancy

Environmental Impact Assessments (EIA's) and Environmental Management Plans (EMP's) completed for: ESKOM (Electricity Utility in South Africa), National Department of Environmental Affairs, Department of Water Affairs, Department of Minerals and Energy, various provincial conservation agencies and private consultants. In addition, the EIA/EMP work included acting as an Environmental/Ecological Control Officer (ECO).

Training developed and presented to:

- Department of Water Affairs – Namibia
- Water Supply services – Seychelles – for technicians, operators, managers and engineers
- Department of Water Affairs – Uganda
- Corps of Engineers – Botswana Defence Force
- Water treatment operators for various municipalities in South Africa
- Pangani Basin Water - Tanzania

Professional associations

- South African Society of Aquatic Scientists (SASAqS) – 3 years as Vice President and three years as President – currently on the EXCO.
- South African Council for Natural Scientific Professions - Pr. Sci. Nat. (400109/95) – as Chairperson for the Professional Advisory Committee (Aquatic) and member of the Council.

Professional experience

- Supervisor for 5 PhD and 15 MSc students.
- Research fieldwork during MSc and PhD studies (Prof Johan van Vuren – University of Johannesburg) focussed on the histology of the reproductive systems in fish, specifically yellowfish in South Africa and in Israel. As part of the research we used various hormonal programmes to ensure that captive yellowfish were able to reach spawning maturity and then the sperm was stripped and cryopreserved. The motility of the sperm was tested after cryopreservation to determine swim viability and activity period compared to freshly sampled sperm (South Africa and Israel – over 5 years)
- When I started at the University of the Limpopo at the Department of Physiology, I continued the work with Prof George Smit. The experimental worked focussed on the pelleted implants of Buserilin acetate into male and female *Clarias gariepinus*. After 12 hours the fish were manually stripped of eggs and semen, fertilized and hatched. Growth rates were monitored and we also did feeding experiments on the artificially bred fingerlings.
- Research/biomonitoring in: Letaba, Olifants, Luvuvhu, Shingwedzi, Nyl, Crocodile, Komati, Pongola, Sabie and Sand River systems – e.g**. project on water quality and biota of the Shingwedzi River system and management strategies suggested to the KNP for implementation**, "**State of the Rivers Report – Luvuvhu and Letaba Rivers**", water quality and pollution, fish biology, monitoring (fish, macro-invertebrates, riparian vegetation, water quality and habitat assessments), wetland research and monitoring, freshwater ecology, management strategies and conservation plans (3 years).
- Project leader for the Water Research Commission (WRC) on Project about "**A biophysical framework for the sustainable management of wetlands in the Limpopo Province with Nylsvley as a reference model**" (WRC report no.: 1258/1/06). The aim was to investigate impacts on the river system, identify impacts and to compile a management plan for the system (January 2001 – December 2003).
- Project leader for a WRC project: **biodiversity and pollution threats to frogs of the Kruger National Park** (programme leader – WRC report: 1928/1/12 – January 2009 to December 2011).
- Researcher and project manager for WRC project: **impacts of water and the implementation of the reserve on the tigerfish in the Olifants and Luvuvhu rivers** (WRC report 1922/1/13 - – January 2010 to December 2012).

