SPECIALIST FAUNAL SURVEY/ HABITAT ASSESSMENT FOR THE PROPOSED TABOR-NZHELELE 400KV TRANSMISSION LINE, LIMPOPO PROVINCE

Compiled for LIDWALA CONSULTING ENGINEERS (SA) BY:
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DETAILS OF SPECIALIST

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Appointment of specialist

Clayton Cook was commissioned by Lidwala Consulting Engineers (SA) to provide specialist consulting services for the Environmental Impact Assessment for the proposed 400kV transmission line from the Tabor Substation to the Nzhelele substation located in Limpopo Province. The consulting services comprise a description of faunal species on the site and an assessment of the potential for threatened mammal, reptile and amphibian species likely to occur within the proposed alternative alignments of the Tabor-Nzhelele powerline.

Summary of expertise

Clayton Cook:

- Registered professional member of The South African Council for Natural Scientific Professions (Zoological Science), registration number 400084/04.
- Faunal and Specialist Herpetological consultant since 1997.
- Conducted over 150 preliminary faunal surveys and over 70 specialist surveys as a Specialist Faunal consultant.
- Regional Organiser for Gauteng Province for the South African Frog Atlas Project 1999-2003.
- Published a scientific paper on *Pyxicephalus adspersus*, 8 scientific conference presentations, co-wrote the species accounts for the genus *Pyxicephalus* for the Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland South African as well as W.R.C Report No. 1258/1/06 on “A Biophysical framework for The Sustainable Management Of Wetlands In Limpopo Province With Nylsvley as a Reference Model”.
- Attended 5 national and international herpetological congresses & 3 expert workshops, 6 Zoological Conferences as well as 4 South African Aquatic Sciences conferences lectured zoology and botanical science at University of Limpopo (2001-2004).
- Participant and author in the State of the Rivers project for the upper reaches of the Letaba River System.
- Participant in the EWT Giant Bullfrog species survival programme as well as African Grass Owl Workshops.
- Co-worker on a 3 year W.R.C. project on the current status of frog species in the Kruger National Park (2009-2012).

Independence:

Clayton Cook have no connection with the proponent of the development and is not a subsidiary, legally or financially, of the proponent, remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making authorities responsible for permitting this proposal and the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project. The percentage work received directly or indirectly from the proponent in the last twelve months is approximately 0% of turnover.

Scope and purpose of report

The scope and purpose of the report are reflected in the "Terms of reference" section of this report below.

Terms of Reference

Clayton Cook was commissioned by Lidwala Environmental to provide specialist consulting services for the Environmental Impact Assessment for the proposed 400kV transmission line from the Tabor Substation to the Nzhelele substation located in Limpopo Province. The consulting services comprise a description of faunal species on the site and an assessment of the potential for threatened mammal, reptile and amphibian species likely to occur within the proposed alternative alignments of the Tabor-Nzhelele powerline.

1. INTRODUCTION

Eskom Transmission is responsible for providing a high quality supply of electricity to meet the ever increasing needs of its end users. As a result, its infrastructure of power lines and substations are continuingly being established and expanded upon to support annual load growth. Eskom Holdings SOC Limited has, in line with the EIA Regulations, appointed Lidwala Consulting Engineers (SA) as the independent consultant to undertake the EIA for the proposed 400kV line from the Tabor Substation to the Nzhelele substation (see FIGURE 1) located in Limpopo Province. Lidwala Consulting Engineers (SA) has appointed Mr C. L. Cook as faunal specialist to investigate the potential animal (mammals, reptiles and amphibians) related impacts associated with the construction and operation of the proposed 400kV power line. Special emphasis will be placed on the potential occurrence of Red Listed/Data animal species likely to occur in the areas of the proposed five alternative powerline alignments.

1.1 Objectives of the Specialist Faunal Survey

- To provide a description of the fauna occurring in the proposed Tabor-Nzhelele five alternative alignments and adjacent areas (1000 m).
- To provide a description of any threatened mammals, birds, reptiles and amphibians occurring or likely to occur on the proposed Tabor-Nzhelele alignments and immediate surrounding areas.
- To describe the available habitats along the Tabor-Nzhelele alignments including areas of important conservation value or areas most likely to form important habitat for remaining threatened faunal species.
- To determine potential impacts of the proposed Tabor-Nzhelele 400kV powerline on the occurring within the alignments and immediate adjacent areas (1000 m).
- To provide management recommendations to mitigate negative and enhance positive impacts of the proposed Tabor-Nzhelele 400kV powerline.

1.2 Scope of study

- A preliminary mammal, reptile and amphibian survey recording sightings and/or evidence of existing fauna.
- An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the current status of threatened animal species (Red Data Species), within the proposed five alternative alignments and adjacent areas (1000 m).
- Identification of potential ecological impacts that could occur as a result of the Tabor-Nzhelele 400kV powerline development and assess the significance of these, where possible.
- Investigate feasible and practical management recommendations that should be implemented to reduce or minimize the impacts, should the project be approved.
- To rank the proposed four alternative alignments of the Tabor-Nzhelele 400kV powerline on the potential environmental impacts as well as associated fauna.
- Documentation of the findings of the study in a report.

1.3 Constraints and Limitations

- Limitation to a base-line ecological survey for only 4 days (40 hours) during the summer months (March and November 2012) of the previous summer rainfall season (2011/2012).
- The majority of threatened species are seasonal only emerging after sufficient heavy summer rainfall between November and February.
- The majority of threatened species are extremely secretive and difficult to observe even during intensive field surveys conducted over several years.
- Access to certain areas along the proposed servitudes is restricted through the fencing off of private lands.

- Limitation of historic data and available databases. Insufficient knowledge on detailed habitat requirements (migratory, foraging and breeding) of the majority of threatened species.
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records and previous surveys conducted in similar habitats 1998-2012).

1.4 Gaps in the baseline data

- Little long-term, verified data of certain faunal species distribution on micro-habitat level in the Polokwane-Makhado-Musina areas.
- Little long-term, verified data on impacts of previous and current agricultural as well as forestry activities and existing powerlines in the study area on fauna.
- The majority of the red data atlases are outdated especially pertaining to reptiles as well as inadequate coverage of some areas by the atlases

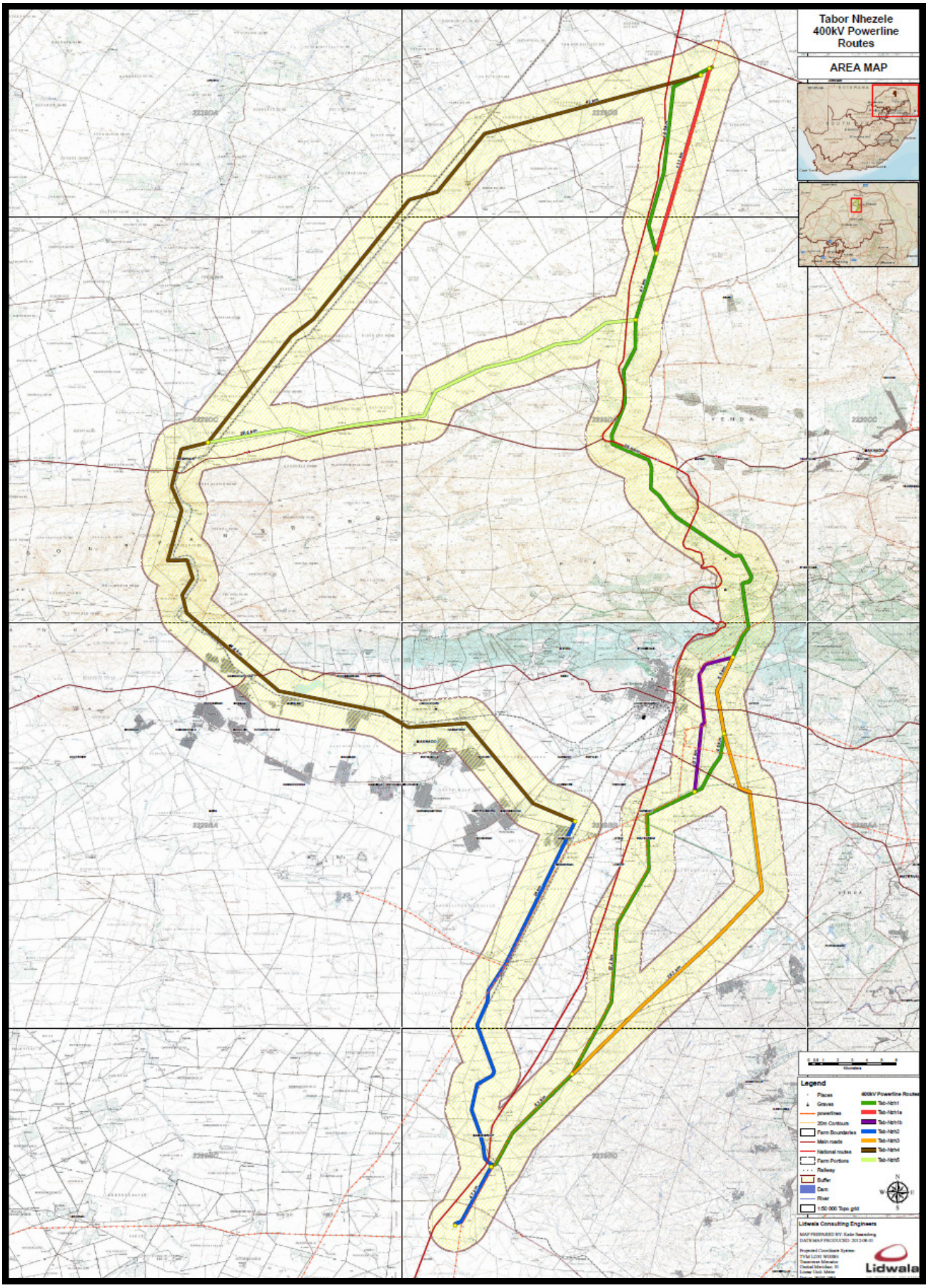

Figure1. Locality map of the proposed Tabor-Nzhelele 400kV lines

2. METHODOLOGY

The specialist faunal survey focused mainly on mammals, reptiles and amphibians occurring or likely to occur along the proposed Tabor-Nzhelele 400kV alternative alignments. A separate specialist avifaunal (bird) survey has been conducted by Mr. Andrew Pearson from EWT. The survey focused on the current status of threatened animal species occurring, or likely to occur within the proposed five alternative alignments between the Tabor substation and the Nzhelele sub-station and describing the available and sensitive habitats, identifying potential impacts resulting from the proposed powerline development.

2.1 Predictive methods

A 1:50 000 map of the study area was provided showing existing infrastructure and the proposed Tabor-Nzhelele 400kV alternative alignments. This was used as far as possible in order to identify potential "hot-spots" or specialised habitats e.g. Patches of undisturbed vegetation, streams, wetlands and dams and agricultural areas (previous and current). Satellite imagery of the area was obtained from Google Earth was studied in order to get a three dimensional impression of the topography and land use. Aerial photographs were utilised for the sensitivity mapping using Arcview 9.2.

2.2 Literature Survey

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur in the Polokwane-Makhado-Tshipise areas. The literature search was undertaken utilizing *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description. *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) for mammals. The *Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians. The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) for reptiles. Distribution data were extracted from the Southern African Frog Atlas Project (SAFAP) virtual museum data base. *A reptile survey of the Transvaal* (Jacobsen 1989). The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001), *A Complete Guide to the Snakes of Southern Africa* (Marais 2004), *Reptiles of Southern Africa* (Alexander & Marais 2007), *Tortoises, Terrapins and Turtles of Africa* (Branch 2008) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) for reptiles. Distribution data of reptiles and amphibians were extracted from the Southern African Reptile Conservation Assessment (SARCA) virtual museum data base (available at http://www.saherps.net/sarca/sp-summary.php).

2.3 Site Investigation Methodology

A preliminary assessment of the status, spatial requirements and habitat preferences of all priority faunal species occurring; or likely to occur, in the proposed the 2229DB; 2229DC; 2229DD; 2329BB and 2329BD quarter degree grid cells (QDGC's). For certain species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature. For other species, little of this information was readily available and conservation targets remain speculative. Species assessments will be updated when additional data (SARCA) becomes available and where appropriate, proposed conservation targets will be revised.

Two general habitat sensitivity scans were carried out on site on the 13-14th March as well as the 12th-13th of November 2012. A helicopter fly-over of the alternative alignments was conducted on the 13th of November 2012. These site visits did not entail intensive surveying or utilisation of any specialised sampling methods and can rather be viewed as being an opportunity to identify sensitive faunal habitats occurring in the proposed Tabor-Nzhelele 400kV alternative alignments. Emphasis was placed on the primary Makhado Sweet Bushveld (SVcb 20), Soutpansberg Mountain Bushveld (SVcb 21) and Musina Mopane Bushveld (SVmp 1) as well as seasonally inundated depressions, rivers, rocky outcrops and the Soutpansberg. A single nocturnal survey was conducted on the 13th of November 2012. The majority of mammals were identified by visual observations as well as droppings and various burrow types. The majority of amphibians identified on the site were incidentally observed adults (under rocks, logs etc), calling males as well as dip-netting of tadpoles. Reptiles were actively searched for under suitable refuges such as loosely embedded flat rocks, logs, stumps, dumped building rubble, tyres and carpets and identified by actual specimens.

The data was supplemented by previous surveys conducted in similar habitats within the study area, literature investigations, personal records and historic data. Different habitats were explored to identify any sensitive or specialised species. Mammal names are as used by Skinner and Chimimba (2005), reptile names by Branch (1998) and Alexander and Marais (2007); amphibian names by Du Preez and Carruthers (2009) and Minter *et.al.* (2004)

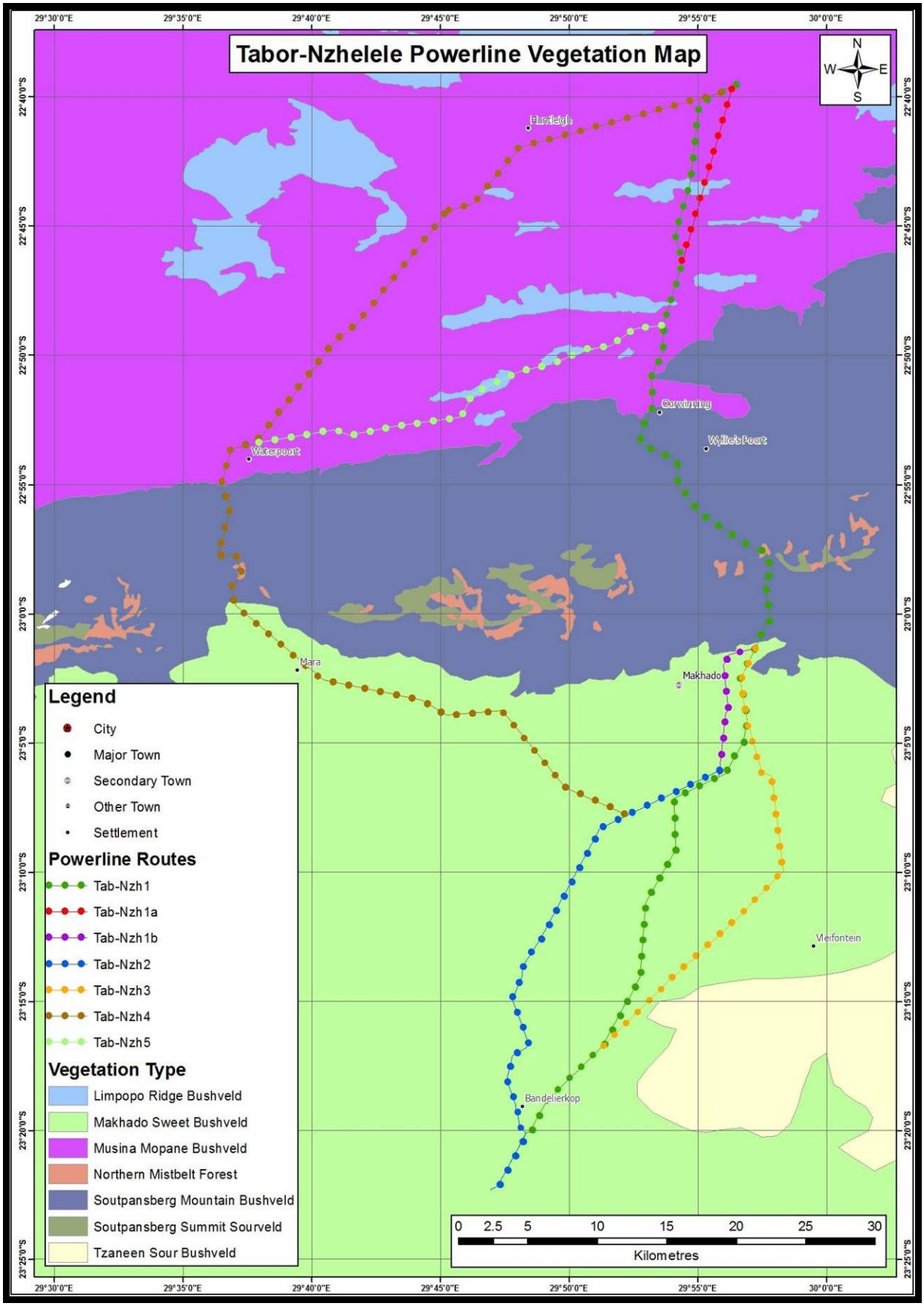

Figure2. Vegetation map of the proposed Tabor-Nzhelele alignments adapted from Mucina & Rutherford (2006).

3. VEGETATION AND FAUNAL HABITAT AVAILABILITY

Vegetation structure is generally accepted to be more critical in determining faunal habitat than actual plant composition. Therefore, the description of vegetation presented in this study concentrates on factors relevant to faunal species abundance and distribution, and does not give an exhaustive list of plant species which occur in the study area. The proposed 100km Tabor to Nzhelele 400kV powerline bisects five vegetation units namely **Makhado Sweet Bushveld (SVcb 20), Soutpansberg Mountain Bushveld (SVcb 21 Musina Mopane Bushveld (SVmp 1), Limpopo Ridge Bushveld (Svmp 2)** as well as small isolated patches of **Northern Mistebelt Forest (Foz 4)** (see Figure 2 above). Large areas of the proposed alignment bisect private game and hunting farms which comprise the natural vegetation composition although certain sections of the alignment occur adjacent to transformed bushveld including agricultural lands, mining activities, forestry activities, as well as degraded bushveld including dense areas of bush encroachment especially to the north of the Tabor substation towards the southern slopes of the Soutpansberg.

3.1 Makhado Sweet Bushveld (SVcb 20)

Figure3. The vegetation unit of the proposed 3 alternative alignments for 400kV powerline from the Tabor sub-station site until the southern footslopes of the Soutpansberg is situated within **Makhado Sweet Bushveld (SVcb 20)** (Mucina & Rutherford 2006) vegetation unit which was previously classified as **Mixed Bushveld** (Acocks 1998) or **Mixed Bushveld** (44%) and **Sweet Bushveld** (43%) (Low & Rebelo 1996).

Distribution:
Makhado Sweet Bushveld is distributed in the Limpopo Province straddling the Tropic of Capricorn. It occurs on the plains south of the Soutpansberg, east of the Waterberg and on the apron surrounding the Blouberg and Lerataupje Mountains, and north of the Polokwane Platea and west of the escarpment, with extensions to Mokopane to the south and to the north of Vivo.

Vegetation & Landscape Features:

Makhado Sweet Bushveld occurs on slight to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Short and shrubby bushveld with a poor developed grass layer. The vegetation around the alignments consist of game and hunting farms as well as cattle grazing activities and small scale agricultural activities.

Geology & Soils:
The area is underlain by the gneisses and migmatities of the Hout River Gneiss (Randian Erathem) and the potassium-deficient gneisses of the Gudplaats Gneiss (Swazian Erathem). Sandstones and mudstones of the Matlabas Subgroup (Mokolian Group) are also found. Soils include deep, greyish sands, eutrophic plinthic catenas, red-yellow apedal freely drained soils with high base status, clayey in the bottomlands (Mucina & Rutherford, 2006).

Climate:
Summer rainfall area with dry winters. Mean Annual Precipitation from about 450 mm to around 900 mm. Generally a frost-free region.

CONSERVATION
This vegetation unit is currently considered as **Vulnerable**. The conservation target is 19%, with just over 1% statutorily conserved mainly in the Bellevue Nature Reserve. Some 27% already transformed, mainly by cultivation, with some urban and built up areas. The south-western half of the unit has densely populated rural communities. (Mucina & Rutherford 2006).

Soutpansberg Mountain Bushveld (SVcb 21)

Figure4. The proposed Tabor-Nzhelele 1, 2 and 3 alignments follow an existing powerline servitude which bisects the Soutpansberg to the east of Makhado and the the N1 and the proposed Tabor-Nzhelele 4 follows an existing railway line through the Sand River Gorge to the west of Makhado. The vegetation unit comprises **Soutpansberg Mountain Bushveld (SVcb 21)** (Mucina & Rutherford 2006).

Distribution:

Soutpansberg Mountain Bushveld occurs within the Limpopo Province on the slopes of the Soutpansberg Mountain, Blouberg and Lerataupje Mountains to the west; extending eastwards on the lower ridges including Khaphamalia and Makonde Mountains. Altitude varies between 600-1 500m (Mucina & Rutherford 2006).

Soutpansberg Mountain Bushveld occurs on the lower to higher mountains, highest in the west, splitting into increasing number of lower mountains towards the east. Dense tree layer and poorly developed grass layer. The topography of the east-west-orientated ridges of the mountain changes dramatically over short distances, resulting in orographic rain on the southern ridges, and a rainshadow effect on the northern ridges. Because of this topographic diversity, the Soutpansberg Mountain Bushveld comprises a complex mosaic of sharply contrasting kinds of vegetation within limited areas.

