Herpetofauna Impact Assessment Report

FOR THE PROPOSED DEVELOPMENT OF RENEWSTABLE ®SIVUTSE ON THE FARM BERGVLIET 65HS AND REMAINING EXTENT OF THE FARM RIETFONTEIN 66HS, WITHIN THE DR PIXLEY KA ISAKA SEME LOCAL MUNICIPALITY IN THE MPUMALANGA PROVINCE

MBONENI
ECOLOGICAL SERVICES

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List of Abbreviations

ADU	Animal Demography Unit
CBAs	Critical Biodiversity Areas
EIA	Environnemental Impact Assessment
EMPr	Environnemental Management Programme
HDF	Hydrogene de France
GPS	Global Positioning System
GIS	Geographic Information system
QDS	Quarter Degree Squares
IUCN	International Union for Conservation of Nature
MTPA	Mpumalanga Tourism and Parks Agency
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
PAOI	Project Area of Influence
PPA	Power Purchase Agreement
SAFAP	South African Frog Atlas Project
SANBI	South African National Biodiversity Institute
SARCA	Southern African Reptile Conservation Assessment
SEI	Site Ecological Importance
SCC	Species of Conservation Concern
SPC	Special Purpose Company

1 BACKGROUND AND MOTIVATION

As part of the Eskom lander tender MWP1247GX, Hydrogene de France (HDF- Energy) has been awarded 1782 ha of Eskom's land to develop 8 Renewstable® hydrogen power plants in the Mpumalanga Province, South Africa. Distributed over five farm portions near the Tutuka and Majuba Coal Power Stations, HDF-Energy is part of a cluster of different project developers, also awarded with land in the area to develop infrastructure related to renewable energy. HDF-Energy, under its Special Purpose Company (SPC) "Renewstable Mpumalanga (Pty) Ltd", is undertaking the development and implementation of 4 projects referred to as Majuba Cluster that consists of the following:

- Renewstable® Bokamoso
- **Renewstable® Sivuste**
- Renewstable® Qhakaza
- Renewstable® Ntokozo

The project's main objective is to design, develop, build, manufacture, operate, and maintain a 74MW Renewstable® Sivutse power plant and related infrastructure near Amersfoort in Mpumalanga to generate clean energy/electricity, increase access to electricity and contribute to the country's sustainable development initiatives.

The project involves developing the 74MW Renewstable Sivutse Power Plant, a high-capacity renewable power plant based on hydrogen BESS storage technology that harnesses renewable energy from a Photovoltaic (PV) Park and converts it into hydrogen using an electrolyser system. This hydrogen is stored in a compressed gas form; subsequently, when the photovoltaic park generates insufficient energy, the stored hydrogen is utilised to produce electricity for the grid through a fuel cell system. This innovative approach ensures a continuous and reliable power supply even when the PV park's energy production is inadequate. The system will only emit oxygen and water vapour as by-products.

The electricity produced by the plants will be purchased by a private(s) off-taker (s) at an agreed rate under the Power Purchase Agreement (PPA) for at least 25 years from the commissioning. The power plant is scheduled to be commissioned in 2027 and will contribute to the greening of the local power grid and enhance the territory's energy independence. The proposed development entails the following primary infrastructure:

Table 1. Primary infrastructures

Primary Infrastructure	Power produced
Baseload electricity	**55MW day, and evening 12 MW night**
Solar plant	210MWp
Electrolyser	60MW
Green H2 storage	250MWh
High-capacity fuel cells	12MW
Battery power	220MW
Battery storage	55MWh
Capacity production	87%
Land required	315 hectares
Electricity production	841.09 MWh daily 307 000 MWh yearly

Associated infrastructure includes the following:

- Hydrogen Power Centre
- Control Room
- Access/Service roads
- Buildings
- Fencing and Security
- Communications DC and AC cables installed underground and overhead.
- High Voltage Collector station that will be shared with other IPPS

A Herpetofauna Assessment was undertaken by Mboneni Ecological Services (Pty) Ltd as part of the Environmental Impact Assessment (EIA) process to assess the impacts that the proposed development will have on the receiving environment. The objective of this study was to identify sensitive herpetofauna species and their habitats on the study area. The current ecological status and conservation priority of vegetation on the site were assessed. Potential herpetofauna habitats were investigated in the study area and all reptiles, and amphibians known to occur or seen on site were recorded.

2 STUDY AREA

The proposed project is located on Portions 1, 6, 34 and the Remaining Extent of the Farm Bergvliet 65HS as well as the Remaining Extent of the Farm Rietfontein 66HS, approximately 3 km northeast of Majuba Power Station and approximately 7 km southwest of Amersfoort. The site is within Ward 8 in the Pixley Ka Isaka Seme Local Municipality jurisdiction in the Mpumalanga Province under the Gert Sibande District Municipality. The extent of the site is approximately 435 ha. (**Figures 1** and **2**).

