Proposed Kekana Powerline and Substation, City of Tshwane Metropolitan Municipality, Gauteng Province

Terrestrial Biodiversity Impact Assessment Report

MBONENI
ECOLOGICAL SERVICES

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Executive Summary

Introduction and Background

The proposed Kekana powerline and substation project will entail the following:

Servitude Project

- Servitude acquisition for the proposed Kekana 132/22kV substation,100x150m site.
- Acquire 31m wide servitude for the approximate 7km 132kV double circuit loop-in, loop out line from the existing Pelly-Temba Main 132kV line to Kekana substation.

New Substation and Loop in & Loop out lines

- Build a new 132/22kV 2 × 20MVA transformers Kekana substation.
- Install 4 × 22kV feeder bay.
- Loop in and out New Kekana substation with 2 × 7m 132kV TERN conductor on a double circuit structure from existing Pelly – Temba Main 132kV Bear conductor.

Mboneni Ecological Services (Pty) Ltd was appointed by Nsovo Environmental Consulting to undertake a Terrestrial Biodiversity Assessment as part of the Environmental Impact Assessment (EIA) process in order to assess the impacts that the proposed development will have on the receiving environment. The objective of this study was to identify sensitive species and their habitats on the study area. The current ecological status and conservation priority of vegetation on the site were assessed. Potential faunal habitats were investigated in the study area and all mammals, birds, reptiles, amphibians and invertebrates known to occur or seen within the project development routes.

Study Area

The proposed Kekana powerline and substation development is situated in Hammanskraal township, City of Tshwane, Gauteng province.

The proposed Alternative 1 Route and its substation are situated on portion 8, 9, 10, 1, and Remainder of Portion 2 of Farm HAMANSKRAAL 112 JR, on portion 108 of Farm ZANDKOP ZYN LAAGTE 108 JR and the Remainder of Portion 2 of farm TWEEFONTEIN 94 JR.

The proposed Alternative 2 Route and its substation are situated on Remainder of Portion 2 of Farm HAMANSKRAAL 112 JR, on portion 4, 1, and remainder of Farm KLIPDRIFT 116 JR, on portion 12 and on Remainder of Farm RONDAVEL ALIAS SCHOONGEZICHT 109 JR, on portion 110 of Farm KAP 111 JR and portion 4 of Farm STERKWATER 106 JR and also on portion of 108 of Farm ZANDKOP ZYN LAAGTE 108 JR.

The proposed Alternative 3 Route and its substation are situated on Remainder of Portion 2 of Farm HAMANSKRAAL 112 JR, on portion 4, 1, and remainder of Farm KLIPDRIFT 116 JR, on Remainder of Farm RONDAVEL ALIAS SCHOONGEZICHT 109 JR, and remainder of Farm INDERMINNE 113 JR. and on portion 1 of Farm ANNEX 110 JR and portion 108 of farm ZANDKOP ZYN LAAGTE 108 JR.

Regional Vegetation

The entire project site falls within the Savanna Biome and this Biome is the largest Biome in South Africa and occupies over one third of the country. It is characterized by a grassy ground layer and distinct upper layer of woody plants. This biome is defined by a herbaceous layer dominated by grass species and a discontinuous to sometimes very open tree layer.

The project site is classified as falling within the **Vulnerable** Central Sandy Bushveld and **Endangered** Springbokvlakte Thornveld Mountain Bushveld vegetation types and the remnants of these vegetation type still exist on site.

Terrestrial Threatened Ecosystems

"Ecosystem protection level" is an indicator of how adequately an ecosystem is protected or not. Ecosystems can be classified as *not protected, poorly protected, moderately protected* or *well protected* depending on the proportion of each ecosystem that is under conservation management within a protected area, as recognized in the National Environmental Management: Protected Areas Act (Act 57 of 2003) –these protected areas include state or privately-owned protected areas as well a land under biodiversity stewardship agreements.

According to South African National Biodiversity Institute & Department of Forestry, Fisheries and the Environment (2021), there are remnants of the *Least concern* Central Sandy Bushveld and *Vulnerable* Springbokvlakte Thornveld terrestrial threatened ecosystem/vegetation type within the proposed development site. This ecosystem/vegetation type is listed as **Poorly Protected (PP)** on a national scale. An ecosystem is considered "not protected" if under 5% of its biodiversity target is met within protected areas, "poorly protected" if 5% to 49% of its target is met in protected areas, and "moderately protected" if 50% to 99% of its target is met. If more than 100% of the target is met in protected areas, it is considered "well protected".

Gauteng Conservation Plan

Gauteng Conservation Plan 3.3 includes the following units that will be used as input into the National Bioregional Plan for the country:

- Critical Biodiversity Areas (CBA): containing *Irreplaceable, Important* and *Protected Areas* all merged together into one layer.
- Ecological Support Areas (ESA): containing all layers that are part of the entire hierarchy of biodiversity, but it is not possible to include all biodiversity features.

The project site falls within the Gauteng CBA (*Important Areas*) and also within an ESA region.

Gauteng Ridges

Ridges are specialized by high spatial heterogeneity due to the range of differing aspects (north, south, east, west and variations thereof), slopes and altitudes resulting in differing soil characteristics (e.g., depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions. Moist cool aspects are more conducive to the leaching of nutrients than warmer drier slopes. Variations in aspect, soil drainage and elevation/altitude have been found to be especially important predictors of biodiversity. The project site does not fall within any of the Gauteng ridges (Gauteng C-Plan 3.3), with Class 4 ridge situated East of the project routes.

Methodology

Field visit methodology included a comprehensive desktop review, utilising available provincial and national ecological data, relevant literature, GIS databases, topographical maps and aerial photography. This was then supplemented through a ground-truthing phase, where pertinent areas associated with the project area were visited during field survey undertaken on the 16th of April 2024. The survey focused on flora (vegetation) and fauna (mammals, avifauna, reptiles, amphibians and invertebrates). Several Red Listed Data floral and faunal species pertaining to the project area were identified during the desktop review and their habitat suitability was assessed through the ground-truthing phase of the survey.

Results and Discussion – Flora and Fauna

The proposed Alternative 1 Route (Preferred) is mostly situated along the edges of human settlements, with anthropogenic activities such as illegal dumping of materials prevalent on site and is dominated mostly by alien invasive plants species. All three proposed routes traverse the NFEPA river, namely Apies River. The proposed Alternative routes 2 and 3, which are situated within the same or similar habitats, are mostly aligned along the Farm roads, which are dominated by plant species such as *Terminalia sericea, Dichrostachys cinerea, Combretum hereroense, Combretum molle* etc. An Orange Listed Plant species, namely *Hypoxis hemerocallidea* (Star Flower) was recorded on site. It should be noted that communication with Authorities has been undertaken with regards to this plant species and it was noted that whilst this plant species has been down listed, there should be a continuation to preserve it until such time the Policy is reviewed. Therefore, in order to mitigate the impacts to this plant species, a Search, Rescue and Relocation Plan should be developed and must be supervised by a competent Ecologist/Botanist. This Plan should also take into account medicinal plant species such as and *Aloe davyana* recorded on site. However, if the translocation of these plant species is happening outside of the project site, a Permit from GDARDE is required.

Of the protected tree species that are known to occur within the region, three protected trees were recorded on or adjacent to the project site, namely Marula (*Sclerocarya birrea subsp. caffra*), Leadwood (*Combretum imberbe*) and Shepherd's tree (*Boscia albitrunca*). As far as possible, these protected trees should be preserved and not destroyed by the activities, however, where this proves not to be possible, a permit will be required from the DFFE in order to cut, destroy or damage the tree before construction activities commence.

As previously mentioned, the proposed Alternative 1 route falls on the edges of human habitats, where the other two proposed routes and mostly within the bushveld dominated by *Acacia* species and *Terminalia* species. Based on observations made during the site visit, the proposed Alternative 1 route has been negatively impacted on by anthropogenic activities such as dumping of illegal materials (waste) and increased invasion of alien species. However, all the proposed routes traverse through the Apies River, which provides suitable riparian habitat for water-dependant mammal species. A number of small wild mammal species are however expected to be present occasionally, however, these mammal species are being hunted by the domestic dogs. According to the information obtained from the locals, hunting is prevalent in the area. No Mammal Species of Conservation Concern were recorded on the project development site.

Within the vegetation type found in the study area and immediate surrounding areas, four major bird micro-habitat systems were identified, namely open grassland, exotic trees, bushveld, pans and perennial river.

Open grasslands: Patches of open grasslands and disturbed grasslands on site represent a significant feeding area for many bird species. The grassland patches are also a favourite foraging area for game birds such as francolins, Helmeted Guineafowl and Black-shouldered Kite etc. This in turn may attract raptors because of both the presence and accessibility of prey. Red Data Listed bird species such as Lanner Falcon, Lesser Kestrel, and Martial Eagle, may often hunt in open grassland areas.

Exotic trees often provide roosting and nesting habitat for various bird species, and as such their importance for avifauna should not be under-estimated. Exotic trees provide perching, roosting and nesting habitat for various raptor species, as well as larger birds such as francolins, Guineafowl, Herons and Hadeda ibises. Although stands of *Eucalyptus* spp are invader species, these stands have become important refuges for certain species of raptors including Eagles and Buzzards. Birds such as Lesser Kestrel and Falcons make use of large *Eucalyptus* trees, where they roost in large numbers. Nests identified on the study area should not be unnecessarily destroyed.

Bushveld: The proposed development site traverses through woodland habitat, which varies between broadleaved woodland, *Acacia*-dominated woodland, and open woodland with small scattered *Acacia* trees. The bird species within this habitat generally include a great variety of arboreal passerines, such as drongos, warblers, flycatchers, shrikes, sunbirds, waxbills and weavers, as well as arboreal non-passerines such as doves, cuckoos and woodpeckers. Many of these species make use of the thorny nature of these trees to build their nests. *Acacia* trees typically attract many insects and in turn attract a good diversity of typical bird species found in *Acacia* savanna.

Pans: The study area contains pans/dams, mostly associated with the Apies River. Common species that could use pans and dams include Red-knobbed Coot, Black-headed Heron, African Darter, Blacksmith Lapwing, and Egyptian Goose. Red Data species recorded by

SABAP2 in the relevant pentads that may use the dams are Greater Flamingo and Maccoa Duck, both of which were recorded in low number.

The perennial **river** on site is considered important attractants to various bird species. Bird species such as herons, bishops, weavers, cisticolas and warblers will breed in the reeds growing on the banks of the rivers and will also feed on insects that live within the reeds. Many of these bird species make use of the thorny nature of these trees to build their nests. Water bodies represent sensitive areas because they provide habitat for a wide variety of terrestrial and aquatic species, particularly avifauna.

Forty-Five (45) bird species were recorded during the field survey. Species recorded were common and widespread and typical of savanna biome. No Red Data bird species associated with the study routes were recorded.

The rock boulders, river/riparian vegetation, trees (bushveld) and grasslands provide suitable habitats for reptile species to occur within the project site. Termite mounds 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). No termite mounds were destroyed during the brief field surveys. All overturned rock material was carefully replaced in its original position. Only six reptile species were noted on site, these being the Southern Rock Agama (*Agama atra*), Southern Tree Agama (*Acanthocercus atricollis*), Speckled Rock Skink (*Trachylepis punctatissima*), Puff adder (*Bitis arietans arietans*), Striped Skaapsteker (*Psammophylax tritaeniatus*) and Common Dwarf Gecko (*Lygodactylus capensis*). No reptile Species of Conservation Concern were recorded on the project development site. According to the anecdotal information, Brown House Snake (*Boaedon capensis*) and Water Monitor (*Varanus niloticus*) have been seen on site. The Brown House Snake species is known to frequent human dwellings where it feeds on rodents or lizards. It is widespread in South Africa and very common in suburban gardens.

The Apies River and wetlands on site provides water on a permanent basis and provides an important breeding habitat for most of the frog species which could occur within the study area. During the field survey, four frog species were recorded along the project routes, namely Common Platanna (*Xenopus laevis*), Guttural Toad (*Sclerophrys gutturalis*), Bubbling Kassina (*Kassina senegalensis*) and Common Caco (*Cacosternum boettgeri*). No frog SCC were recorded during the field survey.

During the field survey, the following invertebrate species were recorded on the proposed development site, namely Citrus swallowtail (*Papilio demodocus*), Blue pansy (*Junonia orithya*), African Monarch (*Danaus chrysippus*), African Yellow Pansy (*Junonia hierta cebrene*), Broad Scarlet (*Crocothemis erythraea*), Two-striped Skimmer (*Orthetrum caffrum*), Veined Russet (*Aloeides pierus*), Broad-bordered Grass Yellow (*Terias brigitta*), Red-veined darter (*Sympetrum fonscolombii*), Pioneer white (*Belenois aurota*), Painted Lady (*Vanessa cardui*), Julia Skimmer (*Orthetrum julia*), Long-tailed Blue (*Lampides boeticus*), Garden Acraea (*Acraea horta),* Dark blue Pansy (*Junonia oenone*), Elegant Grasshopper (*Zonocerus elegans*), Common grass yellow Butterfly (*Terias hecabe solifera*) and Meadow White (*Pontia*

helice). No invertebrate species of conservation concern were recorded during the field survey.

Terrestrial Sensitivity

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, the relative plant species theme sensitivity is considered as *Medium* and the terrestrial biodiversity Theme sensitivity is assigned a *Very high Sensitivity* due to the presence of Sterkwater Private Nature Reserve, CBA 1, CBA 2, ESA 1, ESA 2, National Protected Area Expansion Strategy (NPAES) and VU_Springbokvlakte Thornveld. The site verification was conducted concurrently with the Terrestrial biodiversity impact assessment and during the survey, it was concluded that the proposed development site falls within Medium category in terms of ecological sensitivity. The site verification was conducted concurrently with the Terrestrial biodiversity impact assessment and during the survey, it was concluded that the Apies River is considered High in terms of Sensitivity, and Proposed routes 2 and 3 are considered Medium, whereas the proposed alternative route 1 is generally regarded as Low in terms of sensitivity. No Tower position should be situated within the 30-50m of the Apies River.

Conclusion and Recommendations

During the field survey, it was found that the impacts of the proposed development on flora and fauna 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. Once the proposed development has been constructed, rehabilitation process needs to take place and should also ensure that alien plant emergence and erosion do not occur. Should the proposed development be approved, information boards should be erected within the development site and should be part of the induction process to inform staff of the presence of Red and/or Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements. This will make identification easier and inform all personnel on site of the sensitivity of the project site. Any SCC found during construction phase, the Contractor should notify the ECO immediately and construction activities should be stopped. The ECO will then contact a plant specialist and inform GDARDE.

The proposed Alternative 1 Route is the preferred route as it is mostly situated along the edges of human settlements, with anthropogenic activities such as illegal dumping of materials prevalent on site and is dominated mostly by alien invasive plants species. This is considered to be the preferred alternative as it is likely that it would generate the lowest overall impacts compared to the other alternatives. Although there are some sensitive features along the power line corridor, impacts on these features can generally be mitigated to acceptable levels. It is also the shortest route (approximately 6.95 km), which will lead to less clearing of natural/indigenous vegetation as compared to Alternative Routes 2 and 3 (which are approximately 9.26Km and 8.7Km, respectively). The proposed Alternative routes 2 and 3,

which are situated within the same or similar habitats, are mostly aligned along the Farm roads, which are dominated by plant species such as *Terminalia sericea, Dichrostachys cinerea, Combretum hereroense, Combretum molle* etc. All three proposed routes traverse the NFEPA river, namely Apies River. A Walk-through survey of the approved and final Powerline route is recommended in order to evaluate the servitude and pole positions in terms of the natural environment.

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List of Abbreviations

ADU	Animal Demography Unit
AIPs	Alien Invasive Plant species
BODATSA	Botanical Database of Southern Africa
CBAs	Critical Biodiversity Areas
CARA	Conservation of Agricultural Resources Act
CoJ	City of Johannesburg
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESAs	Ecological Support Areas
GPS	Global Positioning System
GIS	Geographic information system
QDS	Quarter degree Squares
GDARDE	Gauteng Department of Agriculture, Rural Development and Environment
JW	Johannesburg Water
IBA	Important Bird and Biodiversity Area
IUCN	International Union for Conservation of Nature
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
PRECIS	Pretoria Computer Information Systems
SAAB	South African Association of Botanists
SAIEES	South African Institute of Ecologists and Environmental Scientists
SABAP	South African Bird Atlas Project
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SARCA	Southern African Reptile Conservation Assessment
SCC	Species of Conservation Concern
TOPS	Threatened or Protected Species

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;
- 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

27 May 2024

Date

Signature

1 INTRODUCTION AND BACKGROUND

The proposed Kekana powerline and substation project will entail the following:

Servitude Project

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2 STUDY AREA

The proposed Kekana powerline and substation development is situated in Hammanskraal township, City of Tshwane, Gauteng province (**Figures 1** and **2**).

The proposed Alternative 1 Route and its substation are situated on portion 8, 9, 10, 1, and Remainder of Portion 2 of Farm HAMANSKRAAL 112 JR, on portion 108 of Farm ZANDKOP ZYN LAAGTE 108 JR and the Remainder of Portion 2 of farm TWEEFONTEIN 94 JR.

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Farm INDERMINNE 113 JR. and on portion 1 of Farm ANNEX 110 JR and portion 108 of farm ZANDKOP ZYN LAAGTE 108 JR.

A collage of photographs taken within the project routes and Substations are in indicated in **Figures 3, 4 and 5** below.

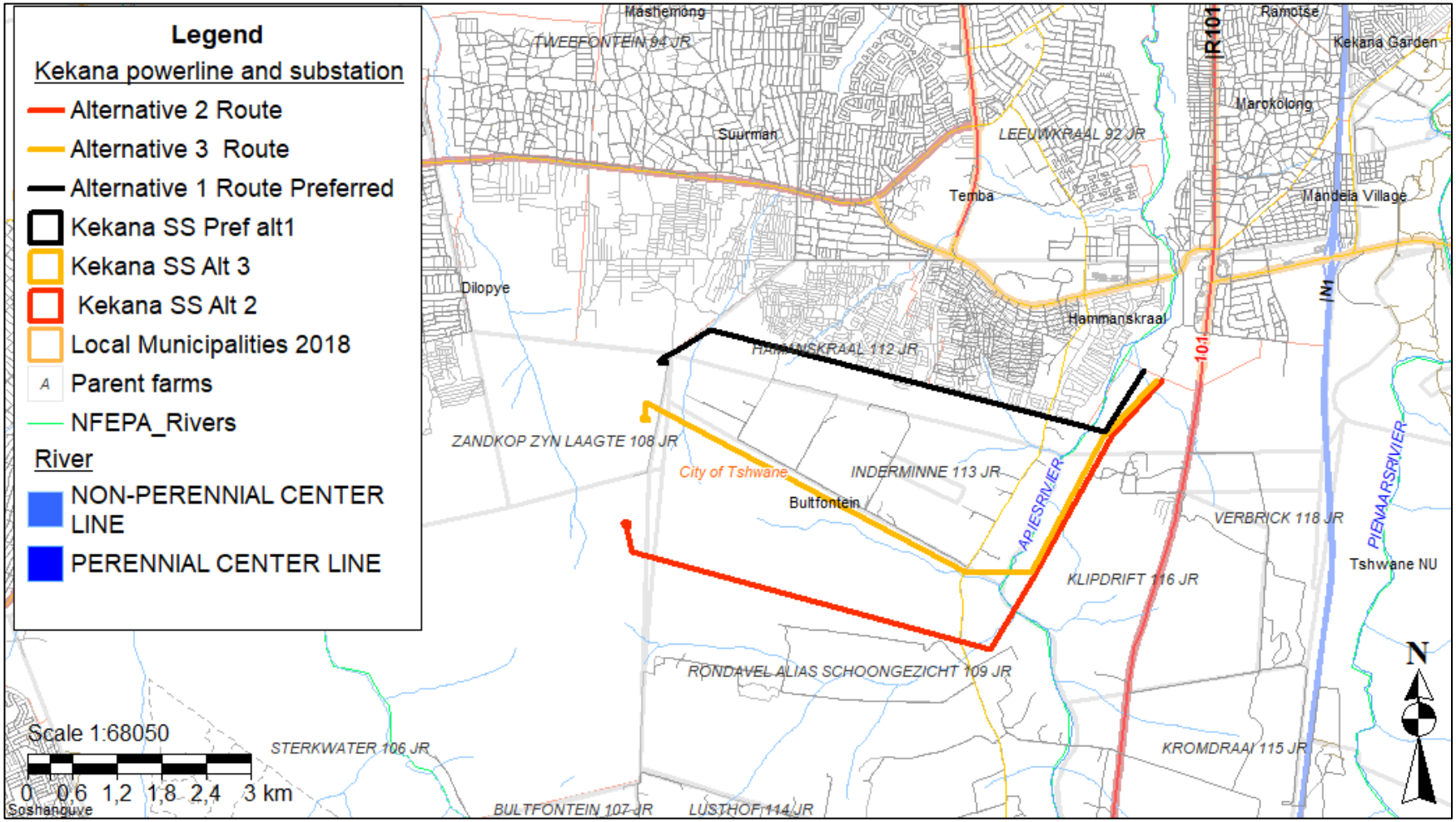

Figure 1. Locality Map

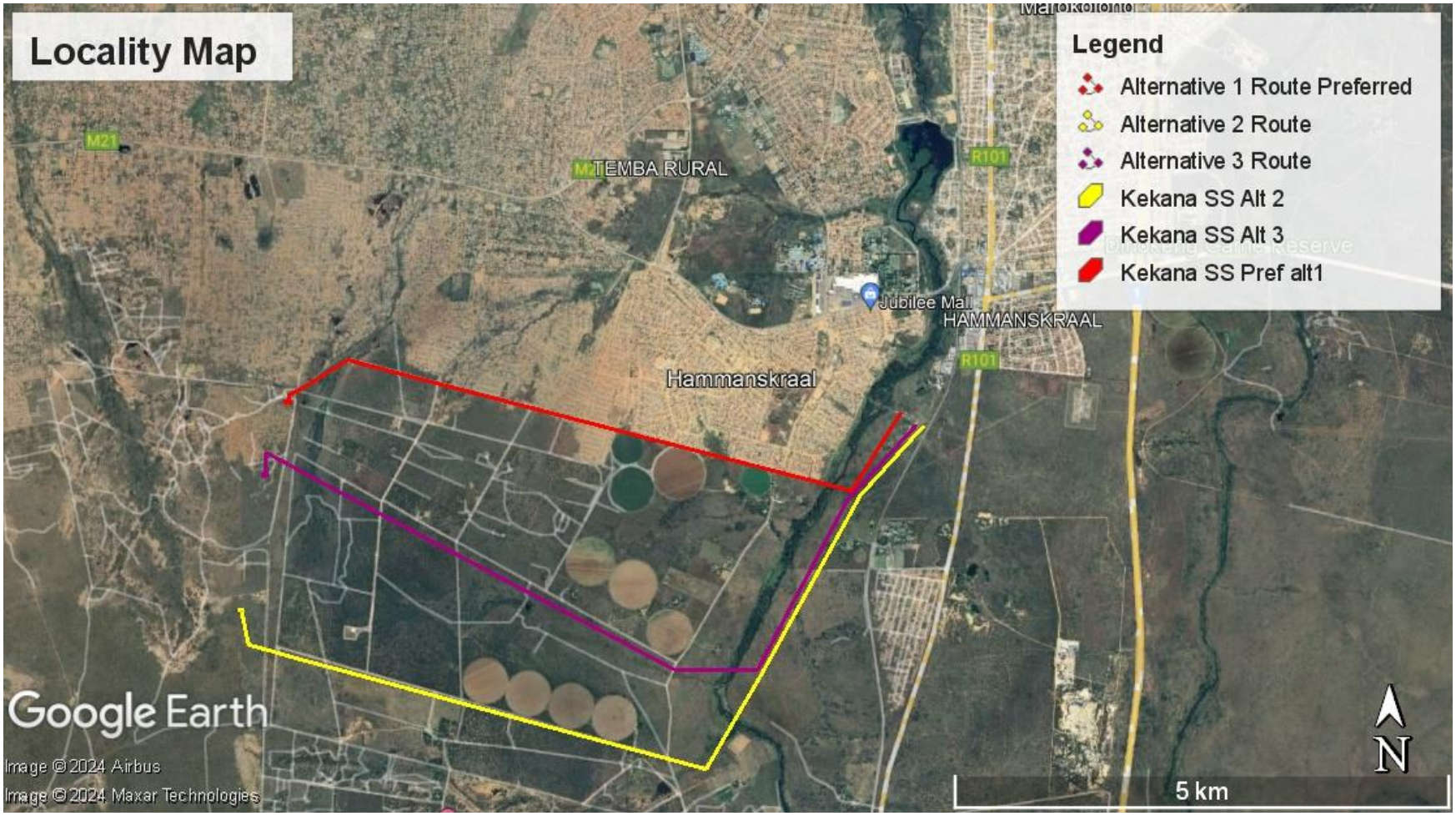

Figure 2. Google Earth Map of the project site

Figure 3. A collage of photographs taken along proposed Alternative 1 Route and Kekana Substation Preferred Alternative 1