The main vegetation variations within the Soutpansberg Mountain Bushveld are **subtropical moist thickets** (mainly along the lower-lying southern slopes on steep clayey soils of volcanic origin), **mistbelt bush clumps** (within the mistbelt of the southern and central ridges of the mountain, or rugged quartzitic outcrops with shallow sandy soils), relatively **open savanna sandveld** (on both deep and shallow quartzitic sands along the dry middle and northern slopes of the mountain), and **arid mountain bushveld** (along the very arid northern ridges of the mountain)(Mucina *et al.,* 2006).

Geology & Soils:

Reddish or brown, sandstone and quartzite, conglomerate, basalt, tuff, shale and siltstone of the Soutpansberg Group (including the Wyllie's Poort, Funduzi and Nzhehele Formations), Mokolian Erathem. Rocky areas with miscellaneous soils including dystrophic to mesotrophic sandy to loamy soil. Glenrosa and Mispah soil forms are common. Erosion is low to moderate. Land types mainly Ib, Ab, Fa, Fb, Ae and Ia (Mucina & Rutherford, 2006).

Climate:

Summer rainfall area with dry winters. Mean Annual Precipitation from about 450 mm to around 900 mm. Generally a frost-free region.

CONSERVATION:

This vegetation unit is currently considered as **Vulnerable**. The conservation target is 24%, with just over 2% formally protected within the Blouberg, Happy Rest and Nwanedi Nature Reserves. A smaller area is conserved in other reserves. Some 21% already transformed, mainly by cultivation (14%) and (6%) plantations. High rural human populations densities, particularly in the eastern section of the unit (Mucina & Rutherford 2006).

Musina Mopane Bushveld (SVmp 1)

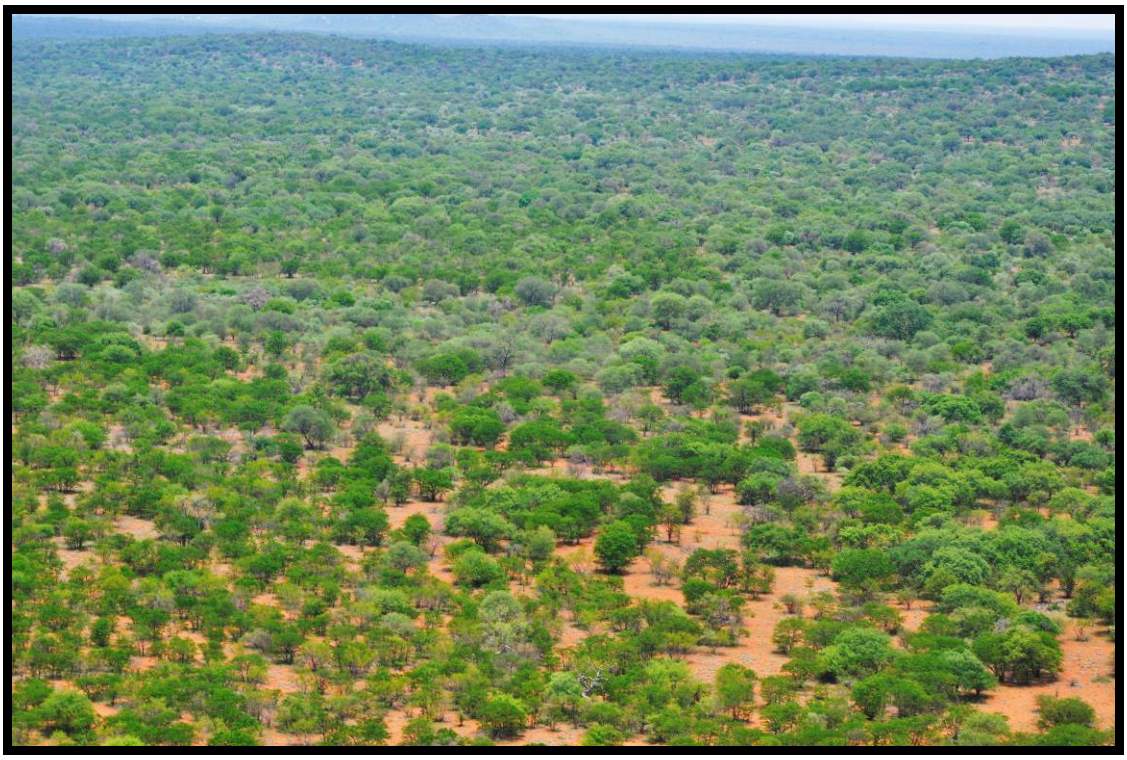

Figure5. The vegetation unit of the proposed 400kV line north of the Soutpansberg towards the Nzhelele sub-station is situated in **Musina Mopane Bushveld (SVmp 1)** (Mucina & Rutherford 2006) which was previously classified as **Mopane Veld** (Acocks 1998) or **Mopane Bushveld** (Low & Rebelo 1996)

Distribution

Limpopo Province on undulating plains from around Baines Drift and Alldays in the west, remaining north of the Soutpansberg and south of the Limpopo River (but also occurring to the north of Zimbabwe), through Musina and Tshipise to Malongavlakte, Masis and Banyini Pan in the east. Altitude about 300m in the eastern Limpopo Valley up to 800m.

Vegetation and Landscape Features

Undulating to very irregular plains, with some hills. In the western section, open woodland to moderately closed shrubveld dominated by *Colophospermum mopane* on clayey bottomlands and *Combretum apiculatum* on hills. In the eastern section on basalt, moderately closed to open shrubveld is dominated by *Colophospermum mopane* and *Terminalia prunioides*. On areas with deep sandy soils, moderately open savanna dominated by *Colophospermum mopane, Terminalia sericea, Grewia flava* and *Combretum apiculatum.* Field layer well developed (especially on the basalt), open during the dry season; the herbaceous layer is poorly developed in areas with dense cover of *Colophospermum mopane* shrubs, for example north of Alldays bordering the Limpopo floodplain (Mucina *et al.* 2006).

Geology and Soils

Most of the area is underlain by the Archaen Beit Bridge Complex, except where it is covered by much younger Karoo sandstones and basalts, The Beit Bridge Complex consists of gneisses and metasediments and is structurally very complex. Variable soils from deep red/brown clays, moderately deep, dark, heavy clays to deep, freely drained sandy soils to shallower types including skeletal Glenrosa and Mispah soil forms.

Climate

Summer rainfall with very dry winters including the shoulder moths of May and September. MAP about 300-400mm. Generally frost-free unit.

Conservation

Least Threatened. Target 19% with only 2% statutorily conserved in the Mapungubwe National Park as well as Nwanedi and Honnet Nature Reserved. Additionally, about 1% conserved in the Baobab Tree Reserve. Roughly 3% transformed, mainly by cultivation. Erosion is high to moderate (Mucina *et al.* 2006).

Limpopo Ridge Bushveld (SVmp 2)

Figure6. Limpopo Ridge Bushveld observed adjacent to Tabor-Nzhelele alternative 5 to the north of the Soutpansberg and east of the Sand River.

Distribution

Limpopo Ridge Bushevld occurs on the hills and ridges, such as Madiapala in the lower Mogalakwena River basin in the west through a cluster of hills in the Pontdrift area including Poortjieberg and Tsolwe, eastwards including Mapungubwe Mountain in the Mapungubwe National Park through the hills and ridges in the vicinity of the Limpopo River further downstream including Ha-Tshansi at Musina, Ha-Dowe and Maremani. Also including hills and ridges well away from the Limpopo River north of the Soutpansberg and generally east of the Sand River (e.g. Thsitangai, Bloukop and Ha-Manenzhe) through some rugged areas in the far northern Kruger National Park. Altitude varies from about 300 m in the east to 700 m, with the summit of a few hills in the west around 1000 m (Mucina & Rutherford 2006).

Vegetation and Landscape Features

Extremely irregular plains with ridges and hills. Moderately open savanna with poorly developed ground layer. Umbrella-shape canopied *Kirkia acuminate* is prominent on some ridge skylines with the often enormous Adansonia digitata on shallow calcerous gravel, the shrub *Catophractes alexandri* is dominant on cal-silicate soils. These are particularly striking landscapes with rock walls and passages with areas of sandstone of the Clarens Formation (e.g. within the Mapungubwe National Park) (Mucina & Rutherford 2006).

Geology and Soils

Mostly rocks of the Beit Bridge Complex (Swazian Erathem) as well as sediments (including sandstones of the Clarens Formation) and basalt (particularly in the east) of the Karoo Supergroup. Shallow gravel and sand (Glenroas and Mispah soil forms) to calcareous clayey soil. Land types mainly Fc, Fb and Ib (Mucina & Rutherford 2006).

Climate

Summer rainfall with very dry winters including the shoulder months of may and September. Mean Annual Precipitation (MAP) around 300-400 mm. Generally a frost-free area.

Conservation

Least Threatened. Target 19% with some 18% statutorily conserved mainly in the Mapungubwe National Park as well as the Kruger National Park. An additional 2% conserved in the Baobab Tree Reserve (thus together attaining the conservation target). Only about 1% transformed, mainly for cultivation and mining activities (Mucina *et al.* 2006).

Northern Mistbelt Forest (FOz 4)

Figure7. Northern Mistbelt Forest situated within Lekgalameetse Nature Reserve.

Distribution

Limpopo and Mpumalanga Provinces as well as Swaziland. Occuring along the Soutpansberg from Blouberg in the northwest to the Samandou Plateau in the northeast and further southwards (including the Northern Escarpment) from Abel Erasmus Pass (Olifants River) to the surroundings of Badplaas and Barberton. In northern Swaziland in fire refugia and cooler sheltered areas along a north-south trending Lowveld/highveld transition. Most of the patches occur in an altitudinal belt spanning 1 050 m to 1 650 m (Mucina & Rutherford 2006).

Vegetation and Landscape Features

Tall, evergreen afrotemperate mistbelt forests occurring primarily on the east-facing fire refugia such a subridge scarps and moist sheltered kloofs where they form small, fragmented patches. The most common canopy trees include *Xymalos monospora, Podocarpus latifolius, Combretum kraussi, Cryptocarya transvaalensis, Scefflera umbellifera, Syzigium gerrardii, Olea capensis* subsp. *macrocarpa, Psdrax obovata* subsp. *elliptica, Pterocelastrus galpinii*. In the understorey *Psychotria zombamontana, Canthium kuntzeanum, Gymnosporia harveyana, Peddiea africana, Pavetta inandensis, Mackaya bella, Sclerochiton harveyanus* (Mucina & Rutherford 2006).

Geology and Soils

Highly weathered, clayey soils mainly of the Avalon and Hutton soil forms which are derived from shales (Pretoria Group), quartzite (Black Reef Formation), dolomite (Chuniespoort Group), granite (Nelspruit Basement) and diabase (Mokolian intrusives) (Mucina & Rutherford 2006).

Conservation

Least Threatened. Target 30% with some 10% statutorily conserved in Blyde River Canyon, Lekgalameetse, Songimvelo, Makobulaan, Malalotja, Nelshoogte, Barbeton and Starvation Creek Nature Reserves. More than 25% enjoys protection in privately owned nature reserves including Wolberg Wilderness Area, In-De-Diepte, Sudwala, Mac Mac, Buffelskloof, Mount Sheba. Alien vegetation such as *Solanum mauritianum, Caesalpinia decapetala, Acacia mearnsii* and *Lantana camara* can be locally of concern. Encroaching subsistence farming, firewood collection in communal areas and selective harvesting of bark are viewed as serious potential threats (Mucina *et al.* 2006).

4. RESULTS OF THE PRELIMINARY FAUNAL SURVEY OR HABITAT ASSESSMENT

The faunal survey focused on mammals, reptiles and amphibians of the study area. The preliminary survey focused on the current status of threatened animal species occurring, or likely to occur within the study area. Faunal surveys should ideally be conducted over extended periods during the summer rainy season between November and March. This is especially pertinent to amphibian surveys; with the majority of frog species being explosive breeders, initiating their short-duration reproductive events after early summer rainfall mainly in November and December. Faunal data was obtained during the 2 day site inspection carried out by vehicle. All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. No small mammal trapping was undertaken due to time constraints and the extreme limitations that the results from a single season site survey conducted during the summer months would pose. Instead fieldwork was augmented with previous surveys in similar habitats as well as published data. Amphibians were identified by visual observations of adults. Reptiles were actively searched for and identified by actual specimens or observations of specimens during site inspection along the proposed alignments. The data was supplemented by previous surveys conducted in the area, literature investigations, personal records and historic data.

4.1 MAMMALS

In 2002 the Endangered Wildlife Trust (EWT) and the IUCN's Conservation Breeding Specialist Group instigated a project to initiate a concerted effort by mammal specialists to assess the status of all mammals in South Africa. The primary threats impacting negatively on many mammals include habitat loss and land transformation through deforestation, agriculture, timber planting and urban and industrial development. Poisoning, pollution and hunting have also been listed as having a negative impact on a number of mammals. The result of this collaborative effort was a detailed compilation of knowledge from many specialists; resulting in an updated status of Red List as mammal species. Taxon Data Sheets and distribution maps for each of the **295** species and subspecies of South African mammals were evaluated. Of the total number of species and subspecies evaluated; **57 (19.3%)** were assigned threat categories according to the IUCN Red List criteria (version 3.1). These are divided into:

- **10 (3.4%)** classified as Critically Endangered (CE)
- **18 (6.1%)** classified as Endangered (E) and
- **29 (9.8%)** classified as Vulnerable (VU)

A total of **53 (18%)** species were assessed as being Data Deficient (DD) and therefore a threat category could not be assigned to these species. A total of **38 (12.8%)** species were assessed as being Near-Threatened (NT) and **147 (49.8%)** as Least Concern (LC) (Friedmann & Daly 2004).

As a result of this initiative, increasing data is available for the threatened mammals of the Limpopo Province. In Limpopo Province, the majority of large mammals which are considered as threatened are only found in National Parks or other conservation areas such as private game reserves, and it is neither practical nor beneficial to re-introduce them into unprotected natural areas. Threatened small mammals, such as the White-tailed Mouse, however, are not confined to conservancies and occur in varied habitats in the province and are significantly impacted on by human activities and urgent conservation attention needs to be directed towards the threatened small mammal species in the province.

Limpopo is faunally diverse with a high mammalian species richness occurring in savannahs and grasslands, which could be as a result of the wide variety of habitats available. In Limpopo Province, savanna and mountainous grassland areas with the availability of sufficient cover, karst areas, wetlands, pans and a well-managed mosaic of short and tall grassland, are habitats that significantly contribute towards the ecological requirements of certain mammal species. Certain species in Limpopo, towards which conservation efforts for habitat protection should be directed, have been identified. Priority species can be used to emphasise key habitats, which are of conservation concern. These species thus contribute towards identifying priority areas of conservation importance and in determining the conservation value of land. Anthropogenic land conversion and habitat degradation and fragmentation are major threats to the continued existence of endemic and threatened fauna in the province.

The Soutpansberg has a remarkable diversity of mammals making up 60% of the total number of species that occur in South Africa. There are more mammal species in the Soutpansberg than in the Cape Floristic Kingdom (127). The whole of the Kruger National Park only contains two more species of mammals than the Soutpansberg. It is particularly rich in bats, carnivores and larger hoofed animals. A total of 145 species has been recorded in the Soutpansberg (Gaigher & Stuart 2003) (see Table 1 below).

Table1. Number of mammal species per order as recorded for the Soutpansberg in relation to South Africa (Gaigher & Stuart 2003).

Order	Number Species		%
	Soutpansberg	S. A.	
INSECTIVORA	11	35	31
CHIROPTERA	36	55	65
PRIMATES	5	5	100
PHOLIDOTA	1	1	100
LAGOMORPHA	3	6	50
RODENTIA	31	64	48
CARNIVORA	26	34	76
TUBULIDENTATA	1	1	100
PROBOSCIDEA	1	1	100
HYRACOIDEA	2	3	66
PERISSODACTYLA	3	4	75
ARTIODACTYLA	25	33	76
TOTAL	**145**	242	60

The high density settlements and massive habitat transformation around Makahado and associated illegal hunting and poaching; limits the suitability of these areas for larger mammal species. The collection or harvesting of wood (stumps) and rock material as well as the frequent burning of the vegetation reduces available refuge habitat an exposes remaining smaller terrestrial mammals to increased predation levels. The use of wire snares for high intensity poaching activities will significantly affect remaining smaller mammal species such as rabbits and mongooses. Secondary access roads and vehicles (motor cars, motor cycles, quad bikes) increase access to the open areas as well as potential road fatalities. Major road networks with high vehicular traffic increase the risk of road fatalities (hedgehogs, hares) of mammals. Smaller mammal species are extremely vulnerable to feral cats and dogs.

Several Greater Kudu (*Tragelphagus strepsiceros*), Common Duikers (*Sylvicarpa grimmia*) as well as an adult male Bushbuck (*Tragelaphus scriptus*) were observed in the denser *Acacia* woodland vegetation units along the Tabor-Nzhelele alternative alignments. Several Impala (*Aepyceros melampus*) were observed in the open woodland vegetation units. The bush encroached areas along alternative alignments improves the habitat for Impala and restricts poaching activities due to the impenetrable thickets.

Vervet Monkeys (*Ceropithecus aethiops*) were observed foraging in a Cluster Broom Fig (*Ficus sur*). Evidence (spoor) of several antelope species were observed along the informal dirt roads and human pathways including Bushbuck (*Tragelaphus scriptus*) and Common Duiker (*Sylvicarpa scriptus*). Slender Mongoose was observed running across the N1 as well as secondary roads. Several rodent burrows (most likely Bushveld Gerbils) were observed within the sandy sections of the alignment as well as adjacent to the Tabor substation.

Several Aardvark (*Orycteropus afer)* burrow systems where observed during the helicopter fly-over along the Tabor-Nzhelele alternative 2 alignment. Several recently excavated burrows were found in open woodland, scrub and grassland, especially where these are associated with sandy ground. Nevertheless, they are capable of utilizing heavy soils and are found in areas of mopane woodland and other types of hard ground, and on heavy red soils of parts of the Subregion. They are associated particularly with heavy utilized grassland where there are termite populations (Skinner and Smithers, 1991).

Figure8. Several recently scraped and active Aardvark burrows were observed adjacent to the Tarbor-Nzhelele Alternative alignments.

Apart from small exploratory scratchings, which show clearly the impression of the broad front claws, aardvarks appear to make three types of excavations. The first are shallow diggings, often in flat ground or penetrating termitaria, which are only sufficiently deep to give access to the food. Some of these burrows may penetrate a termitarium to a depth sufficient to cover the head and shoulders of the animal, or allow it to disappear altogether. These excavations are not used as refuges and normally are not revisited. The second type of burrow, dug overnight, is a temporary refuge and may penetrate several metres shallowly underground. These may be re-used over a period of a day or two or may be returned to sporadically. They usually have a chamber at the end to allow the individual to turn around. The third type of burrow is the most permanent and is used as a shelter where the young are born. These permanent shelters may extend deeply into the ground, have an extensive burrow system with numerous chambers, and several entrances. Burrows, when unoccupied, provide both shelter and safe refuge for a wide

range of mammals, birds, reptiles and insects (Skinner and Smithers, 1991).

The dense *Acacia* and *Combretum* woodland habitats offer favourable habitat for arboreal mammal species such as Galagos, Woodland Doormouse and Tree Rats. The Soutpansberg Conservancy provides important habitat for several larger and smaller mammal species. Larger mammal species including Giraffe, Eland, Plains Zebra, Kudu, Impala, Blue Wildebeest, Common Duiker, Grey Rhebok, Reedbuck, Blesbuck, Bushbuck, Warthogs, Red Hartebeest, Bushpigs, Antbears, Black-backed Jackal, Spotted Hyaena, Brown Hyaena, Leopard, Caracal, African Civet, African Wid Cat, Vervet Monkey, Common Warthog and Chacma Baboons.

The small Northern Mistbelt Forest pockets situated within the Soutpansberg Conservation Area provide suitable habitat for Red Duiker as well as remnant patched of closed woodland around Makhado. Throughout their range red duikers are associated with forest, forest clumps and dense thickets. They occur in riverine forest, on forest clad mountain slopes, in thickly wooded ravines and dense coastal bush (Skinner & Chimimba, 2005). The Red Duiker (*Cephalophus natalensis*) was classified as Least Concern (LC) during the Mammal Conservation Assessment (CAMP) 2002/2003 and is currently listed by Skinner and Chimimba (2005) as Lower Risk: Conservation Dependent (LR/cd). There is debate about the assignment of the species as there has been a considerable drop since the 'Rare' assessment by Smithers (1986).

The species could possibly be elevated to the ‘Near-Threatened’ category based on the fact that there are fewer than 10 000 mature individuals in the population as well as having only 4 locations in South Africa. The Greater St Lucia Wetland Park currently has an estimated population of 1000 or more but this is for the total population (Rowe-Rowe, D.T. 1994) which may indicate that there are fewer than 1 000 mature individuals which would potentially qualify the species as Vulnerable VU based on criteria C2ai (CAMP 2002/2003).

Evidence of Cape Clawless Otters (*Aonyx capensis*) in the form of faeces or spraints as well as quills of Cape Porcupine (*Hystrix africaeustralis*) where also observed along the riparian zone of the Sand River.

A list of mammal species observed on the site as well as species likely to occur on the site using habitat as an indicator of presence; is presented in the Appendix A (see table 10).