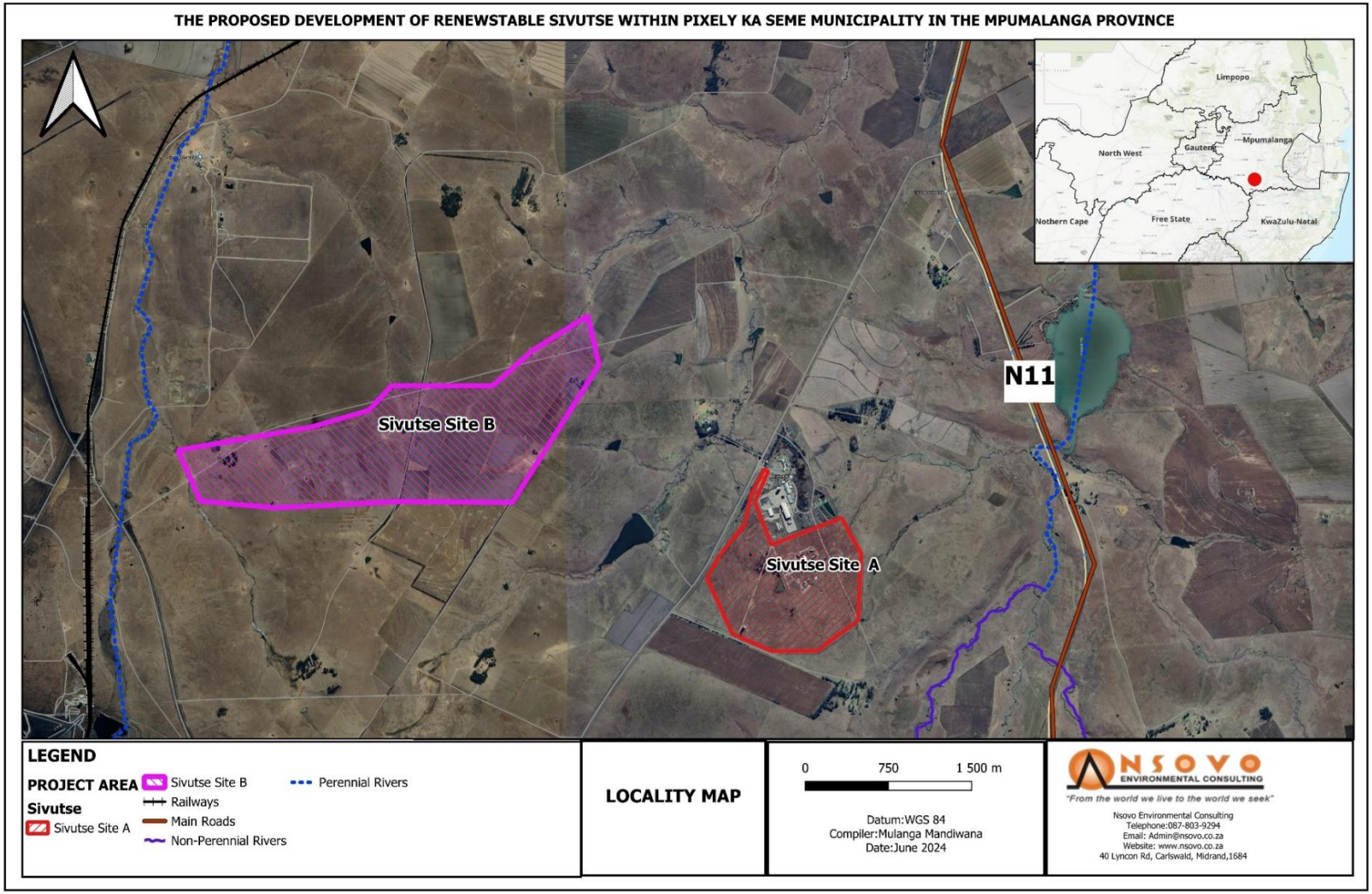

Figure 1. Google Earth image of the project site

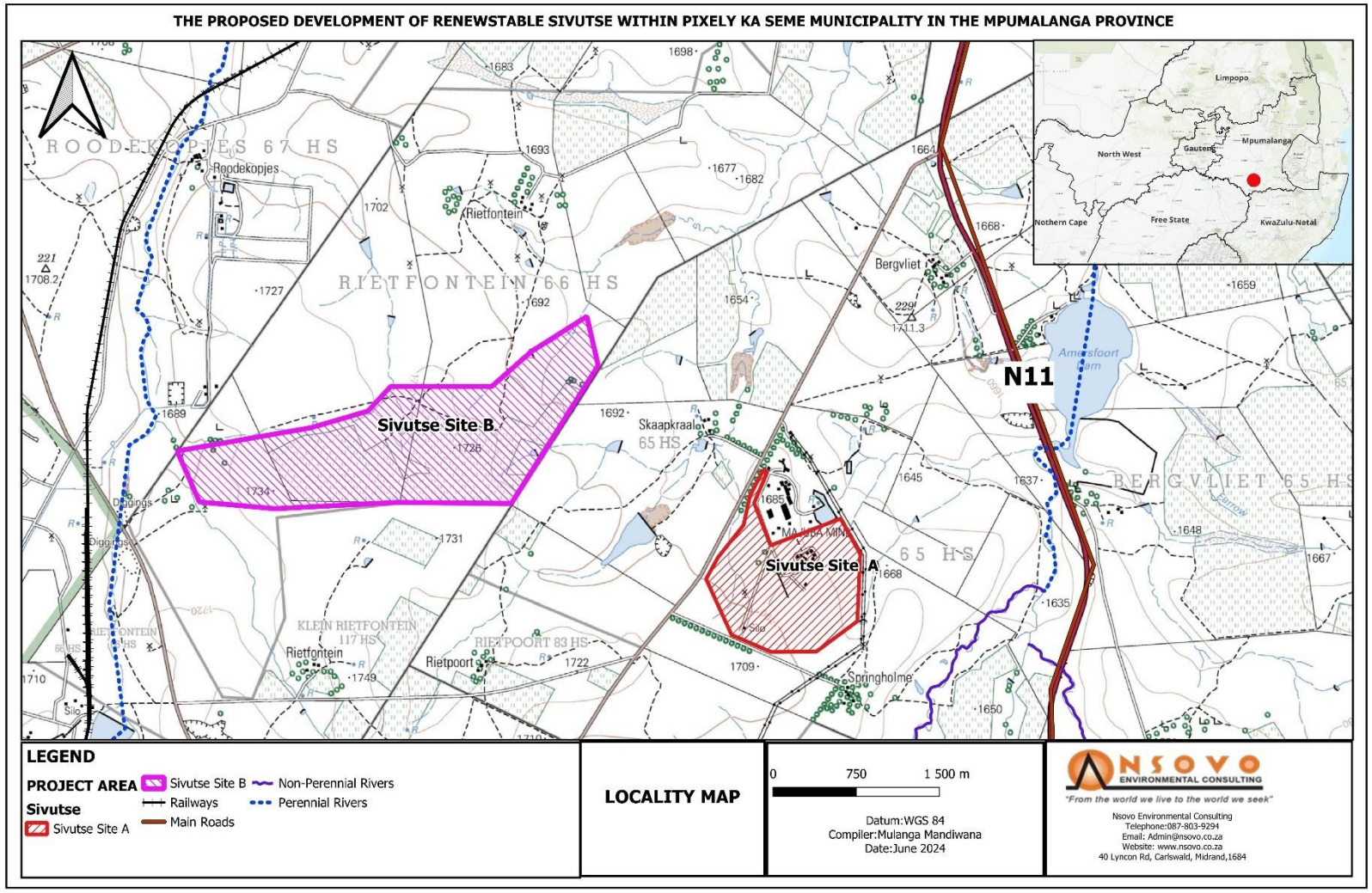

Figure 2. Locality Map

2.1 Declaration of Independence

I, Avhafarei Phamphe, declare that I –

- Act as the independent specialist;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations 2014;
- Will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant and there are no circumstances that may compromise my objectivity in performing such work;
- Have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- Will comply with the Act, regulations and all other applicable legislation;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake that the report adheres to Appendix 6 of GN No. R 982 of 4 December 2014 (as amended), and
- Will provide the Competent Authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Avhafarei Phamphe:

- Holds a M. Sc in Botany from the University of the Pretoria;
- Is registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Pr. Sci.Nat) Ecological Science, (Registration No.: 400349/12), with expertise in floral and faunal ecology;
- Has been actively involved in the environmental consultancy field for over 18 years;
- Is a Professional Member of South African Institute of Ecologists and Environmental Scientists (SAIEES) and
- Is a member of the South African Association of Botanists (SAAB).

Avhafarei Phamphe

Name of Specialist

Mboneni Ecological Services (Pty) Ltd

Name of Company

12 September 2024

Date

Signature

3 RELEVANT LEGISLATION AND GUIDELINES

The legislations that have possible bearing on the proposed project from an ecological perspective are captured below:

- Occupational Health & Safety Act (Act No. 85 of 1993);
- The Constitution of the Republic of South Africa (Act 108 of 1996) –Section 24;
- The white paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- National Environmental Management Act (Act No. 107 of 1998);
- The National Environmental Management Act (NEMA) No. 107 of 1998): Environmental Impact Assessment Regulations, 2014 as amended. Specifically, the requirements of the specialist report as per the requirements of Appendix 6;
- National Environmental Management Protected Areas Act 2003 (Act No 57 of 2003);
- National Environmental Management: Biodiversity Act (Act No.10 of 2004);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Threatened or Protected Species regulations;
- Guidelines for Involving Specialists in the EIA Processes Series (2005).
- Dr Pixley Ka Seme Local Municipality Environmental Management Framework (2011);
- National Biodiversity Assessment (2018) and
- Gert Sibande Bioregional Plan (2023).

4 LIMITATIONS AND GAPS

The following constraints/limitations were applicable to this assessment:

- Field visits were undertaken in May 2024, and as the majority of reptiles and amphibians are secretive, nocturnal and/or seasonal, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of these species based on scientific literature, field guides, atlases and databases. This can be done irrespective of survey season.
- Due to the nature of most biophysical studies, it is not possible to cover every square metre of the proposed development site.

- Preferably, a herpetofauna assessment should be conducted over a long timeframe and be repeated over several seasons. Consequently, this assessment should be regarded as a snapshot of the receiving environment and associated amphibian and reptile communities.
- Weather conditions during the surveys were favourable for recording both reptiles and amphibians.
- The desktop and field assessments were conducted on those portions of the project area as originally defined by the client. Any changes in the project boundary subsequent to this may negatively affect the robustness of this report.
- By their nature, amphibian and reptile species are cryptic and difficult to detect in a given environment, and although a thorough survey was completed, it is highly likely that certain species of herpetofauna that occur on site, or that only occur on site during particular times of the year, were not recorded.
- The focus of the survey remains a habitat survey that concentrates on the possibility that species of conservation concern occur on the site or not.
- While assessment of the potential occurrence of SCC has been undertaken, and is informed by readily available information, this provides only a surrogate indicator of the likelihood of such species occurring. This is however regarded as appropriate given the level of habitat degradation/transformation across much of the project area.
- The potential of future similar developments in the same geographical area, which could lead to cumulative impacts cannot be meaningfully anticipated.
- The impact descriptions and assessment are based on the author's understanding of the proposed development based on the site visit and information provided.
  Since ecological impact studies deal with dynamic natural systems additional information may come to light at a later stage and this Specialist can thus not accept responsibility for conclusions and mitigation measures made in good faith-based information gathered or databases consulted at the time of the investigation.

5 METHODOLOGY

The herpetofauna assessment consisted of two complementary approaches:

- A desktop analysis, which included literature review, local knowledge, topographical maps, and Google Earth imagery; and
- Site visits were conducted on the 16th and 17th of May 2024.

Satellite imagery of the area was obtained from Google Earth and was studied in order to acquire a three-dimensional impression of the topography and land use and also to identify potential "hot-spots"

or specialized habitats such as rivers, grasslands, trees and natural vegetation on or near the project site.

The probability of occurrence is based on the presence of suitable habitat where the species is likely to occur, known distribution, overall abundance, disturbance factors, anthropogenic change and the habitats of the species.

- **High** probability would be applicable to a species with a distributional range overlying the study site as well as the presence of prime habitat occurring on the study site.
- **Medium** probability pertains to a herpetofauna species with its distributional range peripherally overlapping the study site or required habitat on the site being sub-optimal.
- A **low** probability of occurrence will mean that the species' distributional range is peripheral to the study site and habitat is sub-optimal.