Figure 4. A collage of photographs taken along proposed Alternative 2 Route and Kekana Substation Alternative 2

Figure 5. A collage of photographs taken along proposed Alternative 3 Route and Kekana Substation Alternative 3

3 RELEVANT LEGISLATION AND GUIDELINES

The following legislations are relevant to this project:

- Transvaal Nature Conservation Ordinance, 1983 (Act No. 12 of 1983);
- The Constitution, 1996 (Act No. 108 of 1996) – Section 24;
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);
- The white paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- National Forests Act, 1998 (Act No. 84 of 1998);
- National Environmental Management Act, 1998 (Act No. 107 of 1998);
- National Environmental Management Biodiversity Act, 2004 (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);
- 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;
- Gauteng Conservation Plan Version 3.3 (2011);
- Draft Bioregional Plan for the City of Johannesburg (2011);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) - Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014;
- Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3 (2014)
- National Biodiversity Assessment (2018) and
- Gauteng Ridge Guidelines (2019).

4 LIMITATIONS, GAPS AND ASSUMPTIONS

The following constraints/limitations were applicable to this assessment:

- The field survey was conducted in early April 2024, which covers optimal time of the year to find animals and plant species of high conservation priority. It is unlikely that any more visits would reveal information that would change the outcome of this assessment both in terms of ecosystems of special conservation concern or suitable habitats of species of particular conservation concern. A site visit which was conducted therefore appear to be sufficient to address the objectives of this study.
- The survey areas were concentrated along the proposed development routes.

- Weather condition during the survey was favourable for recording both fauna and flora.
- The focus of the survey remains a habitat survey that concentrates on the possibility that species of particular conservation priority 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.
- Data collection in this study relied heavily on data from representative, homogenous sections of vegetation units, as well as general observations, analysis of satellite imagery from the past until the present, generic data and a desktop analysis.
- 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

5.1 Flora

The flora assessment consisted of two complementary approaches:

- A desktop analysis, which included literature review, previous biodiversity reports, local knowledge, topographical maps, and Google Earth imagery; and
- Site visit was conducted on the 16th of April 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 and natural vegetation on or near the project area.

The computerized data storage and retrieval system, called the Botanical Database of Southern Africa (BODATSA) was consulted to retrieve a list of Red Data plants recorded from

the 2528AC and 2528AD Quarter Degree Squares (QDS) http://posa.sanbi.org/searchspp.php). This list was used to determine which Red Data plant species could potentially occur on the project site. Version 2024 of the Red List of South African plants (http://redlist.sanbi.org/index.php), which is managed as part of SANBI's Threatened Species Programme, was consulted for the current conservation status of each species in the above list. The term "Species of Conservation Concern" (SCC) as defined by Raimondo *et al.* (2009) was followed in this report, namely all species classified as threatened (Critically Endangered, Endangered and Vulnerable), as well as species classified as Near Threatened, Critically Rare and Rare.

The vegetation map published by Mucina and Rutherford (2018) was consulted in order to identify vegetation types that are found along the project sites/routes. The description of the vegetation types follows Mucina and Rutherford (2006).

The project sites/routes were traversed on foot and species listed as they were encountered. Attention was paid to the occurrence of medicinal, Red data plant species, protected trees, provincially protected plants, alien invasive and declared weed species. Vegetation associations identified during this study are based on the overall similarity in vegetation structure, species composition, and abiotic features such as moistness and rocky areas. However, slight phytosociological differences within each broadly grouped vegetation association are present. Field guides such as van Wyk *et al.* (1997), Pooley (1998), van Oudshoorn (1999) and Manning (2009) were consulted during the field visit to aid in the identification of plant species.

Regulations published for the National Forests Act (Act 84 of 1998) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distributions of species on this list were obtained from published sources (e.g., van Wyk & van Wyk 1997) and from the South African National Biodiversity Institute (SANBI) Biodiversity Information System website (http://sibis.sanbi.org/) for the quarter degree grids in which species have been previously recorded.

Alien Invasive plant species are controlled by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) - Alien and Invasive Species (AIS) List, 2016 (and the latest revised edition of 2019-02-13) was consulted. The AIS Regulations list different categories of invasive species that must be managed, controlled or eradicated from areas where they may cause harm to the environment, or that are prohibited to be brought into South Africa.

Alien Invasive plant species are divided into four categories, namely:

- Category 1a: Invasive species which must be combatted and eradicated. Any form of trade or planting is strictly prohibited.
- Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form or trade or planting is strictly prohibited.
- Category 2: Invasive species, or species deemed to be potentially invasive, in which a permit is required to carry out a restricted activity. Category 2 species include commercially important species such as pine, wattle and gum trees.
- Category 3: Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade, is however prohibited.

5.2 Mammals

The Animal Demographic Unit (ADU) website, GDARDE, DFFE Screening report, previous biodiversity reports, South African National Biodiversity Institute (SANBI) and Skinner & Chaminda (2005) were consulted in order to draw up a list of mammal species potentially occurring within the project sites/routes.

During the site visit, mammals were identified by spoor, burrows and visual sightings through random transect walks and documented. The habitat quality and quantity for Red Listed species potentially present were evaluated. The adjoining properties (approximately 50m) were also scanned for the presence of Red Listed mammal species/habitat. The confirmed list of presences was augmented with anecdotal information provided by the local community residing in the vicinity of the proposed development sites/routes.

5.3 Avifauna

The online databases of the Southern African Bird Atlas Project (SABAP 2), GDARDE, DFFE Screening report, previous biodiversity reports and *Mybirdpatch* were consulted as a means to determine which Red Listed bird species were previously recorded from the area.

During the site visit, this list was audited based on confirmed sightings of Red Listed bird species and the evaluation of suitable habitat for Red Listed bird species potentially present.

The study site, including the adjoining properties within 50 m, were surveyed on foot during random transect walks and all sightings were documented.

Birds were identified through visual identification by using a 10 x 50 Voyager binocular, by call, and from feathers. Where necessary, identifications were verified using field guides such as Sasol birds of Southern Africa (Sinclair *et al.* 2002) and the Chamberlain Guide to Birding Gauteng (Marais & Peacock, 2008).

5.4 Reptiles

The ADU website, previous biodiversity reports, GDARDE, DFFE Screening report, SANBI and historic distributions (Alexander & Marais, 2007) of reptile species were consulted in order to draw up a list of potential occurrences. During the site visit, 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 50 m) 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 proposed development sites/routes.

5.5 Amphibians

FitzPatrick Institute of African Ornithology (2024), GDARDE, DFFE Screening report, the South African Frog Atlas Project (SAFAP) (1999-2003) data and du Preez & Carruthers (2009) were consulted in order to draw up a list of potential occurrences. A Field visit was then undertaken/conducted in order 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 50m) were also scanned for important frog species. Samplings were conducted on the moist to semi-aquatic areas. Frog calls were compared with pre-recorded calls from du Preez and Carruthers (2009)'s CD and identified from this comparison.

5.6 Invertebrates

Physical ground and rock searches were undertaken in order to identify threatened arachnids, scorpions and various insects which take refuge underground in burrows or under rocks. An insect net with a diameter of 40 cm was used for collecting insects and arachnids. The focus of this assessment was on protected and species of conservation concern. The Field Guide to Insects of South Africa (Picker *et al.,* 2012) and the Field Guide to Butterflies of South Africa (Woodhall, 2005) assisted in species identification.

Selected stones that were lifted to search for Arachnids were put back very carefully resulting in the least disturbance possible. The area was searched for possible signs of trap door spiders or other mygalomorph spiders (for example traces of wafer-lids, cork lids or silk-lined burrows). Investigations by brushing the soil surface with a small broom/paint brush, scraping or digging into the soil with a spade, were made. All the above actions were accompanied by the least disturbance possible.

Whilst conducting transects through the study area, all insect species visually observed were identified, and where possible photographs taken. It must be noted however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the study area at the time of surveys. Specific attention was given to insect SCC listed on a regional and national level. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for SCC scorpions within the study area.

6 GAUTENG CONSERVATION PLAN

Gauteng Nature Conservation, a unit within GDARDE, produced the Gauteng C-Plan Version 3 (C-Plan 3) in December 2010. C-Plan is critical in ensuring adequate protection of biodiversity and the environment in Gauteng Province (Gauteng Conservation Plan Version 3.3, 2011). Gauteng C-Plan 3.3 includes the following that will be used as input into the National Bioregional Plan for the country:

- Critical Biodiversity Areas (CBA): containing *Irreplaceable, Important* and *Protected Areas* all merged together into one layer.
- Ecological Support Areas (ESA): containing all layers that are part of the entire hierarchy of biodiversity, but it is not possible to include all biodiversity features.

CBAs include natural or near-natural terrestrial and aquatic features that were selected based on an areas biodiversity characteristics, spatial configuration and requirement for meeting both biodiversity pattern and ecological process targets.

ESAs are areas that are not essential for meeting biodiversity representation targets/thresholds, but nonetheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The project site falls within the Gauteng CBA (*Important Areas*) and also within an ESA region (**Figure 6**).

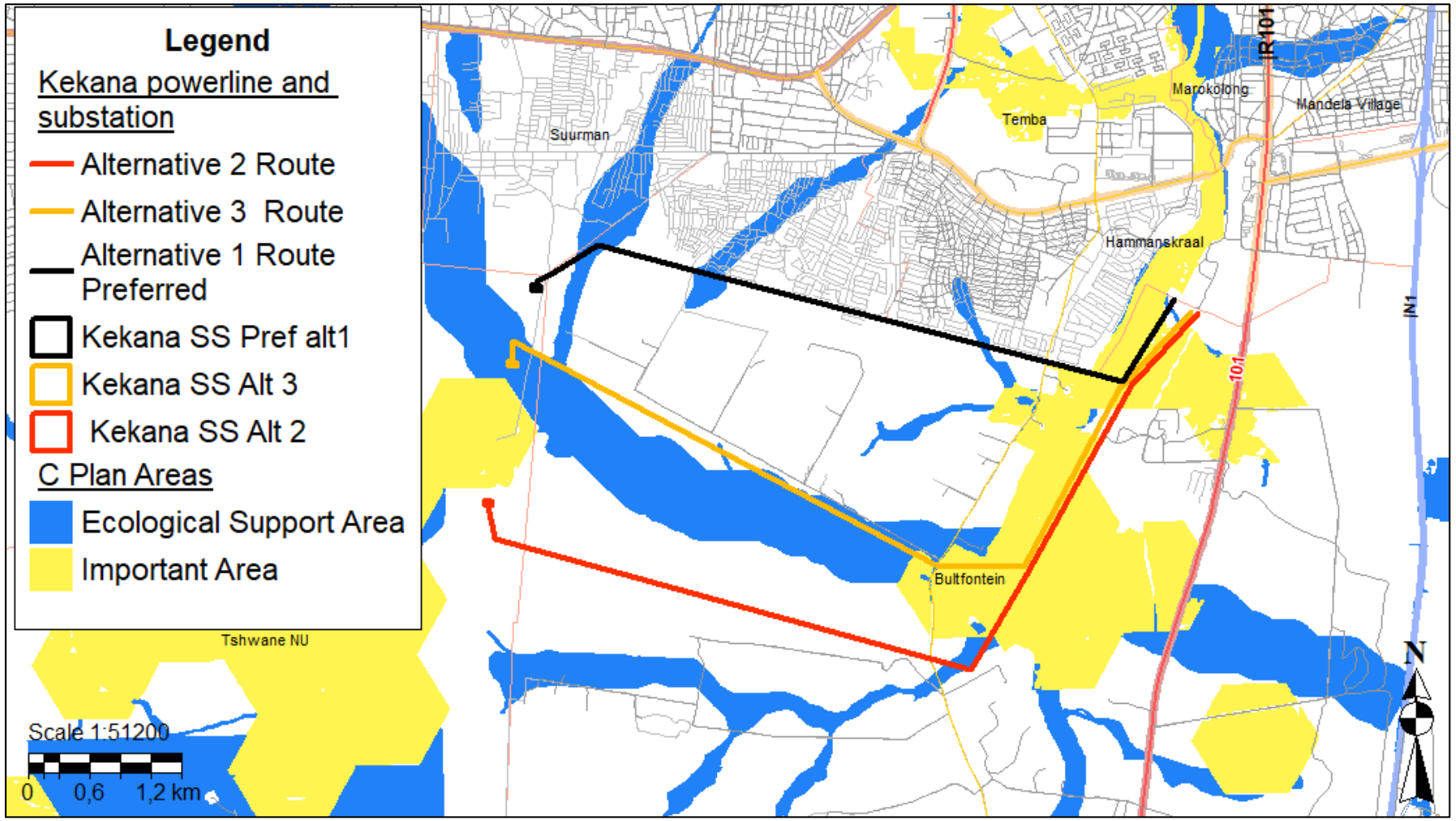

Figure 6. Gauteng C-Plan in relation to the project sites/routes

7 GAUTENG RIDGES

Ridges are specialized by high spatial heterogeneity due to the range of differing aspects (north, south, east, west and variations thereof), slopes and altitudes resulting in differing soil characteristics (e.g., depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions (Samways and Hatton, 2000). Moist cool aspects are more conducive to the leaching of nutrients than warmer drier slopes (Lowrey and Wright, 1987). Variations in aspect, soil drainage (Burnett *et al*. 1998) and elevation/altitude (Primack, 1995) have been found to be especially important predictors of biodiversity. According to Tshwane Open Space Framework (2005), Seventy-four (74%) percent of the twenty-two (22) globally threatened plant species occur on the ridges and hills of Gauteng, while at least three (3) threatened mammal species, several bird species of conservation concern, three (3) rare reptile species and a Red Data Butterfly inhabit ridges.

According to Bredenkamp & Brown (1998 In: Pfab 2001): “The quartzite ridges of Gauteng, together with the Drakensberg Escarpment, should be regarded as one of the most important natural assets in the entire region of the northern provinces of South Africa. They are characterised by a unique plant species composition that is found nowhere else in South Africa or the world.” In Gauteng, any topographic feature with a slope of 5O or more is defined as a ridge. The Development Guidelines for Ridges indicates that ridges are important as biodiversity hotspots and refuges, as well as providing habitat for Species of Conservation Concern, wildlife corridors, and an important art of ecosystem processes (Pfab 2001, updated in 2006).

All ridges in Gauteng have been classified into four classes (**Table 1**) based on the percentage of the ridge that has been transformed (mainly through urbanization or other human activities) using the 1994 CSIR/ARC Landcover data.

The project site does not fall within any of the Gauteng ridges (Gauteng C-Plan 3.3), with Class 4 ridge situated East of the project routes, as indicated in **Figure 7**.

Table 1. Four classes of ridges in Gauteng Province, percentage of transformation and land use guidelines

Ridge type	% of Gauteng ridges	Policy
Class 1 (0-5% transformed) includes Suikerbosrand & parts of Magaliesberg	58%	Only low impact activities with an ecological footprint of 5% or less in the 200-metre buffer zone of the ridge will be supported, no development will be permitted on the ridge itself.

Ridge type	% of Gauteng ridges	Policy
Class 2 (5-35% transformed) includes parts of Magaliesberg, Cradle of Humankind World Heritage site, Klipriviersberg, Bronberg, Skurweberg	23%	Development activities and uses that have a high environmental impact on a Class 2 ridge will not be permitted. Low impact development activities, such as tourism facilities, which comprise of an ecological footprint of 5% or less of the property may be supported. (The ecological footprint includes all areas directly impacted on by a development activity, including all paved surfaces, landscaping, property access and service provision). Low impact development activities on a ridge will be supported where is it feasible to undertake the development on a portion of the property abutting the ridge.
Class 3 (35-65% transformed) Includes Northcliff, Roodepoort and Krugersdorp ridge	8%	The guidelines for Class 2 ridges will be applied to areas of the ridge that have not been significantly impacted on by human activity. The guidelines for Class 3 will be applied to areas of the ridge that have been significantly impacted on by human activity
Class 4 (65-100% transformed) includes Melville Koppies & Linksfield ridge	11%	Further development activities will not be supported in areas of the ridge where the remaining contiguous extent habitat is 4ha or more.

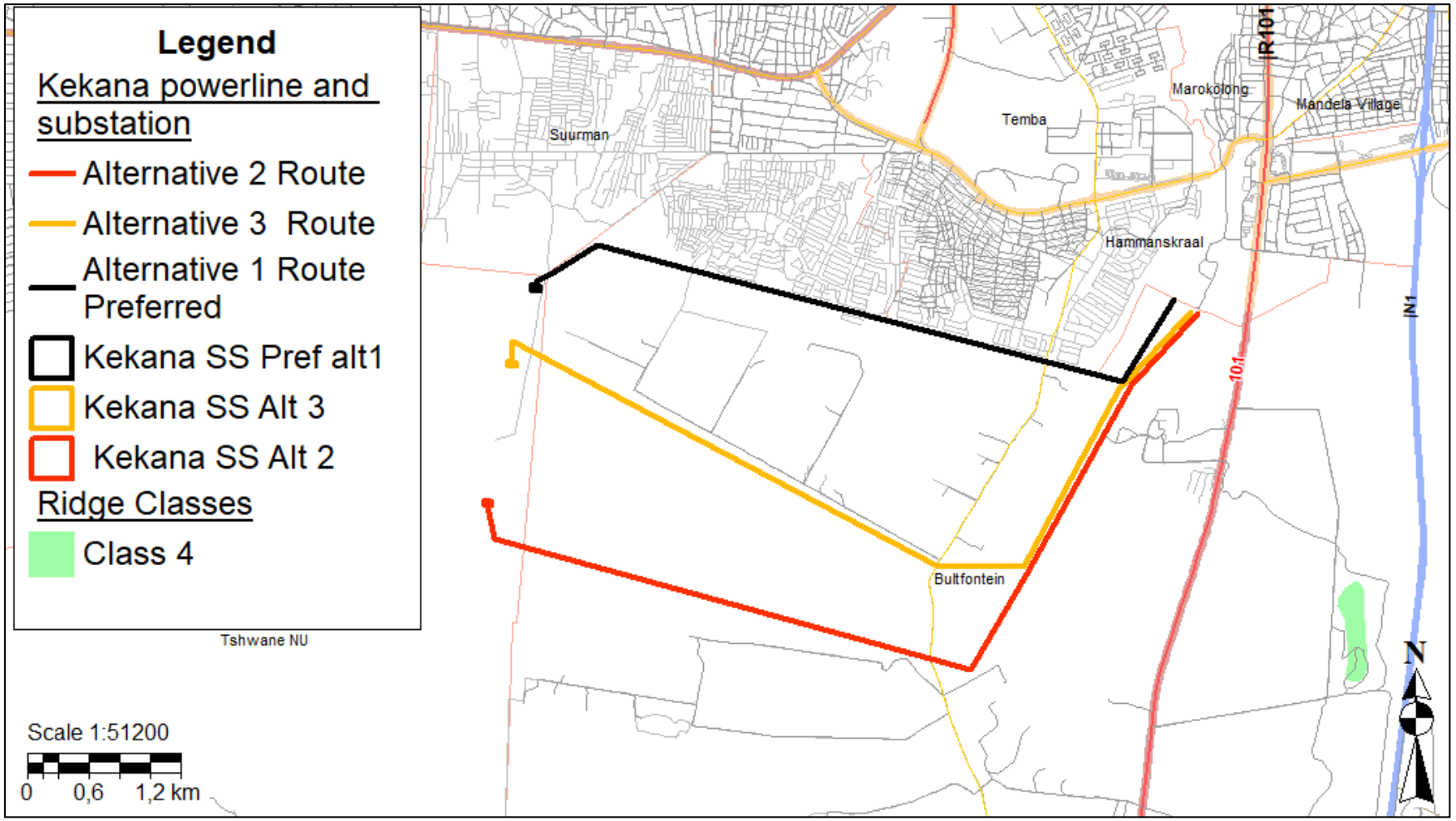

Figure 7: The project site does not fall within any of the Gauteng ridges

8 REGIONAL VEGETATION

The entire project site falls within the Savanna Biome (**Figure 8**) and this Biome is the largest Biome in South Africa and occupies over one third of the country. It is characterized by a grassy ground layer and distinct upper layer of woody plants. This biome is defined by a herbaceous layer dominated by grass species and a discontinuous to sometimes very open tree layer (Low and Rebelo, 1996).