Habitat available for Sensitive or Endangered Species

According to the "South African Red Data Book of Terrestrial Mammals" (Smithers 1986) and Skinner and Chimimba (2003), the study area falls within the distribution ranges of 7 species which are placed into one of known threatened species (2) Endangered, (2) Vulnerable and (3) species which are presently listed as Lower Risk Near-threatened. Several Lower Risk-Conservation Dependent (LR/cd) species occur within the alignments including Giraffe, African Buffalo, Greater Kudu, Nyala, Eland, Blue Wildebeest, Red Hartebeest, Tsessbe, Blesbok, Roan, Sable, Red Duiker, Waterbuck, Impala and Klipspringer No sensitive or endangered mammals were recorded during the brief survey but suitable habitat occurs on the site and surrounding private game farms, hunting farms and provincial nature reserves (Manavhela Ben Lavin) and conservancy areas for certain rare or threatened mammal species. More comprehensive surveys undertaken over extended periods will deliver a more representative species list of mammal species likely to occur on the site.

Table2. Mammal species of conservation importance possibly occurring on the proposed 400kV Tabor-Nhzehele powerline alignments (using habitat availability and distribution records as an indicator of possible presence).

COMMON NAMES	SCIENTIFIC NAMES	IUCN RED LIST	CRITERIA
ORDER RODENTIA			
White-tailed mouse	*Mystromys albicaudatus*	EN	A3c
ORDER PHOLIDOTA			
Ground Pangolin	*Manis temminckii*	LR/nt	
ORDER CARNIVORA			
Brown Hyaena	*Hyaena brunnea*	LR/nt	
Cheetah	*Acinonyx jubatus*	VU	C2a(1)
Lion	*Panthera leo*	VU	A2abcd
African Wild Dog	*Lycaon pictus*	EN	C2a(1)
ORDER PERRISSODACTYLA			
White Rhinoceros	*Ceratotherium simum*	NT	

IUCN (World Conservation Union): **CR** = Critically Endangered, **En** = Endangered, **Vu** = Vulnerable, **LR/nt** = Lower Risk near threatened, **DD** = Data Deficient.

White-tailed Mouse (*Mystromys albicaudatus*) (A.Smith, 1834)

Distribution

White-tailed Mice are confined to the subregion. They occur in the southern, western, eastern and north-eastern parts of the Cape province, in Kwazulu-Natal, the Free State, the south-western and southern parts of Gauteng and Swaziland.

Habitat Preference

In the eastern parts of their distribution range, they follow very closely the savanna grassland zone, but are not confined to this, occurring in the Karoo and in the south-west, in the Cape Macchia Zone (Smithers and Skinner, 1991). In the former Transvaal they were recorded in area of dense grass and sandy soils, but also from rocky areas with good grass cover (Rautenbach 1982). In Kwazulu-Natal they were caught in similar habitat to that in Lesotho being collected in short sparse grassland on a gentle stony slope (Taylor, 1998). They are nocturnal and terrestrial, living in burrows or cracks in the soil (de Graaf, 1981). They appear to be cold adapted and remain inactive during the day in the thermally buffered microenvironment of their burrows (Downs & Perrin, 1995).

Food

Their diet includes insects, seeds and green vegetable matter.

Reproduction

Roberts (1951) stated that they breed throughout the year, but this remains to be confirmed under natural conditions (Skinner and Smithers, 1991).

Suitable habitat (cracks in soil) occurs in the sandy soils on the slopes of the rocky outcrops and low-lying rocky sheets for White-tailed mouse.

Ground Pangolins *Manis temminckii*

Figure9. Ground Pangolin is a rare solitary species which has been recorded from the Soutpansberg as well as Ben Lavin and several private game farms to the north of the Soutpansberg. (Photo taken in KNP).

Ground Pangolins *Manis temminckii* are uncommon throughout its known range, which extends from south of the Sahara to the east of Africa and to the northern parts of South Africa. Ground Pangolins are savanna species and don't occur in swamps, grassland, forests and desert. This species is Within this broad category, however, they are catholic in their habitat requirements, occurring in scrub in areas of low rainfall (250mm per year), as well as various types of savanna woodland, floodplain grassland, bushveld, rocky hills, and on sandveld with a much higher rainfall (up to 1 500mm per year). Pangolins move between many different burrow sites with a well-defined home range. In Limpopo Province the area of the home range was 1.3-7.9 km^2 (Skinner & Chimimba 2005).

The Ground Pangolin seems to favour areas with moderate temperatures not dropping below 0℃. The ground pangolin is a savanna species and does not occur in the swamps, grasslands, forest or desert. Within this broad category they are catholic in their habitat requirements, occurring in scrub in areas of low rainfall (250mm per year), and various types of savanna woodland, floodplain grassland, bushveld, rocky hills, and on sandveld with a much higher rainfall (up to 1 400mm per annum). Swart *et al.* (1999) have hypothesized that their absence from parts of southern Africa may be due to the effects of temperature on certain ant activity and the nest characteristics, especially *Anoplolepis custodiens* (primary food source), which escape the cold winter nights by hibernating deep below the soil surface (Skinner & Chimimba 2005).

This solitary species occurs in low numbers, and occupies large home ranges and move between different burrow sites. The Ground pangolin uses the burrow system of Aarvarks, Springhares and Warthogs. The males in the Sabi Sand nature reserve have home ranges of up to 2000ha whereas the female move in areas of 500ha. Their major threat seems to be the muti trade as there is a high demand for their scales. Only one young is born per year, seemingly in the drier months). They are also vulnerable to agricultural developments and seem to be susceptible to insecticides.

Freitag & Van Jaarsveld (1997) rank the Pangolin fourth in conservation priority in a list of 197 mammal species for the former Transvaal. The South African Red Data Book for Mammals (Smithers 1986) classifies the Pangolin as a Threatened species with a **Vulnerable** status, but was recently down-listed to Lower Risk, **Near-Threatened** (Skinner & Chimimba 2005). No pangolins have as yet survived in captivity, possibly due to their specialised diet. Therefore, breeding these animals in captivity and replacing them in the wild is not possible at this stage (Cohane & Gamacho 2002).There are records of Ground Pangolin from the Soutpansberg Conservancy as well as to the north of the Soutpansberg. It must be stressed that the Ground Pangolin is an extremely secretive and elusive species which may not be observed over extensive field surveys.

Brown Hyaenas

Brown Hyaenas are solitary foragers, but most of them live in groups that occupy fixed territories. Territory sizes vary from between 170 km^2 in seasons with more than 600mm of rainfall to more than 400km^2 when only 15.5mm of rain fell in the Central Kalahari. Skinner and Van Aarde (1987) estimated that in Gauteng the size of the home range occupied by an adult male was 18.83km^2, which varied monthly from 13.5 km^2 to 23.63 km^2. Brown Hyaenas are scavengers and spend little time and energy hunting prey. Brown Hyaenas forage alone, often over long distances of up to 50 km, but members of a group occupying the same home range scavenge communally. Brown Hyaenas can move up to 30km in 12 hours. The site offers limited suitable habitat for Brown Hyaenas due to extensive thicket formation and the dense closed woodland unit. Brown Hyaenas prefer rocky mountainous areas and open scrub and woodland habitats. Their diet includes a wide range of small mammals, birds, reptiles and insects. Brown Hyaenas have been recorded from the Soutpansberg Conservancy.

Cheetah

Figure10. Free roaming Cheetah occur within privately owned game farms to the north of the Soutpansberg to Vivo to the south of the Soutpansberg (pers. comm. Mr Vincent van der Merwe; Co-ordinator of EWT Cheetah Project). (Photo taken in KNP).

Cheetah are believed to favour open grassland plains but are equally at home in savanna woodland extending into arid areas. Avoids forest and woodland with thick undergrowth or tall grass cover, although they use this for shelter. Cheetah are independent on water. Free-roaming Cheetah occur to the north of the Soutpansberg to around Blouberg (Vivo) to the south of the Soutpansberg (pers. comm. Mr. V. van der Merwe). Cheetah may use the opened 55m servitude of the Tabor-Nzhelele transmission line for dispersal or exploratory movements as well as hunting activities.

Lion (*Panthera leo*)

Figure11. Lions have been introduced to several private game farms to the north of the Soutpansberg. (Photo taken in KNP).

Lions are able to exploit a wide range of habitats except rain forest and true desert. It can penetrate into arid areas along drainage lines, and can subsist without water for long periods without drinking. Where water is available they drink regularly, especially after feeding. The most important requirements are that their habitat should provide an ample supply of food in the form of medium-large-sized game animals, some shade in which to lie up during the heat of the day, and the barest of cover to facilitate the stalking of prey. Lions are incompatible with stock farming and human settlements (Skinner & Chimimba 2006). Lions have been introduced into several private game farms to the north of the Soutpansberg.

Figure12. Several precautionary signs were observed on the perimeter fences of the private game farms along the alternative alignment 1a; although they may just be a deterrent for trespassing or poaching activities.

African Wild Dog (*Lycaon pictus*)

Figure13. Wild Dogs (4) have recently (June 212) been recorded at Lajuma in the Soutpansberg. Photograph taken by consultant in KNP.

Wild Dogs are found in open grassland, open woodland and bushveld, and broken hilly areas. In Limpopo Province and Mpumalanga they are confined to the Kruger National Park and adjacent conservancies. African Wild Dogs have been introduced into the Madikwe National Park and the Venetia Private Reserve in Limpopo Province. There are occasional sightings of vagrants within the northern portions of Limpopo Province around the Mussina Nature Reserve as well as the western portions of the province (Thaba Thola) (pers. comm. Rubin Els). Four Wild Dogs were captured on a camera trap at Lajuma on the 13-06-2012.

White Rhinoceros (*Ceratotherium simum*)

Figure14. White Rhinoceros foraging on short grass within the southern KNP. Rhinoceros occur on several private game farms to the north of the Soutpansberg.

White Rhinoceros require areas flat or gently undulating areas of short grass, for which they have a marked preference, but including stands of medium-tall *Panicum maximum* found under trees and *Themeda triandra*; availability of water to drink and wallow and adequate bush cover. The most essential requirement for the White Rhinoceros are suitable areas free from the ever increasing poaching activities. These requirements are met in the open wooded bushveld areas to the north of the Soutpansberg in the private game farms.

Even though suitable habitat remains within Manavhela Ben Lavin Nature Reserve, the Soutpansberg Conservation area as well as the adjacent private game and hunting farms to the north of the Soutpansberg for the above-mentioned threatened mammal species, it is highly unlikely that the proposed 55m Tabor-Nzhelele servitude forms critical habitat for any threatened mammal species. The clearance of the open and closed woodland/bushveld vegetation will have a **medium-high** impact on the mammal species (mainly arboreal species) occurring within the proposed 55m servitude. The cleared 55m servitude may be utilised for foraging activities, dispersal movements as well as territorial boundaries for remaining mammal species.

MAMMAL RECOMMENDATIONS

- Prior to construction and vegetation clearance a walk through of the preferred alignment should be undertaken by a suitable qualified zoologist to provide site specific mitigatory measures as well as closely examine the proposed tower/pylon footprint areas for any animal burrows, logs, stumps etc. Smaller mammal species recorded in the vicinity of the tower positions can be relocated away from the construction area in suitable habitat.
- Trees including stumps; bark and holes in trees are vital habitats for numerous arboreal mammal species (Galagos, Woodland Doormouse and Tree Rat).
- The removal of indigenous tree species as well as vegetation clearance must be kept to the minimum area required (55m) and remain as close to existing powerline, road and railways servitudes wherever possible. This is especially pertinent for the crossing of the Soutpansberg Conservation area.
- All rules and regulations applying to the provincial and private game farms must be adhered to especially within the farms where dangerous mammal species occur.
- No hunting or poaching activities must be allowed along the servitude during the construction and operational phases of the Tabor-Nzhelele project. Severe fines should be implemented for any illegal poaching activities.
- Major rocky outcrops, large termitaria and animal burrow systems should be avoided.
- All mammals encountered during the vegetation clearance should be allowed to free movement away from the area without being trapped or harassed.

4.3 REPTILES

Reptile lists require intensive surveys conducted for several years. Reptiles are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons. A total of at least 116 reptile species have been recorded in the Soutpansberg. This biodiversity is remarkably high for such a small area and makes up 36% of the total number of reptile species that have been recorded in South Africa. This is roughly the same number of species (119) that occur in the Kruger National Park. The diversity is high compared to biodiversity hotspots of the world and the species diversity per unit area is higher than that of most of these hotspots. Most of the species (92 or 79%) are either catholic or occur in "savannah" or bushveld. Nine species (8%) are mainly restricted to grassland, nine (8%) are associated with forests and five (4%) occur in wetlands. Twelve species show a distinct preference for rocky outcrops (Gaigher 2003).

A total of at least 116 reptile species have been recorded in the Soutpansberg with 111 species found for the combined locus = 2229DB, 2229DC, 2229DD, 2329BB, 2329BD (http://sarca.adu.org.za accessed on the 18-01-2013). This biodiversity is remarkably high for such a small area and makes up 36% of the total number of reptile species that have been recorded in South Africa. This is roughly the same number of species (119) that occur in the Kruger National Park. The diversity is high compared to biodiversity hotspots of the world and the species diversity per unit area is higher than that of most of these hotspots. Most of the species (92 or 79%) are either catholic or occur in "savannah" or bushland. Nine species (8%) are mainly restricted to grassland, nine (8%) are associated with forests and five (4%) occur in wetlands. Twelve species show a distinct preference for rocky outcrops (Gaigher 2003).

Table3. Reptile species of conservation significance that have been recorded from the Soutpansberg Conservancy area (Gaigher 2003). Species in bold could possibly occur on the site due to the presence of suitable habitat.

Common Name	**Scientific Name**	**Conservation Status**
White-lipped snake	*Amblyodipsas micropthalmus nigra*	Near-endemic subspecies listed as 'Peripheral' (SA RDB Branch 1988)
Transvaal Quill-snouted Snake	*Xenocalamus transvaalensis*	Isolated population
Southern Brown Egg Eater	*Dasypeltis inornata*	Isolated Population
Lang's Round-Headed Worm Lizard	*Chirindia langi langi* and *C.l.occidentalis*	Near Endemic Subspecies
Slender Spade Snouted	*Monopeltis*	Isolated Population

Worm Lizard	*.sphenorhynchus sphenorhynchus*	
Cregoi's Blind Legless Skink	*Typhlosaurus lineatus subtaeniatus* and *T.l. richardi*	Endemic subspecies
Limpopo Dwarf Burrowing Skink	*Scelotes limpopoensis albiventris*	Near endemic subspecies. Occurrence in Soutpansberg Mountain to be verified.
Soutpansberg Rock Lizard	*Australolacerta rupicola*	Endemic species
Delalandes Sandveld Lizard	*Nucras lalandi*	Relict population (not restricted to the Mountain)
Van Dam's Girdled Lizard	*Smaug* (*Cordylus*) *vandami*	Isolated population
Soutpansberg Flat Lizard	*Platysaurus relictus*	Endemic species to the Soutpansberg. Listed as 'Restricted' (SA RDB Branch 1988)
Common Flat Lizard	*Platysaurus intermedius inopinus*	Near endemic subspecies
Transvaal Dwarf Chameleon	*Bradypodion* cf.sp. *transvaalensis*	Isolated Population. Revision of the group might show that it is a different species or subspecies
Kalahari Ground Gecko	*Colopus wahlbergii wahlbergii*	Isolated population
Muller's Velvet Gecko	*Homopholis mulleri*	Near Endemic
Spotted Dwarf Gecko	*Lycodactylus ocellatus soutpansbergensis*	Endemic subspecies
Black Spotted Dwarf Gecko/Cryptic Dwarf Gecko	*Lygodactylus nigropunctatus incognitus*	Endemic Subspecies

Figure15. A recently killed Boomslang was observed during the March 2012 site inspection on a secondary access road adjacent to Tabor-Nzhelele alternative 1 alignment to the north of the Soutpansberg.

The majority reptile species are sensitive to severe habitat alteration and fragmentation. The indiscriminate killing of all snake species as well as the illegal collecting of certain species for private and the commercial pet industry (Southern African Python) reduces reptile populations especially snake populations drastically. The frequent burning of the bushveld vegetation as well as fire breaks around afforested plantations will have a high impact on remaining reptiles. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as potential refuge areas increasing the predation risks.

The proposed alignments bisect krantzes, rocky hills or outcrops, extensive areas of rocky koppies, or gorges with rocky sides. Rock outcrops especially with large exposed bedrock and boulder scree provide favourable refuges for several snake and lizard species (rupicolous reptile species). Several large termitaria and smaller termite mounds were observed along the alignments. Termite mounds offer important refuges for numerous frog, lizard and snake species. Large number of species of mammal, birds, reptiles and amphibians feed on the emerging alates (winged termites). These mass emergences coincide with the first heavy summer rains and the emergence of the majority of herpetofauna. Moribund termite mounds also provide nesting site for numerous snakes, lizards (varanids) and frogs. Trees including stumps; bark and holes in trees are vital habitats for numerous arboreal reptiles (chameleons, snakes, tree agamas, geckos and monitors).

Reptile species recorded during the survey included Striped Skinks (*Trachylepis punctatissima*), Rainbow Skink (*Trachylepis margaritifer*) were observed on a small rocky outcrop to the north of the Tabor substation. Spotted Sand Lizard (*Pedioplanis lineoocellata*), Flap-necked Chameleon (*Chamaeleo dilepis*), Yellow-throated Plated Lizard (*Gerrhosaurus flavigularis*) as well as Southern Tree Agama *Acanthocercus atricollis* and Ground Agama *Agama aculeata.distanti* were observed within the open and closed woodland vegetation units along the alternative alignments. A Leopard Tortoise (*Stigmochelys pardalis*) was observed around Bandelierskop along the Tabor-Nzhelele alternative 2. Several Wahlberg's Snake-eyed Skinks (*Panaspis whalberghii*) were observed under logs and loosely embedded rocks within the closed woodland unit.

Road fatalities included Nile Monitor (*Varanus niloticus*), White-Throated Monitor (*Varanus albigularis*), Boomslang (*Dispholidus typus typus*) and Puff Adder (*Bitis arietans arietans*) were along the N1. A probable list of reptile species observed on the site as well as species likely to occur on the site using habitat as an indicator of presence; is presented in the Appendix A (see Table 9).

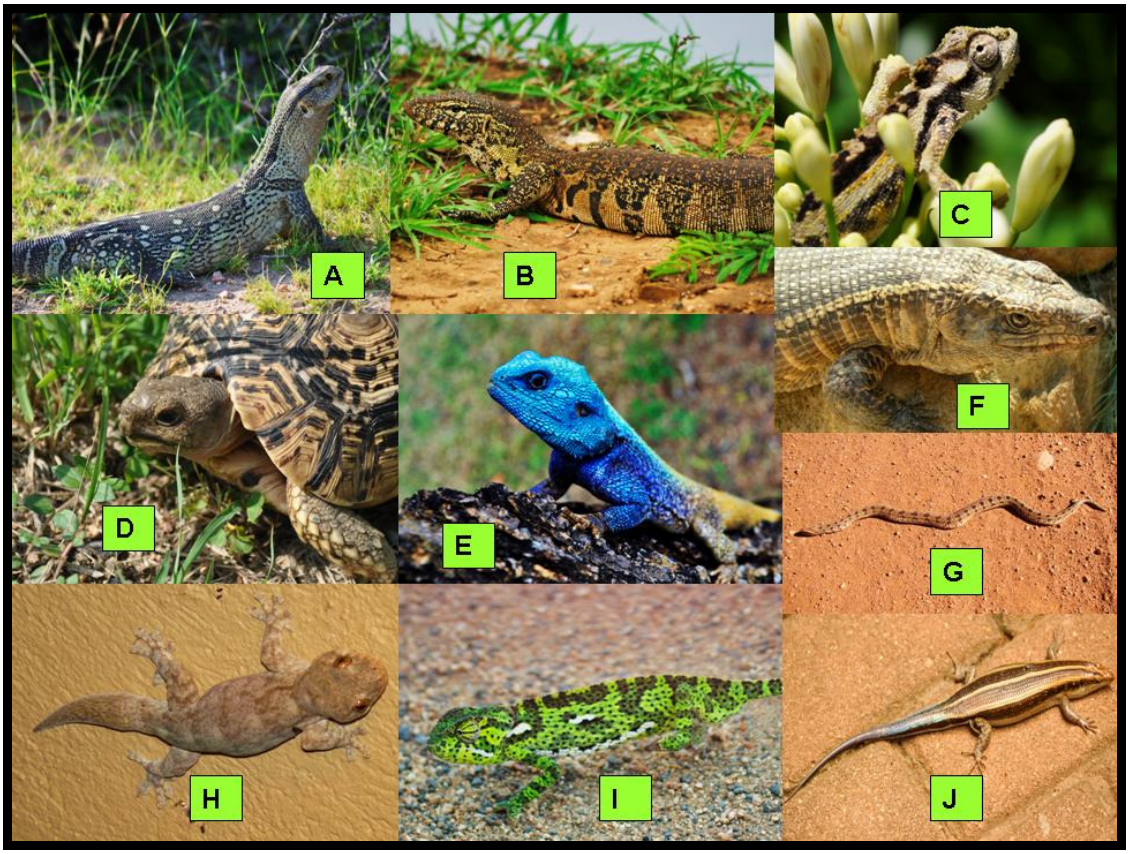

Figure16. A conglomerate of photographs displaying the reptile species observed within the Tabor-Nzhelele alignments. A: Rock or White-throated Monitor (*Varanus albigularis albigularis*), **B:** Nile Monitor (*Varanus niloticus*); **C:** Transvaal or Wolkberg Dwarf Chameleon (*Bradypodium transvaalense*); **D:** Leopard Tortoise (*Stigmochelys pardalis*); **E:** Southern Tree Agama (*Acanthocercus atricolis atricolis*), **F:** Giant Plated Lizard (*Gerrhosaurus validus*); **G:** Rhombic Night Adder (*Causus rhombeatus*); **H:** Wahlberg's Velvet Gecko (*Homopholis whalbergii*); **I:** Flap-necked Chameleon (*Chamaeleo dilepis dilepis*) and **J:** Five-lined or Rainbow Skink (*Trachylepis margaritifer*).