5.1 Reptiles

The Animal Demographic Unit website, Mpumalanga Tourism and Parks Agency (MTPA), Department of Forestry, Fisheries and the Environment (DFFE) Screening report, previous ecological studies, and historic distributions (Alexander & Marais, 2007) of reptile species were consulted in order to draw up list of potential occurrences. During the site visits, reptiles were identified by visual sightings during random transect walks. Possible reptile retreats such as burrows were inspected for any inhabitants. The habitat quality and quantity for Red Listed species potentially present were evaluated. The adjoining properties (approximately 20m) were also scanned for sensitive reptile species and habitats. The list of confirmed presences was augmented with anecdotal information provided by the local community residing in the vicinity of the study area. Conclusions were drawn, based on the impressions gathered during the site visit, as well as publications such as FitzSimons' Snakes of Southern Africa (Broadley, 1990), Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998), A Guide to the Reptiles of Southern Africa (Alexander and Marais, 2007), Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al*., 2014). The following habitats/vegetation were thoroughly investigated for the presence of Giant Girdled Lizard (*Smaug giganteus*), namely:

- Areas covered by *Themeda* grasses (Red grass).
- Areas where compacted sandy loam soils occur with little to no rocks.
- Short grasses (less that 30-40 cm in length).

5.2 Amphibians

ADU (2024), MTPA, the South African Frog Atlas Project (SAFAP) (1999-2003) data and Du Preez & Carruthers (2009) were consulted to draw up a list of potential occurrences. Field visit was then conducted to document all observed frog species. Potential habitat for Red Listed frog species which were previously recorded in the study area were then identified. Habitat quality and quantity for Red Listed species potentially present were then evaluated. This was then augmented with anecdotal evidence provided by locals. Adjoining properties (approximately 20m) were also scanned for important frog species. Samplings were conducted on the moist to semi-aquatic areas. Suitable habitats where amphibian Species of Conservation were also investigated. Frog calls were compared with pre-recorded calls from Du Preez and Carruthers (2009)'s CD and identified from this comparison. Almost all amphibian species in South Africa have unique and identifiable vocalisations that can be used to identify individuals at a species level. Vocalisations that were heard at the project site were recorded and identified. Most South African amphibians are nocturnal and/or are more vocal at night and are usually less concealed than during the day. For this reason, a nocturnal survey of the project area was conducted for several hours on the night of the 16th of May 2024. Headlamps and torches were used to locate individual frogs and reptiles.

6 Regional Vegetation

The project site falls within the Grassland biome and this Biome has a high biodiversity, ranked only below the Fynbos biome in terms of biodiversity in South Africa (Driver *et al*. 2004). This Biome is found mainly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal Province and the Eastern Cape Province. Grasslands are dominated by a single layer of grasses. Trees are absent, except in a few localised habitats and geophytes are often abundant (Low and Rebelo, 1996). SANBI (2018) classified the project site as falling entirely within the *Vulnerable* Amersfoort Highveld Clay Grassland vegetation type.

7 Protected and Conservation Areas

The National Environmental Management: Protected Areas Act (Act No. 57 of 2003) aims to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural seascapes. The purpose of a Protected Environment is amongst others to protect a specific ecosystem outside a special nature reserve world heritage site or nature reserve and to ensure the use of the natural resources in the area is sustainable.

The proposed development site falls near the Majuba Nature Reserve (SAPAD, 2023) (**Figure 3**) (approximately 1km west). This Nature Reserve is declared for the protection of Sungazer Lizard (*Smaug giganteus*).

According to National Protected Areas Expansion Strategy (NPAES) (DEA, 2016), its goal is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and recommend mechanisms for protected area expansion. The project area is situated in an area earmarked as a Priority Focus Area in terms of Protected area expansion (**Figure 4**).

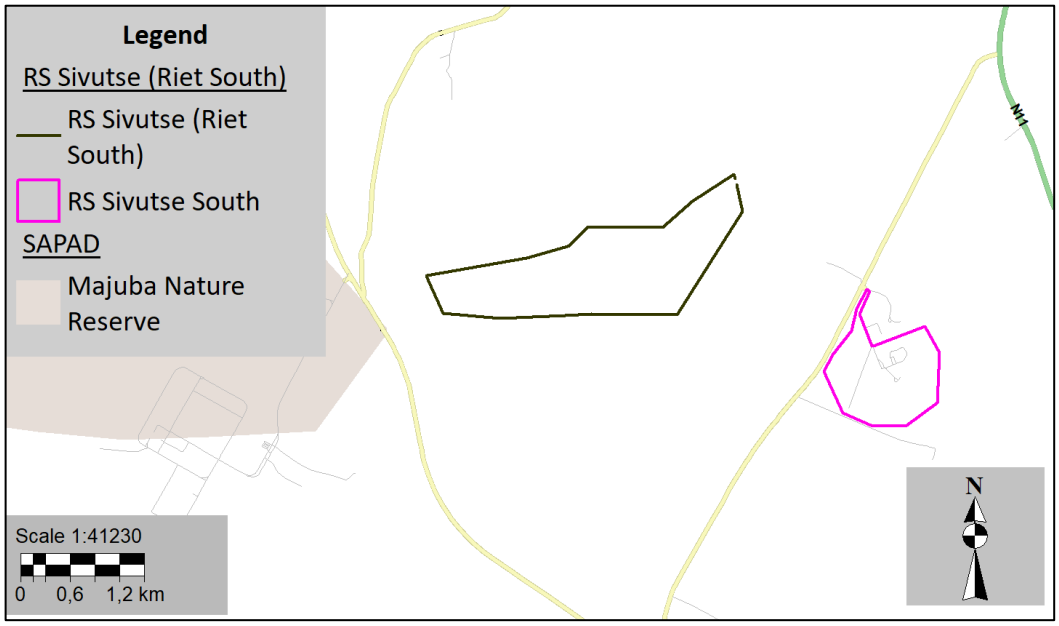

Figure 3. Majuba Nature Reserve in relation to the project area

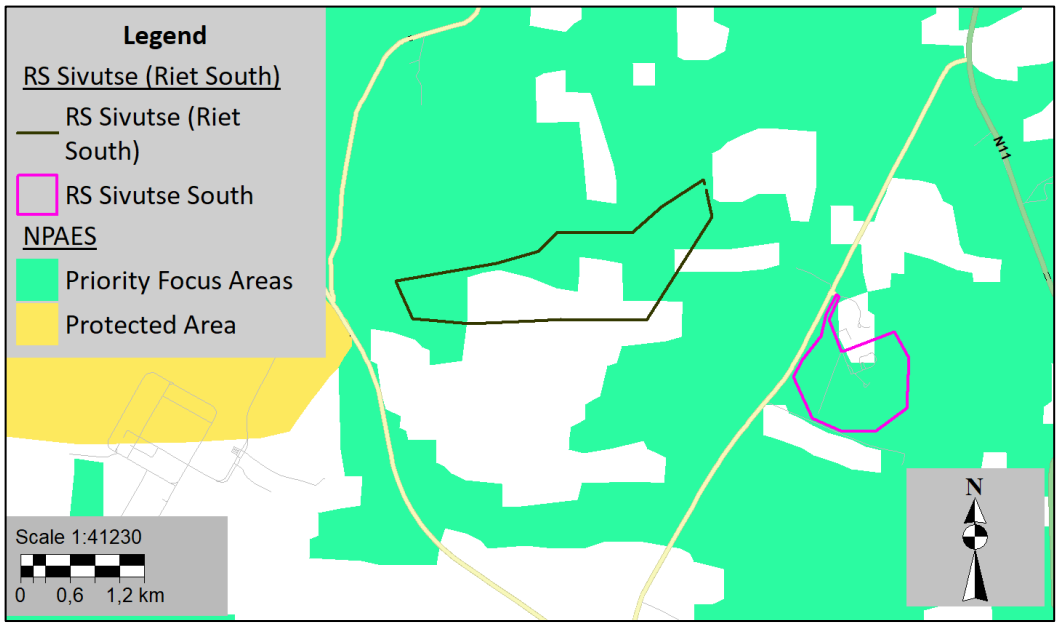

Figure 4. NPAES Priority Focus Areas in relation to the project area

8 RESULTS AND DISCUSSION

8.1 Reptiles

8.1.1 Desktop survey results

As previously stated, the proposed pipeline route falls within the grassland biome and this biome houses 22% of South Africa's endemic reptiles (O' Connor and Bredenkamp, 1997). According to the data sourced from the South African Reptile Conservation Assessment (ADU, 2024) for the grid cell 2729BB (**Table 2**), DFFE Screening report, MTPA (**Table 3**) and historic distribution (Alexander & Marais, 2007), Red data reptile species are known to occur in the region.