Mucina and Rutherford (2018) classified the project site as falling within the Central Sandy Bushveld and Springbokvlakte Thornveld vegetation types, as indicated in **Figure 9**.

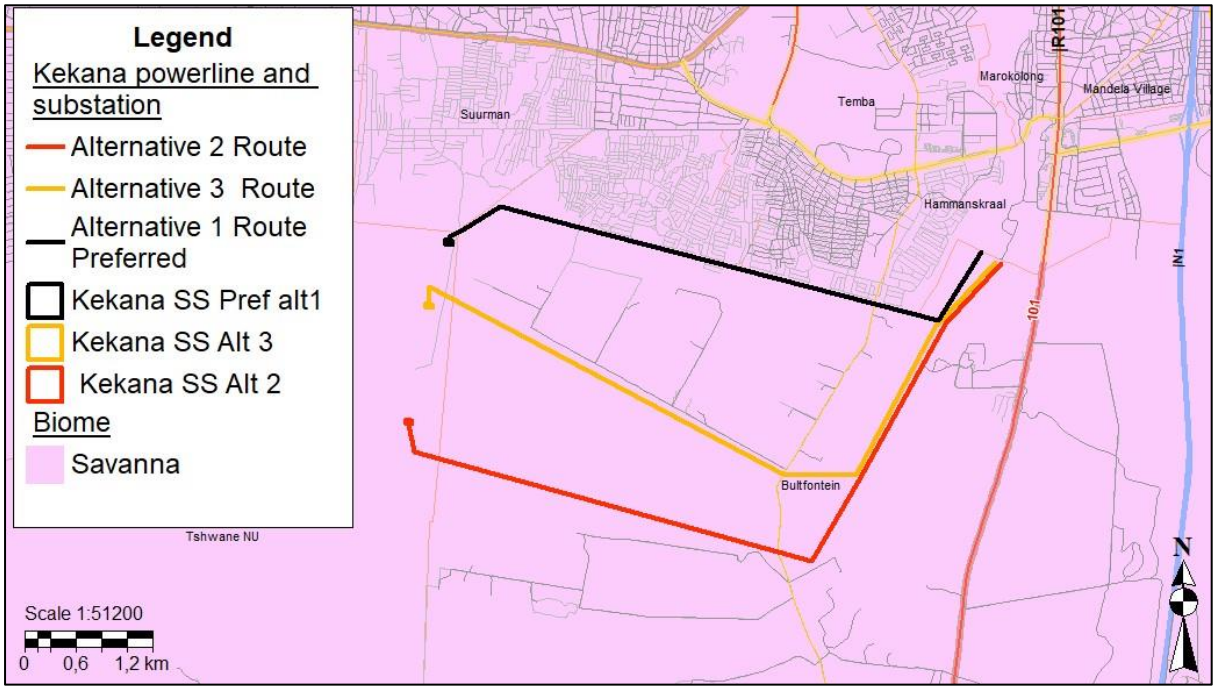

Figure 8. Biome on the project site

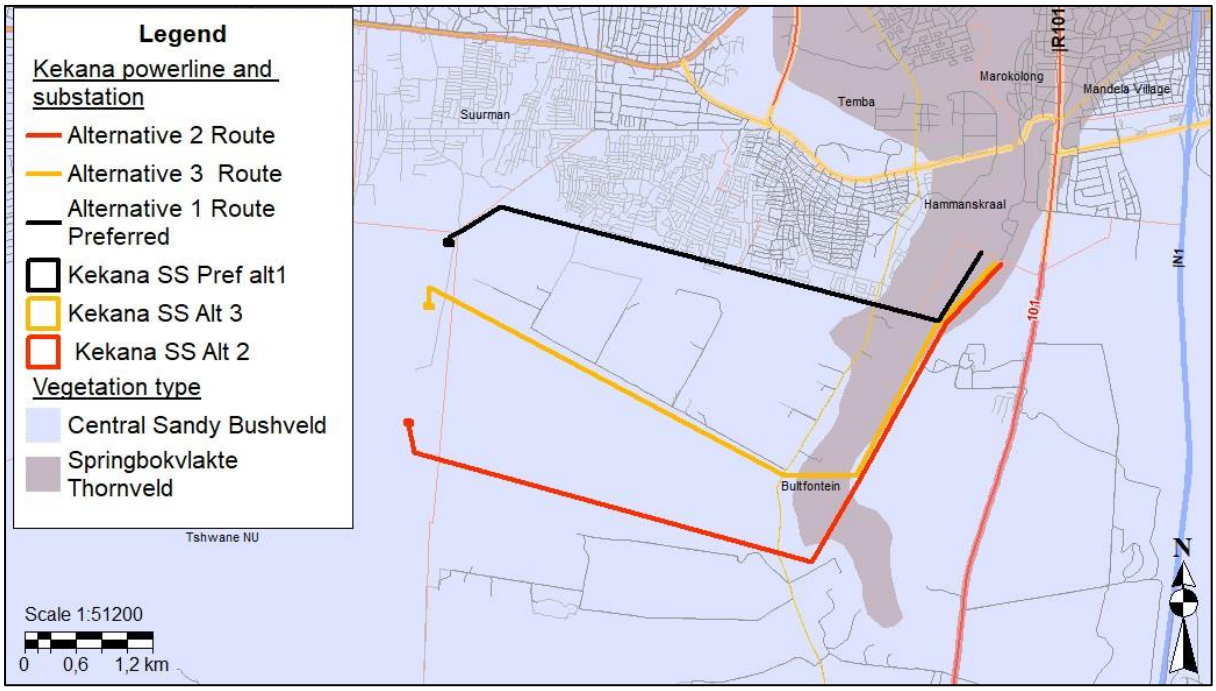

Figure 9. Vegetation types within the project site

The description of the vegetation types follows below:

8.1 Central Sandy Bushveld

Central Sandy Bushveld vegetation type is found in Limpopo, Mpumalanga, Gauteng and North-West Provinces. The undulating terrain occurs mainly in a broad arc south of the Springbokvlakte from the Pilanesberg in the west through Hammanskraal and Groblersdal to GaMasemola in the east. A generally narrow irregular band occurs along the north western edge of the Springbokvlakte (including Modimolle) extending into a series of valleys and lower-altitude areas within the Waterberg including the upper Mokolo River Valley near Vaalwater, the corridor between Rankins Pass and the Doorndraai Dam, and the lowlands from the Mabula area to south of the Hoekberge. Some isolated sandy rises are found on the Springbokvlakte (Mucina and Rutherford, 2006).

According to Mucina & Rutherford (2006), important taxa include Tall Trees: *Senegalia (Acacia) burkei, Vachellia (Acacia) robusta, Sclerocarya birrea* subsp*. caffra*. Small Trees: *Burkea africana, Combretum apiculatum, C. zeyheri, Terminalia sericea, Ochna pulchra, Peltophorum africanum, Searsia leptodictya.* Tall Shrubs: *Combretum hereroense, Grewia bicolor, G. monticola, Strychnos pungens*. Low Shrubs: *Agathisanthemum bojeri, Indigofera filipes, Felicia fascicularis, Lasiosiphon sericocephalus.* Geoxylic Suffrutex: *Dichapetalum cymosum.* Woody Climber*: Asparagus buchananii*. Graminoids: *Brachiaria nigropedata,*

Eragrostis pallens, E. rigidior, Hyperthelia dissoluta, Panicum maximum, Perotis patens, Anthephora pubescens, Aristida scabrivalvis subsp*. scabrivalvis, Brachiaria serrata, Elionurus muticus, Eragrostis nindensis, Loudetia simplex, Schmidtia pappophoroides, Themeda triandra, Trachypogon spicatus. Herbs: Dicerocaryum senecioide, Barleria macrostegia, Blepharis integrifolia, Crabbea angustifolia, Evolvulus alsinoides, Geigeria burkei, Hermannia lancifolia, Indigofera daleoides, Justicia anagalloides, Kyphocarpa angustifolia, Lophiocarpus tenuissimus, Waltheria indica, Xerophyta humilis.* Geophytic Herb: *Hypoxis hemerocallidea.* Succulent Herb: *Aloe greatheadii* var*. davyana.* Graminoid: *Mosdenia leptostachys.* Herb: *Oxygonum dregeanum* subsp*. canescens* var*. dissectum* (Mucina and Rutherford, 2006).

The conservation status of this vegetation type is classified as **Vulnerable**, with a national conservation target of 19%. Less than 3% is statutorily conserved spread thinly across many nature reserves including the Doorndraai Dam and Skuinsdraai Nature Reserves. An additional 2% is conserved in other reserves including the Wallmansthal SANDF Property and a grouping of private reserves, which include most of the Nylsvlei freshwater wetlands. About 24% is transformed, including about 19% is cultivated and 4% is urban and built-up areas. Much of the unit in the broad arc south of the Springbokvlakte is heavily populated by rural communities. Several alien plants are widely scattered but often at low densities; these include *Cereus jamacaru, Eucalyptus species, Lantana camara, Melia azedarach, Opuntia ficus-indica* and *Sesbania punicea* (Mucina and Rutherford, 2006).

8.2 Springbokvlakte Thornveld

Springbokvlakte Thornveld is found in Limpopo, Mpumalanga, North-West and Gauteng Provinces: Flats from Zebediela in the northeast to Hammanskraal and Assen in the southwest as well as from Bela-Bela and Mookgophong in the northwest to Marble Hall and Rust de Winter in the southeast (Mucina and Rutherford, 2006).

According to Mucina and Rutherford (2006), the Important taxa include:

- Small trees: *Acacia karoo* (d), *A. luederitzii var. retinens* (d), *A. mellifera subsp. detinens* (d), *A nilotica* (d), *Ziziphus mucronata* (d), *Acacia tortilis* subsp*. heteracantha, Boscia foetida* subsp*. rehmanniana.*
- Tall shrubs: *Euclea undulata* (d), *Rhus engleri* (d), *Dichrostachys cinerea, Diospytos lycioides subsp. lycioides, Grewia flava, Tarchonanthus camphortus;*
- Low shrubs: *Acacia tenuispina (d), Ptycholobium plicantum;*
- Succulent shrub: *Kleinia longiflora;*
- Herbaceous climbers: *Momordica balsamina, Rhynchosia minima;*

- Graminoids: *Aristida bipartita* (d), *Dichanthium annulatum* var. *papillosum* (d), *Ishaemum afrum* (d), *Setaria incrassata* (d), *Aristidia canescens, Brachiaria erucifromis;* and
- Herbs: *Aspilla mossambicensis, Indigastrum parviflorum, Nidorella hottentotica, Orthosiphon suffrutescens, Senecio apiifolius.*

The conservation status of this vegetation type is classified as **Endangered**, with a national conservation target of 19%. Only 1% statutorily conserved, mainly in the Mkombo Nature Reserve. Roughly three times this area is conserved in a number of other reserves. At least 49% transformed, including about 45% cultivated and 3% urban and built-up. Dense rural populations in parts of the southern and eastern side of the unit. Very scattered alien plants over wide areas include *Cereus jamacaru, Eucalyptus species, Lantana camara, Melia azedarach, Opuntia ficus-indica* and *Sesbania punicea* (Mucina and Rutherford, 2006).

9 TERRESTRIAL THREATENED ECOSYSTEMS

In terms of section 52(1) (a), of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), a national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011 (Government Notice 1002 (Driver *et al.* 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Protected. The purpose of categorising these ecosystems is to prioritise conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems.

It is estimated that threatened ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), Environmental Impact Assessments (EIAs) and other environmental applications (Mucina *et al*. 2006).

‘Ecosystem protection level’ is an indicator of how adequately an ecosystem is protected or not. Ecosystems can be classified as not protected, poorly protected, moderately protected or well protected depending on the proportion of each ecosystem that is under conservation management within a protected area, as recognized in the National Environmental Management: Protected Areas Act (Act 57 of 2003) –these protected areas include state or privately-owned protected areas as well a land under biodiversity stewardship agreements.

According to South African National Biodiversity Institute & Department of Forestry, Fisheries and the Environment (2021), there are remnants of the *Least concern* Central Sandy Bushveld and *Vulnerable* Springbokvlakte Thornveld terrestrial threatened ecosystem/vegetation type within the proposed development site (**Figures 10 and 11**). However, according to the Skowno *et al.* (2019), this ecosystem/vegetation type is listed as **Poorly Protected (PP)** on a national scale. According to the Driver *et al.,* (2012), an ecosystem is considered "not protected" if under 5% of its biodiversity target is met within protected areas, "poorly protected" if 5% to 49% of its target is met in protected areas, and "moderately protected" if 50% to 99% of its target is met. If more than 100% of the target is met in protected areas, it is considered "well protected".

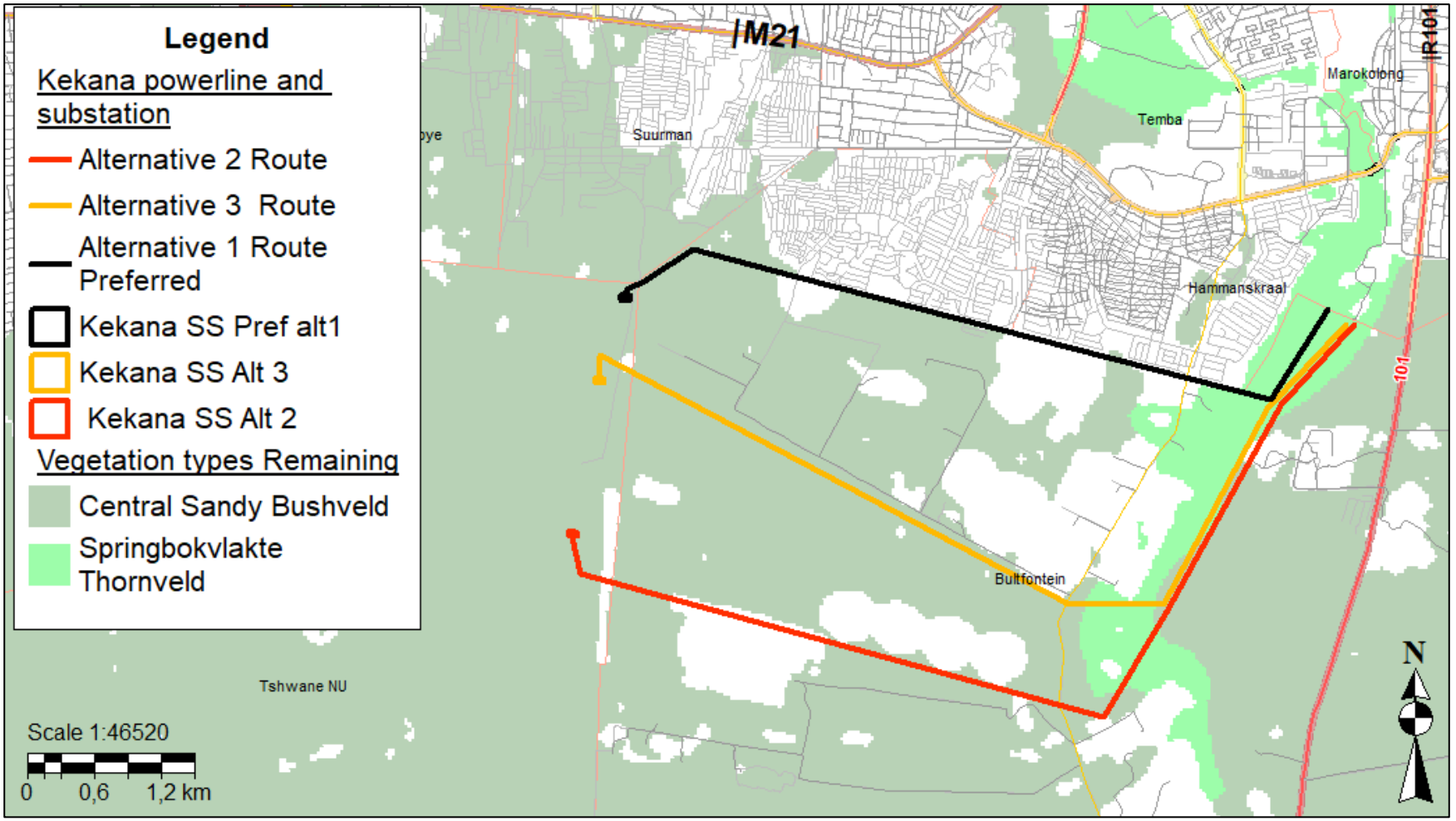

Figure 10. Remnants of the threatened ecosystems/vegetation types within the project area

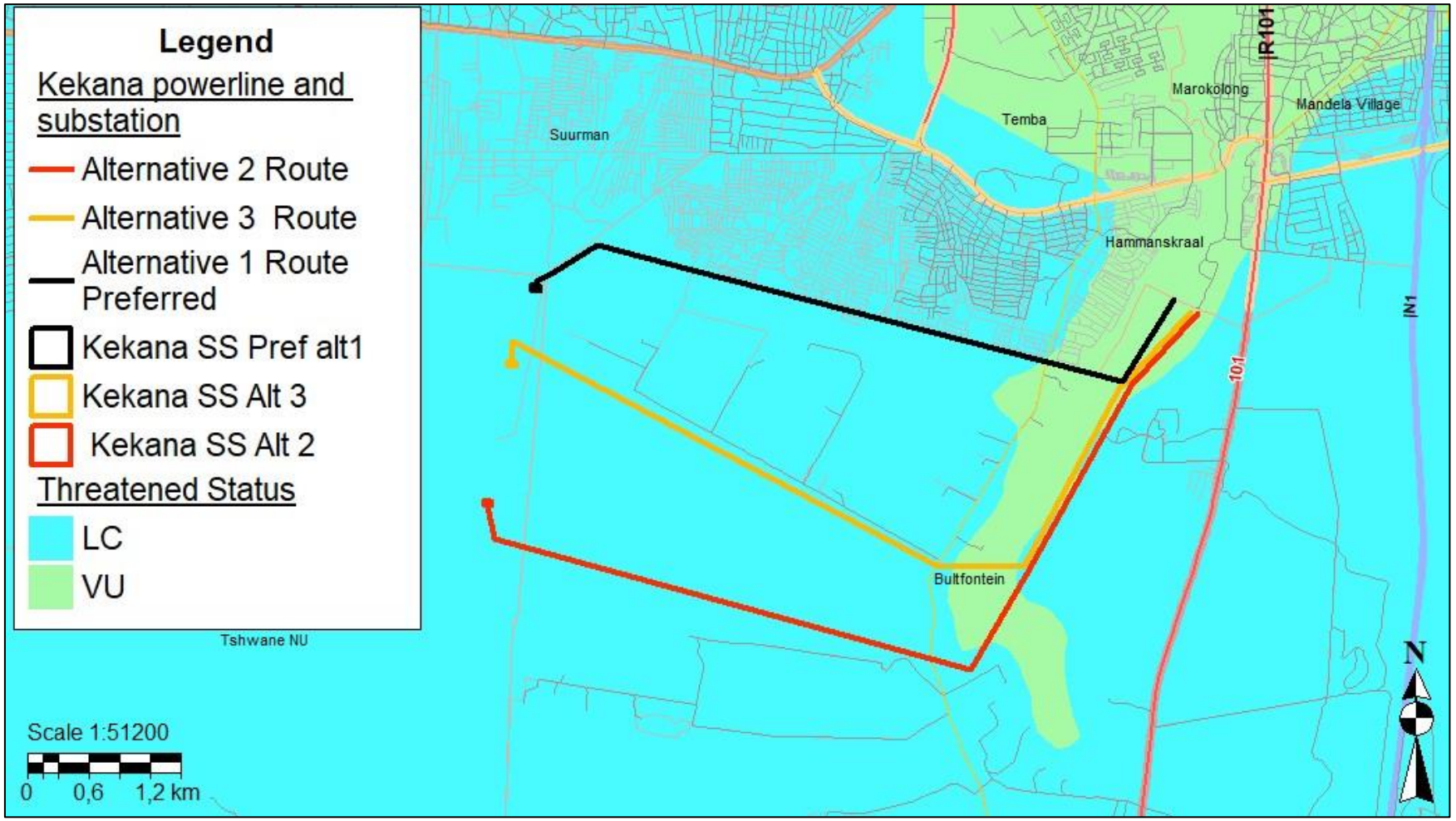

Figure 11. Threatened status within the project area

10 PROTECTED AND CONSERVATION AREAS

The aim of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) is 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 also to ensure the use of the natural resources in the area is sustainable.

The proposed development routes/sites fall within the Sterkwater Private Nature Reserve (SAPAD, 2023) (**Figure 12**). This Nature Reserve is not a formal Protected Area and there is no fence to demarcate this Reserve and has been de-proclaimed.

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 makes recommendations on mechanisms for protected area expansion. The proposed development site falls within the NPAES Priority focus areas (**Figure 13**).