Table4. Reptile species of conservation importance likely to occur on or around the proposed Tabor-Nzhelele alignments.

COMMON NAME	SCIENTIFIC NAME	RED DATA STATUS (BRANCH 1988)	1996 IUCN GLOBAL LISTING
Southern African Python	*Python natalensis*	Vulnerable	Not Evaluated
Blunttailed Worm-lizard	*Dalaphia pistillum*	Peripheral	Not Evaluated
Black Whitelipped snake	*Amblyodipsas micropthalmus nigra*	Near-endemic subspecies listed as 'Restricted (SA RDB Branch 1988)	Not Evaluated
Muller's Velvet Gecko	*Homopholis mulleri*	Near Endemic listed as 'Restricted (SA RDB Branch 1988)	Lower Risk: Near Threatened
Soutpansberg Flat Lizard	*Platysaurus relictus*	Endemic species to the Soutpansberg. Listed as 'Restricted' (SA RDB Branch 1988)	Lower Risk: Near Threatened
Soutpansberg Rock Lizard	*Australolacerta rupicola*	Endemic species Listed as 'Restricted' (SA RDB Branch 1988)	Lower Risk: Near Threatened
Lang's Round Headed Worm Lizard	*Chirindia langi langi and C.l.occidentalis*	Near Endemic Subspecies Listed as 'Restricted' (SA RDB Branch 1988)	Not Evaluated

The previous Red Data book for reptiles (Branch 1988) is out dated due to the discovery of several new species, as well as the latest internationally accepted IUCN assessment criteria have not yet been applied to the region's reptiles. It is believed that many additional species are threatened, and there is a clear need to undertake new surveys to improve the information base from which assessments can be done (Harrison 2005). A recent (2005-2009) South African Reptile Conservation Assessment (SARCA) should improve the knowledge on the conservation status of our reptile species.

Southern African Python (*Python natalensis*)

Figure17. Southern African Pythons have been recorded throughout the Soutpansberg as well as Manhavela Ben Lavin Nature Reserve. Suitable habitat occurs to the north of the Soutpansberg for pythons, especially within the private game farms. The low-lying strands of the electrified perimeter fences may result in electrocution of pythons.

The Southern African Python (Python natalensis) is protected in South Africa (SA RDB, Vulnerable) and their numbers have declined due to habitat destruction, killed for their skins (fashion), 'muti', illegally collected for pets and the pet industry. It is unlikely that pythons will retain this threat classification when reassessed using the latest IUCN criteria, since it appears to be relatively common in certain areas and has a widespread distribution (Alexander and Marais 2007). It was not evaluated during the IUCN 1997 Global Listing.

The majority of pythons are indiscriminately killed due to fear and ignorance or due to road fatalities. Southern African Pythons have been recorded from the Manavhela Ben Lavin Nature Reserve throughout the Soutpansberg Conservation areas as well as within suitable habitat within the private game farms surrounding the alignments. Pythons live in a wide variety of habitats, but are most common in moist, rocky, well-wooded valleys. They are frequently found in and around water, in which they bask and ambush food. They are also excellent climbers. They hunt mainly at night or in the twilight, but can also be found basking, and occasionally even hunting during the day. The diet of juveniles consists mainly of small rodents and ground living birds, although they will also take fish and water or nile monitors (leguaans). The adults feed mainly on medium-sized mammals, including dassies, hares, cane rats, duikers, etc.

Blunttailed Worm-lizard (*Dalaphia pistillum*)

This is the largest local worm-lizard which with a broad, horizontal spade that is covered with a single horny shield. These worm-lizards are fossoarial and therefore are only observed during large scale earth moving operations, such as road constructions. The habitat requirements vary and include Kalahari Sand and coastal alluvium. They feed heavily on beetles and their larvae (Branch 1988). This species was not evaluated during the IUCN Global listing. A recent (2005-2009) South African Reptile Conservation Assessment (SARCA) should improve the knowledge on the conservation status of this species.

Black Whitelipped snake (*Amblyodipsas micropthalmus nigra*)

This is an uncommon small fossorial snake with a bluntish snout and a spiky tail tip. This species hides under stone in rocky areas preying on legless lizards (Branch 1988). Specimens were found under rock and road fatalities during the rainy season when they move on the surface at night (Branch 1988). This species was not evaluated during the IUCN 1997 Global assessment. A recent (2005-2009) South African Reptile Conservation Assessment (SARCA) should improve the knowledge on the conservation status of this species.

Muller's Velvet Gecko (*Homopholis mulleri*)

Figure18. A photograph of a museum specimen of Muller's Velvet Gecko (*Homopholis mulleri*).

A rare and poorly known species that probably resembles Whalberg's Velvet Gecko (*Homopholis wahlbergii*) in habits and behaviour; occurring in open and mixed mopane veld. It usually shelters under bark or in holes in Marula (*Sclerocarya birrea* subsp. *caffra*) and Knob-Thorn Acacia (*Acacia nigrescens*) and not likely to enter rock cracks as the cogener *Homopholis wahlbergii*. It is restricted to a small area between Soutpansberg and the Limpopo River (Branch 1988). This species is listed as a lower risk 'Near Threatened" (IUCN 1996). Several large Marula (*Sclerocarya birrea* subsp.

caffra) and Knob-Thorn Acacia (*Acacia nigrescens*).were observed within the private game farms to the north of the Soutpansberg. Due to severe time constraints as well as access restrictions; more intensive surveys are required in order to ascertain the current status of this species within the private game farms to the north of the Soutpansberg.

Soutpansberg Flat Lizard (*Australolacerta rupicola*)

Figure19. A male Soutpansberg Flat Lizard observed within the northern Soutpansberg.

This species is widespread along the Soutpansberg from Vivo eastwards to Entabeni including the southern and northern ranges of the Soutpansberg. It is an alert, flat rupicolous lizard occurring mainly in areas where there are large sheets of bedrock and numerous loose boulders and crevices within north-facing sandstone outcrops. They live in colonies with several males, females and juveniles in the same area. Males have a dark green back and limbs, with pale yellow-green marks on the head, a faint yellow-green stripe along the back-bone and numerous yellow-green spots. Suitable habitat occurs to the north of the Soutpansberg (Tabor-Nzhelele Alternative 1) as well as to the west of the Soutpansberg along the Tabor-Nzhelele alternative 4 alignment following the Sand River through the Sand River Gorge (pers. obs. helicopter fly-over). This species is listed as a lower risk 'Near Threatened" (IUCN 1996). More intensive surveys are required in order to ascertain the current status of this species within the alternative 4 alignment through the Sand River Gorge.

Even though suitable habitat remains within Manavhela Ben Lavin Nature Reserve, the Soutpansberg Conservation area as well as the adjacent private game and hunting farms to the north of the Soutpansberg for the above-mentioned threatened reptile species, it is highly unlikely that the proposed 55m Tabor-Nzhelele servitude forms critical habitat for any threatened reptile species. The clearance of the open and closed woodland/bushveld vegetation will have a **medium-high** impact on the reptile species (mainly arboreal species including Muller's Velvet Gecko) occurring within the proposed 55m servitude. The proposed alignment should avoid major rupicolous or rocky outcrops wherever possible.

REPTILE MANAGEMENT RECOMMENDATIONS

- Prior to construction activities a walk through of the preferred alignment; with special emphasis on any rocky outcrops in close proximity to the servitude as well as around the proposed tower positions; should be undertaken by a suitably qualified herpetologist in order to provide specific mitigatory measures for the construction phase of the project.
- Ideally the construction activities should take place during the dry winter months when the majority of reptile species are dormant.
- No rocky outcrops or termite mounds should be intentionally destroyed.
- Any reptiles rescued or recovered around the proposed tower positions should be relocated in suitable habitat away from the servitude
- Trees including stumps; bark and holes in trees are vital habitats for numerous arboreal reptiles (chameleons, snakes, agamas, geckos and monitors).
- The removal of indigenous tree species as well as vegetation clearance must be kept to the minimum area required (55m servitude).
- Cleared vegetation should form wood piles and logs and stumps. Dead or decaying wood piles should be created as these will provide valuable refuge areas especially due to the clearance of vegetation cover. Logs and stumps also provide important habitats for several reptile species as well as smaller mammals, amphibians, arachnids and scorpions. With time they will eventually be reduced to valuable compost by several animal species. Dead trees and stumps will also be used for nesting purposes by barbets, hoopoes, owls, hornbills as well as perching or hunting platforms for birds like the kingfisher.
- Any lizards, gecko's, agamids, monitors or snakes encountered should be allowed to escape to suitable habitat away from the disturbance. No reptile should be intentionally killed, caught or collected during any phase of the project.
- Several venomous snake species occur along the proposed alignments including Black Mamba, Horned Adder, Boomslang, Mozambique Spitting Cobra, Snouted Cobra, Snouted Night Adder, Common or Rhombic Night Adder and Puff Adder (*Bitis arietans*).
- General avoidance of snakes if the best policy if encountered. Snakes should not be intentionally harmed or killed and allowed free movement away from the area.
- Appropriate foot wear (sturdy leather boots) should be worn in the field.

4.2 AMPHIBIANS

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Amphibians have declined dramatically in many areas of the world. These declines seem to have worsened over the past 25 years and amphibians are now more threatened than either mammals or birds, though comparisons with other taxa are confounded by a shortage of reliable data. Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile fogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment. The Giant Bullfrog (Pyxicephalus adspersus) has been chosen as a flagship species for the grassland eco-region (Cook in le Roux 2002)

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in Limpopo Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. The general type of reproductive habitat chosen has a strong influence on the entire developmental strategy followed by many species. Most anuran larvae within Limpopo inhabit temporary habitats that range from small pools to larger artificial dams/pans situated in lower lying areas or depressions. Unpredictable temporal and spatial distributions and cyclic patterns of nutrient availability are common features of these habitats. Others develop in more complex permanent aquatic habitats as temporary invaders in established communities such as rivers, streams and the artificially created pans/dams. Numerous physical (e.g. distance from shore, oxygen concentration, substrate qualities, water depth and flow rate, site duration, and temperature) and biological (e.g. presence and distribution of vegetation, other tadpoles, other organisms including predators, and the phenology of all organisms) factors influence the spatial and temporal distribution of tadpoles among microhabitats.

As the survey was undertaken for only two days (no nocturnal surveys) during the late summer months (March) as well as on the 12th November prior to adequate rainfall only a few species of amphibians were active. No surface water was observed within any of the seasonally inundated depressions or non-perennial drainage lines along the alignments during the two assessments. Only a small shallow puddle of water was observed at the large seasonal Spies Dam constructed on a tributary of the Sand River; to the west of Makhado (immediately to the north of the Tabor-Nzhelele Alternative 4). Comprehensive herpetological surveys can only be undertaken throughout the duration of the wet season (November-March). It is only during this period that accurate frog species lists can be

compiled. During this survey; fieldwork was augmented with species lists compiled from personal records (1999-2012); data from the Thabazimbi area collected for the South African Frog Atlas Project (SAFAP) (1999-2003) and published data, and the list provided in the Appendix A (see Table 8) is therefore regarded as likely to be fairly comprehensive.

Figure20. A conglomerate of photographs of frog species likely to occur within the Tabor-Nzhelele alignments. **A:** Painted Reed Frog (*Hyperolius marmoratus taeniatus*), **B:** Boettger's Caco (*Cacosternum boettgeri*), **C:** Brown-Backed Tree Frog (*Leptopelis mossambicus*) juvenile colouration, **D:** Common River Frog (*Amietia angolensis*); **E:** Giant Bullfrog (Pyxicephalus adspersus), **F:** African Bullfrog (*Pyxicephalus edulis*), **G:** Banded Rubber Frog (*Phrynomantis bifasciatus*), **H:** Southern Foam Nest Frog (*Chiromantis xerampelina*), **I:** Bubblink Kassina (*Kassina senegalensis*), **J:** Russet-Backed Sand Frog (*Tomopterna marmorata*), **K:** Tremelo Sand Frog (*Tomopterna cryptotis*), **L:** Eastern Olive Toad (*Amietophrynus garmani*), **M:** Mottled Shovel-nosed Frog (*Hemisus marmoratus*), **N:** Bushveld Rain Frog (*Breviceps adspersus*), **O:** Dwarf Puddle Frog (*Phrynobatrchus mababiensis*) and **P:** Plain Grass Frog (*Ptychadena anchietae*).

HABITAT AVAILABLE FOR SENSITIVE OR ENDANGERED SPECIES

Figure21. The Giant Bullfrog (*Pyxicephalus adspersus*) has been recorded by the consultant at numerous localities between Polokwane and Mankweng to the south-east and towards Makhado to the north. Observations are usually of road fatalities of adult males migrating towards suitable breeding sites (seasonally inundated depressions/pans).

GIANT BULLFROG *(PYXICEPHALUS ADSPERSUS)*

Precipitation strongly influences Giant Bullfrog activity, distribution and dispersion patterns, reproductive cycles, and rates of growth and development. Many species including the Giant Bullfrog remain underground retreats (burrows) for the majority of the year except during the wet periods. Burrow depth varies according to the soil type with shallower burrows constructed in clayey soils (<300mm) and deeper burrows in sandier soils (up to 1000 mm). Heavy summer downpours result in adult migrations to suitable breeding habitat and the initiation of breeding events. Following some form of courtship, adults of oviparous species deposit eggs in or near the water. Giant Bullfrogs prefer shallow seasonally inundated grass and sedge dominated pans for breeding. Large numbers of eggs are deposited to ensure survival of certain tadpoles. The eggs and tadpoles are adapted to theses ephemeral habitats and develop rapidly. The tadpoles are major consumers in aquatic environments. After a period of growth, the tadpoles undergo metamorphosis and move back to the terrestrial environment where they feed and continue to grow. When mature, they return to their specific aquatic environment or habitat to breed, completing the biphasic, complex life cycle.

The Giant Bullfrog was previously assigned as a regionally near-threatened species (Miter et al. 2004) but has been downgraded to Least-Concern on a global basis (Measey 2011). Giant Bullfrogs have been recorded from Polokwane-Makhado during previous surveys as well as during the South African Frog Atlas Project (SAFAP). Specimens recorded were of road fatalities, migrating adult males as well as several breeding localities. A large breeding population occurs at the Makhado (Louis Trichardt) Airforce base to the west of the Alternative 2 alignment. Juvenile Giant Bullfrogs (*Pyxicephalus adspersus*) are difficult to distinguish between African Bullfrog (*Pyxicephalus edulis*). The two species are sympatric to the north of Polokwane between Vivo and Makhado.

NORTHERN FOREST RAIN FROG (*BREVICEPS SYLVESTRIS*)

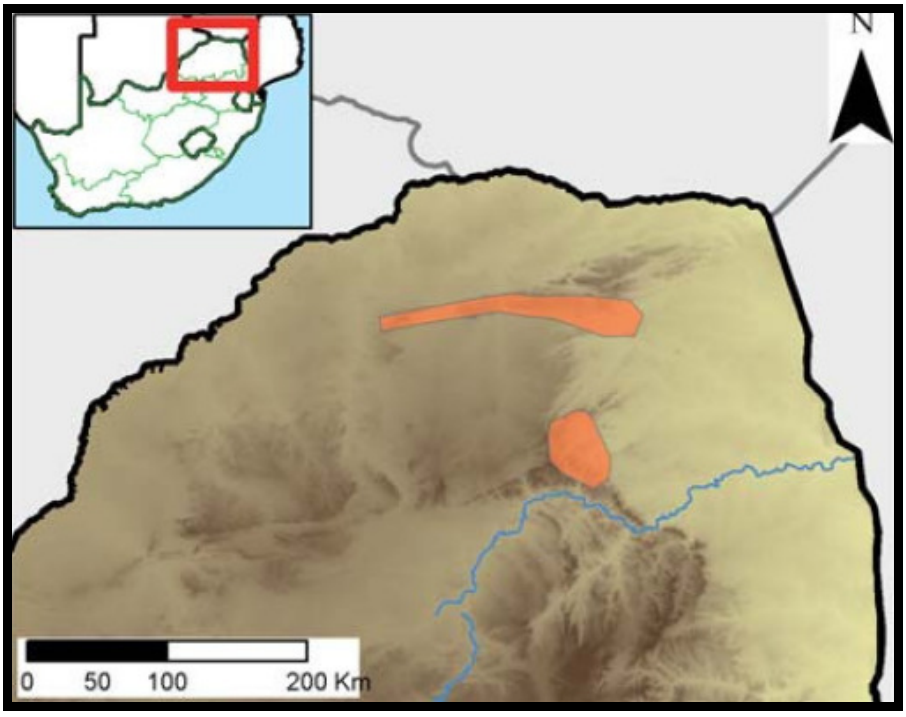

Figure22. The Northern Forest Rain Frog (*Breviceps adspersus*) has a small area of occupation which has been heavily impacted upon by the sivivulture, agricultural and urban sprawl (Measey *et al.* 2011). The proposed Tabor-Nzhelele alternative 1 as well as alternative 4 bisects small fragmented patches of Northern Mistbelt Forest (FOz 4); which offers suitable habitat for the Northern Rain Frog (*Breviceps sylvestris*).

Breviceps sylvestris is endemic to Limpopo Province, where it occurs on the slopes and crest of the Blouberg, Soutpansberg, Wolkberg and Drakensberg ranges. It is locally abundant but its distribution is restricted to isolated fragments of its natural habitat that have not been subjected to afforestation or other forms of agricultures. The breeding and non-breeding habitat is Afromontane Forest. In the breeding season, males call from closed canopy forest, the forest fringe and adjacent open grassland in mountainous terrain. Calling males have also been encountered in disturbed habitats such as wooded parks and gardens, and in pine plantations on the fringe of indigenous forest (Minter 1998). *Breviceps sylvestris* conservation status has been revised and is included as a Red Data Species under the category 'Vulnerable' based on the species severely fragmented and restricted distribution (Minter *et al.* 2006). It's status has been recently revised and is currently listed as 'Endangered' (Measey *et al.* 2011) as its distribution or area of occupation (AOO) is estimated at 101 km^2, and it is considered to have a severely fragmented distribution, and there is a continuing decline in the extent and quality of its habitat.They have been recorded from Hanglip and Entabeni State Forests. Several males were calling all around the afforested plantations, forest fringes, open grassland, cleared plantations and residential gardens within the Soutpansberg.

The proposed Tabor-Nzhelele alternative 1 as well as alternative 4 bisects small fragmented patches of Northern Mistbelt Forest (FOz 4); which offers suitable habitat for the Northern Rain Frog (*Breviceps sylvestris*).

AMPHIBIAN MANAGEMENT RECOMMENDATIONS

- Prior to construction and vegetation clearance a walk through of the preferred alignment should be undertaken by a suitable qualified herpetologist to provide site specific mitigatory measures as well as closely examine the proposed tower/pylon footprint areas for any burrows, logs, stumps etc. Frog species recorded in the vicinity of the tower positions can be relocated away from the construction area in suitable habitat.
- Ideally the construction activities should be undertaken during the dry winter months (May-September) when the majority of amphibian species are dormant.
- Construction activities of the pipeline should be restricted to daylight hours reducing the potential impact on the nocturnal breeding activities of the majority of amphibian species.
- No Giant Bullfrogs must be collected for food or illegal pet trade.
- As a precautionary mitigation measure it is recommended that the construction contractor as well as an independent environmental control officer (ECO) should be made aware of the possible presence of certain threatened amphibian species (Giant Bullfrog, Northern Forest Rain Frog) prior to the commencement of the construction activities. Any Giant Bullfrogs or Northern Rain Frogs unearthed should ideally be relocated away from the construction activities. The frog should be re-buried approximately 20cm in soft moist sand.