- Researcher as part of a WRC project: **the fish population and fishing potential in the Nandoni Lake** (WRC report 1925/1/12 – January 2010 – December 2012).
- Researcher and project manager for a WRC project on the Pongola floodplain investigating the impacts of flow regulation and pollution on the biota (fish, macro-invertebrates, frogs, birds and riparian vegetation), habitat and the impacts on society reliant on the system – "**Socio-Ecological System Management of the Lower Phongolo River and Floodplain Using Relative Risk Methodology**". (WRC Report No. 2185/1/16 – 2012 - 2014).
- Involved with SAEON (Ndlovu Node) in the establishment of a long term monitoring project of the Lowveld Rivers.
- **Expansion of the existing Blinkwater Tailings Storage Facility (TSF)** – wetland, habitat and biodiversity reports, Mogalakwena Mine, Anglo American. (Work done for SRK, January to March 2015).
- **Establishment of a new Waste Rock Dump (WRD) Facility, Witrivier site** - wetland, habitat and biodiversity reports, Mogalakwena Mine, Anglo American. (Work done for SRK, January to March 2015).
- **Wetland and Toxicological Risk Assessment as part of the Water Use Licencing Process for the Proposed Polokwane Metallurgical Complex Expansion and Associated Infrastructure** (Anglo American), Limpopo Province. (March 2016).
- **Determination, review and implementation of reserve in the Olifants, Letaba and Shingwedzi river systems** – project for the Department of Water and Sanitation (South Africa) – June 2015 – December 2016 (Golder and Associates).
- **Determination of Resource Quality Objectives in the Mokolo, Matlabas and Crocodile (West) and Marico rivers Catchments** - project for the Department of Water and Sanitation (South Africa) – August 2016 – January 2017 (Golder and Associates).
- **The determination of Water Resource Classes and associated Resource Quality Objectives in the Thukela Catchment** – August 2020 – November 2021(Golder and Associates).
- **Technical studies to support the water use authorisation for Simuma Complex, NPC Inter Cement, Kwa-ZuluNatal** – January/February 2018 (Golder and Associates).
- **KwaMhlanga Wetland and riparian delineation and assessments and the terrestrial biodiversity and habitat assessment** report. (July 2020).
- **Options with regard to the watercourse on the farm Middellaagte – wetland assessment, Amandelbult Mine**, August 2015 (Anglo American).
- **Water Quality Study for the Der Brochen Impoundment**, October/November 2016 (Anglo American).
- **Habitat Assessment for the Mogalakwena Platinum Mine - Establishment of a new Waste Rock Dump (WRD) Facility, Remaining Portion and Portion 1 of the Farm Witrivier 777 LR**, April 2015 (Anglo American).
- **Habitat Assessment for the Mogalakwena Platinum Mine - Expansion of the existing Blinkwater Tailings Storage Facility (TSF), Farms Blinkwater 820 LR and Zwartfontein 818 LR**, March 2015 (Anglo American).
- **Rehabilitation programme - evaluating the general habitat along the Mohlosane River**, June 2013 to August 2015 (Anglo American).
- **Investigation of clearing of site after Platinum Concentrate Spill** – N1, south of Polokwane, June 2015 (Anglo American).
- **Wetland and Toxicological Risk Assessment as part of the Water Use Licencing Process for the Proposed Polokwane Metallurgical Complex Expansion and Associated Infrastructure, Limpopo Province**, March 2016 (Anglo American).
- **Annual Water Use Licence External Audit and Wetland Assessment – Aerorand Switching Station and 88kV Powerlines** (Eskom). (March 2020 and November 2021 – 5 days each)
- **Annual Water Use Licence External Audit and Wetland Assessment – Grootpan and Brakfontein Switching Station and 88kV Powerlines** (Eskom). (March 2020 and November

2021 – 5 days each).

- **Annual Water Use Licence External Audit and Wetland Assessment – United/Bosch/ Kromklip Substations and associated 88kV Powerlines** (Eskom). (March 2020 and November 2021 – 5 days each).
- **River and wetland audit and rehabilitation plan and monitoring – Villiers/Windfield Substations, power lines** (Eskom). March/April 2020 – 10 days).
- **Habitat, Wetland and Biodiversity Assessment: Ingula Relocation Project** (Eskom). (For Myezo EMS – June/July 2020 for 20 days).
- **Highveld Exchange Yard Rail Siding: Wetland, biodiversity and habitat assessment** report. (For Myezo EMS - September 2020 for 9 days).
- **Onspoed prospecting assessment: biodiversity, habitat and wetlands** report. (For Myezo EMS - December 2020for 7 days).
- **An assessment of the Habitat, Biodiversity and Wetlands at the Gilead Substation** – diversion power line (Eskom). (February 2021 – 4 days).
- **Site Sensitivity Verification and Plant Biodiversity Compliance Statement** - **Construction of a 132kV overhead power line as part of the Loeries-Dwarsrug WEF Grid.** (A Mainstream Renewable Power South Africa (Pty) Ltd, done for SiVEST – November/December 2020 – 10 days).
- **Monitoring of the Critically Endangered *Bunolagus monticularis* (Riverine Rabbit) occurs along seasonal rivers in the Nama Karoo for a cluster of WEF's and Solar Farms – Richmond, South Africa.** (A Green Ventures project for David Hoare Consulting, December 2020 and July to September 2021 for 9 days).
- **Animal Biodiversity Assessment for the proposed Kwana Solar PV project near Richmond, Northern Cape Province.** (A Great Karoo Renewable Energy (Pty) Ltd project for David Hoare Consulting – May 2022 (2 days).
- **Animal Biodiversity Assessment for the proposed Moriri Solar PV project near Richmond, Northern Cape Province.** (A Great Karoo Renewable Energy (Pty) Ltd project for David Hoare Consulting – May 2022 (2 days).
- **Animal Biodiversity Assessment for the proposed Nku Solar PV project near Richmond, Northern Cape Province.** (A Great Karoo Renewable Energy (Pty) Ltd project for David Hoare Consulting – May 2022 (2 days).
- **Animal Biodiversity Assessment for the proposed Merino Wind Farm project near Richmond, Northern Cape Province.** (A Great Karoo Renewable Energy (Pty) Ltd project for David Hoare Consulting – May 2022 (2 days).
- **Vegetation Assessment for the Dwarsrug WEF project, near Loeriesfontein in the Northern Cape (assessment of the WEF turbine layout, grid roads and grid connections).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – March 2022 for 12 days.
- **Vegetation Assessment for the Waaihoek WEF project, near Utrecht in the KZN (assessment of the WEF turbine layout, grid roads and grid connections).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – March/April 2022 for 12 days.
- **Vegetation Assessment for the Rietrug Sutherland WEF projects (2 separate projects), near Sutherland in the Northern Cape (assessment of the WEF turbine layout, grid roads and grid connections).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – March to May 2022 for 25 days.
- **Vegetation Assessment for the Traka and Beaufort WEF project, near Beaufort West in the Western Cape (assessment of the WEF turbine layout, grid roads and grid connections).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – March to May 2022 for 24 days.
- **Vegetation Assessment (Basic Assessment) for the Sutherland 2 WEF project, near Sutherland in the Western Cape (assessment of the WEF turbine layout, grid roads and grid connections).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – May/June 2022 for 20 days.