Table 2. Reptile species which could potentially occur on the study area (Grid cell 2729BB)

Family	Scientific name	Common name	Red list category
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	Least Concern

Family	Scientific name	Common name	Red list category
Cordylidae	*Pseudocordylus melanotus melanotus*	Common Crag Lizard	Least Concern
Cordylidae	*Smaug giganteus*	Giant Girdled Lizard	Vulnerable
Elapidae	*Hemachatus haemachatus*	Southern Rinkhals	Least Concern
Gekkonidae	*Pachydactylus vansoni*	Van Son's Gecko	Least Concern
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	Least Concern
Lacertidae	*Nucras lalandii*	Delalande's Sandveld Lizard	Least Concern
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	Least Concern
Lamprophiidae	*Lamprophis guttatus*	Spotted House Snake	Least Concern
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	Least Concern
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Grass Snake	Least Concern
Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern
Leptotyphlopidae	*Leptotyphlops scutifrons conjunctus*	Eastern Thread Snake	Least Concern
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake	Least Concern
Scincidae	*Trachylepis capensis*	Cape Skink	Least Concern
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern

Table 3. Red data reptile species which could potentially occur in the study area (MTPA)

Farm Name/Area	Scientific name	Common Name	Conservation status		SA Endemic
			RSA	MTPA	
Bergvliet 65 HS	*Homoroselaps dorsalis*	Striped Harlequin Snake	NT	NT	RSA
	Smaug giganteus	Giant Girdled Lizard	VU	VU	RSA

Farm Name/Area	Scientific name	Common Name	Conservation status		SA Endemic
			RSA	MTPA	
Elandspoort 85 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Oudehout kloof 86 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Palmietfontein 64 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Palmietspruit 68 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Rietfontein 66 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Rietpoort 83 HS	*Homoroselaps dorsalis*	Striped Harlequin Snake	NT	NT	RSA
	Smaug giganteus	Giant Girdled Lizard	VU	VU	RSA
Roodekopjes 67 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Tweefontein 97 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Verkyk 88 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Welgedacht 82 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA
Witkoppies 81 HS	*Smaug giganteus*	Giant Girdled Lizard	VU	VU	RSA

8.1.2 Reptiles recorded on and around the study area

The old buildings, trees, watercourses, rocky areas and grasslands provide suitable habitats (**Figure 5**) for reptile species to occur within the project site. There are rivers (perennial and non-perennial), pans and manmade dams on or near the study site. Some of the dams are temporary and others are permanent. These water sources would provide habitat for water-dependent herpetofauna. Termite mounds (**Figure 6**) were present on site and old termite mounds offer important refuges especially during veld fires as well as cold winter months for numerous snake species (Jacobsen, 2005). These structures are good indicators of the occurrence of certain small herpetofaunal species. No termite mounds were destroyed during the brief field surveys. All overturned rock material was carefully replaced in its original position. Trees including stumps; bark and holes in trees are vital habitats for numerous arboreal reptiles (chameleons, snakes, agamas, geckos and monitors). The natural

grassland was first transformed for agricultural purposes and some of it later by anthropogenic influences such as buildings, roads, fences and invasive plants. Four reptile species were recorded during the survey, namely Spotted Skaapsteker (*Psammophylax rhombeatus*) (**Figure 7**), Mole Snake (*Pseudaspis cana*), Speckled Rock Skink (*Trachylepis punctatissima*) and Cape Skink (*Trachylepis capensis*). No reptile Species of Conservation Concern were recorded on the project development site. According to the anecdotal information, the following reptile species have been sighted in the area, namely Bibron's Blind Snake (*Afrotyphlops bibronii*), Peter's Thread Snake (*Leptotyphlops scutifrons*), Rhombic Skaapsteker (*Psammophylax rhombeatus*), Mole Snake (*Pseudaspis cana*) and Rinkhals (*Hemachatus haemachatus*). Most reptile species are sensitive to severe habitat alteration and fragmentation. Species are also very often "expelled" into riparian zones due to transformation of lands for anthropogenic disturbances such as human settlements and agricultural purposes. Reptiles are tremendously secretive and hard to detect during field surveys and therefore the identification of reptile species relied upon an assessment of the vegetation and surrounding areas to the site. Regular burning of the project site will impact the reptile species by reducing refuge areas and increasing predation as well as likely killing any species that cannot outrun the flames. However, due to the cryptic nature of reptile species, the single season survey, the seasonal timing of the survey and historic records of reptile SCC within, and adjacent to, the project area, it is plausible that such species may nonetheless be present and/or may utilise the site for brief periods during the year.

Figure 5. Suitable habitat for reptile species recorded within the project site

Figure 6. Termite mounds recorded within the project site

Figure 7. Spotted Skaapsteker within the project site

Giant girdled lizard (*Smaug giganteus*), formerly known as *Cordylus giganteus*, is found in Highveld Grassland (Van Wyk, 2000) and inhabit flat or sloping Highveld grasslands. They live in self-excavated burrows, although they can be opportunistic and inhabit empty burrows (Bates *et al*., 2014). The Majuba Power Station Nature Reserve, which is situated west of the project site, was declared for the protection of this reptile species. Therefore, in order to protect this species, awareness of construction personnel to recognise Giant girdled lizard species will reduce the probability of this species being harmed unnecessarily and the contractor must ensure that this species is not disturbed, trapped, hunted or killed during the pre-and construction phases. Sungazers are unique within their family (Cordylidae) in that they rely on self-constructed burrows in specific microhabitats within the grassland matrix as long-term, often permanent, shelter and refuge sites. If any individuals or burrows of *Smaug giganteus* are observed, they must be recorded and the ECO immediately notified. Search and rescue operations should occur before the construction works begin to ensure that any slow moving or burrowing species (such as moles, chameleons, snakes or tortoises) would be moved to adjacent suitable habitats by a qualified Faunal Specialist. Sungazers are threatened because their pristine grassland habitat is being rapidly transformed for agricultural expansion, mining activities, overgrazing, and the collection of individuals for the pet trade or local traditional use (Stanton-Jones, W. 2023).

8.1.3 Potential occurrence of Red Data reptile species

Data sourced from Virtual Museum of African Mammals (ADU, 2024), MTPA and historical distribution indicate that there are reptile species which are known to occur in the general vicinity of the site. **Table 4** below indicates the suitable habitat together with the probability of occurrence.

Table 4. Probability of Occurrence of Red Data reptile species which could be found on the project area

Common Name	Conservation status		Suitable habitat	Probability of occurrence
	RSA	MTPA		
Giant Girdled Lizard	Vulnerable	Vulnerable	This species is found in Highveld grassland. It is unique among the cordylids as it an obligate burrower living in self-excavated burrows. It can be considered a habitat specialist, that is highly philopatric for burrowing sites. Although it is a	High

Common Name	Conservation status		Suitable habitat	Probability of occurrence
	RSA	MTPA		
			large lizard, it will not easily disperse across the landscape to make new burrows should its habitat be destroyed. It is diurnal and insectivorous, although plant material may also be consumed	
Striped Harlequin Snake	Near Threatened	Near Threatened	Partially fossorial and known to inhabit old termitaria in grassland habitat. Most of its range is at moderately high altitudes, reaching 1,800 m in Mpumalanga and Swaziland, but it is also found at elevations as low as about 100 m in KwaZulu-Natal	Medium to High

8.2 Amphibians

Amphibians are an essential part of South Africa's exceptional biodiversity and are such worthy of both research and conservation. Frogs and tadpoles are good species indicator of water quality, because they have permeable, exposed skins that readily absorb toxic substances. Tadpoles and frogs are aquatic and greatly exposed to aquatic pollutants (Blaustein, 2003).

8.2.1 Desktop survey results

MTPA data, DFFE Screening report, FitzPatrick Institute of African Ornithology (2024) (grid cell 2729BB) (**Table 5**) and Du Preez & Carruthers (2009) were consulted in order to draw up a list of potential occurrences and no frog species of conservation concern could potentially be found within the study area. It is therefore imperative to note that much of this data is derived from a relatively large spatial scale and on a finer scale, it might be highly unlikely for many of these species to occur within the project site itself.

Table 5. Frog species which could potentially occur on the study area (QDS 2729BB)

Family	Scientific name	Common name	Red list category
Bufonidae	*Sclerophrys capensis*	Raucous Toad	Least Concern
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	Least Concern
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	Least Concern
Hyperoliidae	*Semnodactylus wealii*	Rattling Frog	Least Concern
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern
Ptychadenidae	*Ptychadena porosissima*	Striped Grass Frog	Least Concern
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	Least Concern
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	Least Concern
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	Least Concern
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	Least Concern

8.2.2 Field work results

The watercourses (**Figure 8**) within the study area hold water on a temporarily basis and are important breeding habitats for most of the frog species which could occur within the study area. A hydrology scan (**Figure 9**) was obtained to determine the presence of rivers and wetlands within the study area and

these areas were surveyed for amphibian species. During the field survey, three frog species were recorded within the project site, namely Raucous Toad (*Sclerophrys capensis*), Common River Frog (*Amietia delalandii*) and Guttural Toad (*Sclerophrys gutturalis*). Widespread habitat transformation and high levels of human activities within a study area often results in low amphibian diversity as they are very sensitive to environmental stressors. No frog species of conservation concern were recorded on site. Although the project area is relatively transformed, various herpetofauna are evidently utilising the remaining habitat in the project area and certain species appear to be present in high densities.