5. SENSITIVE ENVIRONMENTS/HABITATS ON AND SURROUNDING THE ALIGNMENT

5.1 Soutpansberg Conservation Area and Rupicolous Outcrops

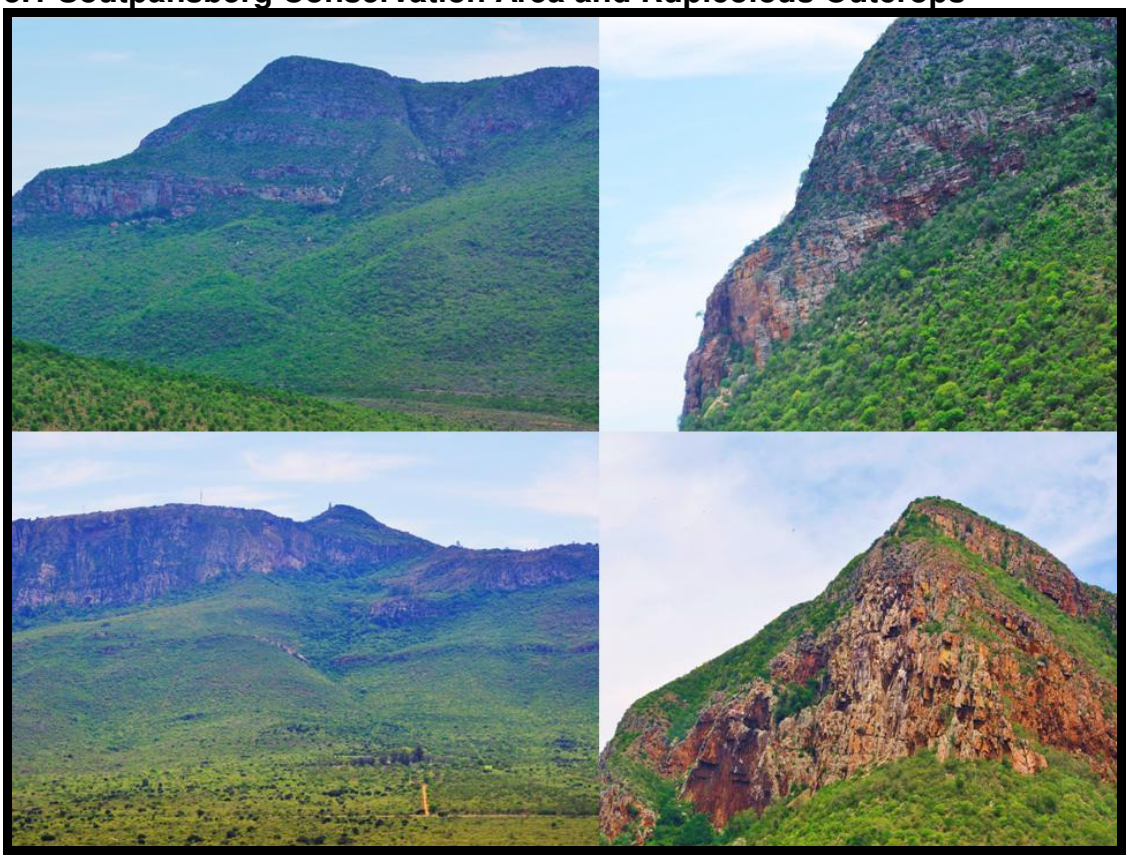

Figure23. A collage of photographs of the Soutpansberg characterised by ridges with high spatial heterogeneity as well as endemicity. The Soutpansberg provides important habitat to several faunal species including several endemic reptile species.

The entire Soutpansberg Conservation area must be considered as a sensitive habitat which provides important habitat for several amphibian, reptile and mammal species. Ridges are characterized by high spatial heterogeneity due to the range of differing aspects (north, south, east, west and variations thereof), slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions. The temperature and humidity regimes of microsites vary on both a seasonal and daily basis (Samways & Hatton, 2000). Moist cool aspects are more conducive to leaching of nutrients than warmer drier slopes (Lowrey & Wright, 1987). Variation in aspect, soil drainage (Burnett *et al.*, 1998) and elevation/altitude (Primack, 1995) have been found to be especially important predictors of biodiversity. It follows that ridges will be characterized by a particularly high biodiversity, as such their protection will contribute significantly to the conservation of biodiversity in the area as well as the rest of Limpopo Province.

For example, a wide variety of bird groups utilize ridges, koppies and hills for feeding, roosting and breeding. These groups include some owls, falcons, nightjars, swifts, swallows, martins, larks, chats, thrushes, cisticolas, pipits, shrikes, starlings, sunbirds, firefinches, waxbills, buntings, canaries, eagles and vultures.

Ridges provide important habitat for sensitive species such as bats (roosting sites) and the eastern rock elephant shrew. Ridges and kloofs also form caves, an important habitat for highly specialized animals, e.g. bats. Variable microclimate conditions have resulted in a vast array of invertebrate communities associated with the high plant diversity characterizing ridges. Hills and koppies generally have more insects (both in terms of individuals and species) than the immediate surroundings (Samways & Hatton, 2000).

Figure24. Limpopo Ridge Bushveld occurs to the north of the Soutpansberg and to the east of the Sand River. These rocky hills and ridges provide important habitat for several rupicolous faunal species, especially reptiles.

Rupicolous outcrops in the Soutpansberg including large sheets of bedrock and numerous loose boulders and crevices within north-facing sandstone outcrops provides important habitat for the Soutpansberg Flat Lizard which is listed as a lower risk 'Near Threatened'. All Limpopo Ridge Bushveld including rocky ridges and hills as well as major rocky outcrops must be considered as a sensitive habitat with unique vegetation as well as fauna (rupicolous species).

5.2 NORTHERN MISTBELT FOREST

Figure25. Small fragmented patches of Northern Mistbelt Forest are bisected by the Tabor-Nzhelele 1 and 4 alignments. Photograph taken in Lekgalameetse Nature Reserve.

The small fragmented patches of Northern Mistbelt Forest which the Tabor-Nzehelele Alternative 1 and 4 alignments bisect must be considered as a sensitive habitat. Although this vegetation type is considered as 'Least Threatened" it provides important habitat for several faunal species; including the red listed 'Endangered" Northern Forest Rain Frog (*Breviceps sylvestris*) (Measey *et al.* 2011) as well as the endemic Wolkberg Dwarf Chameleon (*Bradypodium transvaalense*).

5.3 NATURAL OPEN BUSHVELD

Figure26. All natural open bushveld must be considered as sensitive as it provides suitable habitat for several red listed faunal species. Several Kudu were observed along the alternative alignments.

All remaining large open bushveld areas including (Makhado Sweet Bushveld and Musina Mopane Bushveld) situated within the private as well as provincial nature reserves, game and hunting farms must be considered as a sensitive environment with any activities carefully managed. These large open areas provide suitable habitat for several faunal species including red listed species such as the Ground Pangolin, White Rhinoceros, Lion, Cheetah and African Wild Dog. The protected Marula (*Sclerocarya birrea* subsp. *caffra*) as well as Knob Thorn (*Acacia nigrescens*) occurring to the north of the Soutpansberg provides suitable habitat for the red listed 'Near Threatened) Mullers' Velvet Gecko ((*Homopholis mulleri*).

5.3 RIVERS/WATERCOURSES OR NON-PERENNIAL DRAINAGE LINES WITH ASSOCIATED RIPARIAN ZONE

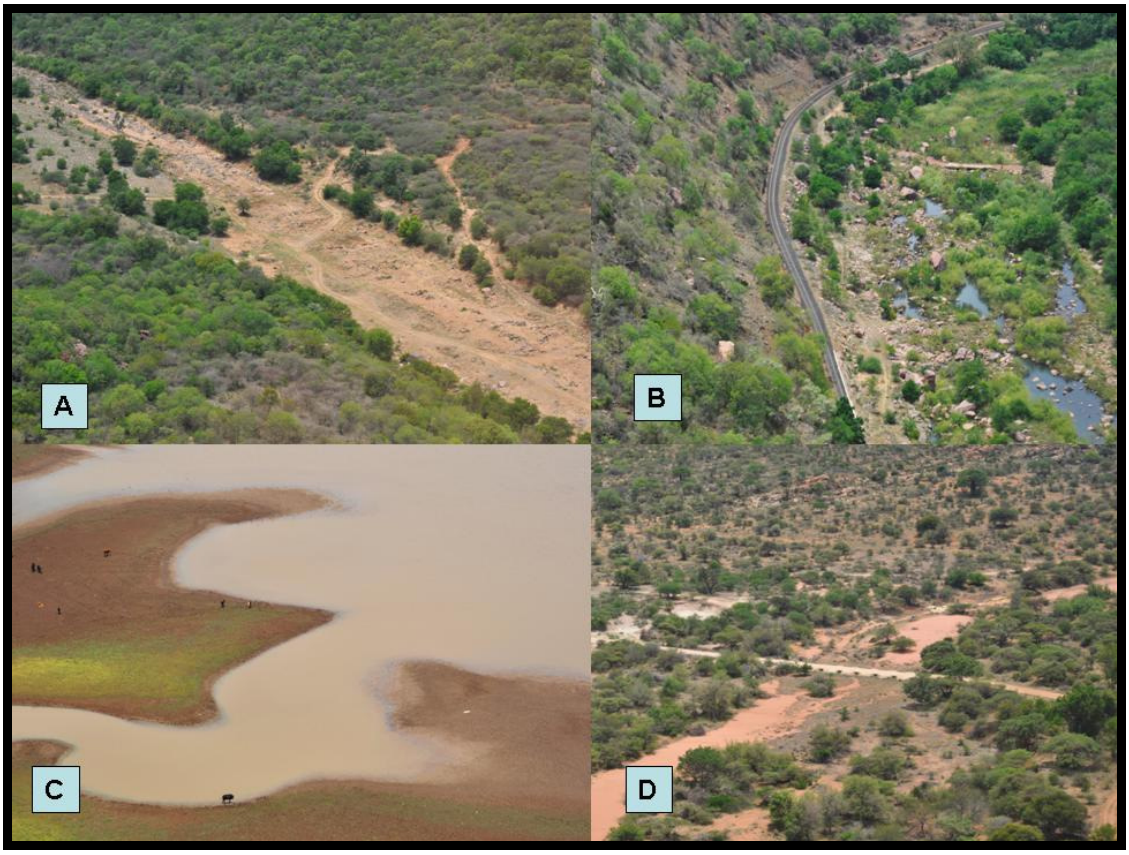

Figure27. A conglomerate of photographs displaying the dominant rivers. A & B: The non-perennial Sand River flows through the Sand River Gorge through the western Soutpansberg. The alternative alignment 4 follows the Sand River and an existing railway line through the Sand River Gorge**. C:** The Spies Dam is situated on a tributary of the Sand River to the west of Makhado and immediately to the north of Tabor-Nzhelele Alternative 4 alignment. The dam contained extremely low water levels during the site visitation in November 2012. **D:** The non-perennial Mutamba River is bisected by the alternative alignment 1 to the north of the Soutpansberg.

- Rivers and streams/drainage lines are longitudinal systems with impacts affecting both upstream and downstream habitat. The entire seasonally inundated or non-perennial drainage lines and their associated indigenous dominated riparian vegetation must be considered as sensitive habitats. Any impact on the riverine area within the study area is therefore also likely to impact on upstream and downstream areas.
- Riparian zones have the capacity to act as biological corridors connecting areas of suitable habitat in birds (Whitaker & Metevecchi, 1997), mammals (Cockle & Richardson 2003) reptiles and amphibians (Maritz & Alexander 2007). Riparian zones may act as potential refugia for certain fauna and could allow for possible recolonisation of rehabilitated habitats. The riparian vegetation plays a vital role in the re-colonisation of aquatic macro-invertebrates as well as reptiles and amphibians

(Maritz & Alexander 2007). The riparian vegetation provides vital refuge, foraging and migratory passages for species migrating to and away from the rivers. The riparian zone comprises plant communities contiguous to and affected by surface and subsurface hydrological features of perennial or intermittent water bodies (rivers and streams).

- The riparian vegetation is dependant on the river for a number of functions including growth, temperature control, seed dispersal, germination and nutrient enrichment. Riparian vegetation comprises a distinct composition of species, often different from that of the surrounding terrestrial vegetation. Tree species are positioned according to their dependence or affinity for water, with the more mesic species (water-loving) being located closest to the river channel, often with their roots in the water, and the less water-loving terrestrial species further away from the river.

The riparian zone, of which vegetation is a major component, has a number of important functions including:

- enhancing water quality in the river by the interception and breakdown of pollutants;
- interception and deposition of nutrients and sediments;
- stabilisation of riverbanks and macro-channel floor;
- flood attenuation;
- provision of habitat and migration routes for fauna and flora;
- provision of fuels, building materials and medicines for communities (if done on a sustainable basis); and
- recreational areas (fishing - rod and line not shade or gill nets; bird watching; picnic areas etc.).

All rivers including the Sand River, Doring River and Mutamba Rives as well as several smaller non-perennial drainage lines must be considered as a sensitive habitats due to ecological functioning as well as providing suitable habitat as well as biological or dispersal corridors for remaining faunal species.

5.4 SEASONALLY INUNDATED PANS/DEPRESSIONS

Figure28. Several seasonally inundated pans/depressions occur adjacent to the proposed alternative alignments. The Tabor-Nzhelele alternative 1a and 2 bisect small seasonally inundated depressions. A small seasonally inundated depression occurs within the proposed extension of the Nzhelele substation yard area.

Seasonal wetlands in the form of seasonally inundated pans or depressions comprises habitats which are restricted in extent, highly productive and which contains a high diversity of plants and animals, many of which are restricted or heavily dependant on such habitats. The seasonally inundated pans or depressions comprise the most important habitat, within the proposed alignments, for certain threatened species, e.g.: Giant Bullfrog. These shallow hydrophilic sedge and grass zones are vital breeding and nesting areas for numerous animal species, including the 'Near Threatened' Giant Bullfrog (*Pyxicephalus adspersus*) (Minter *et. al.* 2004). All seasonal pans with their associated vegetation are extremely sensitive to further negative impacts and must be considered sensitive habitats.

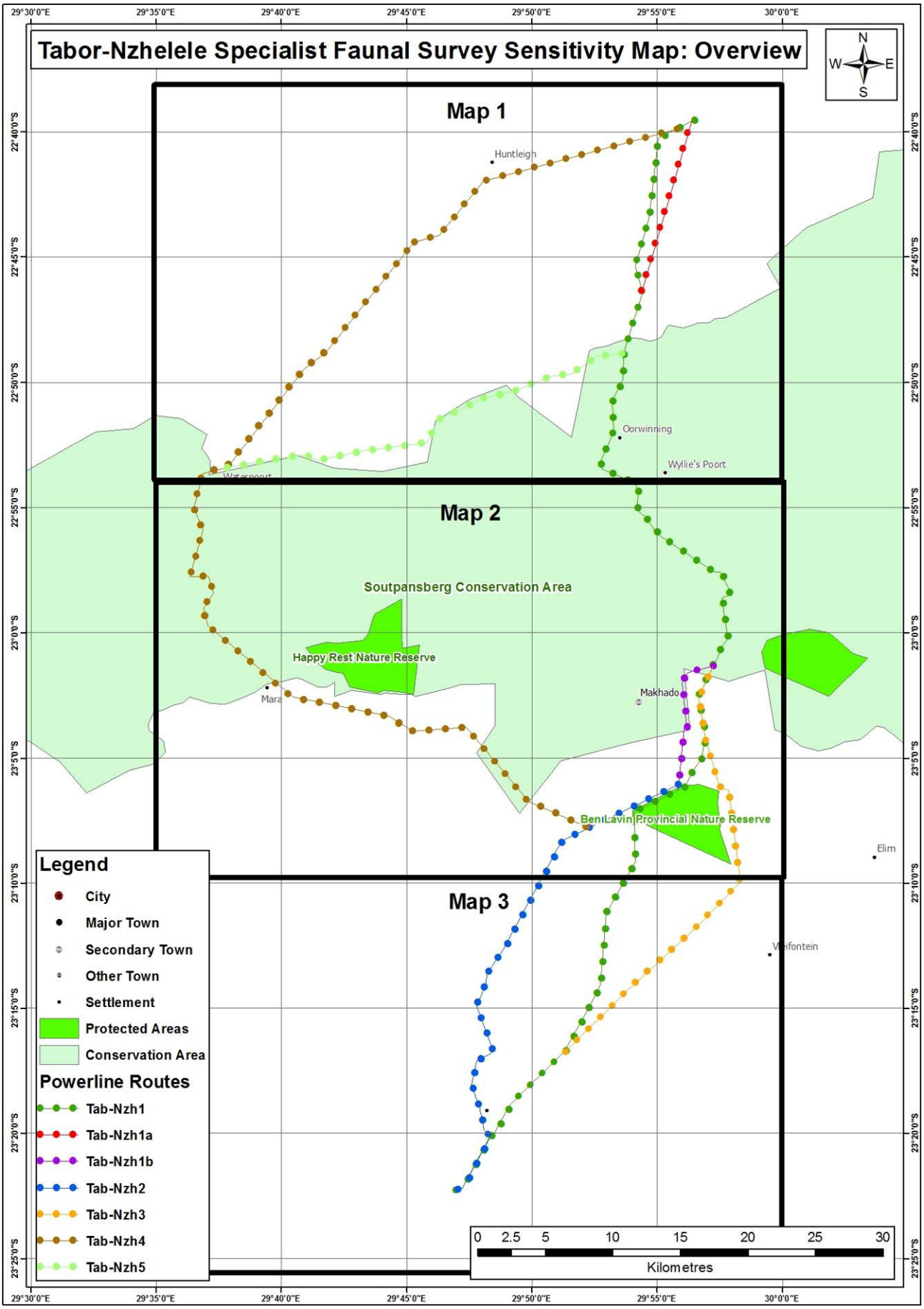

Figure29. Overview of the Tabor-Nzhelele faunal sensitivity map.