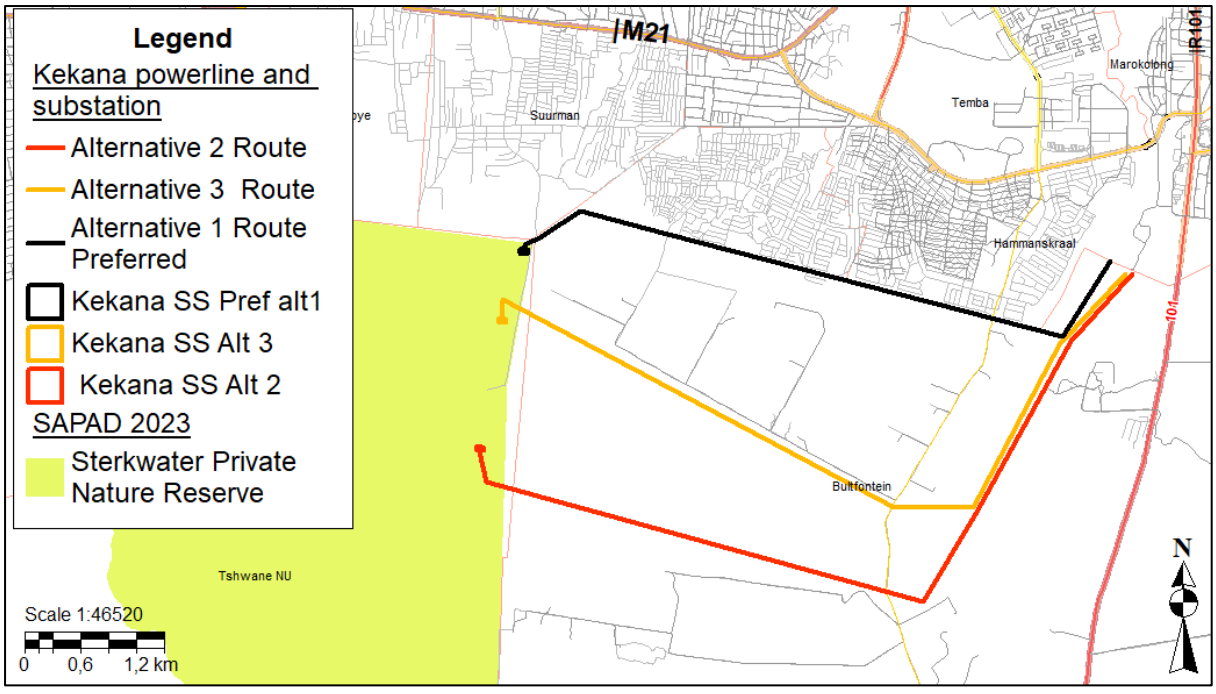

Figure 12. Protected Area in relation to the project sites/routes

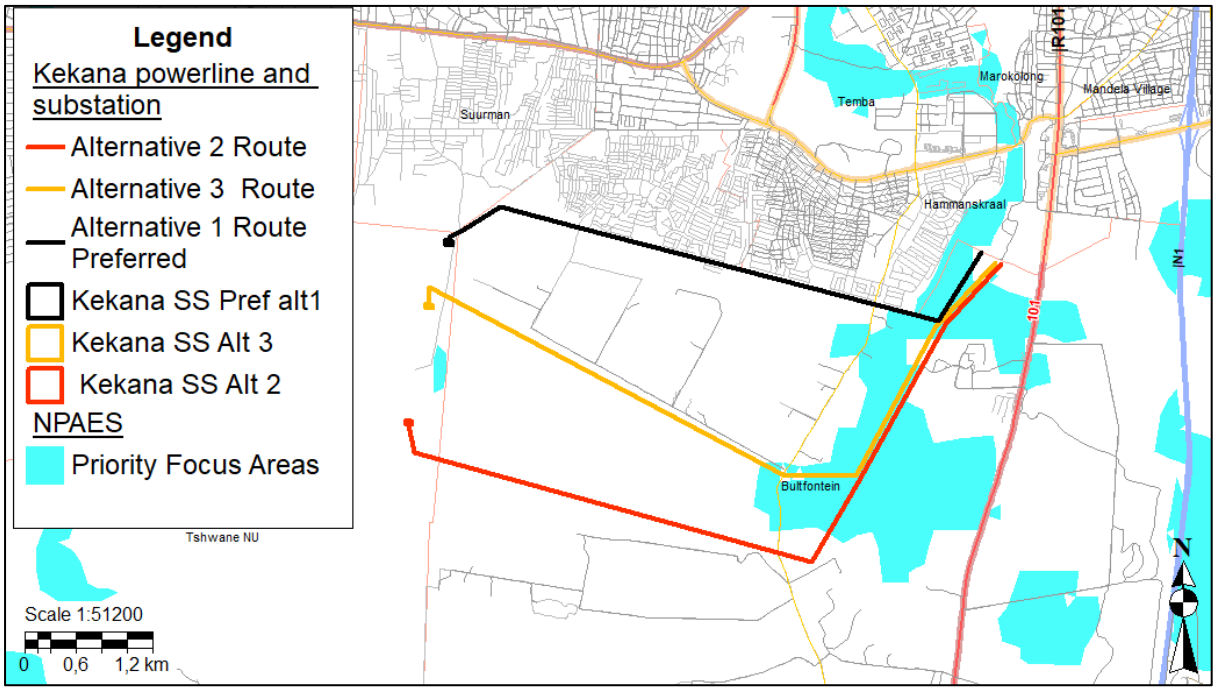

Figure 13. The project site falls within a NPAES Priority Focus area

11 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project aims to:

1. Identify Freshwater Ecosystem Priority Areas (FEPAs) to meet national biodiversity goals for freshwater ecosystems; and
2. Develop a basis for enabling effective implementation of measures to protect FEPAs, including free-flowing rivers (Nel *et al*. 2011).

In order to conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (*i.e*., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al*. 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals. River FEPAs are sub-quaternary catchments with good condition rivers (A or B Ecological Category) that achieve biodiversity targets for ecosystems and threatened or near-threatened fish species. These rivers should remain in good condition to contribute to the biodiversity targets for the country (Nel *et al*. 2011). All streams, rivers, wetlands are deemed legally sensitive

environments in terms of National Water Act (NWA) and National Environmental Management Act (NEMA) and are automatically regarded as highly sensitive areas where they provide ecological connectivity and have at least remnant natural vegetation.

The project powerline routes traverse through the NFEPA river (Apies River) but not along any of the NFEPA wetlands (**Figure 14**).

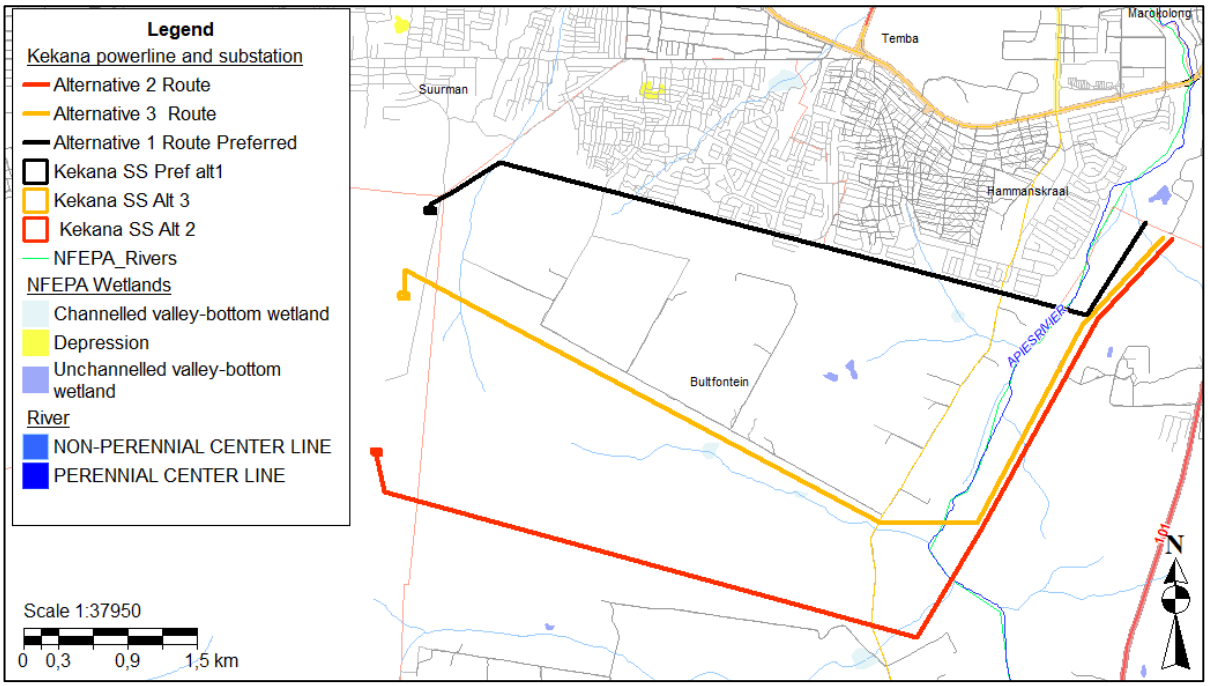

Figure 14. NFEPA wetlands and NFEPA river within the project area

12 RESULTS AND DISCUSSION

12.1 Flora

12.1.1 Desktop study results

According to the data sourced from BODATSA (SANBI) (2528AC and 2528AD QDS), DFFE Screening report and previous biodiversity studies, Red Data plant species which are known to occur on or near the project site are indicated in **Table 2** below. The definitions of the conservation status are provided in **Table 3**. According to the information received from GDARDE, *"No populations of the Red List plant taxa are present on the study site or in the near vicinity of the study site and no Red List plant taxa have been recorded from the farm on which the study site is situated / within 5km of the study site "*

Table 2. Red Data Plant species recorded in grid cells 2528AC and 2528AD which could potentially occur in the project site (SANBI data).

Family	Taxon	Conservation status	Endemism
Apocynaceae	*Ceropegia turricula*	Near Threatened	South African endemic
Apocynaceae	*Stenostelma umbelluliferum*	Near Threatened	South African endemic
Apocynaceae	*Brachystelma discoideum*	Critically Endangered, Possibly Extinct	Endemic
Fabaceae	*Argyrolobium megarrhizum*	Near Threatened	South African endemic

Table 3. Definitions of Red Data status (Raimondo *et al*. 1999)

Symbol	Status	Description
CR PE	Critically Endangered, Possibly Extinct	**Possibly Extinct** is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
NT	Near Threatened	A species is **Near Threatened** when available evidence indicates that it is close to meeting any of the five IUCN criteria for Vulnerable, and is therefore likely to qualify for a threatened category in the near future.

12.1.2 Plant species recorded on the project site

The proposed Alternative 1 Route (Preferred) is mostly situated along the edges of human settlements, with anthropogenic activities such as illegal dumping of materials (**Figure 15**) prevalent on site and is dominated mostly by alien invasive plants species. All three proposed routes traverse through the NFEPA river, namely Apies River (**Figure 16**). The proposed Alternative routes 2 and 3, which are situated within the same or similar habitats, are mostly aligned along the Farm roads, which are dominated by plant species such as *Terminalia sericea, Dichrostachys cinerea, Combretum hereroense, Combretum molle* etc. Plant species recorded along the project routes/sites are indicated in **Table 4.** Provincially protected plants, Orange listed plants and Protected Trees are shown in **BOLD.**

Figure 15. Illegally dumping materials on site

Figure 16. Apies River on site

Table 4. Plant species recorded within the project site

Scientific Name	Common Name	Ecological/Conservation status	Form	Alternative 1 Route Preferred	Alternative 2 Route	Alternative 3 Route
Abutilon angulatum	Elephant's Ear	Indigenous	Shrub		√	√
Acanthospermum australe	Creeping starbur	Least concern	Herb	√	√	√
Alternanthera pungens	Khakhiweed	Weed	Herb	√	√	√
Agave sisalana	Sisal	Category 2 AIS	Succulent	√		
Aloe davyana	Grasaalwyn	Least concern/Medicinal	Succulent	√	√	√
Ammocharis coranica	Karoo lily	Least concern/Medicinal	Herb		√	√
Aristida congesta subsp. *congesta*	Buffalo Grass	Least concern	Grass	√	√	√
Asparagus laricinus	Bergkatbos	Least concern	Shrublet	√	√	√
Berkheya setifera	Buffalo-tongue	Least concern	Herb	√	√	√
Bidens pilosa	Common Black-jack	Weed	Herb	√	√	√
Boscia albitrunca	**Shepherd's tree**	**Protected tree**	**Tree**	√		
Campuloclinium macrocephalum	Pompom weed	Category1b AIS	Herb	√		
Carissa bispinosa subsp. *bispinosa*	Forest num-num	Least concern	Shrub	√	√	√
Cereus jamacaru	Queen of the Night	Category1b AIS	Succulent	√	√	√
Chloris virgata	Feather-top chloris	Least concern	Grass	√	√	√
Combretum hereroense	Russet bushwillow	Least concern	Tree	√	√	√
Combretum molle	Velvet bush willow	Least concern	Tree	√	√	√
Combretum imberbe	**Leadwood**	**Protected tree**	**Tree**	√		√
Commelina africana	Common yellow Commelina	Least concern	Herb	√	√	√
Cynodon dactylon	Couch Grass	Least concern	Grass	√	√	√
Cylindropuntia imbricata	Imbricate prickly pear	Category 1b AIS	Succulent	√	√	√
Datura ferox	Long spined thorn apple	Category 1b AIS	Herb	√	√	√
Datura stramonium	Jimson weed	Category 1b AIS	Herb	√	√	√
Dichrostachys cinerea	Sicklebush	Least concern	Shrub	√	√	√
Digitaria eriantha	Common Finger Grass	Least concern	Grass	√	√	√
Diospyros lycioides	Blue bush	Least concern	Tree	√	√	√

Scientific Name	Common Name	Ecological/Conservation status	Form	Alternative 1 Route Preferred	Alternative 2 Route	Alternative 3 Route
Dombeya rotundifolia	Wild Pear	Least concern	Tree	√	√	√
Ehretia rigida subsp. *nervifolia*	Puzzle bush	Least concern	Shrub	√	√	√
Euclea crispa	Blue guarri	Least concern	Tree	√	√	√
Eragrostis curvula	Weeping love grass	Least concern	Grass	√	√	√
Eragrostis plana	Fan Love Grass	Least concern	Grass	√	√	√
Eragrostis superba	Saw-tooth love grass	Least concern	Grass	√	√	√
Erigeron (*Conyza*) *bonariensis*	Hairy fleabane	Least concern	Herb	√	√	√
Felicia muricata	Pale Felicia	Least concern/Medicinal	Herb	√	√	√
Flaveria bidentis	Smelter's-bush	Category1b AIS	Shrub	√	√	√
Gomphocarpus physocarpus	Balloon milkweed	Least concern/Medicinal	Shrub	√	√	√
Grewia flava	Wild Currant	Least concern	Shrub	√	√	√
Hibiscus trionum	Flower-of-an-hour	Least concern	Herb	√	√	√
Hilliardiellla (Vernonia) oligocephala	Bicoloured-leaved vernonia	Least concern/Medicinal	Herb	√	√	√
Hyparrhenia hirta	Common Thatching Grass	Least concern	Grass	√	√	√
Hypoxis hemerocallidea	**African Potato**	**Least concern/Medicinal**	**Herb**		√	
Imperata cylindrica	Blady grass	Least concern	Grass	√	√	√
Kalanchoe lanceolata	Narrow-leaved kalanchoe	Least concern	Shrub	√	√	√
Kalanchoe paniculata	Hasie-oor	Least concern/Medicinal	Herb	√	√	√
Lantana camara	Lantana	Category1b AIS	Shrub			
Ledebouria confusa	Grey-leaved African Hyacinth	Least concern/Medicinal	Herb		√	√
Ledebouria revoluta	Pluisiesbos	Least concern/Medicinal	Herb	√	√	√
Ledebouria cf. marginata	Tough-leaved African hyacinth	Least concern/Medicinal	Herb	√	√	√
Leonotis leonurus	Lion's ear	Least concern	Shrub	√	√	√
Lippia javanica	Lemon Bush	Least concern/Medicinal	Herb	√	√	√
Melia azedarach	Persian Lilac/Syringa	Category1b AIS	Tree	√	√	√
Melinis repens	Natal Red Top	Least concern	Grass	√	√	√
Mirabilis jalapa	Marvel-of-Peru	Category1b AIS	Herb	√	√	√

Scientific Name	Common Name	Ecological/Conservation status	Form	Alternative 1 Route Preferred	Alternative 2 Route	Alternative 3 Route
Morus alba	White mulberry	Invader 2	Tree	√	√	√
Nidorella anomala	Mokoteli	Least concern	Herb	√	√	√
Opuntia ficus-indica	Sweet prickly pear	Category 1b AIS	Succulent	√	√	√
Opuntia imbricata	Imbricate prickly pear	Category 1b AIS	Succulent	√	√	√
Parinari capensis	Sand apple	Least concern	Tree		√	√
Peltophorum africanum	African wattle	Least concern	Tree	√	√	√
Persicaria lapathifolia	Pale persicaria	Weed	Herb	√	√	√
Plantago major	Broadleaved Ribwort	Least concern/Medicinal	Herb	√	√	√
Phragmites australis	Common reed Thatching	Least concern	Reed	√	√	√
Prunus persica	Peach tree	Exotic	Tree	√	√	√
Psidium guajava	Guava	Invader 3	Tree	√	√	√
Pseudognaphalium luteo-album	Jersey Cudweed	Least concern	Herb	√	√	√
Richardia brasiliensis	Tropical Richardia	Weed	Herb	√	√	√
Ricinus communis	Castor Oil Bush	Category 1b AIS	Shrub	√	√	√
Sclerocarya birrea* subsp *caffra	**Marula tree**	**Protected**	**Tree**	√	√	√
Schoenoplectus corymbosus	Plume sedge	Least concern	Reed	√	√	√
Schinus molle	Pepper Tree	Exotic	Tree	√	√	√
Searsia lancea	Karee	Least concern	Tree	√	√	√
Searsia pyroides	Common wild currant	Least concern	Tree	√	√	√
Senna occidentalis	Wild coffee	Category 1b AIS	Shrub	√	√	√
Senegalia caffra	Common Hook-thorn	Least concern	Tree		√	√
Senegalia mellifera	Black thorn	Least concern	Tree		√	√
Setaria sphacelata var. *sphacelata*	Common Bristle Grass	Least concern	Grass	√	√	√
Sporobolus africanus	Ratstail Dropseed	Least concern	Grass	√	√	√
Solanum incanum	Bitter Apple.	Weed	Herb	√	√	√
Solanum mauritianum	Bugweed	Category 1b AIS	Tree	√	√	√
Tarchonanthus camphoratus	Camphor Wood	Least concern/Medicinal	Shrub		√	√
Tagetes minuta	Tall Khaki Weed	Weed	Herb	√	√	√
Tecoma stans	Yellow Bells	Category 1b AIS	Tree	√	√	√

Scientific Name	Common Name	Ecological/Conservation status	Form	Alternative 1 Route Preferred	Alternative 2 Route	Alternative 3 Route
Terminalia sericea	Silver cluster-leaf	Least concern	Tree		√	√
Themeda triandra	Red grass	Least concern	Grass	√	√	√
Typha capensis	Bulrush	Least concern	Aquatic Herb	√	√	√
Acacia karroo (*Vachellia karroo*)	Sweet thorn	Least concern	Tree	√	√	√
Vachellia nilotica subsp. *kraussiana*	Scented-pod acacia	Least concern	Tree		√	√
Vachellia robusta subsp. *robusta*	Broadpod robust thorn	Least concern	Tree		√	√
Vachellia tortilis subsp. *heteracantha*	Umbrella thorn	Least concern	Tree		√	√
Vachellia xanthophloea	Fever tree	Least concern/Medicinal	Tree	√	√	√
Verbena bonariensis	Tall Verbena	Weed	Herb	√	√	√
Xanthium spinosum	Spiny cocklebur	Category 1b AIS	Herb	√		
Xanthium strumarium	Large Cocklebur	Category 1b AIS	Herb	√		√
Xysmalobium undulatum	Milkwort	Least concern/Medicinal	Herb	√	√	√
Ziziphus mucronata	Buffalo thorn	Least concern	Shrub	√	√	√

Note: AIS=Alien Invasive Species

12.1.3 Threatened Species, Species of Conservation Concern and provincially protected plants

According to the South African Red data list categories done by SANBI (**Figure 17**), **threatened species** are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered, Endangered or Vulnerable is a threatened species whereas **Species of conservation concern** are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD).

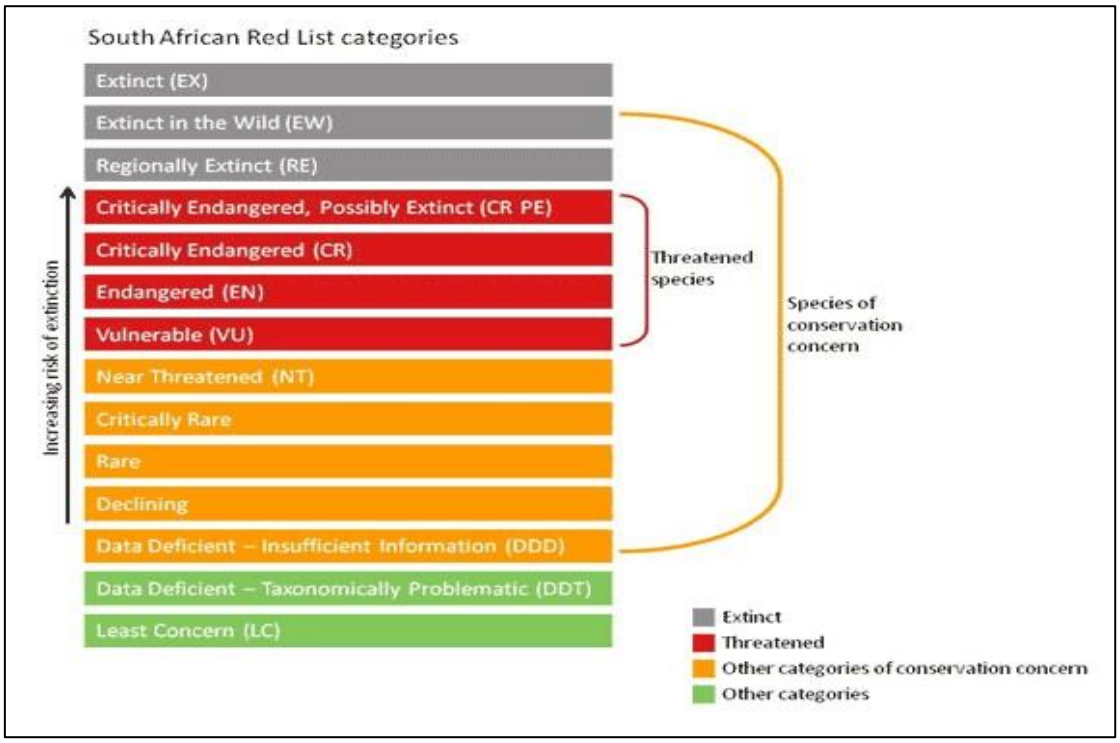

Figure 17. South African Red Data list categories

During the field survey, no threatened plants were recorded on sites. However, one Orange Listed plant species listed was observed on site, namely *Hypoxis hemerocallidea* (Star flower). Orange lists are those within the Red list that are categorised as Rare, Data deficient, Declining or Near threatened.

Hypoxis hemerocallidea (**Figure 18**) occurs in an open grassland and woodland and is widespread in South Africa in the eastern summer rainfall provinces (Eastern Cape, Free

State, KwaZulu-Natal, Mpumalanga, Gauteng and Limpopo). It also occurs in Botswana, Lesotho and Swaziland (Wyk. *et al*. 1997) and it's a highly sought-after medicinal plant.

Figure 18. *Hypoxis hemerocallidea* on site

Hypoxis hemerocallidea plant species used to be classified as *Declining* (Raimondo *et al* 2009), but now de-classified as *Least concern*. Species classified as Least concern are considered at low risk of extinction and are widespread and abundant, however, GDARDE has indicated that this species must remain classified as Orange list plant species due to its provincial level pressures (Appendix C). Therefore, in order to mitigate the impacts to this plant species, a Search, Rescue and Relocation Plan should be developed and must be supervised by a competent Ecologist/Botanist. This Plan should also take into account the several medicinal plant species such as and *Aloe davyana* (**Figure 19**) recorded in abundance on site. However, if the translocation of these plant species is happening outside of the project site, a Permit from GDARDE is required.