Figure 8. Watercourses within the project site

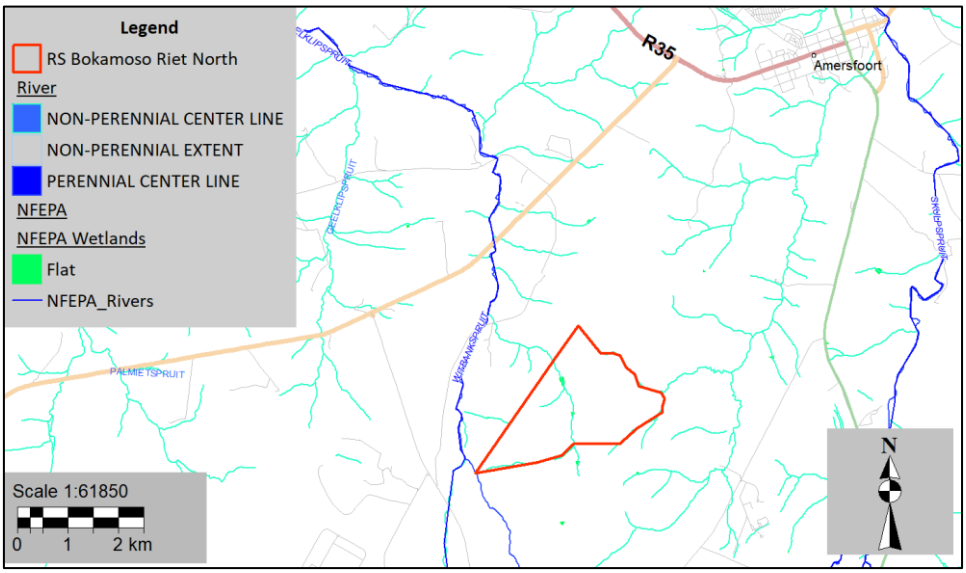

Figure 9. Hydrology Map of the study area

9 TERRESTRIAL ECOLOGICAL SENSITIVITY ANALYSIS OF THE STUDY AREA

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “low”, “medium”, “high” and “very high” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g., for confirmed areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below (**Table 6**).

Table 6. A description of the different screening tool sensitivity ratings

Sensitivity rating	Description of sensitivity rating
Very high	Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 is considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under the CR, EN, or VU D criteria of the IUCN or species listed as Critically/Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a critical habitat, all remaining suitable habitat has been manually mapped at a fine scale.
High	Recent occurrence records for all threatened (CR, EN, VU) and/or Rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2002) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat. For birds, species distribution models (SDMs) and SABAP2 data (http://sabap2.birdmap.africa/) were combined to delineate the ‘high’ sensitivity areas (
Medium	Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a

Sensitivity rating	Description of sensitivity rating
	probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
Low	Areas where no SCC are known or expected to occur.

9.1 Sensitivity Assessment

The evaluation of the terrestrial biodiversity, fauna, flora and vegetation importance of the project site was evaluated according to the procedures for the assessment and reporting of impacts on terrestrial biodiversity, terrestrial fauna and species and flora, for activities requiring environmental authorisation as published under the National Environmental Management Act, 1998 (Act No. 107 of 1998): *Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24 (5)a and (h) of the National Environmental Management Act, 1998, when applying for environmental authorisation (G 42946 – GN 9) and SANBI's Species Protocols for Environmental Impact Assessment in South Africa.*

According to the Screening report for an Environmental Authorization as required by the 2014 EIA regulations – proposed site environmental sensitivity, the relative animal species theme sensitivity is considered as *High* sensitivity (**Figure 10**). However, no herpetofauna species were mentioned.

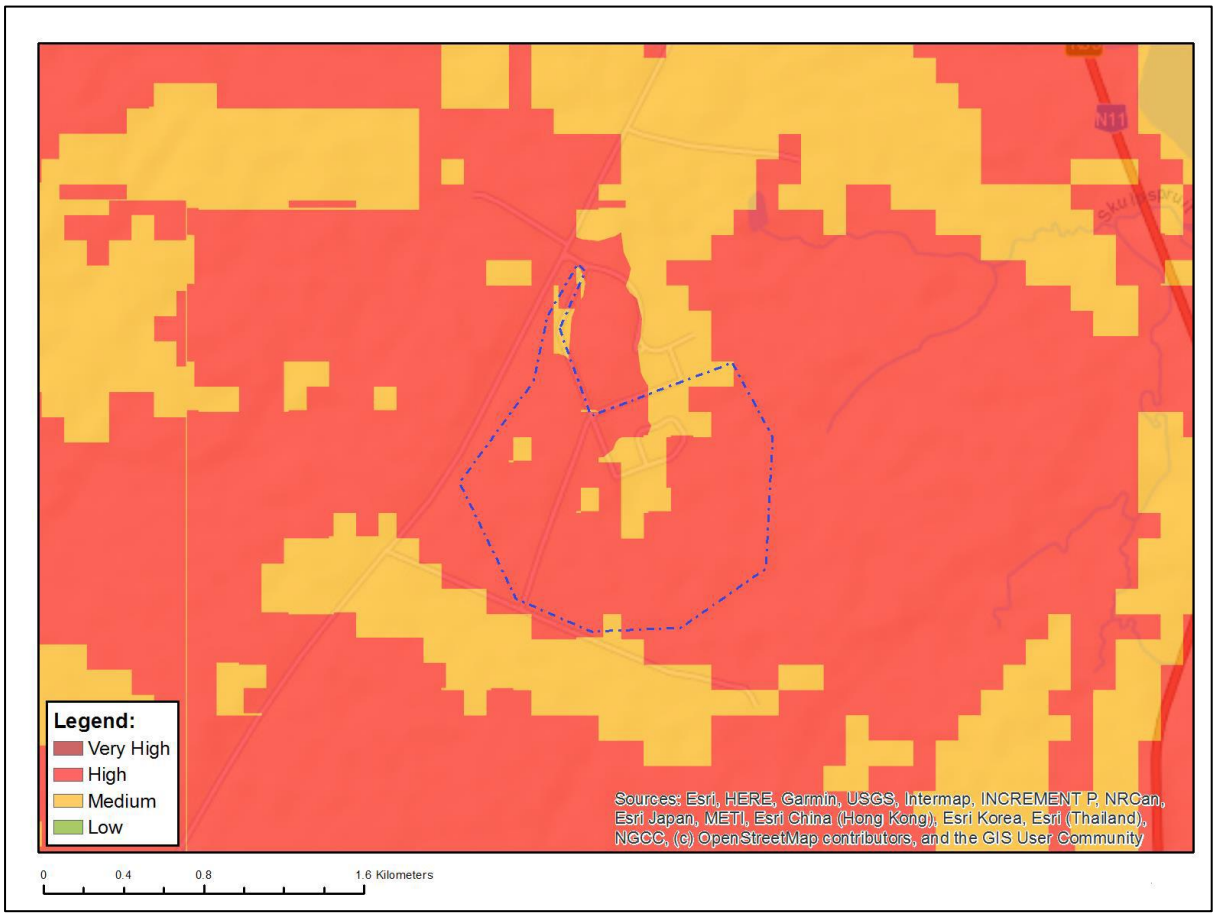

Figure 10. Map of relative Animal species Theme Sensitivity

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (**Table 7**). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings. The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 7. Criteria for establishing Site Ecological importance and description of criteria

Criteria	Description
Conservation Importance (CI)	The importance of a site for supporting biodiversity features of conservation concern present e.g., populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant

Criteria	Description
	populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes
Functional Integrity (FI)	A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	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
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR) (SEI = BI + RR)	

The method used to assess site sensitivity has been described in **Table 7** above. **Tables 8** and **9** below provides a summary of how each site was assessed.

Table 8. Evaluation of Site Ecological Importance (SEI) of habitat, SCC and Project Area of Influence (PAOI)

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	SEI
Amersfoort Highveld Clay Grassland vegetation type	Medium	High	Medium	BI = Medium RR =Medium (=Medium)
	> 50% of receptor contains natural habitat with potential to support SCC.	Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitats patches.	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or	

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	SEI
			(ii) returning to a site once the disturbance or impact has been removed	

Table 9. Guidance for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

Site Ecological Importance	Interpreting in relation to the proposed development activities
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

The site verification was conducted concurrently with the Herpetofauna Impact Assessment and during the surveys, it was concluded that the proposed development site falls within *Medium* category in terms of sensitivity.