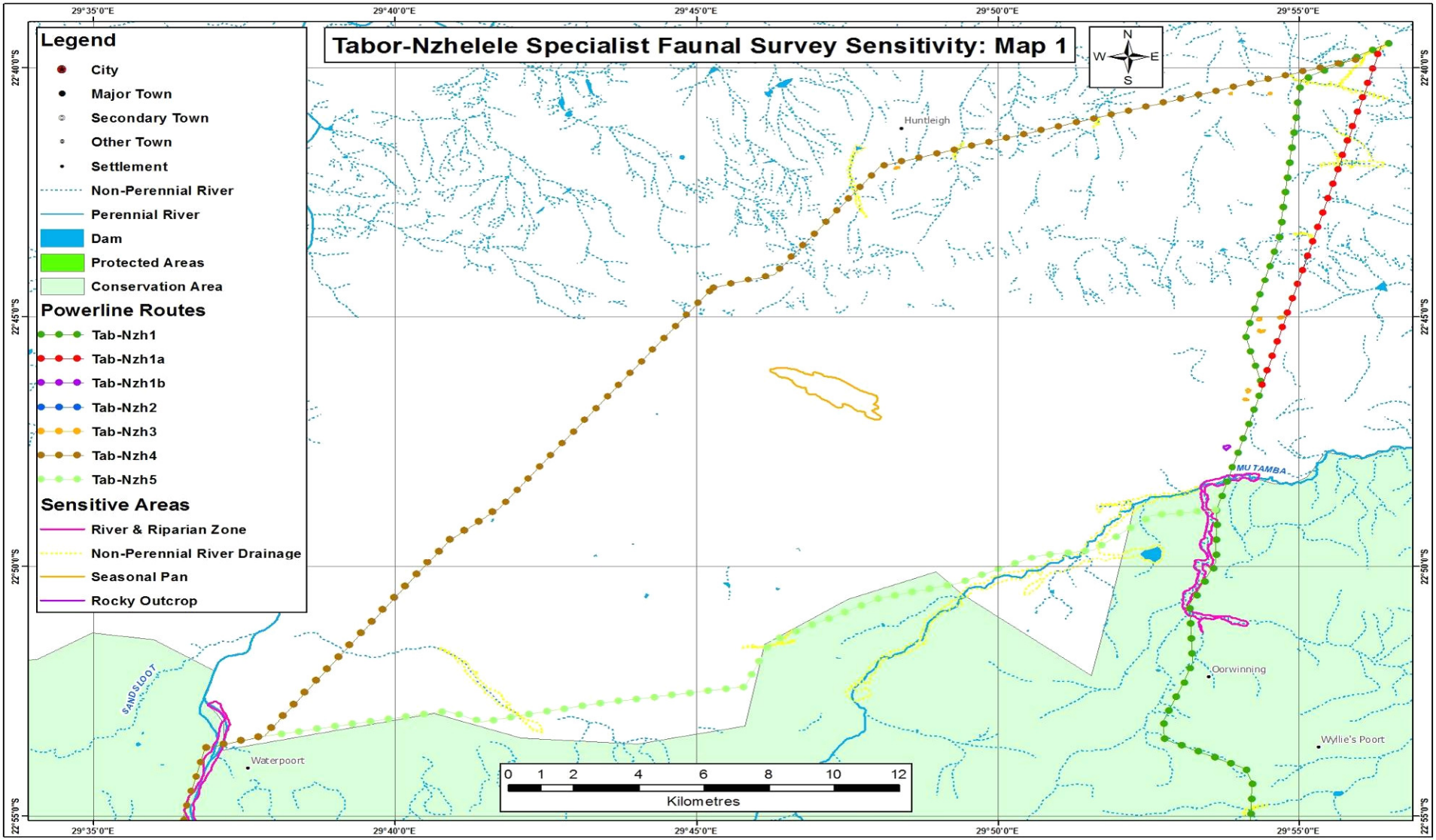

Figure30. The northern section of the Tabor-Nzhelele faunal sensitivity map

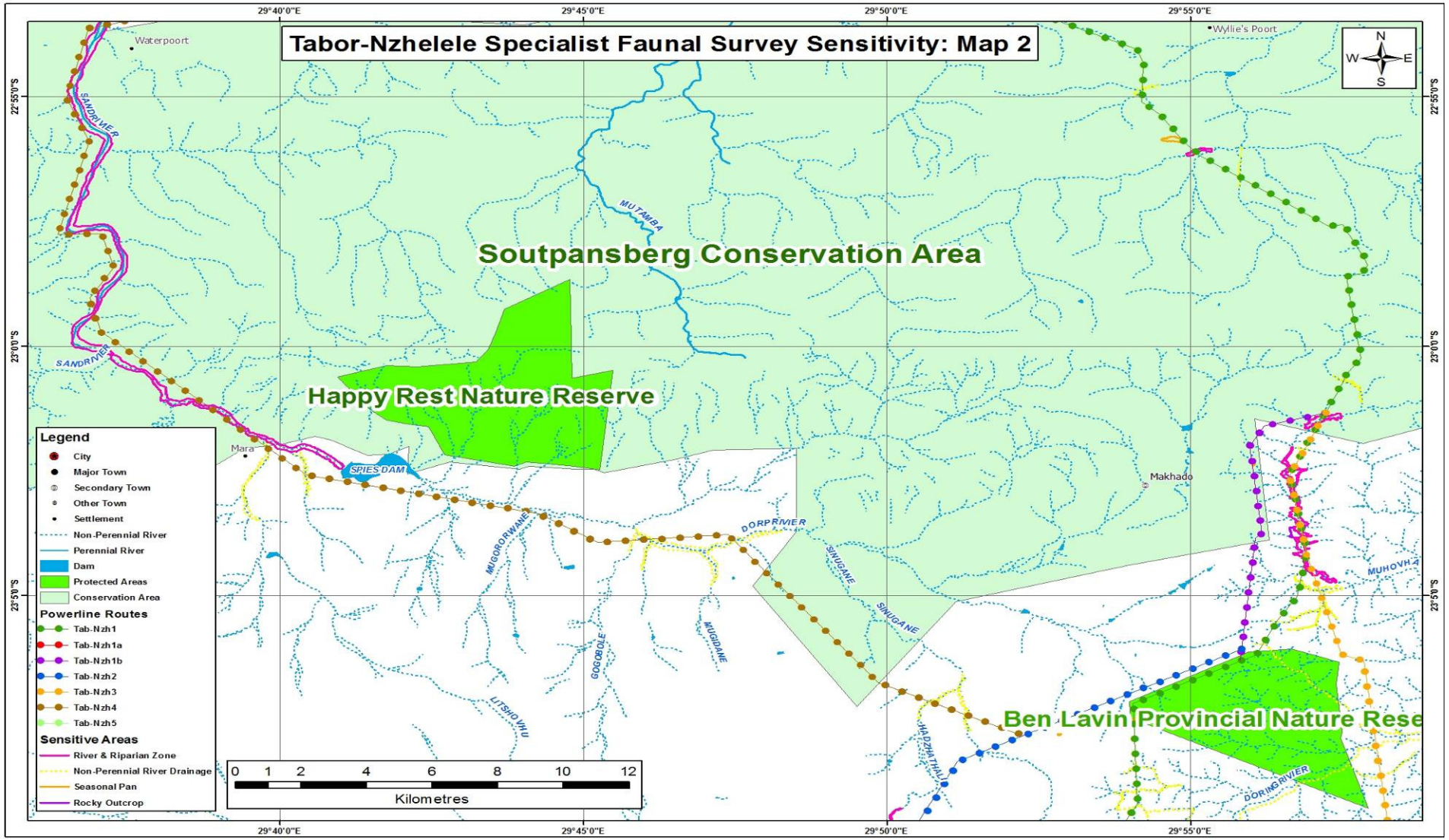

Figure31. The central section of the Tabor-Nzhelele faunal sensitivity map

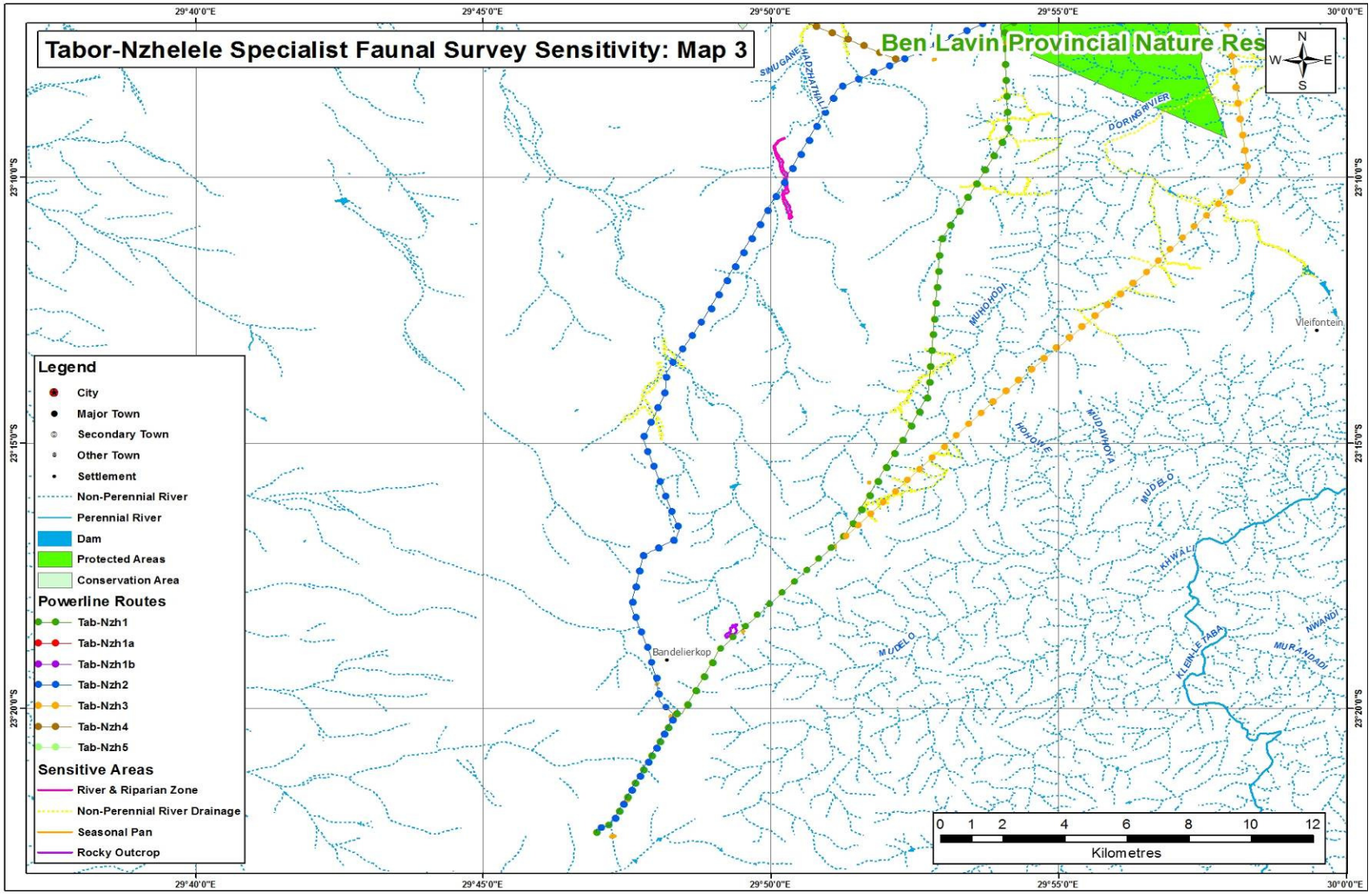

Figure32. The central section of the Tabor-Nzhelele faunal sensitivity map

6. RANKING OF TABOR-NZHELELE ALTERNATIVE ALIGNEMNTS

In order to identify which of the alternative routes is deemed preferred the specialists were requested to rank the alternatives routes according to a route ranking methodology.

The evaluation and nomination of a preferred route involves a highly interdisciplinary approach. The approach undertaken has involved a number of specialist studies which examine a number of different issues. In order to evaluate routes and determine a preferred route, the studies need to be comparative and therefore a route rating matrix was developed. The site preference rating system is applied to each discipline, and the rating of each site was conducted according to the following system:

1 = Not suitable for development / No-Go (impact of very high significance - negative)
2 = not preferred (impact of high significance - negative)
3 = acceptable (impact of moderate significance - negative)
4 = Preferred (impact of low or negligible significance - negative)

Table 5: Faunal Specialist Criteria for Route Preference Ratings

Site preference Rating	Criteria
Fauna	
Preferred (4)	**Low**: A totally degraded and transformed area with a low habitat diversity and ecosystem functioning; no viable populations of natural plants and the faunal composition has already been altered. Development could be supported with low impact on the natural vegetation and associated fauna.
Acceptable (3)	**Medium**: Areas with relatively natural vegetation, though a common vegetation type. Could be developed with mitigation and expected medium impact on ecosystem as well as associated fauna.
Not Preferred (2)	**Medium-High**: Areas with high species richness and habitat diversity comprising natural faunal species. These areas are ecologically valuable and important for ecosystem functioning. An area with a relatively natural faunal species composition; not a highly threatened or unique ecosystem; extremely high faunal species and habitat diversity. Development could be considered under exceptional conditions with medium-high impact on the fauna as well as vegetation / ecosystem.
No-Go (1)	**No-Go:** Areas of atypical habitat, conservation areas, riparian and wetland habitats, rocky ridges and hills with the known presence of faunal species of conservation concern (Red Data Species), not regarded suitable for proposed development, expected impacts likely to be unacceptable on a local or regional scale, adverse impact on the fauna and not possible to mitigate

Table6: Final Site Ranking Matrix

Study	Alt 1	Alt 1a	Alt 1b	Alt 2	Alt3	Alt 4	Alt 5
Fauna	**3**	**3**	**4**	**4**	**3**	**2**	**3**

The preferred alignments from a faunal perspective include the Alternative 2 alignment from the Tabor Substation as it follows an exiting railway line reserve as well as the N1. Alternative 1b if the preferred alignment towards Makhado and the Soutpansberg as it is mainly situated within transformed habitats as well as not bisecting the Manavhela Ben Lavin provincial nature reserve. There are only two alternative alignments over the Soutpansberg Conservation area. Alternative 4 to the west of Makhado follows an existing railway line as well as the Sand River through the Sand River Gorge. This is not the preferred alignments due to the sensitivity of the adjacent environment. The preferred alignment is Alternative 1 immediately to the east of the N1 and Makhado as sections of the alignment are situated within transformed and degraded vegetation units. Ideally the alternative 1 alignment should be realigned to avoid the small patch of Northern Mistbelt Forest as this provides suitable habitat for several threatened faunal species including the “Endangered” Northern Forest Rain Frog (*Breviceps sylvestris*). The alternative 1 alignment follows an existing Powerline servitude through the Soutpansberg Conservation area. The preferred alignment to the north of the Soutpansberg towards the Nzhelele substation is the Alternative 1 alignment. Alternative 1a is not preferred as Alternative 1 is situated in close proximity to the N1 and the cleared servitude could potentially be utilised for a fire-break.

The Significance Rating Scales

Tables indicating the significance rating of all five alternative alignments are presented in Appendix B.

Issues are assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected and how it will be affected;
- The physical **extent**, wherein it is indicated whether:
  - 1 - the impact will be limited to the site;
  - 2 - the impact will be limited to the local area;
  - 3 - the impact will be limited to the region;
  - 4 - the impact will be national; or
  - 5 - the impact will be international;
- The **duration**, wherein it is indicated whether the lifetime of the impact will be:
  - 1 - of a very short duration (0–1 years);
  - 2 - of a short duration (2-5 years);
  - 3 - medium-term (5–15 years);
  - 4 - long term (> 15 years); or
  - 5 - permanent;

- The **magnitude of impact on ecological processes**, quantified on a scale from 0-10, where a score is assigned:
  - 0 - small and will have no effect on the environment;
  - 2 - minor and will not result in an impact on processes;
  - 4 - low and will cause a slight impact on processes;
  - 6 - moderate and will result in processes continuing but in a modified way;
  - 8 - high (processes are altered to the extent that they temporarily cease); or
  - 10 - very high and results in complete destruction of patterns and permanent cessation of processes;
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:
  - 1 - very improbable (probably will not happen;
  - 2 - improbable (some possibility, but low likelihood);
  - 3 - probable (distinct possibility);
  - 4 - highly probable (most likely); or
  - 5 - definite (impact will occur regardless of any prevention measures);

- the **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- the **status**, which is described as either positive, negative or neutral;
- the degree to which the impact can be reversed;
- the degree to which the impact may cause irreplaceable loss of resources; and
- the *degree* to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:
S = (E+D+M)*P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **31-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

Table7. Summary table of potential impacts of the proposed Tabor-Nzhelele 400kV transmission line throughout all stages of the project.

Construction Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**		High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**		High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.							

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**		High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting with the lines should be removed. The vegetation including smaller tree, shrub, forb and grass species occurring within the 55m servitude should not be totally removed and will providing refuge habitat for remaining faunal species (especially arboreal species)							Medium-Low
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.							High
Direct Impact on associated fauna and teractions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**		Medium
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.							High

Decommissioning Phase								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**	**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact						
	with	1	1	2	5	**20**	**Low**		High
	without	2	1	4	5	**35**	**Medium**		High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.						Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.						High

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	6	5	**55**	**Medium**		High
	without	2	4	8	5	**70**	**High**		High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude. A walk down of the preferred alignment by a suitably qualified zoologist in order to provide site specific mitigatory measures for the preferred alignment as well as proposed tower/pylon positions.							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**		High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mist belt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros.							High

No-Go Alternative									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
No impact on the associated fauna and the status quo of the environment remains the same	**Nature of impact:**								
	with								
	without								
	degree to which impact can be reversed:								
	degree of impact on irreplaceable resources:								

7. DESCRIPTION OF POTENTIAL IMPACTS OF TABOR-NZHELE 400kV TRANSMISSION LINE ON ASSOCIATED FAUNA

The proposed 400kV Tabor to Nzhelele transmission alignments bisect several sensitive environments including the Manavhela Ben Lavin Nature Reserve, the Soutpansberg Conservation area, rivers (Sand, Doring and Mutmaba) as well as several non-perennial drainage lines, seasonally inundated pans as well as large open bushveld areas especially to the north of the Soutpansberg in several private game and hunting farms.

The preferred alignments from a faunal perspective include the Alternative 2 alignment from the Tabor Substation as it follows an exiting railway line reserve as well as the N1. Alternative 1b is the preferred alignment towards Makhado and the Soutpansberg as it is mainly situated within transformed habitats as well as not bisecting the Manavhela Ben Lavin provincial nature reserve. There are only two alternative alignments over the Soutpansberg Conservation area. Alternative 4 to the west of Makhado follows an existing railway line as well as the Sand River through the Sand River Gorge. This is not the preferred alignments due to the sensitivity of the adjacent environment. The preferred alignment is Alternative 1 immediately to the east of the N1 and Makhado as sections of the alignment are situated within transformed and degraded vegetation units. Ideally the alternative 1 alignment should be realigned to avoid the small patch of Northern Mistbelt Forest as this provides suitable habitat for several threatened faunal species including the “Endangered” Northern Forest Rain Frog (*Breviceps sylvestris*). The alternative 1 alignment follows an existing Powerline servitude through the Soutpansberg Conservation area. The preferred alignment to the north of the Soutpansberg towards the Nzhelele substation is the Alternative 1 alignment. Alternative 1a is not preferred as Alternative 1 is situated in close proximity to the N1 and the cleared servitude could potentially be utilised for a fire-break.

The construction of the proposed Tabor-Nzhelele 400kV Transmission line will most-likely result in limited (55m) opening-up of the vegetal cover during the construction phase. The opening up of existing vegetated areas, thereby creating corridors along which animals can move, may result in increased predation levels on small mammals, reptiles, amphibians, arachnids and scorpions along these corridors. The limitation of the disturbance of vegetation cover as well as rocky outcrops, logs, stumps, termite mounds within sensitive areas will ameliorate this impact. Impact will be short-long term depending on the amount of vegetation to be cleared. Excessive habitat destruction during construction could reduce the amount of habitat available. This impact is anticipated to be localised, of a long-term nature and of medium significance, provided that appropriate mitigation measures are implemented (e.g. the limitation of vegetation clearance within

sensitive areas).

Prior to construction and vegetation clearance a suitably qualified zoologist (herpetologist) should conduct a walk down of the preferred alignment and closely examine the proposed tower/pylon construction areas (concrete supports) for the presence of any animal burrows (including spiders and scorpions), rocky outcrops, logs, stumps and other debris and relocate any affected animals to appropriate habitat away from the servitude or tower.

The alteration of vegetation and habitats in the proposed 55m servitude will impact on the fauna directly within the proposed route and potentially in the immediate surrounding area. It is imperative that minimal vegetation clearance and disturbances should occur along the proposed alignment. Vegetation clearance should be restricted to the actual transmission line servitude (55m) and not into adjacent bushveld areas. As certain sections of the proposed transmission line is situated on a sloping gradient; erosion/siltation preventative measures must be implemented throughout all phases of the project. In addition, the increased human density, heavy construction machinery and vehicles will most likely directly and indirectly result in the short-long term alteration of the faunal composition on the site and surrounding areas. Loss of habitat for foraging, reproduction and shelter will most severely impact on the smaller sedentary species (insects, arachnids, reptiles, amphibians and mammals).

PROPOSED NEW ACCESS AND MAINTENANCE ROADS

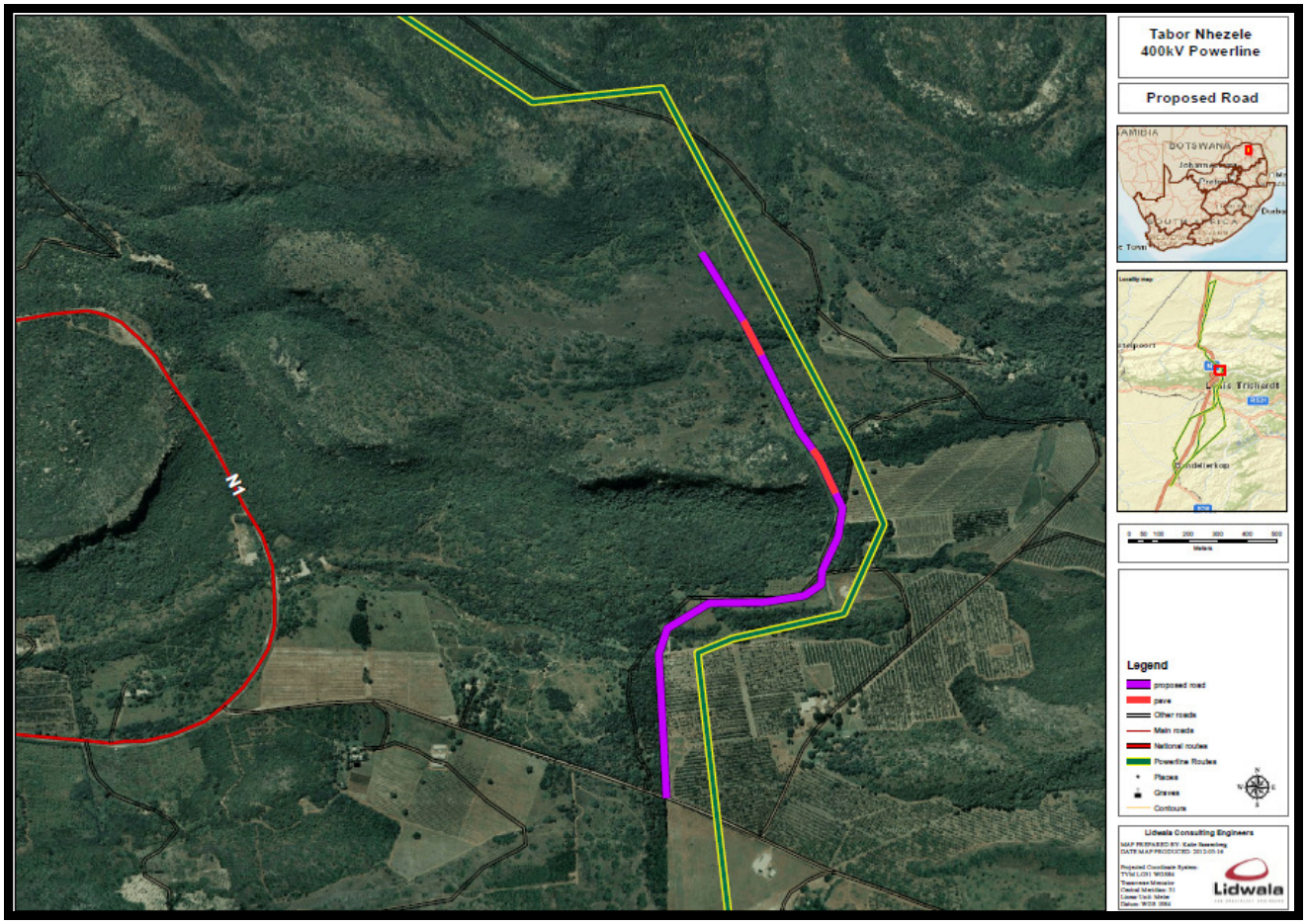

Figure33. Proposed new access and maintenance road indicated by purple line. Red sections are on steep slopes and require paving.

The proposed new access road situated adjacent to Alternative alignment 1 follows an existing track adjacent to agricultural and forestry activities for the majority of the alignment. As a precautionary measure prior to the construction of the new access road a walk through of the entire road footprint should be undertaken by a suitably qualified zoologist in order to inspect the area for any animal burrows, rocky outcrops etc. Site specific mitigatory measures can be implemented for the new access road. It is however highly unlikely that the proposed new access road provides critical habitat for any threatened faunal species due to the adjacent habitat transformation.