Figure 19. *Aloe davyana* on site

The distribution of the Orange Listed plant species on site is shown in **Figure 20** below.

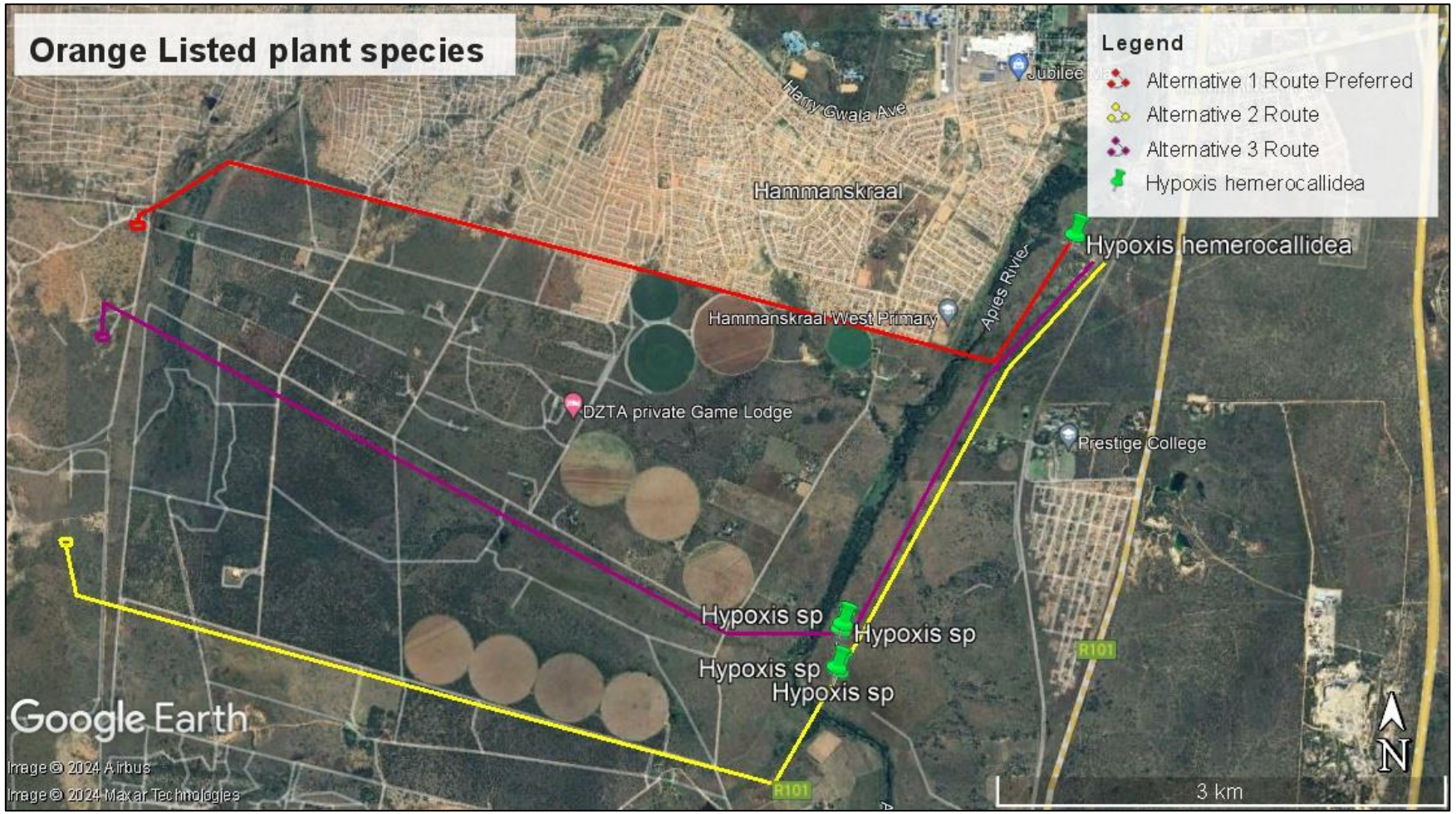

Figure 20. Distribution of the Orange listed plants on site

12.1.4 Protected tree species recorded on or near the study area

In terms of the National Forests Act (NFA), 1998 (Act No 84 of 1998) GN 536 in GG 41887 of 7 September 2018, certain tree species are declared as protected. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. The NFA affords protection to a number of tree species occurring within South Africa, listed as *Schedule A* protected trees. In terms of Section 15(1) of the National Forests Act, 1998, '*no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated'*.

Of the protected tree species that are known to occur within the region, three protected trees were recorded on or adjacent to the project routes, namely Marula (*Sclerocarya birrea* subsp*. caffra*), Leadwood (*Combretum imberbe*) and Shepherd's tree (*Boscia albitrunca*).

As far as possible, these protected trees should be preserved and not destroyed by the activities, however, where this proves not to be possible, a permit will be required from the National Department of Forestry, Fisheries and the Environment (DFFE) in order to cut, destroy or damage the trees before construction activities commence.

Marula (*Sclerocarya birrea* subsp*. caffra*) (**Figure 21**) is widespread in Africa from Ethiopia in the north to KwaZulu-Natal in the south. In South Africa, it is more dominant in the Baphalaborwa area in Limpopo province. It occurs naturally in various types of woodland, on sandy soil or occasionally sandy loam (Coates Palgrave, 1985).

Figure 21. Marula tree along the pipeline route

Leadwood (*Combretum imberbe*) (**Figure 22**) can be found in all the bushveld regions and in mixed forest in southern Africa. It is widespread in Lowveld areas and grows along streams and rivers. It is also found in Mpumalanga, Limpopo, North-West Provinces, Mozambique, and into tropical Africa (Coates Palgrave, 2002).

Figure 22. Leadwood along the pipeline route

Shepherd's tree (*Boscia albitrunca*) (**Figure 23**) is found in the drier parts of southern Africa, in areas of low rainfall. The vast distribution range covers Botswana, Limpopo, Gauteng, North-West, Swaziland, the Free State, Northern Cape and KwaZulu-Natal. It also extends into Zambia, Zimbabwe and Mozambique (Coates Palgrave, 2002).

Figure 23. Shepherd's tree along the pipeline route

The distribution of the 3 protected tree species along the routes is shown in **Figure 24** below

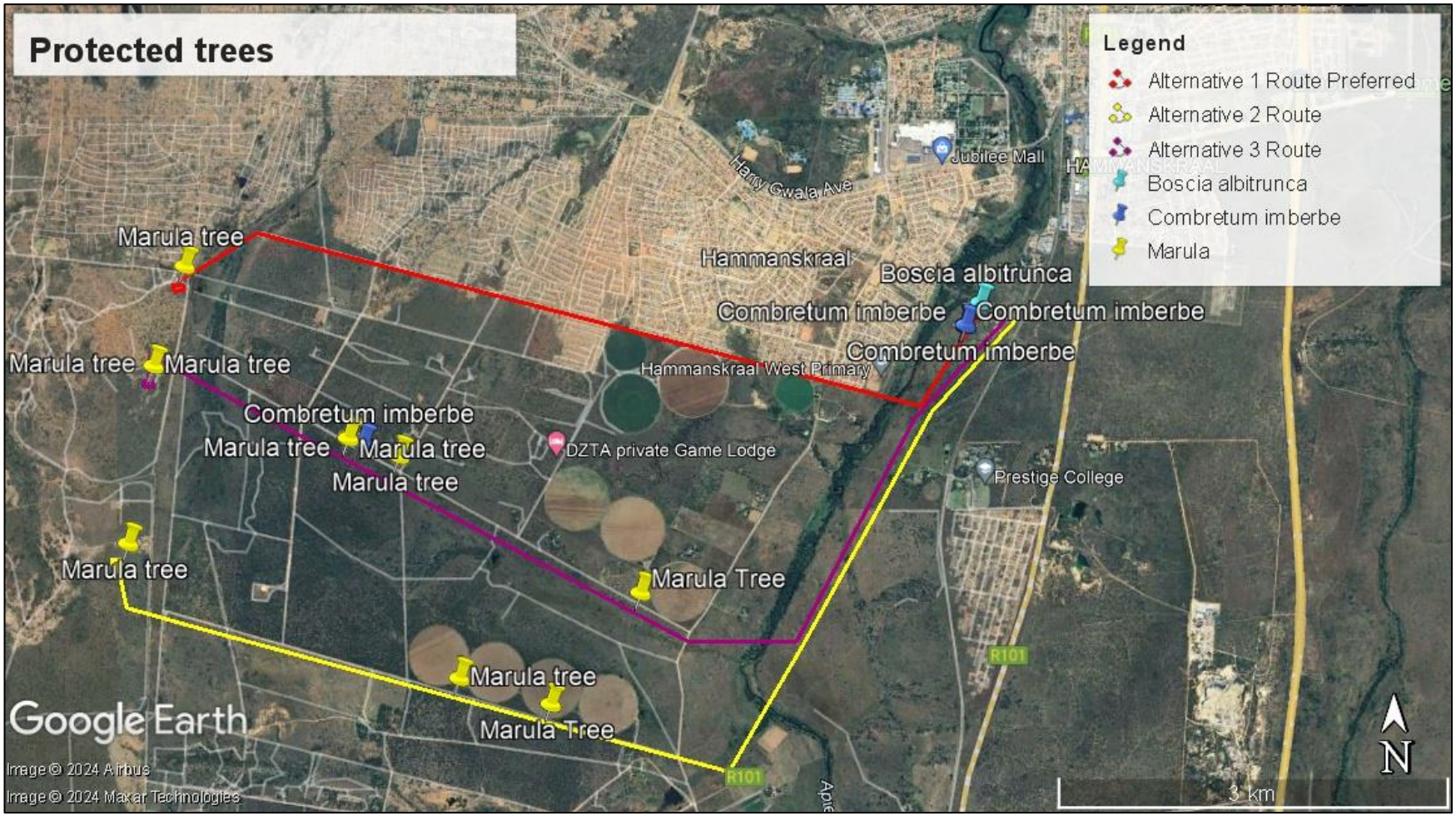

Figure 24. Distribution of the 3 protected trees along the powerline routes

12.1.5 Alien invasive plant species recorded on the study area

Alien invader plant species (AIS) are species of exotic origin that typically invade undeveloped or disturbed areas (Bromilow, 2018). AIS pose a threat to ecosystems because by nature they grow fast, reproduce quickly and have high dispersal abilities allowing them to replace indigenous species (Henderson, 2001).

Alien invasive plant species on the study area (**Table 4**) were observed to occur in clumps, scattered distributions or as single individuals. Invader and weed species on site must be controlled to prevent further infestation and it is recommended that all individuals of invader and weeds species (especially Category 1b) must be removed and eradicated.

Alien plant species such as *Flaveria bidentis* (**Figure 25**), *Campuloclinium macrocephalum* (**Figure 26**), *Solanum mauritianum* (**Figure 27**), *Mirabilis jalapa* (**Figure 28**) and *Datura stramonium* (**Figure 29**) (Category 1b) were recorded in abundance within the project site.

Figure 25. *Flaveria bidentis* recorded within the project site

Figure 26. *Campuloclinium macrocephalum* recorded within the project site

Figure 27. *Solanum mauritianum* recorded within the project site

Figure 28. *Mirabilis jalapa* recorded within the project site

Figure 29. *Datura stramonium* recorded within the project site

12.1.6 Potential occurrence of Red Data plant species

Data sourced from SANBI website (BODATSA), DFFE Screening report, GDARDE and previous biodiversity studies indicate that there are plant species on the Red Data List that are known to occur in or on areas surrounding the project area. The Probability of Occurrence is based on suitable habitat and known distribution ranges. The plant species and their probability of occurrence are indicated in **Table 5** below. Only plant species which have higher probability to occur on the project site are shown in the table below.

Table 5. Probability of occurrence of Red Data Plant species which could potentially occur on the project area.

Taxon	Conservation status	Suitable habitat	Probability of Occurrence
Ceropegia turricula	Near Threatened	Grassland slopes.	Low
Stenostelma umbelluliferum	Near Threatened	Deep black turf in open woodland mainly in the vicinity of drainage lines.	Medium
Brachystelma discoideum	Critically Endangered (Possibly Extinct)	Gravelly, sandy soils in bushveld.	Medium
Argyrolobium megarrhizum	Near Threatened	Mixed bushveld.	Low

12.2 Fauna

12.2.1 Mammals

12.2.1.1 Desktop survey results

The potential mammal species that could be found within the study area are those which have been recorded in grid cell 2528AC and 2528AD (FitzPatrick Institute of African Ornithology, 2024), GDARDE, DFFE Screening report, previous biodiversity reports, SANBI data and also from distributions based on records documented in Skinner and Chimimba (2005), Monadjem *et al*., (2010) and Stuart & Stuart (2013) (**Table 6**). Conservation status assessments for each species were obtained from Child *et al*. (2016).

Table 6. Red Data mammal species potentially occurring on the project site

Family	Scientific name	Common name	Red list category
Bovidae	*Damaliscus lunatus lunatus*	(Southern African) Tsessebe	Vulnerable
Bovidae	*Damaliscus pygargus pygargus*	Bontebok	Vulnerable
Felidae	*Acinonyx jubatus*	Cheetah	Vulnerable
Felidae	*Leptailurus serval*	Serval	Near Threatened
Hyaenidae	*Hyaena brunnea*	Brown Hyena	Near Threatened
Muridae	*Otomys auratus*	Southern African Vlei Rat (Grassland type)	Near Threatened
Muridae	*Dasymys robertsii*	Robert's Marsh Rat	Vulnerable
Mustelidae	*Hydrictis maculicollis*	Spotted-necked Otter	Vulnerable
Nesomyidae	*Mystromys albicaudatus*	African White-tailed Rat	Vulnerable
Soricidae	*Crocidura mariquensis*	Swamp Musk Shrew	Near Threatened
Vespertilionidae	*Miniopterus schreibersii*	Schreibers's Long-fingered Bat	Near Threatened
Vespertilionidae	*Pipistrellus (Pipistrellus) rusticus*	Rusty Pipistrelle	Near Threatened

12.2.1.2 Mammals recorded on the study area

As previously mentioned, the proposed Alternative 1 route falls on the edges of human habitats, where the other two proposed routes and mostly within the bushveld dominated by *Acacia* species and *Terminalia* species. Based on observations made during the site visit, the proposed Alternative 1 route has been negatively impacted on by anthropogenic activities such as dumping of illegal materials (waste) and increased invasion of alien species. However, all the proposed routes traverse through the Apies River, which provides suitable riparian habitat for water-dependant mammal species. A number of small wild mammal species are however expected to be present occasionally, however, these mammal species are being

hunted by the domestic dogs. According to the information obtained from the locals, hunting is prevalent in the area. No Mammal Species of Conservation Concern were recorded on the project development site. **Table 7** indicates mammal species recorded along the 3 routes.

Table 7. Mammal species recorded on the project area

Family	Scientific name	Common name	Red list category
Bathyergidae	*Cryptomys hottentotus*	Southern African Mole-rat	Least concern
Lagomorpha	*Lepus saxatilis*	Scrub Hare	Least concern
Muridae	*Mus musculus*	House mouse	Exotic
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	Least concern

12.2.1.3 Potential occurrence of Red Data mammal species

The potential mammal species that could be found within the project site are those which have been recorded in grid cell 2528AC and 2528AD (FitzPatrick Institute of African Ornithology, 2024), DFFE Screening report, SANBI data and also from distributions based on records documented in Skinner and Chimimba (2005), Monadjem *et al*., (2010) and Stuart & Stuart (2013). The probability of occurrence (**Table 8**) was based on the consideration of the following factors:

- Known distribution;
- Overall abundance of a species;
- Availability of suitable habitat on the study area;
- Availability of prey items on the study area and surrounding areas;
- Level of anthropogenic disturbance; and
- Species tolerance to anthropogenic disturbance.

The Likelihood of occurrence was generally assessed as follows:

- **Confirmed**: either through current survey or through sightings, and local knowledge where provided.
- **High**: Distribution of the species occurs over the sites and the sites and immediate surrounds provide habitat, roosting and food requirements of the specific species. There is nothing to prevent the species from residing on site for a length of time (season or year).
- **Medium**: Distribution of the species occurs over the sites but the specific habitat, roosting and/or food requirements are absent or sparse on site, but are present in the greater area. Species are not likely to reside on site, but may forage over or traverse the site. Species population is at low density or erratic over site, but habitat and / or foraging areas are present on site and in the immediate surrounds.

- **Low**: Distribution is on the edge of site and habitat, roosting and/or food requirements are absent or sparse in the sites and surrounds. Species population is at low density or erratic over site and habitat and foraging areas are sparse or absent.

Table 8. Probability of occurrence of Red Data mammal species which could potentially occur within the project site

Common name	Red list category	Suitable habitat	Probability of occurrence
(Southern African) Tsessebe	Vulnerable	In South Africa, the Tsessebe formerly occurred in the bushveld and lowveld, often at the ecotone between grassland and woodland. Their preferred habitats are Kimberley Thornveld and Mopane Bushveld. They do not occur in forests, arid or montane habitats	Low
Bontebok	Vulnerable	Bontebok are almost exclusively grazers, with a preference for short grass and recently burnt veld. Within their natural range on the coastal lowlands, grassy areas are predominantly found in the renosterveld areas but Bontebok also make use of small grassy microhabitats or recently burnt fynbos and strandveld habitats. Suitable habitat for Bontebok is thus predominantly limited to the remaining renosterveld patches in the Overberg region.	Very Low
Cheetah	Vulnerable	Cheetahs are habitat generalists and as such can survive where sufficient food is available and threats are tolerable.	Low
Serval	Near Threatened	Servals are mostly found in and around marshland, well-watered savannah and long-grass environments, and are particularly associated with reed-beds and other riparian vegetation types.	Low
Brown Hyena	Near Threatened	It inhabits desert areas, semi-desert, and open woodland savannahs. It can survive close to urban areas by scavenging.	Low
Southern African Vlei Rat (Grassland type)	Near Threatened	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	Low
Robert's Marsh Rat	Vulnerable	Robert's Shaggy Rat is dependent on intact rivers and wetland ecosystems, as they have not been found in artificial or degraded wetlands. It is patchily distributed in the lowveld of northern South Africa and Zimbabwe. It occurs predominantly in Limpopo, Mpumalanga and Gauteng provinces	Low

Common name	Red list category	Suitable habitat	Probability of occurrence
African White-tailed Rat	Vulnerable	It is often associated with calcrete soils within grasslands and never found on soft, sandy substrate, rocks, wetlands or river banks. It can also occur in disturbed areas (heavily grazed and in sparse grasslands	Medium
Spotted-necked Otter	Vulnerable	Spotted-necked Otters are thought to inhabit freshwater habitats where water is not silt-laden, and is unpolluted, and rich in small fishes	Medium
Swamp Musk Shrew	Near Threatened	This species has highly specific habitat requirements, occurring only close to open water with intact riverine and semi-aquatic vegetation such as reedbeds, wetlands and the thick grass along river banks. They are found both in the wet substrates and drier grassland away from the water's edge. They are often sampled in waterlogged areas, such as inundated grasslands and vleis	Medium
Schreibers's Long-fingered Bat	Near Threatened	It has been found to roost in caves, rock clefts, culverts, caverns, and galleries	Low
Rusty Pipistrelle	Near Threatened	It occurs in savannah woodland and is associated with open water bodies, but is absent from moist miombo woodland and arid savannah	Medium

12.2.2 Avifauna

12.2.2.1 Desktop survey results

The Important Bird and Biodiversity Areas (IBA) Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that are globally threatened, have a restricted range and are restricted to specific biomes/vegetation types (Barnes, 2000). As shown in **Figure 30** below, the project area does not fall within any of the IBAs. The nearest IBA is Magaliesberg IBA, situated South-west of the project area.

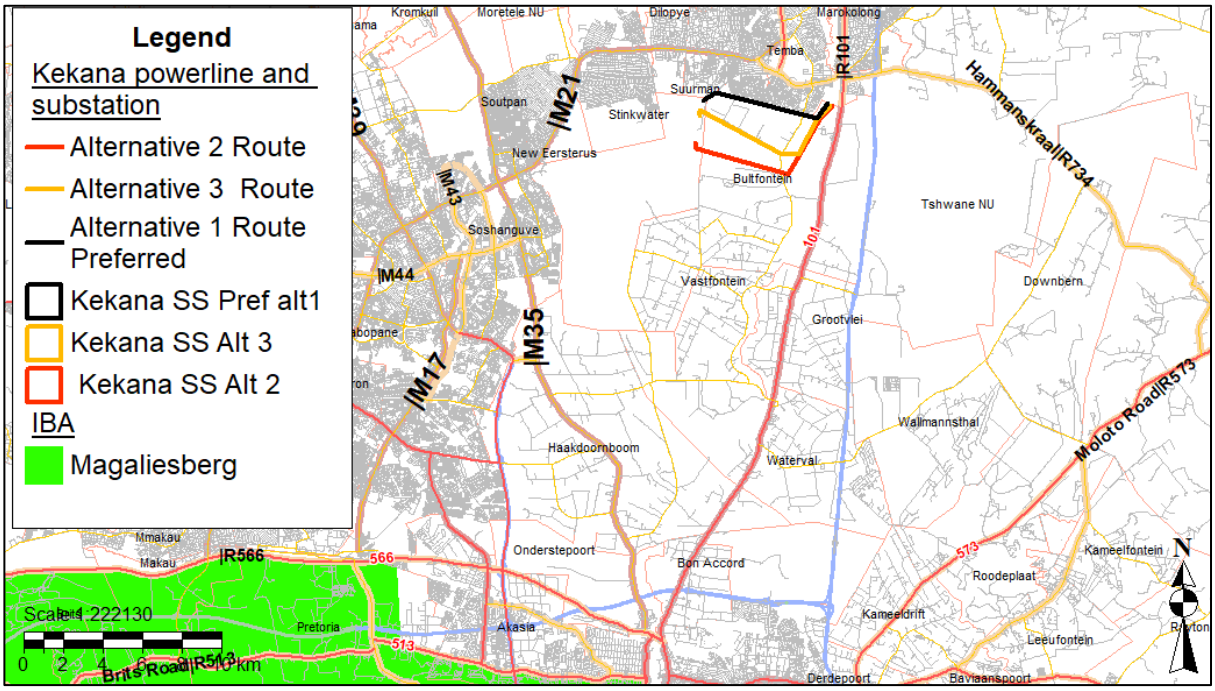

Figure 30. Magaliesberg IBA in relation to the project area

The online database of the Southern African Bird Atlas Project (SABAP), GDARDE, DFFE Screening report and SANBI were queried for a list of bird species confirmed to occur in the relevant pentads (mapping units) that the project area is located in, namely 2528AC and 2528AD. Taylor *et al*. (2015) was consulted for the most current conservation status of each species of conservation concern on the list (**Table 9**).