10 ENVIRONMENTAL IMPACT ASSESSMENT

10.1 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed on a qualitative level and thereafter quantitatively assessed by evaluating the duration, extent, magnitude, probability and ultimately the significance of the impacts (refer to methodology provided below. The assessment considers impacts before and after mitigation measures (**Table 10**).

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 (spatial scale) 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	2 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

Significance of the impact, Degree of Irreversibility, Degree of loss of Resource are rated as follows:

Significance Rating	Description
Low (score of 1-29)	Impact will not significantly change fauna biodiversity and requires no significant mitigation measures.
Moderate (score of 30-60)	Impact will change fauna biodiversity and requires some mitigation measures.
High (Score of 61-100)	Impact will significantly change fauna biodiversity and significant mitigation measures and management is required. Potential fatal flaw.

The Significance = (Magnitude + Spatial Scale + Duration) x Probability

10.1.1 Impacts on Herpetofauna

Only the ecological issues identified during the appraisal of the receiving environment and potential impacts are assessed (**Table 10**). Mitigation measures are provided to prevent (first priority), reduce or remediate adverse environmental impacts.

The pre/construction phases of the proposed development are anticipated to have direct impacts on herpetofauna habitats, and therefore, site clearing will potentially result in permanent removal of floral habitat and therefore the disturbance of vegetation must be limited to areas of construction only.

Based on the results of the field survey, it is evident that the project site provides habitat to several herpetofauna species. Although it is assumed that most fauna species will move to different areas as a result of disturbance, many SCC fauna species have a specific habitat requirement and the destruction of their habitats will result in displacement to less optimal habitats, or ultimately may result in their demise. However, the impacts to the reptile SCC can be mitigated.

Increased levels of noise, disturbance and human activity during construction may be detrimental to herpetofauna. The risk of illegal hunting/poaching/trapping of wildlife for various uses is likely. Many species would however become habituated to the existing activities and would return to normal activity after some time. The operational phase of the development will be permanent. Potential impacts on

local faunal species as a result of disturbance/displacement has been assessed as significant at a local scale.

The potential impacts associated with the pre-construction, construction and operational activities are discussed in **Table 10**.

10.1.1.1 Pre-construction / Construction Phases

Activities associated with the pre-construction and construction phases, include the following:

- Site establishment, such as construction camps, laydown and storage areas on site;
- Earthmoving activities e.g., excavation and soil stockpiling and
- Vegetation clearance of the site.

Potential impacts to herpetofauna during the pre-/and construction phases, include the following:

- Destruction of natural vegetation during site establishment and potential loss of herpetofauna habitats;
- Inadvertent killing and injury of herpetofauna species during vegetation clearance and excavation;
- Loss/displacement of herpetofauna species potentially present on site;
- Loss of herpetofauna habitat due to vegetation clearance.

10.1.1.2 Operational Phase

Activities associated with the operational phase, include the following:

- Vegetation management activities; and
- Fauna management activities.

Potential impacts associated with the operational phase, include the following:

- Disturbance of local faunal communities; and
- Loss of habitat due to operational activities.

Table 10: Potential impacts and recommended mitigation measures with significance rating before and after mitigation

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
Destruction of natural vegetation during site establishment and potential loss of herpetofauna habitats.	Medium to long term (4)	Local (2)	Highly Probable (4)	Moderate (6)	48 (Medium) Status (-ve)	• A search for trapped animals must be done daily throughout the construction phase. This must be done by a suitably qualified trained snake handler. If any species are recorded, they must be carefully removed and placed in adjacent natural area.	Short to medium term (2)	Local (2)	Highly Probable (4)	Slight to moderate (4)	32 Low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						• A search and rescue mission should be conducted in order to capture and relocate any Sungazer in the project area. This should be done before construction begins. It is recommended that these animals be relocated to suitable habitat in the adjacent Majuba Nature Reserve.					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						• Emergency numbers for snake handlers must be clearly displayed in the offices. • An Environmental Control Officer (ECO) with appropriate herpetofauna experience should be present during initial site clearing activities, in the event that any amphibian or reptile SCC are encountered.					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						• Any other herpetofauna encountered can be relocated either to the wetlands in the area or (preferably) into the Majuba Nature Reserve nearby. • Development planning must ensure that loss of vegetation and disturbance are restricted within the recommended					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						site layout footprint. • Clearly demarcate the construction footprint prior to clearing of vegetation. Areas cleared of vegetation must be re-vegetated/landscaped prior to contractor leaving the site. • Pre-construction environmental induction must be conducted to all construction staff					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						on site to ensure that basic environmental principles are adhered to. This includes awareness as to conservation and importance of herpetofauna of conservation concern. • An ECO should provide supervision and oversight of vegetation clearing activities. • All laydown, storage areas,					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						site camps etc. should be restricted to within the project area and should preferably be situated within areas of low sensitivity (already disturbed areas). • Appropriate traffic calming measures need to be put in place and signage warning road-users of the possible					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						presence of Sungazers.					
Loss and displacement of Fauna Species of conservation concern on site due to habitat loss and mortality	Medium to long term (4)	Local (2)	Highly Probable (4)	Moderate (6)	48 (Medium) Status (-ve)	• If any individuals or burrows of *Smaug giganteus* are observed on site, they must be recorded and the ECO immediately notified. Search and Rescue operations should occur before the construction works begin to ensure that any slow moving or burrowing species (such as moles,	Short to medium term (2)	Site specific (1)	Highly Probable (4)	Slight to moderate (4)	28 Low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						chameleons, snakes or tortoises) would be moved to adjacent suitable habitats by a qualified Faunal Specialist. • If any faunal species are recorded during construction, especially the protected species potentially occurring on site, activities should temporarily cease, and an appropriate					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						specialist should be consulted to identify the correct course of action. • Awareness of construction personnel to recognise threatened faunal species will reduce the probability of fauna being harmed unnecessarily. • The contractor must ensure that no faunal species are disturbed,					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						trapped, hunted or killed during the pre-and construction phases. • Any new fences / walls to be constructed within the project site, should be constructed in such a way as to be as 'frog-friendly' as possible. • Vehicles must adhere to the set speed limit. • All construction vehicles must use					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						designated access roads. Off-road driving should be strictly prohibited. • Herpetofauna that become trapped in any excavation or in any construction related activity, may not be harmed and must be rescued and relocated by suitably qualified personnel. • Any fauna threatened by the construction					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						activities should be removed to safety by the ECO or any suitable qualified personnel. • Awareness of construction personnel to recognise threatened herpetofauna species will reduce the probability of fauna being harmed unnecessarily. • The contractor must ensure that					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						no faunal species are disturbed, trapped, hunted or killed during the pre-and construction phases. • Vehicles must adhere to the set speed limit. • All construction vehicles must use designated access roads. Off-road driving should be strictly prohibited. • Herpetofauna that become trapped in any					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						excavation or in any construction related activity, may not be harmed and must be rescued and relocated by suitably qualified personnel. • Any Herpetofauna threatened by the construction activities should be removed to safety by the ECO or any suitable qualified personnel.					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
Herpetofauna killed during construction activities and by visitors, including intentional and accidental killing (but excluding road kills)	Medium to long term (4)	Local (2)	Highly Probable (4)	Moderate (6)	48 (Medium) Status (-ve)	• Construction workers are to be instructed to avoid harming any herpetofauna and drive only on pre-existing vehicle tracks and work as much on foot as possible. Any herpetofauna that are uncovered or displaced during construction activities should be relocated a short distance away from the construction area.	Short to medium term (2)	Site specific (1)	Highly Probable (4)	Slight to moderate (4)	28 Low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						• Design and erect information boards that inform the public of the herpetofauna and their importance on the site, and that wildlife must be left undisturbed. This has the potential to reduce intentional killing of herpetofauna to levels below that which might be expected without the development.					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						• The handling, poisoning and killing of on-site fauna by contractors must be strictly prohibited.					
Inadvertent killing and injury of fauna species during vegetation clearance.	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)	• If possible, the clearance of vegetation should commence during non-breeding season of fauna species (i.e., winter). • A speed limit of 20km per hour should apply to the roads on site to reduce the	Short to medium term (2)	Site specific (1)	Improbable (2)	Slight (2)	10 (Low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						chance of road fatalities. • Pits/Trenches should be covered when not in use to avoid animals from falling in, for example overnight. Any animals fallen must be safely removed from the development area. • Ensure that no structures are built, during and after construction that could act as					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						potential pit-fall traps for amphibian species. • Any fauna threatened by the construction activities should be moved to safety by a suitable qualified ECO or an Ecologist. • All personnel should undergo an environmental induction with regards to herpetofauna, in particular					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						awareness about harming or collecting species such as snakes, tortoises. • If trenches are to be dug, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are left open should have places where there are soil ramps, which will allow fauna to					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						escape the trench. • No herpetofauna should be intentionally destroyed or killed, and no hunting or poaching of animals is allowed in the project site or adjacent areas. • No food or similar waste that may attract wild animals should be disposed of at the site. All food and litter waste					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						should be placed in sealed bins and removed from the site each day. • In order to reduce collisions of vehicles with herpetofauna, animals should have right of way. • The use of poisons, such as pesticides, should be avoided as far as possible. • Road signs to instruct construction vehicles to					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						adhere to speed limit.					
Operational phases											
Disturbance of local fauna populations.	Medium (3)	Local (2)	Highly Probable (4)	Moderate (6)	44 (Medium) Status (-ve)	• Animals residing within the designated area shall not be unnecessarily disturbed. • No hunting, trapping, killing of any animal should be permitted. • Snake and or animal handling should be strictly limited to qualified staff or a dedicated	Short to medium term (2)	Site specific (1)	Improbable (2)	Slight (2)	10 (low) Status (-ve)