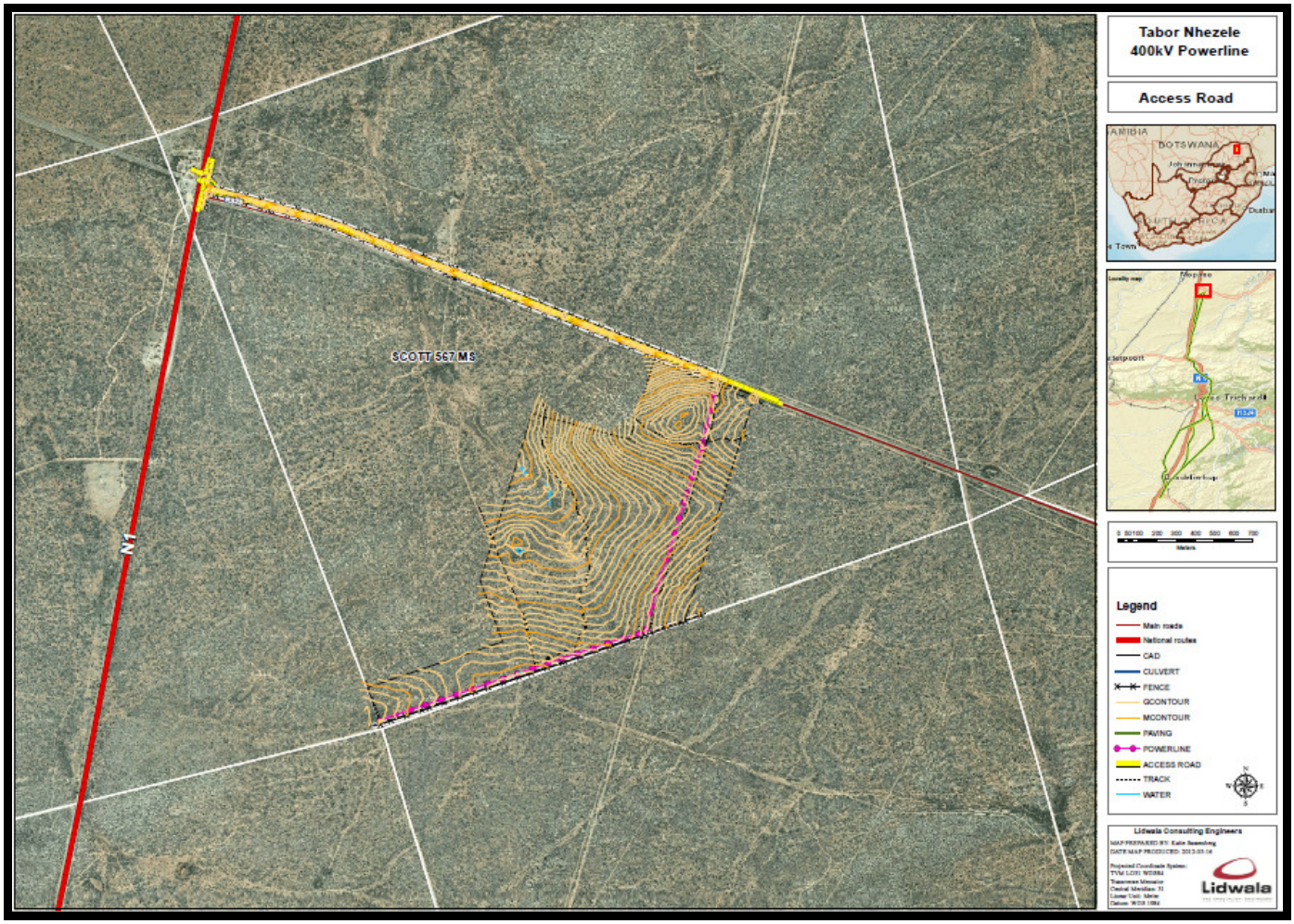

Figure34. Proposed new access (yellow line) and maintenance road for the Nzhelele substation.

The proposed new access and maintenance road to the Nzhelele substation follows an existing informal access road. The new Nzhelele distribution substation (awaiting approval) yard footprint will have to be expanded from the 2 ha to 6 ha for the proposed new Tabor-Nzhelele 400kV transmission line. Two small non-perennial drainage lines as well as a seasonally inundated pan are situated within the proposed expanded substation site. No surveys were undertaken for the expanded sections of the Nzhelele substation due to restricted access. More intensive surveys are required in order to ascertain the presence of any threatened faunal species namely Giant Bullfrogs (*Pyxicephalus adspersus*) at the seasonal pan as well as Mullers' Velvet Gecko (*Homopholis mulleri*) on any Marula (*Sclerocarya birrea*) and Knob Thorns (*Acacia nigrescens*). It is however highly unlikely that the proposed 6ha development footprint provides critical habitat for both species within the immediate area. As a precautionary measure a suitably qualified herpetologist should examine the proposed expanded 6ha footprint for any Marula(*Sclerocarya birrea*) and Knob Thorns (*Acacia nigrescens*) as well as the seasonal wetland habitats.

8. GENERIC DESCRIPTION OF POTENTIAL IMPACTS OF POWER LINES ON ASSOCIATED FAUNA

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in Southern Africa are electrocution of birds (and other animals) and disturbance and habitat destruction during construction and maintenance activities.

8.1 Habitat destruction and disturbance

During the construction phase and maintenance of powerlines, some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads, and the clearing of servitudes. 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 have an impact on fauna breeding, foraging and roosting in or in close proximity of the servitude, both through modification of habitat and disturbance caused by human activity.

Mitigation and Recommendations

The following general recommendations are made to minimise the impacts of powerline construction on **threatened fauna**:

- As a precautionary measure a walk through of the selected alignment as well as tower positions should be conducted during the EMP phase of the project by a suitable qualified botanist as well as zoologist; in order to ascertain for the presence of any threatened plant or animal species within or in close proximity to the construction areas (tower supports) for the presence of any animal burrows (including spiders and scorpions), rocky outcrops, logs, stumps and other debris and relocate any affected animals to appropriate habitat away from the servitude or tower.
- Close site supervision must be maintained during construction.
- During the **CONSTRUCTION** phase workers must be limited to areas under construction and access to the undeveloped areas, especially the surrounding open areas must be strictly regulated (“no-go” areas during construction activities).
- Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) water in the area. Mobile toilets must be provided in order to minimise unauthorised traffic of construction workers outside of the designated areas.

- All temporary stockpile areas including litter and dumped material and rubble must be removed on completion of construction. All alien invasive plant should be removed from the site to prevent further invasion.
- Access to the powerline servitude must be restricted. Access to the powerline servitude should ideally be fenced off and gated along the main access roads. No quad-bikes, motorcycles or off road vehicles and illegal hunting should be permitted in the adjacent properties.
- Firearms or any other hunting weapons must be prohibited on site.
- Contract employees must be educated about the value of wild animals and the importance of their conservation.
- Educational programmes for the contractor's staff must be implemented to ensure that project workers are alerted to the possibility of snakes being found during vegetation clearance. The construction team must be briefed about the management of snakes in such instances. In particular, construction workers are to go through ongoing refresher courses to ensure that threatened snakes, such as pythons, are not killed or persecuted when found.
- Severe contractual fines must be imposed and immediate dismissal on any contract employee who is found attempting to snare or otherwise harm wild animals.
- No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.
- No specific recommendations are made for the protection of burrowing red data mammals. Consideration could be given to rescuing the animals where there burrows are found in advance of construction. This is not recommended as a general prescription since the chances of digging out live Aardwolf or Antbear are small. Aardwolf are likely to vacate their burrows in the face of the advancing construction. There is also a risk associated with capturing animals dug out of burrows, and holding them in captivity. If a section of many active burrows is found then mitigation could be considered (minor deviation to the powerline alignment or rescue operation for the animals).

8.2 VEGETATION/FLORA

Protected or endangered species may occur along the line route. Special care should be taken not to damage or remove any such species unless absolutely necessary. Permits for removal must be obtained from Provincial Nature Conservation should such species be affected. All plants not interfering with the operation of the line shall be left undisturbed. Collection of firewood and traditional medicinal plants is strictly prohibited. No area should be cleared of trees, bushes and other vegetation for the purpose of a camping site.

Management objective

- Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the line
- No unnecessary destruction to surrounding vegetation
- Protection of any protected or endangered plant species
- Prevention of litigation concerning removal of vegetation

Measurable targets

- Adequate protection of any endangered or threatened plant or tree species
- No litigation due to removal of vegetation without the necessary permits

Mitigation and recommendation

Remaining indigenous bulbous geophytes and Aloes should be retained or replanted wherever possible. Where herbicides are used to clear vegetation, specimen-specific chemicals should be applied to individual plants only. General spraying should be prohibited.

All alien vegetation should be eradicated over a five-year period. Invasive species (*Acacia mearnsii, Melia azedarach, Opuntia ficus-indcia, Lantana camara, Solanuma mauritianum, Caesalpinia decapetala, Eucalyptus* sp) should be given the highest priority. No dumping of any materials in undeveloped open areas and neighbouring properties. Activities in the surrounding open undeveloped areas (especially open grasslands) must be strictly regulated and managed.

The construction of the proposed Tabor-Nzhelele 400kV transmission line will definitely result in limited opening-up of the vegetal cover during the construction and operational (maintenance) phase. The opening up of existing vegetated areas, thereby creating corridors along which animals can move, may result in increased predation levels on small mammals, reptiles, amphibians, arachnids and scorpions along these corridors.

The limitation of the disturbance of vegetation cover as well as any rocky outcrops, logs, stumps, termite mounds within sensitive areas will ameliorate this impact. Impact will be short-long term depending on the amount of vegetation to be cleared. Excessive habitat destruction during construction could reduce the amount of habitat available. This impact is anticipated to be localised, of a long-term nature and of medium significance, provided that appropriate mitigation measures are implemented (e.g. the limitation of vegetation clearance within sensitive areas).

8.3 VEGETATION CLEARANCE

Management objective

- Minimise damage to surrounding vegetation
- Minimise damage to topsoil
- Successful rehabilitation of barren areas

Measurable targets

- No damage to vegetation outside the 55m powerline servitude
- No loss of topsoil
- No visible erosion three months after completion of the contract
- All disturbed areas successfully rehabilitated three months after completion of the contract

The object of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for the safe mechanical construction and electrical operation of the distribution line. Only an 8m strip may be cleared flush with the ground to allow vehicular passage during construction. No scalping shall be allowed on any part of the servitude road unless absolutely necessary. The removal of all economically valuable trees or vegetation shall be negotiated with the Landowner before such vegetation is removed.

Vegetation clearing on tower sites must be kept to a minimum. Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are removed. Stumps shall be treated with herbicide. Smaller vegetation can be flattened with a machine, but the blade should be kept above ground level to prevent scalping. Any vegetation cleared on a tower site shall be removed or flattened and not be pushed to form an embankment around the tower.

No vegetation clearing in the form of de-stumping, scalping or uprooting shall be allowed on river- and stream banks (riparian zone). Vegetation shall only be cut to allow for the passage of the pilot-cables and headboard. Trees and vegetation not interfering with the statutory clearance to the conductors can be left under the line. Dense vegetation under the line which could cause a fire hazard, particularly in the middle third of the span in the

vicinity of the lowest point of the conductors, will be considered as a separate case. With permission of the landowner, the total servitude under the line and up to 5m outside the outer phases can be cleared.

Protected or endangered species of plants shall not be removed unless they are interfering with a structure. Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained from Provincial Nature Conservation. All protected species not to be removed must be clearly marked and such areas fenced off if required.

Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent soil erosion.

The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. Eskom's approval for the use of herbicides is mandatory. Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the supplier’s specifications.

Upon completion of the stringing operations and before handover, the servitude must be inspected and all vegetation interfering with the safe operation of the line shall be removed / cut down. All alien vegetation in the total servitude and densifiers creating a fire hazard shall be cleared and treated with herbicides. Ideally the mowing or cutting of grasses should be restricted to the transformed grassland areas and not within the valley bottom wetlands and hillslope seepage areas. The removal of rank grassland vegetation could have a potentially negative impact on secretive species such as the African Grass Owl which prefers rank grassland for nesting and roosting activities.

It is recommended that a contractor for vegetation clearing should comply with the following parameters:

- The contractor must have the necessary knowledge to be able to identify protected species as well as species not interfering with the operation of the line due to their height and growth rate.
- The contractor must also be able to identify declared weeds and alien species that can be totally eradicated.
- The contractor must be in possession of a valid herbicide applicators license.

8.4 REVEGETATION

Where necessary a suitable mixture of grass seed shall be used to re-seed damaged areas. Badly damaged areas shall be fenced in to enhance rehabilitation. Areas to be rehabilitated must be planted with a mixture of endemic pioneer grass species endemic to the area, as soon as the new growing season starts. To get the best results in a specific area, it is a good idea to consult with a vegetation specialist or the local extension officer of the Dept of Agriculture. Seed distributors can also give valuable advice as to the mixtures and amount of seed necessary to seed a certain area. Re-seeding, as well as fencing in of badly damaged areas, will always be at the discretion of the Environmental Control Officer, unless specifically requested by a Landowner.

Management objective

- Minimise damage to topsoil and environment at tower positions
- Successful rehabilitation of all damaged areas
- Prevention of erosion

Measurable targets

- No loss of topsoil due to construction activities
- All disturbed areas successfully rehabilitated within three months of completion of the contract
- No visible erosion scars three months after completion of the contract

A mixture of seed can be used provided the mixture is carefully selected to ensure the following:

a) Annual and perennial plants are chosen.
b) Pioneer species are included.
c) All the plants shall not be edible.
d) Species chosen will grow in the area without many problems.
e) Root systems must have a binding effect on the soil.
f) The final product should not cause an ecological imbalance in the area.

CONSTRUCTION PHASE

- Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent soil erosion.
- Re-seeding shall be done on disturbed areas as directed by the Environmental Control Officer.

8.5 Surrounding Farming Activities

Domestic Livestock

Construction activities must be planned carefully so as not to interfere with the calving and lambing season for most animal species. The Contractor's workforce will have to be very careful not to disturb the animals as this may lead to fatalities which will give rise to claims from the Landowners. Interference with any wildlife without the applicable permits shall not be allowed. The Contractor shall under no circumstances interfere with livestock without the Landowner being present. This includes the moving of livestock where they interfere with construction activities. Should the Contractors workforce obtain any livestock for eating purposes, they must be in possession of a written note from the Landowner. Speed limits must be restricted especially on farm roads (30km/hr) preventing unnecessary road fatalities of surrounding livestock.

Management objective

- Minimise disruption of surrounding farming activities
- Minimise disturbance of fauna
- Minimise interruption of breeding patterns of fauna

Measurable targets

- No hunting and poaching or intentional killing of animals (including snakes, scorpions, spiders)
- No stock losses where construction is underway
- No complaints from Landowners or Nature Conservation
- No litigation concerning stock losses and animal deaths

8.6 ACCESS ROADS

Planning of access routes must be done in conjunction between the Contractor, Eskom and the Landowner. All access to private farmland must be negotiated in advance with land-owners. All agreements reached shall be documented in writing and no verbal agreements should be made. The condition of existing access / private roads to be used shall be documented with photographs.

The Contractor shall properly mark all access roads. Markers shall show the direction of travel as well as tower numbers to which the road leads. Roads not to be used shall be marked with a "**NO ENTRY**" sign. Unnecessary traversing of agricultural and natural open land is discouraged. Where required, speed limits shall be indicated on the roads (30km). All speed limits shall be strictly adhered to at all time.

Vehicle access to the powerline servitude must as far as possible be limited to existing roads. If a new access roads need to be constructed it should follow cleared areas such as cattle pathways.

8.7 DANGEROUS ANIMALS

Numerous dangerous wild animals (Lions. Buffalo, Rhino), venomous snakes and arachnids and scorpions occur around the proposed expanded Nzhelele substation site and along the proposed 400kV transmission line and thus safety measures must be implemented to ensure the safety of the contractors and sub-contractors.

ARACHNIDS

During the construction phase care must be taken not to destroy any trap-door or baboon spider burrows. Prior to excavations a thorough inspection of the cleared areas must be undertaken to determine the presences of any baboon spider burrows, loosely embedded rocks or stumps in the proposed cleared areas. Several species of Baboon and Trapdoor species have been recorded in the area.

Conservation

Of the mygalomorphs, it is mainly the larger Baboon Spiders that are in great demand as pets and are consequently regarded as commercially threatened by the International Union for Conservation of International Trade in Endangered Species (CITES) (De Wet & Schoonbee 1991). The genera *Ceratogyrus, Harpactira* and *Pterinochilus* were added to schedule V11 of the Transvaal Provincial Nature Conservation Ordinance of 1983 as Protected Invertebrate Animals. Eskom must ensure that no baboon spiders are illegally collected or intentionally destroyed throughout all stages of the project.

Scorpions

Several species of scorpions are recorded from the area. These scorpions construct burrows or scrapes under rocks as well as found under loose bark, wood piles and other surface debris. The majority of these scorpions possess a painful sting they are not of medical importance except *Parabuthus spp.* which are amongst South Africa's most venomous scorpion species. Suitable habitat occurs along the alignments for *Parabuthus transvaalicus* and *Parabuthus mossambicensis.* Care should be taken when removing stumps, logs or rock material. Any scorpions encountered on the site should be left alone and allowed free access away from the activity or safely removed from the area. No scorpions should be intentionally killed. Standard precautions or safety measures includes wearing sturdy leather boots and gloves in the field and close inspection of sleeping areas and bedding, clothes, shoes etc. for any scorpions. Stings from mildly venomous scorpions cause localised pain and swelling, with little systematic reaction. The affected limb should be immobilized and an ice pack should be applied, if possible, to the site of the sting. The site of the sting should be cleaned and never cut open. Venom sprayed in the eyes (certain *Parabuthus* species are able to spray venom) produces an intense burning sensation and may result in temporary blindness if the eyes are not washed out thoroughly with clean water or some other neutral liquid such as milk

SNAKES

Several venomous snake species occur along the proposed route including Black Mamba (*Dendroaspis polylepis*), Boomslang (*Dispholidus typus*), (Southern or Bibron's Burrowing Asp (*Actractaspis bibronii*), Mozambique Spitting Cobra (*Naja mossambica*), Snouted Cobra (*Naja annulifera*), Puff Adder (*Bitis arietans*), Rinkhals (*Haemachatus haemachatus*), Common or Rhombic Night Adder (*Causus rhombeatus*). General avoidance of snakes if the best policy if encountered. Snakes should not be harmed or killed and allowed free movement away from the area. Safety precaution measure must be implemented especially during the vegetation clearance phase which could result in encounters with several venomous snake species. Appropriate foot wear (sturdy leather boots) should be worn in the field.

8.8 Fire Prevention

The frequent burning of the vegetation will have a high impact on remaining reptile species. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks.

Management objective

- Minimise risk of veld fires
- Minimise damage to grazing
- Prevent runaway fires

Measurable targets

- No veld fires started by the Contractor's work force
- No claims from Landowners for damages due to veld fires
- No litigation

Mitigation and recommendations

No open fires shall be allowed on site under any circumstance. The Contractor shall have fire-fighting equipment available on all vehicles working on site, especially during the winter months.

8.9 Threatened animals

At a local scale the study site and surrounding areas comprises suitable habitat for certain threatened animal species.

Mitigation and recommendations

As a precautionary mitigation measure it is recommended that the construction contractor as well as an independent environmental control officer (ECO) should be made aware of the possible presence of certain threatened animal species namely Giant Bullfrog, Northern Forest Rain Frog, Southern African Python, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros. Prior to the commencement of construction activities a walk through of the preferred alignment as well as proposed tower positions must be undertaken by a suitably qualified zoologist/herpetologist in order to provide site specific mitigatory measures as well as make recommendations in order to ameliorate potentially negative impacts to any threatened faunal species. In the event that any of the above-mentioned species are discovered relevant conservation authorities should be informed and activities surrounding the site suspended until further investigations have been conducted.

9. REFERENCES

ACOCKS, J.P.H. (1988). *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No.57: 1-146. Botanical Research Institute, Pretoria.

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

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

BRANCH, W.R. (1988). *Field Guide to the Snakes and other Reptiles of Southern Africa*. Struik Publishers, Cape Town.

BRANCH, W.R. AND HACKE, W.D. (1980) A fatal attack on a young boy by an African rock python *Python sebae*. *Journal of Herpetology*, **14** (3): 305 - 307.

BURNETT, M.R., AUGUST, P.V., BROWN, J.H. & KILLINGBECK, K.T. (1998). The influence of geomorphological heterogeneity on biodiversity. I. A patch-scale perspective. *Conservation Biology*, 12, 363-370.

CARR, R.D. 1984. *Mammal Conservation Plan*. Department of Nature Conservation, Transvaal Provincial Administration, Mimeograph.

CARRUTHERS, V.C. (2001). *Frogs and Frogging in South Africa*. Struik Publishers, Cape Town.

DAVIES, B and DAY, J. (1998). *Vanishing Waters*. UCT Press. Cape Town.

DE GRAAF, G. (1981). *The rodents of southern Africa*. Butterworth Press, Pretoria.

DU PREEZ, L & CARRUTHERS, V.C. 2009. *A complete guide to the Frogs of Southern Africa*. Struik Publishers, Cape Town.

JACOBSEN, N.H.G. (1989). A herpetological survey of the Transvaal. Unpublished Ph.D. thesis, University of Natal, Durban.

GAIGHER, I.G. (2003). *Reptiles*. Report on the Reptiles of the Soutpansberg Conservancy. Accessed on the internet on 14th January 2013.

GAIGHER, I.G. and STUART, C. 2003. Mammals. Report on the Mammals of the Soutpansberg Conservancy. Accessed on the internet on 14th January 2013.

HOCKEY, P.A.R., DEAN, W.R.J., RYAN, P.G. (eds).(2005) *Roberts- Birds of Southern Africa VIIth ed*. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

LOW, A.B. and REBELO, A.G. (1998). *Vegetation of South Africa, Lesotho and Swaziland*. D.E.A.&T., Pretoria.

MINTER, L.R., BURGER, M., HARRISON, J.A., BRAAK, H.H, BISHOP, P.J, AND KLOEPFER, D. 2004. *Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland.* SI/MAB Series 9. Smithsonian Institution, Washington, DC.

PASSMORE, N.I. and CARRUTHERS, V.C. (1995). *Frogs of South Africa. A Complete Guide*. Wits University Press, Witwatersrand.

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

ROBERTS, A. (1951). *The mammals of South Africa*. Central News Agency, Cape Town.

ROWE-ROWE, D.T. (1994). *The Ungulates of Natal*. Natal Parks Board.

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

SIEGFIED, W.R. (1989). *Preservation of species in southern African nature reserves*. In: Huntley, B.J. (Ed). *Biotic Diversity in Southern Africa*, 186-201. Cape Town: Oxford University Press.