Table 9. Red listed bird species which could potentially occur on the project area

Species	Scientific name	Conservation status
Ludwig's Bustard	*Neotis ludwigii*	Endangered
Burchell's courser	*Cursorius rufus*	Vulnerable
Grey Crowned Crane	*Balearica regulorum*	Endangered

Species	Scientific name	Conservation status
Blue Crane	*Anthropoides paradiseus*	Near Threatened
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable
Lanner Falcon	*Falco biarmicus*	Vulnerable
Greater Flamingo	*Phoenicopterus roseus*	Near Threatened
Lesser Flamingo	*Phoeniconaias minor*	Near Threatened
Karoo Korhaan	*Eupodotis vigorsii*	Near Threatened
African Rock Pipit	*Anthus crenatus*	Near Threatened
Secretarybird	*Sagittarius serpentarius*	Vulnerable
Yellow-billed Stork	*Mycteria ibis*	Endangered
Caspian Tern	*Sterna caspia*	Vulnerable
African finfoot	*Podica senegalensis*	Vulnerable
Martial Eagle	*Polemaetus bellicosus*	Endangered
Tawny eagle	*Aquila rapax*	Endangered
White-bellied korhaan	*Eupodotis senegalensis*	Vulnerable

12.2.2.2 Field work results and discussion

Within the vegetation type found in the study area and immediate surrounding areas, four major bird micro-habitat systems were identified, namely open grassland, exotic trees, bushveld, pans and perennial river.

Open grasslands: Patches of open grasslands and disturbed grasslands on site represent a significant feeding area for many bird species. The grassland patches are also a favourite foraging area for game birds such as francolins, Helmeted Guineafowl and Black-shouldered Kite etc. This in turn may attract raptors because of both the presence and accessibility of prey. Red Data Listed bird species such as Lanner Falcon, Lesser Kestrel, and Martial Eagle, may often hunt in open grassland areas.

Exotic trees often provide roosting and nesting habitat for various bird species, and as such their importance for avifauna should not be under-estimated. Exotic trees provide perching, roosting and nesting habitat for various raptor species, as well as larger birds such as francolins, Guineafowl, Herons and Hadeda ibises. Although stands of *Eucalyptus* spp are invader species, these stands have become important refuges for certain species of raptors including Eagles and Buzzards. Birds such as Lesser Kestrel and Falcons make use of large *Eucalyptus* trees, where they roost in large numbers. Nests identified on the study area should not be unnecessarily destroyed.

Bushveld: The proposed development site traverses through woodland habitat, which varies between broadleaved woodland, *Acacia*-dominated woodland, and open woodland with small scattered *Acacia* trees. The bird species within this habitat generally include a great variety of arboreal passerines, such as drongos, warblers, flycatchers, shrikes, sunbirds, waxbills and weavers, as well as arboreal non-passerines such as doves, cuckoos and woodpeckers. Many of these species make use of the thorny nature of these trees to build their nests. *Acacia* trees

typically attract many insects and in turn attract a good diversity of typical bird species found in *Acacia* savanna.

Pans: The study area contains pans/dams, mostly associated with the Apies River. Common species that could use pans and dams include Red-knobbed Coot, Black-headed Heron, African Darter, Blacksmith Lapwing, and Egyptian Goose. Red Data species recorded by SABAP2 in the relevant pentads that may use the dams are Greater Flamingo and Maccoa Duck, both of which were recorded in low number.

The perennial **river** on site is considered important attractants to various bird species. Bird species such as herons, bishops, weavers, cisticolas and warblers will breed in the reeds growing on the banks of the rivers and will also feed on insects that live within the reeds. Many of these bird species make use of the thorny nature of these trees to build their nests. Water bodies represent sensitive areas because they provide habitat for a wide variety of terrestrial and aquatic species, particularly avifauna.

Forty-Five (45) bird species (**Table 10**) were recorded during the field survey. Species recorded were common and widespread and typical of savanna biome. No Red Data bird species associated with the study routes were recorded. Bird species recorded within the project site are shown in **Figures 31-36.**

Table 10. Bird species recorded within the project site

Common name	Scientific name	Conservation status
Cattle Egret	*Bubulcus ibis*	Least concern
Hadeda Ibis	*Bostrychia hagedash*	Least concern
African darter	*Anhinga rufa*	Least concern
Black-headed Heron	*Ardea cinerea*	Least concern
Reed Cormorant	*Phalacrocorax africanus*	Least concern
Glossy ibis	*Plegadis falcinellus*	Least concern
African Sacred ibis	*Threskiornis aethiopicus*	Least concern
Black-shouldered kite (Black-winged kite)	*Elanus caerulus*	Least concern
Helmeted Guineafowl	*Numida meleagris*	Least concern
Blacksmith Lapwing (Plover)	*Vanellus armatus*	Least concern
Natal Francolin/Spurfowl	*Pternistis natalensis*	Least concern
Crowned lapwing (Plover)	*Vanellus coronatus*	Least concern
African Wattled Lapwing	*Vanellus senegallus*	Least concern
Speckled Pigeon	*Columba guinea*	Least concern
Rock Dove (Feral Pigeon)	*Columba livia*	Least concern
Laughing Dove	*Streptopelia senegalensis*	Least concern
Common (Indian) Myna	*Acridotheres zeylonus*	Introduced species
House Sparrow	*Passer domesticus*	Least concern
Egyptian Goose	*Alopochen aegyptiaca*	Least concern
African Hoopoe	*Upupa africana*	Least concern
Green Wood hoopoe	*Phoeniculus purpureus*	Least concern
Speckled Mousebird	*Colius striatus*	Least concern
Swainson's Spurfowl	*Pternistis swainsonii*	Least concern
Pied crow	*Corvus albus*	Least concern

Common name	Scientific name	Conservation status
Crested Barbet	*Trachyphonus vaillantiii*	Least concern
Common Fiscal (Shrike)	*Lanius collaris*	Least concern
Red-eyed Dove	*Streptopelia semitorquata*	Least concern
Spotted Eagle-Owl	*Bubo africanus*	Least concern
Brown Snake-eagle	*Circaetus cinereus*	Least concern
Cape (Orangethroated) Longclaw	*Macronyx capensis*	Least concern
Rattling Cisticola	*Cisticola chiniana*	Least concern
Zitting Cisticola	*Cisticola juncidis*	Least concern
Blue-waxbill	*Uraeginthus angolensis*	Least concern
Karoo thrush	*Turdus smithi*	Least concern
Southern boubou	*Laniarius ferrugineus*	Least concern
Dark-capped Bulbul	*Pycnonotus tricolor*	Least concern
Cape Robin-Chat	*Cossypha caffra*	Least concern
Cape Glossy-Starling	*Lamprotornis nitens*	Least concern
Levaillant's cisticola	*Cisticola tinniens*	Least concern
Cape Wagtail	*Motacilla capensis*	Least concern
Grey go-away-bird	*Corythaixoides concolor*	Least concern
Southern-masked Weaver	*Ploceus velannus*	Least concern
Southern red bishop	*Euplectes orix*	Least concern
Pin-tailed whydah	*Vidua macroura*	Least concern
Village weaver	*Ploceus cucullatus*	Least concern

Figure 31. Hadeda ibis and African Sacred ibis on site

Figure 32. Blue-waxbill on site

Figure 33. Cattle Egret and African Sacred ibis on site

Figure 34. African Wattled Lapwing on site

Figure 35. Village weaver site

Figure 36. Black-headed heron on site

12.2.2.3 Mortality due to collisions of birds with the overhead power lines

Although all birds have the potential to be affected by collisions, species groups most at risk of collision impacts are those with heavier bodies and relatively small wingspan, making them less movable and therefore more prone to collisions. Species groups include bustards, storks, cranes, eagles, vultures, ibises, etc. Further groups at risk are fast-flying waterfowl, especially ducks and geese and these bird species are mostly heavy-bodied species, with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Collisions are probably the biggest single threat posed by transmission lines to birds in southern Africa. Several factors are thought to influence birds collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. (Van Rooyen, 2004).

The proposed power lines could pose a limited collision threat to Red Data species. The biggest threat will be in the remaining grassland areas, where White-bellied Korhaans and Secretarybirds could still be present. There is also a possibility of collisions at pans, dams and wetlands which could affect Maccoa Duck and Greater Flamingo and a variety of non-threatened waterbirds.

12.2.2.4 Mortality of birds due to electrocution on the power lines

According to van Rooyen (2004), electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. Electrocution risk is strongly influenced by the power line voltage of the and design of the pole structure and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Electrocution of birds on overhead lines is an important cause of unnatural mortality of raptors and storks. Large birds of prey are the most commonly electrocuted on power lines, but the larger power lines from 220kV to the massive 765kV structures are usually not a threat to large raptors, because the pylons are designed in such a manner that the birds do not perch in close proximity the potentially lethal conductors. In fact, these power lines have proved to be beneficial to birds such as Martial Eagles, Tawny Eagles, White-backed Vultures, and even occasionally Verreaux's eagles by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce. Red data bird species such as Cape Vultures have also taken to roosting on power lines in certain areas in large numbers, while Lappet-faced Vultures are increasingly using power lines as roosts, especially in the Northern Cape. The steel monopole structure that is used for 132kV lines is not regarded as a major electrocution threat. The only electrocutions that have been reliably recorded on this structure type are Cape Vultures (Van Rooyen 2000), which do not occur in the study area. No electrocution impact is therefore expected from the proposed 132kV power lines.

12.2.2.5 Habitat destruction and Disturbances due to powerlines

Habitat destruction and alteration will take place during the construction phase of power lines, and this happens with the clearing of the site itself and any associated infrastructures. The servitude also has to be maintained free of any natural vegetation, amongst other reasons to minimize the risk of fire. The destruction or alteration of natural habitat has an impact on birds breeding, foraging and roosting in close proximity to the site.

The construction and operational activities can impact on birds through disturbance, mainly during bird breeding activities and the activities of concern include heavy earth moving general vehicular movement and any other activities which result in noise or increased human activity in an area. The disturbance of non-breeding birds may simply require them to move further away or adjust their activities during the disturbance. This may be either temporary or permanent. Disturbance of breeding birds may result in lower breeding productivity, failed breeding in the relevant season, and temporary or permanent abandonment of a breeding site. All of these reduce the recruitment of young birds to the population and can have significant implications for Red Listed species in particular, many of which are slow to reach breeding age and breed in small numbers.

Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers. These activities could have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude, through destruction of habitat.

The construction of a power line can be highly disturbing to birds breeding in the vicinity of the construction activities. Many birds are highly susceptible to disturbance, and should this disturbance take place during a critical time in the breeding cycle, for example when the eggs have not hatched or just prior to the chick fledging, it could lead to temporary or permanent abandonment of the nest or premature fledging. In both instances, the consequences are almost invariably fatal for the eggs or the fledgling. Such a sequence of events can have far reaching implications for certain large, rare species that only breed once a year or once every two years.

The significance of habitat destruction is influenced by a number of factors, including: size of area to be affected; sensitivity of receiving habitat; uniqueness of the habitat; degree of habitat specialisation of the bird species utilising the habitat; and the conservation status and sensitivity of the species using the habitat.

Should the proposed Alternative 1 route be the preferred option, the potential for the destruction of bird habitat caused by the new power lines is limited due to the extensive impacts that are already evident in the area (urbanisation, illegal dumping and uncontrolled burning). The most sensitive areas are the remaining grassland, riparian habitats and wetland areas.

There are positive interactions between overhead powerlines and avifauna as well (van Rooyen, 2004):

1. Power lines have proven to be partially beneficial to many birds, including species such as Martial Eagles, Tawny Eagles, African White-backed Vultures, and even occasionally Verreaux's Eagles by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce.
2. Pylons can provide a safe nesting and perching sites away from predators. Some Lesser kestrel colonies have been shown to use overhead lines almost exclusively as perching sites. This species has been recorded from the region and has been considered during the survey. Large colonies are not thought to occur within the area, however. Existing overhead wires and towers were noted to be utilised by a small raptor such as Black-winged Kite (**Figure 37**);

3. Pylons can also provide nesting sites within areas devoid of tall trees. This has enabled certain species to expand their range. Large trees were absent throughout the survey area and therefore this is of relevance.

Figure 37. Black-winged Kite on Ararat site

A shorter route alternative would be preferred that is located in close proximity to the existing human settlements. Studies have shown that migratory birds become familiar with the powerline patterns within an area and therefore learn to avoid them (van Rooyen, 2009).

12.2.2.6 Potential occurrence of Red Data bird species

Table 11 below indicates the preferred habitat, together with the probability of occurrence. The probability of occurrence is based on the availability of suitable habitat, known distribution, overall abundance, food availability, disturbance factors, anthropogenic change and the preferred habitats of the species. Only bird species which have higher probability of occurrence on the study area are discussed in the table below.

Table 11. Probability of Occurrence of Red listed bird species which could potentially occur within the project site

Species	Scientific name	Conservation status	Preferred Habitat	Probability of Occurrence
Ludwig's Bustard	*Neotis ludwigii*	Endangered	It generally prefers the semi-arid shrublands of the Karoo, Namib Desert and Nama Karoo, occasionally visiting cultivated land and the southern Kalahari.	Low
Burchell's courser	*Cursorius rufus*	Vulnerable	It generally prefers open, sparsely vegetated areas, such as heavily grazed or burnt grasslands, Karoo, stony and gravelly semi-desert, bare or slightly grassy pans, ploughed fields, emergent cereal crops and rarely coastal dunes	Low
Grey Crowned Crane	*Balearica regulorum*	Endangered	It breeds in marshes, pans and dams with fairly tall vegetation; in the non-breeding season, it generally prefers cultivated habitats, often pastures but also fields of maize, wheat, rice, groundnut, cabbage and cotton. It occasionally wanders into grasslands and other dry habitats.	Low
Blue Crane	*Anthropoides paradiseus*	Near Threatened	It generally prefers open grassland, dwarf shrubland and cultivated land.	Medium
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable	It generally prefers mountains and other rocky habitats with cliffs.	Low
Lanner Falcon	*Falco biarmicus*	Vulnerable	It generally favours open grassland, cleared or open woodland and agricultural land. While breeding it is most common around cliffs used as nesting and roost sites, although it may also use buildings, electricity pylons and trees.	Medium
Greater Flamingo	*Phoenicopterus roseus*	Near Threatened	It generally prefers coastal mudflats, inland dams, sewage treatment works, small temporary pans and river mouths, while it exclusively breeds at recently flooded, large eutrophic shallow salt pans.	Low
Lesser Flamingo	*Phoeniconaias minor*	Near Threatened	It generally favours open, eutrophic and shallow wetlands, coastal mudflats, salt works and sewage treatment plants; it exclusively breeds on salt pans and saline lakes	Low
Karoo Korhaan	*Eupodotis vigorsii*	Near Threatened	It generally prefers dwarf arid shrubland of the Nama Karoo and succulent Karoo, especially with stony ground, while in the Western Cape it also occurs in cultivated land.	Low
African Rock Pipit	*Anthus crenatus*	Near Threatened	It generally prefers open areas with rocky outcrops, bushes and grass tufts, such as on mountains, hills in the Karoo and the escarpment.	Low
Secretarybird	*Sagittarius serpentarius*	Vulnerable	It is usually found in the open grasslands and savannah of the sub-Saharan region	Medium

Species	Scientific name	Conservation status	Preferred Habitat	Probability of Occurrence
Yellow-billed Stork	*Mycteria ibis*	Endangered	It generally prefers wetlands, such as pans, flood plains, marshes, streams, flooded grassland and small pools, occasionally moving into mudflats and estuaries	Low
Caspian Tern	*Sterna caspia*	Vulnerable	It generally prefers sheltered bays, estuaries and large inland water bodies, especially dams and saline pans.	Low
African finfoot	*Podica senegalensis*	Vulnerable	Generally, prefers quiet wooded watercourses bordered by dense riparian vegetation, largely avoiding fast-flowing and stagnant rivers	Low
Martial Eagle	*Polemaetus bellicosus*	Endangered	Occurs in a variety of habitats but seem to prefer arid and mesic savannah but is also commonly found at forest edges and in open shrubland	Low
Tawny eagle	*Aquila rapax*	Endangered	It generally prefers lightly-wooded savanna, but it also occurs Nama Karoo and treeless grasslands, provided that there are pylons and alien trees to nest in.	Low
White-bellied korhaan	*Eupodotis senegalensis*	Vulnerable	It generally prefers fairly tall, dense sour or mixed grassland, either open or lightly wooded, occasionally moving into cultivated or burnt land.	Medium

12.2.3 Reptiles

12.2.3.1 Desktop survey results

As previously stated, the proposed routes fall within the savanna biome and this biome houses and supports a rich reptile fauna with high endemism, but this is partly because the biome is so extensive. Most have extensive ranges, and few are threatened (O' Connor and Bredenkamp, 1997). According to the data sourced from the SANBI, GDARDE, South African Reptile Conservation Assessment (FitzPatrick Institute of African Ornithology, 2024) for the grid cells 2528AC and 2528AD and historic distribution (Alexander & Marais, 2007), three Red data reptile species are known to occur in the region (**Table 12**).

Table 12. Red data reptile species which could potentially occur on the study area

Family	Genus	Species	Common name	Red list category
Crocodylidae	*Crocodylus*	*niloticus*	Nile Crocodile	VU (SARCA 2014)
Lamprophiidae	*Psammophis*	*leightoni*	Cape Sand Snake	Vulnerable (SARCA 2014)
Testudinidae	*Kinixys*	*lobatsiana*	Lobatse hinge-back tortoise	Vulnerable

12.2.3.2 Reptiles recorded on and around the study area

The rock boulders (**Figure 38**), river/riparian vegetation, trees (bushveld) and grasslands provide suitable habitats for reptile species to occur within the project sites. Termite mounds (**Figure 39**) 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). No termite mounds were destroyed during the brief field surveys. All overturned rock material was carefully replaced in its original position. Only six reptile species were noted on site, these being the Southern Rock Agama (*Agama atra*), Southern Tree Agama (*Acanthocercus atricollis*), Speckled Rock Skink (*Trachylepis punctatissima*) (**Figure 33**), Puff adder (*Bitis arietans arietans*), Striped Skaapsteker (*Psammophylax tritaeniatus*) and Common Dwarf Gecko (*Lygodactylus capensis*). No reptile Species of Conservation Concern were recorded on the project development site. According to the anecdotal information, Brown House Snake (*Boaedon capensis*) and Water Monitor (Varanus niloticus) have been seen on site. The Brown House Snake species is known to frequent human dwellings where it feeds on rodents or lizards. It is widespread in South Africa and very common in suburban gardens (Branch, 2001).

Figure 38. Rock boulders on site

Figure 39. Old termite mounds on site

Figure 40. Speckled Rock Skink on site

12.2.3.3 Potential occurrence of Red Data reptile species

Three reptile species of conservation concern are expected to be present on the project area and **Table 13** below indicates the reptiles' preferred habitat together with their probability of occurrence on the project area. The probability of occurrence was based on the consideration of the following factors:

- Known distribution;
- Availability of suitable habitat on the study area;
- Availability of prey items on the study area and surrounding areas;
- Level of anthropogenic disturbance; and
- Species tolerance to anthropogenic disturbance.

Table 13. Probability of occurrence of Red Data reptile species which could potentially occur on the project area.

Common name	Red list category	Suitable habitat and ecology	Probability of Occurrence
Nile Crocodile	Vulnerable	Inhabits swamps, lakes, rivers and river mouths across most of its range as well as	Low

Common name	Red list category	Suitable habitat and ecology	Probability of Occurrence
		coastal estuaries in KwaZulu-Natal Province, South Africa	
Cape Sand Snake	Vulnerable	Found in sand fynbos and strandveld habitats throughout its range.	Low
Lobatse hinge-back tortoise	Vulnerable	It is associated with rocky hillsides in savannas that include *Acacia* and *Combretum* Woodland and tropical Bushveld and Thornveld with vegetation that ranges from dense, short shrubland to open tree savanna	Medium

12.2.4 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).

12.2.4.1 Desktop survey results

FitzPatrick Institute of African Ornithology (2024), DFFE screening report, GDARDE, data from the South African Frog Atlas Project (SAFAP) (1999-2003) and du Preez & Carruthers (2009) were consulted in order to draw up a list of potential occurrences and only one frog Species of Conservation Concern could potentially be found within the study area, namely Giant Bull Frog (*Pyxicephalus adspersus*).

12.2.4.2 Field work results

The Apies River and wetlands on site (**Figure 41**) provides water on a permanent basis and provides an important breeding habitat for most of the frog species which could occur within the study area. During the field survey, four frog species were recorded along the project routes, namely Common Platanna (*Xenopus laevis*), Guttural Toad (*Sclerophrys gutturalis*), Bubbling Kassina (*Kassina senegalensis*) and Common Caco (*Cacosternum boettgeri*). No frog SCC were recorded during the field survey.

Figure 41. Apies River and wetlands within the project site

12.2.4.3 Potential occurrence of Red Data frog species

The only Species of Conservation Concern which is known to occur in the region is the Giant Bullfrog, which usually breeds within the Grassland biome, but also has been shown to breed within savanna wetlands. It is is known to breed in seasonal shallow grassy pans, vleis and other rain filled depressions in open flat areas of grassland or savanna (Du Preez and

Carruthers, 2009). They are explosive breeding frogs which utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. According to the IUCN Red List category (Minter *et al*. 2004), this species is currently assigned a Near-Threatened status. Globally, it is listed as Least Concern (du Preez and Cook, 2004). According to National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) *Threatened or Protected Species*, this species is listed as *protected*. Suitable habitat for this species occurs within the project site, and should this species be found during construction activities, the necessary permits should be acquired from GDARDE and should be re-located to adjacent areas with suitable habitats.

12.2.5 Invertebrates

12.2.5.1 Desktop survey results

FitzPatrick Institute of African Ornithology (2024) (QDS 2528AC and 2528AD), DFFE Screening report, GDARDE and previous biodiversity studies were consulted in order to draw up a list Invertebrates of Conservation Concern which could potentially be found within the study area (**Table 14)**. Conservation status assessments for each species were obtained from Samways & Simaika, 2016) and Mecenero *et al.* (2013).