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						external snake handler. • When accessing the site, vehicles are to utilise the existing roads. • Ensure that no unnecessary clearing of herpetofauna habitat occurs during maintenance activities. • No fires by maintenance personnel are allowed. • All vehicles accessing the site					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						should avoid collisions with susceptible species such as snakes and small rodents. • Monitoring areas within the development footprint for the establishment of Giant Girdled Lizard colonies. • Determine an effective translocation protocol for the Giant Girdled Lizard (if required)					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
Increased risk of veld fires	Medium (3)	Local (2)	Highly Probable (4)	Moderate (6)	44 (Medium) Status (-ve)	• Smoking should only be permitted in designated smoking areas. • Open fires are strictly prohibited. • Fire extinguishers must be made at the site offices and in the vehicles. • Fire emergency procedures and emergency contact details must be made available to all the personnel and be visible at the site office.	Short to medium term (2)	Site specific (1)	Improbable (2)	Slight (2)	10 (low) Status (-ve)

11 CONCLUSION AND RECOMMENDATIONS

The old buildings, trees, watercourses, rocky areas and grasslands provide suitable habitats for reptile species to occur within the project site. There are rivers (perennial and non-perennial), pans and manmade dams within or near the study site. Some of the dams are temporary and others are permanent. These water sources would provide habitat for water-dependent herpetofauna. However, due to the cryptic nature of reptile species, the single season survey, the seasonal timing of the survey and historic records of reptile SCC within, and adjacent to, the project area, it is plausible that such species may nonetheless be present and/or may utilise the site for brief periods during the year.

Herpetofauna species recorded during the field survey were common and are typical of grassland vegetation. No herpetofauna Species of Conservation Concern were recorded within the project site. To conserve the faunal species community structures within the study area, habitat destruction should be limited to an absolute minimum as intact habitat would result in higher faunal species diversity. It is therefore critical that operations are limited to the approved footprint only and effectively designed and managed fence to allow migratory movement of herpetofauna. Mitigation measures to reduce any potential direct and acute impact on reptilian and amphibian species, such as conducting phased earthworks over time to allow various fauna to move away from the site of development, must be implemented.

The only fauna species of conservation concern which has the higher probability of occurring on site was the Sungazer (*Smaug giganteus*), which is found in Highveld grassland and inhabit flat or sloping Highveld grasslands. They live in self-excavated burrows, although they can be opportunistic and inhabit empty burrows. Therefore, in order to protect this species, awareness of construction personnel to recognise Giant girdled lizard species will reduce the probability of this species being harmed unnecessarily and the contractor must ensure that this species is not disturbed, trapped, hunted or killed during the pre-and construction phases. Sungazers are unique within their family (Cordylidae) in that they rely on self-constructed burrows in specific microhabitats within the grassland matrix as long-term, often permanent, shelter and refuge sites. If any individuals or burrows of *Smaug giganteus* are observed, they must be recorded and the ECO immediately notified. Search and Rescue operations should occur before the construction works begin to ensure that any slow moving or burrowing species (such as moles, chameleons, snakes or tortoises) would be moved to adjacent suitable habitats by a qualified Faunal Specialist.

According to the Screening report for an Environmental Authorization as required by the 2014 EIA regulations – proposed site environmental sensitivity, the relative animal species theme sensitivity is considered as *High* sensitivity. However, no herpetofauna species were mentioned. The site verification

was conducted concurrently with the Herpetofauna Impact Assessment and during the surveys, it was concluded that the proposed development site falls within *Medium* category in terms of sensitivity.

During the field survey, it was found that the impacts of the proposed development site on herpetofauna can be mitigated to a satisfactory level and as such, the development is deemed acceptable from the ecological perspective and as such should not be prevented from proceeding based on the ecological considerations, provided that the mitigation measures are implemented and adhered to. The methodologies used and results found during the field survey, together with the impacts and mitigation measures provide confidence that the project can go ahead. However, a search and rescue mission should be conducted in order to capture and relocate any Sungazer in the project area. This should be done before construction begins. It is recommended that these animals be relocated to suitable habitat in the Majuba Nature Reserve.

12 REFERENCES

ALEXANDER, G. & MARAIS, J. (2007). A Guide to the Reptiles of Southern Africa. Struik Nature, Cape Town.

BATES, M.F., BRANCH, W.R., BAUER, A.M., BURGER, M., MARAIS, J., ALEXANDER, G.J. & DE VILLIERS, M.S. (2014). Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. *Suricata* 1. South African National Biodiversity Institute, Pretoria.

BLAUSTEIN, A. R. (2003). Amphibian Population Declines. Encyclopedia.com. [Online] 2003. [Cited: 25 March 2020.] http://www.encyclopedia.com/doc/1G2-3409400018.html.

BRANCH, W.R. (1988). South African Red Data Book - Reptiles and Amphibians. South African National Scientific Programmes Report No. 151. CSIR, Pretoria.

BRANCH, B. (2001). Snakes and Other Reptiles of Southern Africa. Struik Publishers, South Africa.

CARRUTHERS, V. (2001). Frogs and frogging in southern Africa. Struik Publishers, Cape Town.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS (2016). National Protected Areas Expansion Strategy for South Africa 2016. Department of Environmental Affairs, Pretoria, South Africa.

DU PREEZ, L.H. & CARRUTHERS, V.C. (2009). Complete Guide to the Frogs of Southern Africa. Random House Struik. 488pp.

DU PREEZ, L.H. & CARRUTHERS, V. C. (2017). Frogs of Southern Africa: A Complete Guide. 2nd Revised edition, Struik Nature

DRIVER, A., MAZE, K., LOMBARD A.T., NEL, J., ROUGET, M., TURPIE, J.K., COWLING, R.M., DESMET, P., GOODMAN, P., HARRIS, J., JONAS, Z., REYERS, B., SINK, K. & STRAUSS, T. (2004). South African National Spatial Biodiversity Assessment 2004: Summary Report. South African National Biodiversity Institute, Pretoria.

DRIVER A, SINK, KJ, NEL, JN, HOLNESS, S, VAN NIEKERK, L, DANIELS, F, JONAS, Z, MAJIEDT, PA, HARRIS, L & MAZE, K (2012). National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). FrogMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=FrogMAP on 2024-05-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). ReptileMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ReptileMAP on 2024-05-15.

JACOBSEN, N. (2005). Remarkable Reptiles of South Africa. Briza Publications. Pretoria. South Africa.

LÖTTER, M.C. (2015). Technical Report for the Mpumalanga Biodiversity Sector Plan – MBSP. Mpumalanga Tourism & Parks Agency, Mbombela (Nelspruit).

MUCINA, L. & RUTHERFORD, M.C. (eds). (2006). The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African Biodiversity Institute, Pretoria.

MUCINA AND RUTHERFORD (2018) Terrestrial ecosystem threat status and protection level - remaining extent [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 04 November 2019

O'CONNOR, T.G. and BREDENKAMP, G.J. (1997). **Grassland**. In Cowling, R.M., D.M. Richardson, and S.M. Pierce, editors. (eds). Vegetation of Southern Africa. Pp. 215-257. Cambridge University Press, London.

SAPAD: DEPARTMENT OF ENVIRONMENTAL AFFAIRS. (2023). South Africa Protected Areas Database (SAPAD_OR_2023). Online available: [http://egis.environment.gov.za]

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE (SANBI). (2006–2018). The Vegetation Map of South Africa, Lesotho and Swaziland, Version 2018. Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors). Available online at http://bgis.sanbi.org/Projects/Detail/186

STANTON-JONES, W. (2023). Habitat selection by a Threatened lizard, the Sungazer (*Smaug giganteus*): Implications for conservation. Unpublised report. PhD. Johannesburg.

VAN WYK, J.H. (2000). Seasonal variation in stomach contents and diet composition in the large girdled lizard, *Cordylus giganteus* (Reptilia: Cordylidae) in the Highveld grasslands of the north-eastern Free State, South Africa. *African Zoology* 35,1: 9–27

Appendix A: Structure of the Report

The Protocol for the Specialist Assessment and Minimum report content requirements for Environmental Impacts on Terrestrial Animal Species (2020). This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on Terrestrial biodiversity for activities requiring EA. This protocol replaces the requirements of Appendix 6 of the EIA Regulations 2014, GN R. 982 (as amended), published under NEMA.