- **Vegetation Assessment for the Waaihoek WEF Substation and Grid connection to the Bloedrivier Substation WEF project, near Utrecht in the KZN (assessment of the 26km grid connections).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – May/June 2022 for 12 days.
- **Koring MTS DEA Ref. No: 14/12/16/3/3/1/2077 (near Merweville, Western Cape) – A Botanical Assessment for the Koring MTS (Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities).** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – April 2022 for 3 days).
- **Koring MTS DEA Ref. No: 14/12/16/3/3/1/2077 (near Merweville, Western Cape) – Wetland Buffer Assessment: Koring MTS (Sutherland, Sutherland 2 and Rietrug Wind Energy Facilities.** A Mainstream Renewable Power South Africa (Pty) Ltd, done for SLR – April 2022 for 5 days).
- **Barrydale Huisrivier riparian vegetation rehabilitation project – A** Riparian Zone Rehabilitation, Management and Bioremediation, Department of Environmental Affairs and Development Planning Western Cape Government project – December 2021 to February 2022 (21 days).
- **Aries-Upington new 400kV powerline Environmental Services (Project manager) for the Botanical, Animal, Avifaunal, GA Authorisation and Heritage Assessment**. BioAssets CC conducted the botanical and animals assessments. November 2022 to July 2023. (Eskom).
- **GA Monitoring for Elliot-Witkrans 22kV Powerline** – (Eskom). September 2022 to March 2023.
- **Biodiversity Assessment (Animals and Plants) for the Construction of the Proposed Hydra – Kronos 2nd 400 kV Power Line** (DIGES for Eskom). March 2023 – November 2023).

Professional affiliation

- Member of "The South African Council for Natural Scientific Professions" (SACNASP – registered as a "Professional Natural Scientist: Registration number - 400109/95).
- Member of the South African Society for Aquatic Sciences.
- International collaboration and scientific visits to China, Singapore, Hong Kong, Japan, Mozambique and Kenya.
- Team leader for the UNESCO/Flemish Government FETWater project and development of the modules for the water related Master Degree programme (2003 – 2014).
    - Include training in Belgium and collaboration with Polish scientists on a research project (November 2010).

List of recent publications

Vlok W en Van Vuren JHJ. 1986. Chemical composition of seminal plasma of the smallmouth yellowfish Barbus aeneus (Cyprinidae). Presentation at the joint symposium of the Zoological Society of southern Africa and the Parasitological Society of southern Africa, RAU, Johannesburg.

Vlok W, Van Vuren JHJ en Els HJ. 1987. Ultrastructure of the testis of Barbus aeneus (Cyprinidae). S.A. Journal of Science 83(8):511

Vlok W en Van Vuren JHJ. 1988. Physical composition of the semen of Barbus aeneus, the smallmouth yellowfish (Cyprinidae). Comp. Biochem. Physiol. 90A(3): 387-389

Vlok W en Van Vuren JHJ. 1988. Chemical composition of the blood and seminal plasma of Barbus aeneus (Cyprinidae). Comp. Biochem. Physiol. 90A(1): 49-51.

Vlok, W and Engelbrecht, J.S. 2000. Some aspects of the ecology of the Groot Letaba River in the Northern Province, South Africa. *Afr. J. of Aquatic Science* 25: 76 – 83.

Vlok, W. 2005. Histological studies to evaluate gonad development in *Barbus neefi* (Cyprinidae), the sidespot barb, from South Africa. *Afr. J. of Aquatic Science* 30(1): 85 – 88.