Table 14. Red Data Invertebrate species potentially occurring on the project area

Family	Scientific name	Common name	Red list category
Coenagrionidae	*Pseudagrion assegaii*	Assegai Sprite	Vulnerable

12.2.5.2 Field work results

During the field survey, the following invertebrate species were recorded on the proposed development site, namely Citrus swallowtail (*Papilio demodocus*) (**Figure 42**), Blue pansy (*Junonia orithya*) (**Figure 43**), African Monarch (*Danaus chrysippus*) (**Figure 44**), African Yellow Pansy (*Junonia hierta cebrene*) (**Figure 45**), Broad Scarlet (*Crocothemis erythraea*), Two-striped Skimmer (*Orthetrum caffrum*), Veined Russet (*Aloeides pierus*), Broad-bordered Grass Yellow (*Terias brigitta*), Red-veined darter (*Sympetrum fonscolombii*), Pioneer white (*Belenois aurota*), Painted Lady (*Vanessa cardui*), Julia Skimmer (*Orthetrum julia*), Long-tailed Blue (*Lampides boeticus*), Garden Acraea (*Acraea horta),* Dark blue Pansy (*Junonia oenone*), Elegant Grasshopper (*Zonocerus elegans*), Common grass yellow Butterfly (*Terias hecabe solifera*) and Meadow White (*Pontia helice*). No invertebrate species of conservation concern were recorded during the field survey.

Figure 42. Citrus Swallowtail recorded within the proposed development site

Figure 43. Blue pansy on site

Figure 44. African Monarch on site

Figure 45. African Yellow Pansy recorded on site

12.2.5.3 Potential occurrence of Red Data invertebrate species

Data sourced from previous biodiversity studies, GDARDE, ADU (2024) and DFFE Screening report indicate there are invertebrate species on the Red Data List that are known to occur in or on areas surrounding the project site. The probability of occurrence is based on suitable habitat and known distribution ranges. The invertebrate species and their probability of occurrence are indicated in **Table 15** below. Only invertebrate species which has higher probability to occur on the study area are shown in the table below.

Table 15. Probability of Occurrence of Red Data invertebrate species potentially occurring on the project site

Common name	Red list category	Suitable Habitat	Probability of Occurrence
Assegai Sprite	Vulnerable	Swamps, pools, and oxbows. Grassy-fringed pools with lilies and partial shade	Low

13 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 16**).

Table 16. 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 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.

13.1 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 46**), the relative plant species theme sensitivity is considered as *Medium* (**Figure 47**) and the terrestrial biodiversity Theme sensitivity is assigned a *Very high Sensitivity* (**Figure 48**) due to the presence of Sterkwater Private Nature Reserve, CBA 1, CBA 2, ESA 1, ESA 2, National Protected Area Expansion Strategy (NPAES) and VU_Springbokvlakte Thornveld. The site verification was conducted concurrently with the Terrestrial biodiversity impact assessment and during the survey, it was concluded that the proposed development site falls within Medium category in terms of ecological sensitivity.

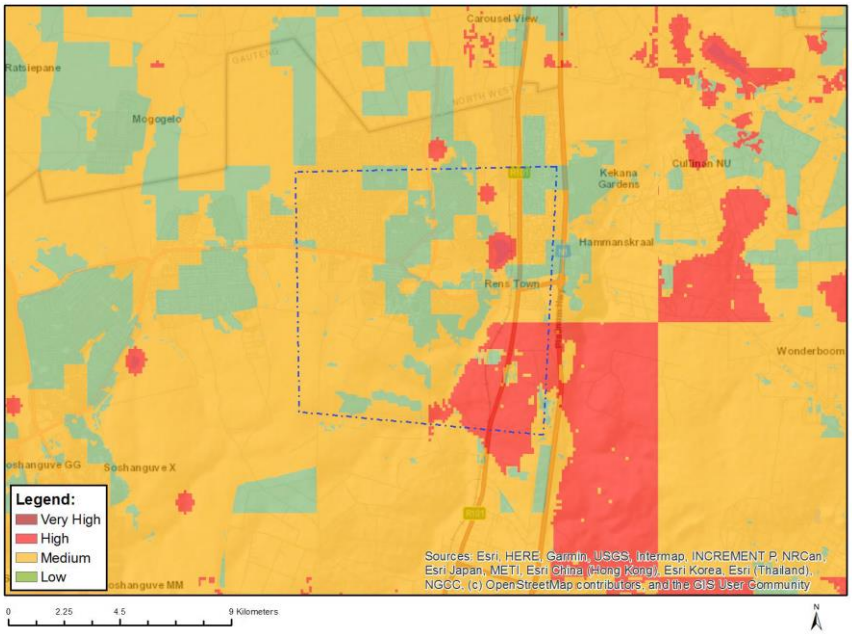

Figure 46. Map of relative Animal species Theme Sensitivity

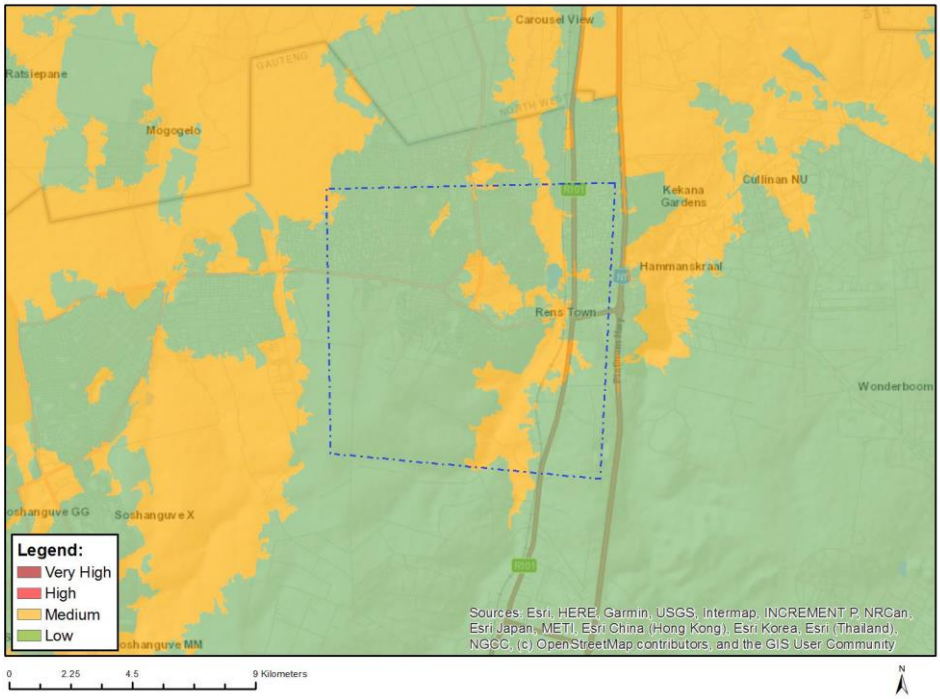

Figure 47. Map of relative Plant species Theme Sensitivity

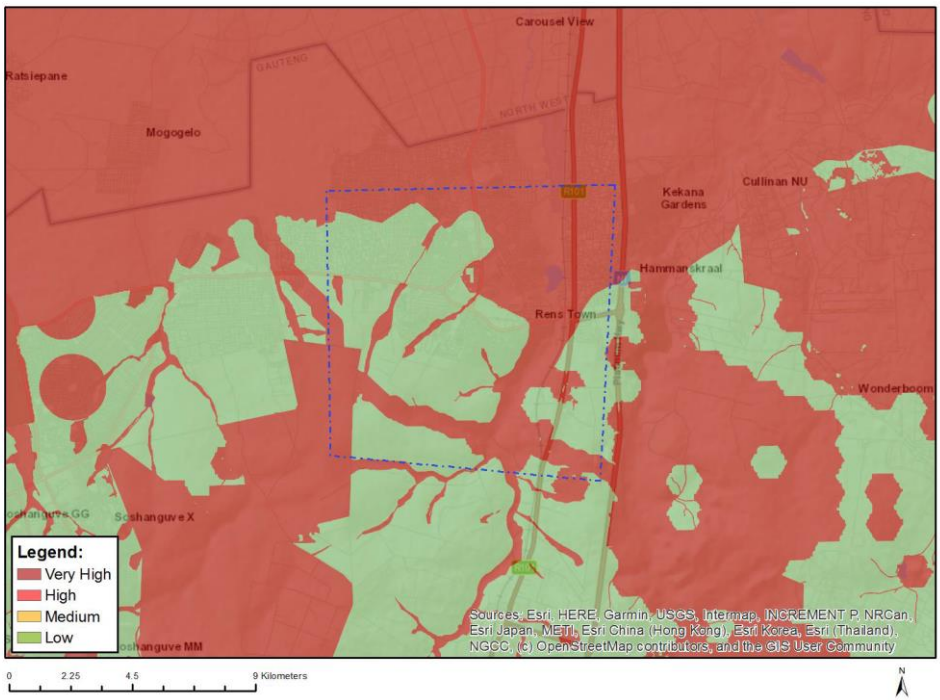

Figure 48. Map of relative Terrestrial Biodiversity Theme Sensitivity

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 17**). 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 17. 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 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 17** above. **Tables 18** and **19** below provides a summary of how each site was assessed.

Table 18. 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
Central Sandy Bushveld	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	

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	SEI
			even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed	
Springbokvlakte Thornveld	Medium	High	Low	BI = Medium RR =Low (=High)
	Any area of natural habitat of threatened ecosystem type with status of VU.	Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches.	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.	

Table 19. 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
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

The site verification was conducted concurrently with the Terrestrial biodiversity impact assessment and during the survey, it was concluded that the Apies River is considered High in terms of Sensitivity, and Proposed routes 2 and 3 are considered Medium, whereas the proposed alternative route 1 is generally regarded as Low in terms of sensitivity. No Tower position should be situated within the 30-50m of the Apies River.

14 ENVIRONMENTAL IMPACT ASSESSMENT

14.1 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.

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

14.1.1 Assessment of Environmental Impacts and Suggested Mitigation Measures

Only the ecological issues identified during the appraisal of the receiving environment and potential impacts are assessed below (**Table 20**). 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 and irreversible impacts on floral habitat, especially within the areas with watercourses. Site clearing along the watercourses will potentially result in permanent removal of floral habitat and therefore the disturbance of vegetation must be limited to areas with low sensitivity. Mitigation measures provided by the Aquatic specialist should be adhered to within the riparian and watercourses. The High sensitivity areas (along Apies River) should be zoned as an open space with little to no development activities taking place. One Orange Listed Plant species, namely *Hypoxis hemerocallidea* (Star Flower) was recorded on site. It should be noted that communication with Authorities has been undertaken with regards to this plant species and it was noted that whilst this plant species has been down listed, there should be a continuation to preserve it until such time the Policy is reviewed. Therefore, in order to mitigate the impacts to this plant species, a Search, Rescue and Relocation Plan should be developed and must be supervised by a competent Ecologist/Botanist. This Plan should also take into account medicinal plant species such as and *Aloe davyana* recorded on site. However, if the translocation of these plant species is happening outside of the project site, a Permit from GDARDE is required. Several species of the Protected trees, Marula (*Sclerocarya birrea* subsp*. caffra*), Leadwood (*Combretum imberbe*) and Shepherd's tree (*Boscia albitrunca*) found on site must be avoided and if not, a permit from the national DFFE is required.

Based on the results of the field survey, it is evident that the project site provides suitable habitat to a number of water-dependant fauna species. Although it is assumed that the majority of 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, due to the study site providing low suitable habitats for SCC fauna to occur, this impact can be mitigated.

The servitude for the powerline will require periodic maintenance to abate fire risks and to control tall trees. This maintenance will displace individuals that utilise these areas. This impact is regarded as being of limited relevance and of a low significance. Maintenance of the servitude must remain within the designated servitude only and no indiscriminate habitat destruction outside of the designated area should be allowed.

The project will lead to the disturbance of flora habitat, which then creates opportunities for invasion by invasive and alien species. The potential disturbance of soil and vegetation during construction activities encourages the establishment of pioneer vegetation, in many cases

creating an ideal opportunity and optimal conditions for weeds and alien invasive plants to invade both disturbed and undisturbed areas after construction have been completed. Alien Invasive plants can have far reaching detrimental effects on indigenous vegetation and has been widely accepted as being a leading cause of biodiversity loss. The large amount of disturbance created during construction will leave the study area and adjacent undeveloped areas vulnerable to alien plant invasion. Failure to manage rehabilitation and landscaping well can lead to serious alien invasive plant infestation.

Increased levels of noise, disturbance and human activity during construction may be detrimental to fauna. 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 not significant at a local scale.

The impact of fatalities from collision with the powerline by avifaunal species is then regarded as the most significant medium to long-term impact. The development of the powerline will require the clearing of a servitude as a safety factor, which will include removal of trees and shrubs that occur beneath or close to the overhead line. This will result in displacement of species. Each tower footprint will also be impacted through habitat destruction, but this is thought to be of lesser significance and of a short term. In order to mitigate for the impact of bird collisions, it is strongly advised that the shortest alternative route in Kekana project be used. The actual overhead powerline and associated towers are thought to not have a significant long-term impact as most of the habitat impacted during the construction phase will be either reinstated as part of a rehabilitation plan, or the vegetation will naturally reinstate. This means that avifauna will be temporarily displaced, but will return back into the area once disturbance impacts (mainly limited to the construction phase) are completed. In order to rate the impact of electrocutions an assumption was made with regard to structural design of the Eskom power line poles. It is assumed that a steel monopole is generally a safe design for birds and the fitment of the standard bird perch further increases this safety and the impact of electrocution is seen as low.

If disturbed areas are not rehabilitated/re-vegetated/landscaped post construction, soil erosion may continue throughout the operational phase of the development. This is likely to be exacerbated by stormwater runoff from any hardened/impermeable surfaces such as compacted soil, etc. Due to the extensive disturbance likely to be created by construction within the project area, this impact is most likely to occur within the project area, but could potentially occur outside the project area as well if suitable avoidance and mitigation measures were not implemented during construction.

The potential impacts associated with the pre-construction, construction and operational activities are discussed in **Table 20** below.

14.1.1.1 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;
- Vegetation clearance of the site;
- Storage of hazardous and non-hazardous material and wastes; and
- Landscaping and rehabilitation of the site.

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

- Destruction of indigenous flora during site establishment;
- Potential loss of Orange listed plant species and protected trees;
- Potential loss of a riparian vegetation/watercourses;
- Inadvertent killing and injury of fauna species during vegetation clearance and excavation;
- Potential loss of soil due to fuel and chemical spills (soil contamination);
- Encroachment, proliferation and spread of weeds and alien invasive plant species;
- Loss/displacement of fauna species potentially present on site;
- Increased soil erosion due to compaction by vehicles and construction activities, and incorrect storm water management measures;
- Soil contamination from hazardous substance spillages (Fuel) outside their primary and secondary containment during maintenance work and re-fuelling.
- Disturbance of local fauna populations due to construction activities; and
- Loss of flora and fauna habitat due to vegetation clearance.

14.1.1.2 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:

- AIPs and weeds
- Disturbance to ecological processes due to altered habitat and disturbance to natural movements/processes;
- Collision of birds with overhead cables;
- Electrocution of birds;
- Disturbance of local faunal communities; and
- Loss of habitat due to operational activities.

Table 20: 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 indigenous flora during site establishment and potential loss of vegetation	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	• An Ecologist must conduct a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria. • Implementation of the appropriate measures included in Eskom's Transmission Vegetation Management Guideline, which include the relation of identified floral SCC and obtain the relevant permits, if required. • Development planning	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**
						must ensure that loss of vegetation and disturbance are restricted within the recommended 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 on site to ensure that basic environmenta					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						l principles are adhered to. This includes awareness as to conservation and importance of provincially protected plant, Orange listed plants, medicinal plants and plant SCC which have High probability of occurring on site. • Environmental Control Officer (ECO) should provide supervision and oversight of vegetation clearing activities. • All laydown, storage areas, site camps etc. should be restricted 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**
						within the project area and should preferably be situated within areas of low sensitivity (already disturbed areas). • Building material or ablution facilities should not be stored or kept in areas containing natural vegetation or near watercourses. • Surrounding areas with indigenous vegetation should under no circumstances be fragmented or disturbed further or used as an area for					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						dumping of waste. • Prohibit the collection of plant material for medicinal purposes and fire wood. •					
Destruction of indigenous flora during site establishment and potential loss of the Orange listed plant and Protected trees	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	All of the above and: • The Orange listed plant (*hypoxis hemerocallidea*) and several species of sought-after medical plants found within the site (*Aloe davyana*), should be preserved and incorporated into the landscaping/rehabilitated areas around the proposed development site or moved to just outside	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**
						of the construction servitudes or plant an equivalent or greater number of new individuals elsewhere in the landscaped/rehabilitated area. It should be noted that communication with Authorities has been undertaken with regards to this plant species and it was noted that whilst this plant species has been down listed, there should be a continuation to preserve it until such time the Policy is reviewed.					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						Therefore, in order to preserve the rapid decline of the species in the wild, a search and rescue operation should apply for this plant species (this process should also include medicinal plant species such as *Aloe davyana*). This plant species can be translocated to a suitable area nearby or at the site by a qualified specialist. Where this proves not to be possible, a permit will be required from GDARDE to transplant these species outside of the					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						proposed development region. • Of the protected tree species that are known to occur within the region, three protected trees were recorded on or adjacent to the project site, namely Marula (*Sclerocarya birrea* subsp. *caffra*), Leadwood (*Combretum imberbe*) and Shepherd's tree *(Boscia albitrunca*). As far as possible, these protected trees should be preserved and not destroyed by the activities, however, where this					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						proves not to be possible, a permit will be required from the DFFE in order to cut, destroy or damage the tree before construction activities commence.					
Potential loss of riparian vegetation and watercourses	Permanent (5)	Local (2)	Highly Probable (4)	Moderate to high (8)	60 (Medium) Status (-ve)	• Keep the footprint of the construction as small as possible. • No Tower should be erected within 30-50m of the watercourses, unless this is within the Aquatic Specialist mitigations measures. • Prior to the commencement of any excavations, the required disturbance footprint will	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**
						be demarcated and all activities will be located within the demarcated area. No vegetation disturbance to take place outside the demarcated area. • On completion of construction at each pylon the site will be left clean and free from all debris, hydrocarbons and waste, and all excavations filled appropriately. • The area of construction should be demarcated, and personnel not allowed to heavily use the					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						surrounding natural vegetation and watercourses. • Avoid any construction or related activity occurring within the riparian habitat outside of the proposed routes. • If any faunal species are recorded during construction, especially the protected species potentially occurring on site, activities should temporarily cease, and an appropriate specialist should be consulted to identify the					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						correct course of action. • As far as possible, the proposed development should be placed in areas that have already been disturbed and transformed (low sensitivity areas). It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. • Areas that are denuded during construction need to be re-					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species.					
Loss and displacement of animals on site due to habitat loss and mortality	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)	• Training of construction personnel to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily. • The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during	Permanent (5)	Site specific (1)	Improbable (2)	Slight (2)	16 (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**
						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. • Fauna (mammals and 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					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						qualified personnel. • Any fauna threatened by the construction activities should be removed to safety by the ECO or any suitable qualified personnel.					
Encroachment, proliferation and spread of weeds and alien invasive plant species	Permanent (5)	Regional (3)	Highly Probable (4)	High (10)	72 (High) Status (-ve)	• Alien invasive plants (listed in this study) can be removed manually or with the help of simple tools. This entails damaging or removing the plant by physical action. Different techniques could be used, e.g., uprooting, ring-barking or bark stripping.	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) 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**
						These control options are only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. It would be preferable to uproot alien vegetation to limit regrowth after cutting. • It should be noted that all infestations cannot be cleared at once, as these plant species do currently play a role in stabilising soils and therefore, the sequence of alien plant removal should be planned,					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						along with re-vegetation of the cleared areas. • Regular monitoring for alien invasive plants within the study area as well as adjacent areas which receive runoff as there are also likely to be prone to invasion problems.					
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). • Any fauna threatened by the construction activities should be moved to safety by a	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
						suitable qualified ECO or an Ecologist. • All personnel should undergo an environmental induction with regards to fauna, in particular 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					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						ramps, which will allow fauna to escape the trench. • No animals 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 should be placed in sealed bins and removed from the site each day. • In order to reduce collisions of vehicles with					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						fauna, animals should have right of way.					
Soil contamination from hazardous substance spillages (Fuel) outside their primary and secondary containment during maintenance work and re-fuelling	Medium (3)	Local (2)	Highly Probable (4)	Moderate (6)	44 (Medium) Status (-ve)	• Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal route. • Fuel and material storage must be away from stockpiles. • The Environmental Control Officer should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated	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**
						environment, with concrete or sealed flooring and a means of preventing unauthorised entry. • Cement, concrete and chemicals must be mixed on an impermeable surface and provisions should be made to contain spillages or overflows into the soil. • Any storage tanks containing hazardous materials must be placed in banded containment areas with sealed surfaces. The bund walls must be high enough 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**
						contain 110% of the total volume of the stored hazardous material. • Contaminated soil must be contained and disposed of offsite at an approved landfill site. • Concrete mixing must be contained within a bunded area and in a designated area. •					
Operational phases											
Erosion caused by inadequate/failing stormwater management measures/designs.	Medium (3)	Local (2)	Highly Probable (4)	Moderate (6)	44 (Medium) Status (-ve)	• Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems	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**
						observed should be rectified as soon as possible, using the appropriate soil erosion control structures and revegetation techniques. • All cleared areas should be landscaped and/or re-vegetated.					
Disturbance of local fauna populations.	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (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	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**
						to qualified staff or a dedicated external snake handler. • When accessing the site, vehicles are to utilise the existing roads. • Ensure that no unnecessary clearing of faunal habitat occurs during maintenance activities. • No fires by maintenance personnel are allowed. • No wild animal may be fed on site. • Ensure that the site is kept clean, tidy and free of rubbish that would attract animal pests. • All vehicles accessing the site should					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						• avoid collisions with susceptible species such as snakes and small rodents. • All waste generated at the facility should be kept in scavenger proof bins and removed from site at regular intervals.					
Collision of birds with infrastructures	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)	• . Only a bird friendly pylon structure is permissible for the construction of the new proposed power line. This will ensure that large birds can perch and roost safely on the hardware. • Fitment of devices on the earth wires to make	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**
						the lines more visible • All construction and maintenance activities should be carried out according to generally accepted environmental best practices. In particular, care should be taken in the vicinity of the non-perennial river found within the Ararat site. Existing roads must be used as far as possible for access during construction.					
Electrocution of birds	Medium to long term (4)	Local (2)	Probable (3)	Moderate to slight (4)	30 (Medium) Status (-ve)	• During operational phase, any nest found on the lines should be managed in accordance	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**
						with Eskom Distribution Nest Management Guidelines and relevant provincial and national legislation. • In order to prevent the electrocution of any birds, on the poles, all poles should be fitted with a standard type, Eskom approved "bird perch" at the top of the pole. This will provide ample safe perching space for any birds well clear of the dangerous hardware.					
Rehabilitation/landscaping of the site after construction activities	Medium to long term (4)	Site specific (1)	Probable (3)	Slight to moderate (4)	27 (Low) Status (-ve)	• Re-vegetation of the disturbed site is aimed at approximating as near as possible the	Permanent (5)	Regional (3)	Highly Probable (4)	High (10)	72 (High) 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**
						natural vegetative conditions prevailing prior to construction • Topsoil will be required during the rehabilitation of the proposed development area and should there be a loss of topsoil and proliferation of alien species on stored topsoil or during rehabilitation, this could ultimately lead to loss and/or degradation of floral habitat. • The plant material to be used for rehabilitation should be similar to what is found					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						in the surrounding area. • When rehabilitating the construction footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated or improved, so that faunal species that were displaced by vegetation clearing and construction activities are able to recolonize the rehabilitated area. • indigenous plants naturally growing within the project area,					

Potential impact BEFORE mitigation						Mitigation Measures	Potential impact AFTER mitigation				
Nature of the impact	**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**		**Duration**	**Extent**	**Probability**	**Magnitude**	**Significance**
						but that would be otherwise destroyed during clearing for development purposes, should be incorporated into rehabilitation areas. • Bare surfaces should be grassed as soon as possible after construction to minimise time of exposure. • All disturbed areas can be re-vegetated with an indigenous grass mix to re-establish a protective grass strip within the power line servitude to minimize soil erosion and dust emission. • Take 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**
						remedial action where vegetation establishment is unsuccessful or erosion is evident. • As much vegetation growth as possible should be promoted within the study area in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. • Immediate rehabilitation of any areas disturbed as a result of construction activities. Use species that are specific to the original vegetation type of the affected area (ensure 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**
						keep top soil separate). • Take appropriate remedial action where vegetation establishment is unsuccessful or erosion is evident.					