The assessment and reporting requirements of this protocol are associated with a level of environmental sensitivity identified by DFFE's national web-based environmental screening tool screening tool. The screening tool identified the site footprint as falling within an area of "Low Sensitivity" for Terrestrial biodiversity theme. The screening tool identified the site footprint as falling within an area of "High" and "Medium" sensitivity for terrestrial animal and plant species diversity, respectively. Table indicates how the assessment complied with the requirements of the Terrestrial Animal Species Protocol, with reference to specific sections in this report.

Requirement of GN 648 of 10 May 2019 **VERY HIGH SENSITIVITY RATING – for Terrestrial Animal Features**	**Fulfilment**
The Animal Specialist Assessment Report must contain, as a minimum, the following information:	
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Section 2.1 Annexure B
A signed statement of independence by the specialist;	Section 2.1
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Chapter 4
A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 5
A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Chapter 4
A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Not Applicable to this project
Additional environmental impacts expected from the proposed development;	Chapter 10.1
Any direct, indirect and cumulative impacts of the proposed development;	Chapter 10.1.1
The degree to which impacts and risks can be mitigated;	Chapter 10.1.1
The degree to which the impacts and risks can be reversed;	Chapter 10.1.1

Requirement of GN 648 of 10 May 2019 **VERY HIGH SENSITIVITY RATING – for Terrestrial Animal Features**	**Fulfilment**
The degree to which the impacts and risks can cause loss of irreplaceable resources	Chapter 10.1.1
Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 10.1.1
A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	Not Applicable to this report
A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Chapter 11
Any conditions to which this statement is subjected	Chapters 8,9 and 10

Appendix B: Biodiversity Specialist CV

AVHAFAREI PHAMPHE

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Linden

2195

Contact Details: 082 783 6724

Email address: Mboneni.Phamphe@gmail.com

Educational Qualification

University of Pretoria – MSc. Botany.
University of Venda – University Education Diploma (Biological Science))
University of Venda - Bachelor of Science Honours (Botany)
University of Venda – Bachelor of Science (Botany & Chemistry)

Professional Registrations

- South African Council of Natural Scientific Professions (SACNASP) (Ecological Science-400349/12)
- South African Institute of Ecologists and Environmental scientists (SAIEES)
- South African Green Industries Council (SAGIC AIS)
- South African Association of Botanists (SAAB)

Project Experience (Selected Projects)

- Proposed upgrading of Olifantspoort and Ebenezer Water Supply Schemes, Phase 1, within the Jurisdiction of Capricorn and Mopani District Municipalities, Limpopo Province.
- Proposed Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP-2A): Water Transfer Infrastructure
- Proposed Vaal Gamagara Regional Water Supply Phase 2: Upgrading of the existing Scheme.
- Terrestrial ecological assessment report. Nketoana Regional Bulk Water Scheme Project Free State province.
- Terrestrial ecological assessment report. Proposed Surface Water Developments for Augmentation of the Western Cape Water Supply System
- Terrestrial ecological assessment report. Eskom Emkhiweni Substation and 400KV Line from Emkhiweni Substation to Silimela, Limpopo and Mpumalanga Provinces
- Botanical survey at Eskom Skaapvlei substation included in the West Coast Group of Battery Energy Storage System (BESS) project, Western Cape province.

- Botanical Survey at Eskom Paleisheuwel Substation in the West Coast. Group of Battery Energy Storage System (BESS) Project in Western Cape
- Proposed Matjhabeng Solar PV with Battery Energy Storage Systems Project: Phase 1 and Phase 2 Sites
- Proposed Turffontein sewer upgrade
- Proposed Greater Orange Farm water upgrade.
- Proposed sewer pipe replacement in Lorentzville, City of Johannesburg
- Proposed Lanseria outfall sewer
- Proposed desludging and lining of dam 02 within the Northern Wastewater Treatment Works, in Johannesburg, Gauteng province.
- Proposed uMkhomazi water project phase 1 – Raw water component
- Proposed roads and stormwater infrastructure for Soshanguve Block L
- Proposed stormwater and sewer infrastructure for the uMhlanga Ridgeside development
- Proposed High altitude training Centre in Belfast
- Flora and fauna assessment, Proposed BG3 pipeline, Vaal River.
- Terrestrial ecological assessment report. New wastewater treatment works at Lanseria, City of Johannesburg.
- Terrestrial ecological assessment report. Proposed 100ml Bronberg reservoir and associated infrastructure
- Ecological Assessment; Proposed Ncwabeni Off-Channel Storage Dam
- Flora and Fauna assessment in Bankfontein farms, Breyten, Mpumalanga
- Flora and Fauna assessment in Vaalbank, Carolina, Mpumalanga.
- Flora and fauna assessment Proposed hydropower plant within Rand Water's hydraulic network at Zoekfontein site.
- Proposed upgrade of O6 pipeline
- Proposed construction of BG3 pipeline near Vaal River
- Proposed construction of S4 pipeline.
- Proposed construction of B16 pipeline.
- Terrestrial ecological assessment report. Proposed Foxwood Dam, Eastern Cape province
- Monitoring reporting for *Warburgia salutaris* in Ithala Game Reserve
- Status report for Black and White rhino in Ithala Game Reserve
- Recovery plan for *Protea comptonii* for Ithala Game Reserve
- Fire monitoring report for Ithala Game Reserve, Vryheid hill nature reserve and Pongola bush nature reserve.
- Mechanical removal of *Dichrostachys cinerea* in Ithala game reserve

Work Experience

1. Independent Biodiversity Specialist

June 2020 to present.

- Vegetation Surveys
- Fauna surveys
- Development of biodiversity sector plans
- Interpreting conservation plans to inform local and regional planning
- Alien Plant Management Plans
- Search, Rescue and Relocation Plans
- Walk-through surveys
- Development of management plans for important species and habitats
- Undertaking environmental audits

2. Nemai Consulting (Pty) Ltd- Senior Biodiversity Specialist

May 2010-May 2020

- Compile flora and fauna reports
- Compile rehabilitation plans.
- Compile Basic Assessments reports and Environmental Management Programmes.
- Scientific data collection.
- Compile scientific flora and flora reports
- Involved in Public Participation Process
- Project management
- Compile Biodiversity Sector Plans
- Acted as an Environmental Control Officers

3. Digby Wells and Associates- Flora and Fauna Specialist

January 2008-April 2010

- Compile flora and fauna reports
- Compile rehabilitation plans.

4. Ezemvelo KZN Wildlife- Ecologist

March 2004-December 2007

- fire management and reporting,
- GIS mapping,
- Monitoring of endangered species,
- Liaise with neighbouring communities and schools about environmental education,
- Handling budget for the research station,
- Annual game count census,
- Involved in integrated management plans,
- Elephant management plan.

- Compile rehabilitation plans.

5. South African National Biodiversity Institute- Agricultural Development Technician

January 2004-February 2004

- Herbarium database
- Herbarium specimens filling
- Data Quality Controller,

6. South African National Biodiversity Institute- Volunteer and Ad Hoc

January 2002-December 2003

- PRECIS database,
- Mounting of specimens,
- Filing,
- Data quality control

7. University of Pretoria-Zoology Department- African National Biodiversity Institute- Volunteer and Ad Hoc

July 2001-September 2001

- Filing,
- Data quality control

Courses/workshops/conferences attended.

- Biodiversity Offset Training October 2019, organized by SANBI and DEFF
- Alien invasive plants workshop, 2016
- South African Association of Botanists Conference in Drakensville, hosted by the University of Kwa-Zulu Natal, January 2013
- South African Association of Botanist's Conference in Rhodes University (Grahamstown 2001)
- South African Association of Botanists' Conference in Pretoria University (2002)
- Distance course (01-03 June 2004)
- Financial policies and procedures (08-10 June 2004)
- Population modeling course (01-04 November 2004)
- Vegetation monitoring (22-24 November 2004)
- Vulture monitoring workshop (19-21 January 2005)
- Grassland ecology course (08-10 March 2005)
- Introduction to geographic information systems (18-26 April 2005)
- Waste management course (13-15 March 2006)
- Elephants of the red volta: earth watch expedition in Ghana (1-18 July 2006)
- 21st international conference of society for conservation biology in nelson Mandela metropolitan university in port Elizabeth (1-5 July 2007)
- Wetlands workshop, organized by GDARD, 2010

Scientific paper reviewed.

- J.P. VAN DER LINDEN, D.P. FERREIRA, S.J. SIEBERT, G.J. BREDENKAMP AND F. SIEBERT. 2007. Vegetation dynamics of the woody layer of Zululand coastal thornveld, KwaZulu-Natal.

References

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