Mbajiorgu, E.F., Aire, T.A., Vlok, W., Alberts, M. and Debusho, L.K. 2007. Haematological profile of male rats treated with ethanol and/or chloroquine and fed normal or low protein diet. *The Int J Hematology.* **3**(1): 1 – 20.

Mbajiorgu, E.F., Aire, T.A., Vlok, W., Alberts, M. 2008. Low protein diet enhances the toxicity of combined ethanol and chloroquine administration on gonadal weight, seminiferous tubular diameter and epithelial height of male Sprague-Dawley rats: A morphometric study. *International J Health Sc* (*IJHS).* **1**(4): 120 – 126.

Mbajiorgu, E.F., Aire, T.A., Vlok, W., Alberts, M. 2009. Effects of ethanol and/or chloroquine with low protein dietary intake on some biochemical parameters in male rats. *Afr J Food Agr Nutr Dev* (*AJFAND).* **9**(4): 1021 – 1042.

Fouché, P.S.O. and Vlok, W. 2010. Water quality impacts on the instream biota of the Shingwedzi River, South Africa. *Afr. J. of Aquatic Science* **35** (1) 1 – 11.

Venter, J.A., Fouché, P.S.O. and Vlok, W. 2010. Current distribution of the southern barred minnow, *Opsaridium peringueyi* (Pisces: Cyprinidae), in South Africa: Is there reason for concern? *African Zoology* **45**(2): 244–253.

ZCC Khoza, MJ Potgieter & W Vlok (2012): A preliminary survey of biotic composition of the Olifantspruit catchment, South Africa, *African Journal of Aquatic Science*, 37:2, 201-208

VeraVerhaert JohannesTeuchies WynandVlok VictorWepener AbrahamAddo-Bediako AntoinetteJooste RonnyBlust LievenBervoets 2019 Bioaccumulation and trophic transfer of total mercury in the subtropical Olifants River Basin, South Africa Chemosphere Volume 216, Pages 832-843

List of recent research reports and relevant projects (experience) related this project

Vlok, W., Venter, J., Fouché, P.S.O. and Snyman, S. (2006). *Progress report on the macro-habitat study of the Southern barred minnow.* WRC PROJECT K5/1677 (The development of a conservation framework for threatened African fish using *Opsaridium peringueyi* as a reference species).

Vlok, W and Fouché, P.S.O (2006). *Progress report on the Yamorna Weir and Luvuvhu River Projects.* Interim Report to the WfW capacity building initiative.

Venter, J., Fouche, P.S.O., Vlok, W., Moyo, N. and Snyman, S. (2007). *Progress report on the macro-habitat study of the Southern barred minnow.* WRC PROJECT K5/1677.

Vlok, W. and Fouché, P.S.O. 2007. A preliminary survey of the Shingwedzi River Catchment – alien plant infestation, aquatic biota, geomorphology, and riparian zone integrity. *Progress report to the Kruger National Park.*

Venter, J., Fouché, P.S.O., Vlok, W., Moyo, N., Grobler P. and Theron, S. (2008). *Progress report of the project on the development of a conservation framework for threatened African fish using the Southern barred minnow as a reference species.* WRC PROJECT K5/1677. 4th March 2008.

Vlok, W., Fouché, P.S.O, Cook, C.L., Wepener, V. and Wagenaar, G.M. (2012). *An assessment of the current distribution, biodiversity and health of the frogs of the Kruger National Park in relation to physical and chemical factors*. WRC Report 1928/1/12.

Fouché, P.S.O, Vlok, W. Roos, J.C., Luus-Powell, W. and Jooste, A. *Establishing the fishery potential of Lake Nandoni in the Luvuvhu River, Limpopo Province*. WRC Report 1925/1/12.

Smit, N.J., Wepener, V., Vlok, W., Wagenaar, G.M. and van Vuren, J.H.J. Conservation of tigerfish, *Hydrocynus vittatus*, in the Kruger National Park with the emphasis on establishing the suitability of the water quantity and quality requirements for the Olifants and Luvuvhu rivers. WRC Report No.1922/1/13.

Vlok, W, PSO Fouché, CL Cook, V Wepener and GM Wagenaar. An assessment of the current distribution, biodiversity and health of the frogs of the Kruger National Park in relation to physical and chemical factors. WRC Report 1928/1/12.

Smit NJ; Vlok W; van Vuren JHJ; du Preez L; van Eeden E; O'Brien GC and Wepener V. 2016. Socio-ecological system management of the lower Pongola River and floodplain using relative risk methodology. WRC Research Report No.2185/1/16.

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Wynand Vlok

Registration Number: 400109/95

is a registered scientist

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

Zoological Science (Professional Natural Scientist)
Botanical Science (Professional Natural Scientist)

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