14.1.2 Cumulative impacts

Cumulative impacts can be identified by combining the potential environmental implications of the proposed project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

- Land clearing activities and other construction-related disturbances could lead to the proliferation of exotic vegetation.
- Habitat loss due to construction of the power line would result in cumulative impacts on listed vegetation types and this would also increase habitat fragmentation and potentially result in a loss of broad-scale landscape connectivity.
- Displacement of sensitive floral and faunal species, species of conservation concern and protected trees due to habitat destruction and habitat fragmentation eventually leads to isolation and loss of those species. This is however, considered to be low within the region.
- Destruction of nesting habitat displaces the affected species eventually leading to loss of those species.
- Cumulative loss of primary vegetation features due to exotic vegetation and vegetation transformation is high at the national level, therefore should be avoided;
- Encroachment of alien vegetation.
- Powerlines represent the largest proportion of established aerial infrastructure throughout the country and collision impacts are of national concern. Fitment of devices on the earth wires to make the lines more visible is reducing this impact at the national level.

14.1.3 Decommissioning

Post to the economic lifespan of the Kekana 132/22kV project, decommissioning and rehabilitation will comply with the appropriate environmental legislation and best practices at that time.

15 CONCLUSION AND RECOMMENDATIONS

An Orange Listed Plant species, namely *Hypoxis hemerocallidea* (Star Flower) was recorded on site. It should be noted that communication with Authorities has been undertaken with regards to this plant species and it was noted that whilst this plant species has been down listed, there should be a continuation to preserve it until such time the Policy is reviewed. Therefore, in order to mitigate the impacts to this plant species, a Search, Rescue and Relocation Plan should be developed and must be supervised by a competent Ecologist/Botanist. This Plan should also take into account medicinal plant species such as and *Aloe davyana* recorded on site. However, if the translocation of these plant species is happening outside of the project site, a Permit from GDARDE is required.

Of the protected tree species that are known to occur within the region, three protected trees were recorded on or adjacent to the project site, namely Marula (*Sclerocarya birrea subsp. caffra*), Leadwood (*Combretum imberbe*) and Shepherd's tree (*Boscia albitrunca*). As far as possible, these protected trees should be preserved and not destroyed by the activities, however, where this proves not to be possible, a permit will be required from the DFFE in order to cut, destroy or damage the tree before construction activities commence.

No threatened fauna were recorded during the survey. However, grasslands, and watercourses provide suitable habitats for most fauna species of conservation concern which could be found on site and must not be unnecessarily disturbed. In order to alleviate the loss of habitat within the study area, it is recommended that a clear, concise and well formulated rehabilitation plan be implemented after the construction activities, focusing on fauna species relocation, as well as the concurrent reinstatement of flora and faunal habitat post construction activities. Any lizards, scorpions, frogs, geckoes, monitors or snakes encountered should be allowed to escape to suitable habitat away from the disturbance. No fauna should be intentionally killed, caught or collected during any phase of the project.

Generally, the development activities proposed within the project area will have impact on biodiversity conservation within the site. In order 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 and floral 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 fauna. The impact on reptiles and amphibians is likely to be localized and may result in species being displaced (snakes and lizards) but no significant or irreversible impact on these species is expected. 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.

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, the relative plant species theme sensitivity is considered as *Medium* and the terrestrial biodiversity Theme sensitivity is assigned a *Very high Sensitivity* due to the presence of Sterkwater Private Nature Reserve, CBA 1, CBA 2, ESA 1, ESA 2, National Protected Area Expansion Strategy (NPAES) and VU_Springbokvlakte Thornveld. The site verification was conducted concurrently with the Terrestrial biodiversity impact assessment and during the survey, it was concluded that the proposed development site falls within Medium category in terms of ecological sensitivity. The site verification was conducted concurrently with the Terrestrial biodiversity impact assessment and during the survey, it was concluded that the Apies River is considered High in terms of Sensitivity, and Proposed routes 2 and 3 are considered Medium, whereas the proposed alternative route 1 is generally regarded as Low in terms of sensitivity. No Tower position should be situated within the 30-50m of the Apies River.

During the field survey, it was found that the impacts of the proposed development on flora and fauna 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. Once the proposed development has been constructed, rehabilitation process needs to take place and should also ensure that alien plant emergence and erosion do not occur. Should the proposed development be approved, information boards should be erected within the development site and should be part of the induction process to inform staff of the presence of Red and/or Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements. This will make identification easier and inform all personnel on site of the sensitivity of the project site. Any SCC found during construction phase, the Contractor should notify the ECO immediately and construction activities should be stopped. The ECO will then contact a plant specialist and inform GDARDE.

The proposed Alternative 1 Route is the preferred route as it is mostly situated along the edges of human settlements, with anthropogenic activities such as illegal dumping of materials prevalent on site and is dominated mostly by alien invasive plants species. This is considered to be the preferred alternative as it is likely that it would generate the lowest overall impacts compared to the other alternatives. Although there are some sensitive features along the power line corridor, impacts on these features can generally be mitigated to acceptable levels. It is also the shortest route (approximately 6.95 km), which will lead to less clearing of natural/indigenous vegetation as compared to Alternative Routes 2 and 3 (which are approximately 9.26Km and 8.7Km, respectively). The proposed Alternative routes 2 and 3, which are situated within the same or similar habitats, are mostly aligned along the Farm roads, which are dominated by plant species such as *Terminalia sericea, Dichrostachys cinerea,*

Combretum hereroense, Combretum molle etc. All three proposed routes traverse the NFEPA river, namely Apies River. A Walk-through survey of the approved and final Powerline route is recommended in order to evaluate the servitude and pole positions in terms of the natural environment.

16 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.

BARNES, K.N. (ed.) (1998). The Important Bird Areas of Southern Africa. Birdlife South Africa: Johannesburg.

BARNES, K.N. (ed.) (2000). The Eskom Red Data Book of Birds of South Africa, Lesotho & Swaziland. Birdlife South Africa, Johannesburg.

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.

BREDENKAMP, G.J. & BROWN, L.R. (1998). A vegetation assessment of open spaces in the Western Metropolitan Local Council Area. A report commissioned by the Western Metropolitan Local Council.

BROMILOW, C. (2018). Problem plants and Alien weeds of South Africa. Briza Publications, Revised Edition, Pretoria.

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

CHILD MF, ROXBURGH L, DO LINH SAN E, RAIMONDO D, DAVIES-MOSTERT HT, EDITORS. (2016). The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

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

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 2024-04-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). LepiMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=LepiMAP on 2024-04-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). MammalMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=MammalMAP on 2024-04-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). OdonataMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=OdonataMAP on 2024-04-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). ReptileMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ReptileMAP on 2024-04-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). SpiderMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=SpiderMAP on 2024-04-15.

FITZPATRICK INSTITUTE OF AFRICAN ORNITHOLOGY (2024). ScorpionMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=ScorpionMAP on 2024-04-15.

FRIEDMANN, Y. & DALY, B, (EDITORS) (2004). Red Data Book of the mammals of South Africa: a conservation assessment: CBSG southern Africa, Conservation Breeding Specialist Group (SSC/IUCN). Endangered Wildlife Trust, South Africa.

GAUTENG CONSERVATION PLAN VERSION 3.3 (C-Plan 3.3) (2011). Gauteng Department of Agriculture and Rural Development. Directorate Nature Conservation. Technological Services.

GDARD (2014). Technical Report: Gauteng Conservation Plan version 3.3 (2011). Compiled by P. Compaan. Gauteng Department of Agriculture and Rural Development: Nature Conservation Directorate. 88 pages.

HARRISON, J.A., ALLAN, D.G., UNDERHILL, L.G., HERREMANS, M., TREE, A.J., PARKER, V. & BROWN, C.J. (EDS) (1997). The atlas of Southern African birds. Vols. 1&2. Birdlife South Africa, Johannesburg.

HENDERSON, L. 2001. Alien weeds and invasive plants. ARC, Pretoria.

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

LOW, A.B & REBELO, A.G. (1996). Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.

LOWREY, T.K. & WRIGHT, S. (1987). The Flora of the Witwatersrand. Volume I: The Monocotyledonae. Witwatersrand University Press, Johannesburg.

MANNING, J. (2009). Field guide to the wild flowers of South Africa. Struik, Cape Town.

MARAIS, E. & PEACOCK, F. (2008). The chamberlain guide to birding Gauteng. Miranda Publishing. Cape Town.

MONADJEM, A., TAYLOR, P.J., COTERRILL, F.D.P. & SCHOEMAN, C. (2010). Bats of southern and central Africa: a biogeographic and taxonomic synthesis. Wits University Press, Johannesburg.

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

MUCINA, L. AND RUTHERFORD, M.C. (eds) (Reprint 2011) The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute (SANBI), 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

NEL, J.L., DRIVER, A. & SWARTZ, E. (2011). National Biodiversity Assessment 2011: Freshwater component. CSIR Report, Council for Scientific and Industrial Research, Stellenbosch, South Africa.

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.

PFAB (2001) Departmental Policy. Development Guidelines for Ridges. Gauteng Department of Agriculture, Conservation, Environment and Land Affairs. Directorate: Nature Conservation.

PICKER, M., GRIFFITHS, C., & WEAVING, A. (2012). Field Guide to Insects of South Africa. Struik Nature: Cape Town. ISBN 978 1 92057 225 9

POOLEY, E.S. (1998). A Field Guide to Wildflowers Kwazulu-Natal and the eastern region. Natal Flora Publishers Trust: Durban, South Africa.

PRIMACK, R.B. (1995). A Primer of Biology. Sinauer Associates Conservation, U.S.A. 277 pages.

RAIMONDO, D., VON STADEN, L., FODEN, W., VICTOR, J.E., HELME, N.A., TURNER, R.C., KAMUNDI, D.A. & MANYAMA, P.A. (eds) In press. Red List of South African plants. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria.

SACAD: DEPARTMENT OF ENVIRONMENTAL AFFAIRS. (2023). South Africa Conservation Areas Database (SACAD_OR_2017_Q3). Online available: [http://egis.environment.gov.za]

SANBI (2009). Draft Threatened Ecosystems in South Africa: Descriptions and Maps. Department of Environmental Affairs and Tourism. Pretoria.

SAMWAYS, M. & HATTON, M. (2000). Palmnut Post, Vol 3, No 2, 9-11.

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE & DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT (2021). Red List of Terrestrial Ecosystems of South Africa June 2021 – version for public comments. South African National Biodiversity Institute. Pretoria, South Africa.

SKINNER, J.D. & CHIMIMBA, C. T. (2005). The Mammals of the Southern African Subregion. Cambridge University Press, Cambridge.

SKOWNO, A.L., RAIMONDO, D.C., POOLE, C.J., FIZZOTTI, B. & SLINGSBY, J.A. (EDS.). (2019). South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria

STUART, C. & STUART, T. (1994). A field guide to the tracks and signs of Southern, Central East African Wildlife. Struik Nature, Cape Town.

STUART, C. & STUART, T. (1988). Field Guide to the Mammals of Southern Africa. Struik Publishers, Cape Town.

TAYLOR, M.R, PEACOCK F, WANLESS R.W (EDS). (2015). The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa. Johannesburg. South Africa.

VAN OUDSHOORN, F. (1999). Guide to grasses of southern Africa. Briza Publications, Pretoria.

VAN WYK, B., VAN OUDTSHOORN, B. AND GERICKE, N. (1997). Medicinal plants of South Africa. Briza Publications, Pretoria.

VAN ROOYEN, C.S. (2000). “An overview of Vulture Electrocutions in South Africa.” Vulture News, 43, pp 5-22. Vulture Study Group: Johannesburg, South Africa.

VAN ROOYEN, C.S. (2004). The Management of Wildlife Interactions with overhead lines. In The fundamentals and practice of Overhead Line Maintenance (132kV and above), pp217-245. Eskom Technology, Services International, Johannesburg.

WOODHALL, S. (2005) Field Guide to the Butterflies of South Africa. Struik Publishers, Cape Town.

Appendix A: Structure of the Report

The Terrestrial Biodiversity Specialist Assessment was conducted in accordance with the Terrestrial Biodiversity Protocol (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 Biodiversity Protocol, with reference to specific sections in this report.

Requirement of GN 648 of 10 May 2019 VERY HIGH SENSITIVITY RATING – for Terrestrial Biodiversity Features	**Fulfilment**
The Terrestrial Biodiversity 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;	Page xv and Appendix B
A signed statement of independence by the specialist;	Page xv
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 14
Any direct, indirect and cumulative impacts of the proposed development;	Chapter 14
The degree to which impacts and risks can be mitigated;	Chapter 14
The degree to which the impacts and risks can be reversed;	Chapter 14
The degree to which the impacts and risks can cause loss of irreplaceable resources	Chapter 14
Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 14 and Table 20
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	Executive summary and Chapter 15
Any conditions to which this statement is subjected	Chapters 12,13,14 and 15

Appendix B: Biodiversity Specialist CV

AVHAFAREI PHAMPHE

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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 KwaZulu 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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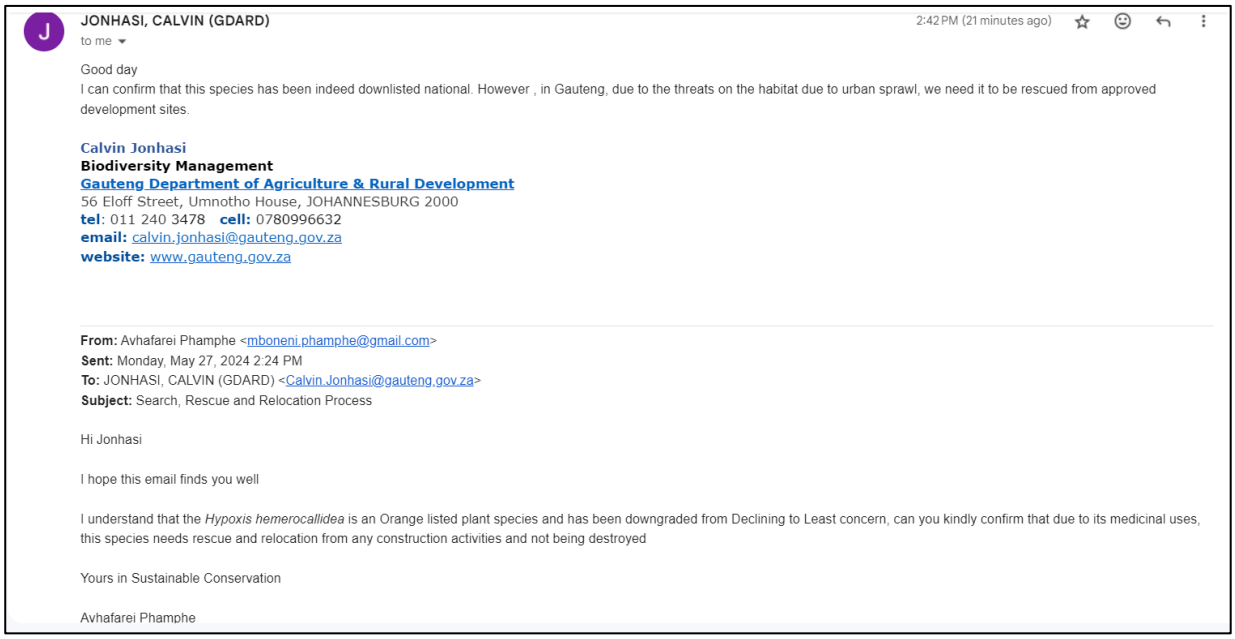
   E-mail: tshisip@univen.ac.za/peter.tshisikhawe@univen.ac.za

Appendix C: Communication with GDARDE regarding Hypoxis hemerocallidea



JONHASI, CALVIN (GDARD) 2:42 PM (21 minutes ago)
to me

Good day
I can confirm that this species has been indeed downlisted national. However , in Gauteng, due to the threats on the habitat due to urban sprawl, we need it to be rescued from approved development sites.

Calvin Jonhasi
Biodiversity Management
Gauteng Department of Agriculture & Rural Development
56 Eloff Street, Umnotho House, JOHANNESBURG 2000
tel: 011 240 3478 **cell:** 0780996632
email: calvin.jonhasi@gauteng.gov.za
website: www.gauteng.gov.za

From: Avhafarei Phamphe <mboneni.phamphe@gmail.com>
Sent: Monday, May 27, 2024 2:24 PM
To: JONHASI, CALVIN (GDARD) <Calvin.Jonhasi@gauteng.gov.za>
Subject: Search, Rescue and Relocation Process

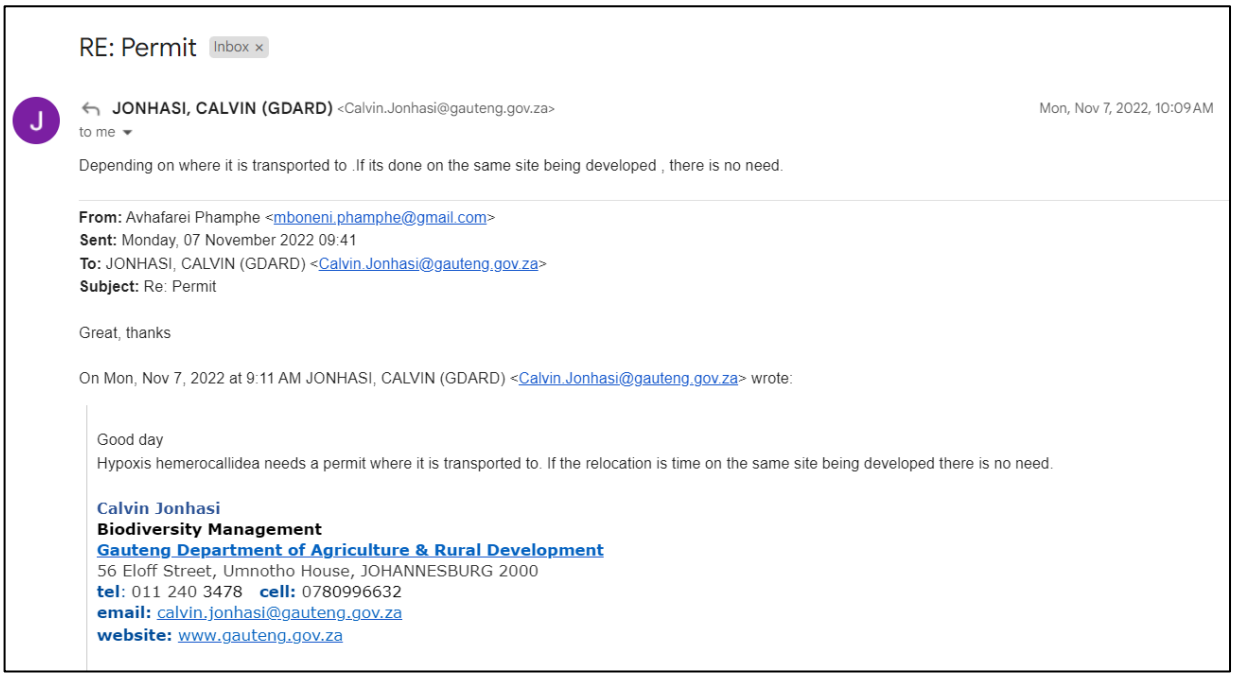
Hi Jonhasi

I hope this email finds you well

I understand that the *Hypoxis hemerocallidea* is an Orange listed plant species and has been downgraded from Declining to Least concern, can you kindly confirm that due to its medicinal uses, this species needs rescue and relocation from any construction activities and not being destroyed

Yours in Sustainable Conservation

Avhafarei Phamphe



RE: Permit Inbox ×

JONHASI, CALVIN (GDARD) <Calvin.Jonhasi@gauteng.gov.za> Mon, Nov 7, 2022, 10:09 AM
to me

Depending on where it is transported to .If its done on the same site being developed , there is no need.

From: Avhafarei Phamphe <mboneni.phamphe@gmail.com>
Sent: Monday, 07 November 2022 09:41
To: JONHASI, CALVIN (GDARD) <Calvin.Jonhasi@gauteng.gov.za>
Subject: Re: Permit

Great, thanks

On Mon, Nov 7, 2022 at 9:11 AM JONHASI, CALVIN (GDARD) <Calvin.Jonhasi@gauteng.gov.za> wrote:

> Good day
> Hypoxis hemerocallidea needs a permit where it is transported to. If the relocation is time on the same site being developed there is no need.
>
> **Calvin Jonhasi**
> **Biodiversity Management**
> **Gauteng Department of Agriculture & Rural Development**
> 56 Eloff Street, Umnotho House, JOHANNESBURG 2000
> **tel**: 011 240 3478 **cell:** 0780996632
> **email:** calvin.jonhasi@gauteng.gov.za
> **website:** www.gauteng.gov.za