SKINNER, J.D., AND CHIMIMBA, C.T. (2005). *The Mammals of the Southern African Subregion* 3rd ed. Cambridge University Press.

SKINNER, J.D. and SMITHERS, R.H.N. (1990). *The Mammals of the Southern African Subregion*. University of Pretoria, Pretoria.

SMITHERS, R.H.N. (1986). *South African Red Data Book-Terrestrial Mammals*. South African National Scientific Programmes Report No.125: 1-214.

APPENDIX A

Table8. Frog species recorded during the South African Frog Atlas Project for the combined locus = 2229DB, 2229DC, 2229DD, 2329BB, 2329BD.

Family	Genus	Species	Common name	Red list category	Atlas region endemic
Brevicepitidae	*Breviceps*	*adspersus*	Bushveld Rain Frog	Least Concern	0
Brevicepitidae	*Breviceps*	*sylvestris*	Northern Forest Rain Frog	Endangered	1
Bufonidae	*Amietophrynus*	*garmani*	Eastern Olive Toad	Least Concern	0
Bufonidae	*Amietophrynus*	*gutturalis*	Guttural Toad	Least Concern	0
Bufonidae	*Amietophrynus*	*maculatus*	Flat-backed Toad	Least Concern	0
Bufonidae	*Amietophrynus*	*rangeri*	Raucous Toad	Least Concern	0
Bufonidae	*Poyntonophrynus*	*fenoulheti*	Northern Pygmy Toad	Least Concern	0
Bufonidae	*Schismaderma*	*carens*	Red Toad	Least Concern	0
Hemisotidae	*Hemisus*	*marmoratus*	Mottled Shovel-nose Frog	Least Concern	0
Hyperoliidae	*Hyperolius*	*marmoratus*	Painted Reed Frog	Least Concern	0
Hyperoliidae	*Kassina*	*senegalensis*	Bubbling Kassina	Least Concern	0
Microhylidae	*Phrynomantis*	*bifasciatus*	Banded Rubber Frog	Least Concern	0
Phrynobatrachidae	*Phrynobatrachus*	*mababiensis*	Dwarf Puddle Frog	Least Concern	0
Phrynobatrachidae	*Phrynobatrachus*	*natalensis*	Snoring Puddle Frog	Least Concern	0
Pipidae	*Xenopus*	*laevis*	Common Platanna	Least Concern	0
Ptychadenidae	*Ptychadena*	*anchietae*	Plain Grass Frog	Least Concern	0
Pyxicephalidae	*Amietia*	*angolensis*	Common or Angola River Frog	Least Concern	0
Pyxicephalidae	*Cacosternum*	*boettgeri*	Boettger's Caco	Least Concern	0

Pyxicephalidae	*Pyxicephalus*	*adspersus*	Giant Bullfrog	Least Concern	0
Pyxicephalidae	*Pyxicephalus*	*edulis*	African Bullfrog	Least Concern	0
Pyxicephalidae	*Strongylopus*	*fasciatus*	Striped Stream Frog	Least Concern	0
Pyxicephalidae	*Strongylopus*	*grayii*	Clicking Stream Frog	Least Concern	0
Pyxicephalidae	*Tomopterna*	*cryptotis*	Tremelo Sand Frog	Least Concern	0
Pyxicephalidae	*Tomopterna*	*marmorata*	Russet-backed Sand Frog	Least Concern	0
Pyxicephalidae	*Tomopterna*	*natalensis*	Natal Sand Frog	Least Concern	0
Rhacophoridae	*Chiromantis*	*xerampelina*	Southern Foam Nest Frog	Least Concern	0

Table9. Reptile species recorded from the combined locus = 2229DB, 2229DC, 2229DD, 2329BB, 2329BD

FAMILY	GENUS	SPECIES	SUBSPECIES	COMMON NAME	RED LIST CATEGORY	ATLAS REGION ENDEMIC
Agamidae	*Acanthocercus*	*Atricollis*	*atricollis*	Southern Tree Agama	Not Evaluated	0
Agamidae	*Agama*	*aculeata*	*distanti*	Distant's Ground Agama	Not Evaluated	1
Agamidae	*Agama*	*armata*		Peters' Ground Agama	Not Evaluated	0
Agamidae	*Agama*	*atra*		Southern Rock Agama	Not Evaluated	0
Amphisbaenidae	*Chirindia*	*langi*	*occidentalis*	Soutpansberg Worm Lizard	Not Evaluated	1
Amphisbaenidae	*Monopeltis*	*infuscata*		Dusky Worm Lizard	Not Evaluated	0
Amphisbaenidae	*Monopeltis*	*sphenorhynchus*		Slender Worm Lizard	Not Evaluated	0
Atractaspididae	*Amblyodipsas*	*microphthalma*	*nigra*	Soutpansberg Purple-glossed snake	Not Evaluated	1
Atractaspididae	*Amblyodipsas*	*polylepis*	*polylepis*	Common Purple-glossed Snake	Not Evaluated	0
Atractaspididae	*Aparallactus*	*capensis*		Black-headed Centipede-eater	Not Evaluated	0
Atractaspididae	*Atractaspis*	*bibronii*		Bibron's Stiletto Snake	Not Evaluated	0

Atractaspididae	*Xenocalamus*	*bicolor*	*lineatus*	Striped Quill-snouted Snake	Not Evaluated	0
Boidae	*Python*	*natalensis*		Southern African Python	Not Evaluated	0
Chamaeleonidae	*Bradypodion*	*transvaalense*		Wolkberg Dwarf Chameleon	Not Evaluated	1
Chamaeleonidae	*Chamaeleo*	*dilepis*	*dilepis*	Common Flap-neck Chameleon	Not Evaluated	0
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Not Evaluated	0
Colubridae	*Crotaphopeltis*	*hotamboeia*		Red-lipped Snake	Not Evaluated	0
Colubridae	*Dasypeltis*	*inornata*		Southern Brown Egg-eater	Not Evaluated	1
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Not Evaluated	0
Colubridae	*Dispholidus*	*typus*	*typus*	Boomslang	Not Evaluated	0
Colubridae	*Duberria*	*lutrix*	*lutrix*	South African Slug-eater	Not Evaluated	1
Colubridae	*Gonionotophis*	*capensis*	*capensis*	Common File Snake	Not Evaluated	0
Colubridae	*Gonionotophis*	*nyassae*		Black File Snake	Not Evaluated	0
Colubridae	*Hemirhagerrhis*	*nototaenia*		Eastern Bark Snake	Not Evaluated	0
Colubridae	*Lamprophis*	*guttatus*		Spotted House Snake	Not Evaluated	0
Colubridae	*Lycodonomorphus*	*rufulus*		Brown Water Snake	Not Evaluated	0
Colubridae	*Lycophidion*	*capense*	*capense*	Cape Wolf Snake	Not Evaluated	0
Colubridae	*Lycophidion*	*variegatum*		Variegated Wolf Snake	Not Evaluated	0
Colubridae	*Philothamnus*	*hoplogaster*		South Eastern Green Snake	Not Evaluated	0
Colubridae	*Philothamnus*	*natalensis*	*occidentalis*	Western Natal Green Snake	Not Evaluated	1
Colubridae	*Philothamnus*	*semivariegatus*		Spotted Bush Snake	Not Evaluated	0
Colubridae	*Prosymna*	*bivittata*		Two-striped Shovel-snout	Not Evaluated	0
Colubridae	*Prosymna*	*lineata*		Lined Shovel-snout	Not Evaluated	0
Colubridae	*Psammophis*	*angolensis*		Dwarf Sand Snake	Not Evaluated	0
Colubridae	*Psammophis*	*brevirostris*		Short-snouted Grass Snake	Not Evaluated	0
Colubridae	*Psammophis*	*crucifer*		Cross-marked Grass Snake	Not Evaluated	0
Colubridae	*Psammophis*	*jallae*		Jalla's Sand Snake	Not Evaluated	0
Colubridae	*Psammophis*	*mossambicus*		Olive Grass Snake	Not Evaluated	0
Colubridae	*Psammophis*	*subtaeniatus*		Western Yellow-bellied Sand Snake	Not Evaluated	0

Colubridae	*Psammophis*	*trinasalis*		Fork-marked Sand Snake	Not Evaluated	0
Colubridae	*Psammophylax*	*tritaeniatus*		Striped Grass Snake	Not Evaluated	0
Colubridae	*Pseudaspis*	*cana*		Mole Snake	Not Evaluated	0
Colubridae	*Rhamphiophis*	*rostratus*		Rufous Beaked Snake	Not Evaluated	0
Colubridae	*Telescopus*	*semiannulatus*	*semiannulatus*	Eastern Tiger Snake	Not Evaluated	0
Colubridae	*Thelotornis*	*capensis*	*capensis*	Southern Twig Snake	Not Evaluated	0
Cordylidae	*Chamaesaura*	*aenea*		Coppery Grass Lizard	Not Evaluated	1
Cordylidae	*Chamaesaura*	*anguina*	*anguina*	Cape Grass Lizard	Not Evaluated	1
Cordylidae	*Chamaesaura*	*macrolepis*		Large-scaled Grass Lizard	Not Evaluated	0
Cordylidae	*Cordylus*	*jonesii*		Jones' Girdled Lizard	Not Evaluated	0
Cordylidae	*Cordylus*	*vittifer*		Common Girdled Lizard	Not Evaluated	0
Cordylidae	*Platysaurus*	*intermedius*	*intermedius*	Common Flat Lizard	Not Evaluated	1
Cordylidae	*Platysaurus*	*intermedius*	*rhodesianus*	Zimbabwe Flat Lizard	Not Evaluated	0
Cordylidae	*Platysaurus*	*relictus*		Soutpansberg Flat Lizard	Lower Risk: Near Threatened	1
Cordylidae	*Smaug*	*warreni*	*depressus*	Flat Girdled Lizard	Not Evaluated	1
Elapidae	*Aspidelaps*	*scutatus*	*scutatus*	Speckled Shield Cobra	Not listed	0
Elapidae	*Dendroaspis*	*polylepis*		Black Mamba	Not Evaluated	0
Elapidae	*Elapsoidea*	*sundevallii*	*longicauda*	Long-tailed Garter Snake	Not listed	0
Elapidae	*Naja*	*annulifera*		Snouted Cobra	Not Evaluated	0
Elapidae	*Naja*	*mossambica*		Mozambique Spitting Cobra	Not Evaluated	0
Gekkonidae	*Afroedura*	*nov sp. 11 (pienaari)*		Flat Gecko sp. 11 (pienaari)	Not listed	0
Gekkonidae	*Afroedura*	*nov sp. 9 (soutpansbergensis)*		Flat Gecko sp. 9 (soutpansbergensis)	Not listed	0
Gekkonidae	*Afroedura*	*transvaalica*		Zimbabwe Flat Gecko	Not Evaluated	0
Gekkonidae	*Chondrodactylus*	*turneri*		Turner's Gecko	Not Evaluated	0
Gekkonidae	*Colopus*	*wahlbergii*	*wahlbergii*	Kalahari Ground Gecko	Not Evaluated	0
Gekkonidae	*Hemidactylus*	*mabouia*		Common Tropical House Gecko	Not Evaluated	0

Gekkonidae	*Homopholis*	*mulleri*		Muller's Velvet Gecko	Lower Risk: Near Threatened	1
Gekkonidae	*Homopholis*	*wahlbergii*		Wahlberg's Velvet Gecko	Not Evaluated	0
Gekkonidae	*Lygodactylus*	*capensis*	*capensis*	Common Dwarf Gecko	Not Evaluated	0
Gekkonidae	*Lygodactylus*	*nigropunctatus*	*incognitus*	Cryptic Dwarf Gecko	Not Evaluated	1
Gekkonidae	*Lygodactylus*	*ocellatus*	*soutpansbergnesis*	Soutpansberg Dwarf Gecko	Not Evaluated	1
Gekkonidae	*Pachydactylus*	*affinis*		Transvaal Gecko	Not Evaluated	1
Gekkonidae	*Pachydactylus*	*capensis*		Cape Gecko	Not Evaluated	0
Gekkonidae	*Pachydactylus*	*punctatus*		Speckled Gecko	Not Evaluated	0
Gekkonidae	*Pachydactylus*	*tigrinus*		Tiger Gecko	Not Evaluated	0
Gekkonidae	*Pachydactylus*	*vansoni*		Van Son's Gecko	Not Evaluated	0
Gekkonidae	*Ptenopus*	*garrulus*	*garrulus*	Common Barking Gecko	Not Evaluated	0
Gerrhosauridae	*Gerrhosaurus*	*flavigularis*		Yellow-throated Plated Lizard	Not Evaluated	0
Gerrhosauridae	*Gerrhosaurus*	*major*	*major*	Rough-scaled Plated Lizard	Not Evaluated	0
Gerrhosauridae	*Gerrhosaurus*	*validus*	*validus*	Common Giant Plated Lizard	Not Evaluated	0
Lacertidae	*Australolacerta*	*rupicola*		Soutpansberg Rock Lizard	Lower Risk: Near Threatened	1
Lacertidae	*Heliobolus*	*lugubris*		Bushveld Lizard	Not Evaluated	0
Lacertidae	*Ichnotropis*	*squamulosa*		Common Rough-scaled Lizard	Not Evaluated	0
Lacertidae	*Nucras*	*holubi*		Holub's Sandveld Lizard	Not Evaluated	0
Lacertidae	*Nucras*	*intertexta*		Spotted Sandveld Lizard	Not Evaluated	0
Lacertidae	*Nucras*	*lalandii*		Delalande's Sandveld Lizard	Not Evaluated	1
Lacertidae	*Pedioplanis*	*lineoocellata*	*lineoocellata*	Spotted Sand Lizard	Not Evaluated	0
Leptotyphlopidae	*Leptotyphlops*	*incognitus*		Incognito Thread Snake	Not Evaluated	0
Leptotyphlopidae	*Leptotyphlops*	*scutifrons*	*scutifrons*	Peters' Thread Snake	Not listed	0
Leptotyphlopidae	*Myriopholis*	*longicauda*		Long-tailed Thread Snake	Not Evaluated	0
Scincidae	*Acontias*	*cregoi*		Cregoi's Blind Legless Skink	Not Evaluated	0

Scincidae	*Acontias*	*kgalagadi*	*subtaeniatus*	Stripe-bellied Blind Legless Skink	Not Evaluated	1
Scincidae	*Acontias*	*plumbeus*		Giant Legless Skink	Not Evaluated	0
Scincidae	*Afroablepharus*	*maculicollis*		Spotted-neck Snake-eyed Skink	Not Evaluated	0
Scincidae	*Afroablepharus*	*wahlbergii*		Wahlberg's Snake-eyed Skink	Not Evaluated	0
Scincidae	*Mochlus*	*sundevallii*	*sundevallii*	Sundevall's Writhing Skink	Not Evaluated	0
Scincidae	*Scelotes*	*limpopoensis*	*limpopoensis*	Limpopo Dwarf Burrowing Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*margaritifer*		Rainbow Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*punctatissima*		Speckled Rock Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*punctulata*		Speckled Sand Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*striata*		Striped Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*varia*		Variable Skink	Not Evaluated	0
Testudinidae	*Kinixys*	*spekii*		Speke's Hinged Tortoise	Not Evaluated	0
Testudinidae	*Stigmochelys*	*pardalis*		Leopard Tortoise	Not Evaluated	0
Typhlopidae	*Afrotyphlops*	*bibronii*		Bibron's Blind Snake	Not Evaluated	0
Typhlopidae	*Megatyphlops*	*schlegelii*		Schlegel's Beaked Blind Snake	Not Evaluated	0
Varanidae	*Varanus*	*albigularis*	*albigularis*	Rock Monitor	Not Evaluated	0
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Not Evaluated	0
Viperidae	*Bitis*	*caudalis*		Horned Adder	Not Evaluated	0
Viperidae	*Causus*	*defilippii*		Snouted Night Adder	Not Evaluated	0
Viperidae	*Causus*	*rhombeatus*		Rhombic Night Adder	Not Evaluated	0

Red listing source: 1996 IUCN global listing

Table10. Mammal species occurring/or likely to occur within suitable habitat along the Tabor-Nzhelele alignments. Mammal species list has been supplemented with species habitat requirements and historical distribution records according to Skinner & Chimimba (2005).

Family	Genus	Species	Subspecies	Common name
Bathyergidae	*Cryptomys*	*hottentotus*	*hottentotus*	African Mole-rat
Bovidae	*Aepyceros*	*melampus*		Impala
Bovidae	*Alcelaphus*	*buselaphus*		Red Hartebeest
Bovidae	*Connochaetes*	*taurinus*	*taurinus*	Blue Wildebeest
Bovidae	*Damaliscus*	*lunatus*	*lunatus*	Tsessebe
Bovidae	*Hippotragus*	*equinus*		Roan Antelope
Bovidae	*Hippotragus*	*niger*	*niger*	Sable Antelope
Bovidae	*Kobus*	*ellipsiprymnus*	*ellipsiprymnus*	Waterbuck
Bovidae	*Oreotragus*	*oreotragus*		Klipspringer
Bovidae	*Oryx*	*gazella*		Gemsbok
Bovidae	*Raphicerus*	*campestris*		Steenbok
Bovidae	*Raphicerus*	*sharpei*		Sharp's Grysbok
Bovidae	*Redunca*	*arundinum*		Reedbuck
Bovidae	*Sylvicapra*	*grimmia*		Common Duiker
Bovidae	*Syncerus*	*caffer*		Cape Buffalo
Bovidae	*Taurotragus*	*oryx*		Eland
Bovidae	*Tragelaphus*	*angasii*		Nyala
Bovidae	*Tragelaphus*	*scriptus*		Bushbuck
Bovidae	*Tragelaphus*	*strepsiceros*		Kudu
Canidae	*Canis*	*mesomelas*		Black-backed Jackal
Canidae	*Lycaon*	*pictus*		African Wild Dog
Cercopithecidae	*Cercopithecus*	*aethiops*	*pygerythrus*	Vervet Monkey
Cercopithecidae	*Papio*	*ursinus*		Chacma Baboon
Elephantidae	*Loxodonta*	*africana*		African Elephant
Emballonuridae	*Taphozous*	*mauritianus*		Mauritian Tomb Bat
Equidae	*Equus*	*burchellii*		Plains Zebra
Erinaceidae	*Atelerix*	*frontalis*		South African Hedgehog
Felidae	*Acinonyx*	*jubatus*		Cheetah
Felidae	*Caracal*	*caracal*		Caracal
Felidae	*Felis*	*silvestris*	*cafra*	African Wild Cat
Felidae	*Leptailurus*	*serval*		Serval
Felidae	*Panthera*	*leo*		Lion
Felidae	*Panthera*	*pardus*		Leopard
Galagidae	*Galago*	*moholi*		Southern Lesser Galago
Giraffidae	*Giraffa*	*camelopardalis*	*camelopardalis*	Giraffe
Herpestidae	*Atilax*	*paludinosus*		Marsh Mongoose
Herpestidae	*Cynictis*	*penicillata*		Yellow Mongoose

Herpestidae	*Galerella*	*sanguinea*		Slender Mongoose
Herpestidae	*Helogale*	*parvula*		Dwarf Mongoose
Herpestidae	*Ichneumia*	*albicauda*		White-tailed Mongoose
Herpestidae	*Mungos*	*mungo*		Banded Mongoose
Hipposideridae	*Hipposideros*	*caffer*		Sundevall's Leaf-nosed Bat
Hyaenidae	*Crocuta*	*crocuta*		Spotted Hyaena
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyaena
Hyaenidae	*Proteles*	*cristatus*		Aardwolf
Hystricidae	*Hystrix*	*africaeaustralis*		Cape Porcupine
Leporidae	*Lepus*	*saxatilis*		Scrub Hare
Leporidae	*Pronolagus*	*randensis*		Jameson's Red Rock Rabbit
Pedetidae	*Pedetes*	*capensis*		Springhare
Pteropodidae	*Epomophorus*	*wahlbergi*		Wahlberg's Epauletted Fruit Bat
Lorisidae	*Otolemur*	*crassicaudatus*		Thick-tailed Bushbaby
Macroscelididae	*Elephantulus*	*myurus*		Eastern Rock Elephant-shrew
Macroscelididae	*Elephantulus*	*brachyrynchus*		Short-snouted Elephant-shrew
Manidae	*Manis*	*Temminckii*		Ground Pangolin
Molossidae	*Tadarida*	*aegyptiaca*		Egyptian Free-tailed Bat
Muridae	*Tatera*	*leucogaster*		Bushveld Gerbil
Muridae	*Acomys*	*spinosissimus*		Spiny Mouse
Muridae	*Lemniscomys*	*rosalia*	*spinalis*	Single-striped Grass Mouse
Muridae	*Rhabdomys*	*pumilio*	*graduate*	Four-striped Grass Mouse
Muridae	*Mastomys*	*coucha*		Southern Multimammate Mouse
Muridae	*Thallomys*	*nigricauda/ paedulus?*		Black-tailed Tree Rat
Muridae	*Aethomys*	*ineptus*		Tete Veld Rat
Muridae	*Micaelamys*	*namaquensis*		Namaqua Rock Mouse
Muridae	*Otomys*	*angoniensis*		Angoni Vlei-Rat
Muridae	*Tatera*	*leucogaster*		Bushveld Gerbil
Muridae	*Tatera*	*brantsii*		Highveld Gerbil
Muridae	*Saccostomus*	*capensis*		Pouched Mouse
Muridae	*Dendromus*	*melanotis*		Grey-Climbing Mouse
Muridae	*Steatomys*	*pratensis*		Fat Mouse
Mustelidae	*Aonyx*	*capensis*		Cape Clawless Otter
Mustelidae	*Ictonyx*	*striatus*		Striped Polecat
Mustelidae	*Mellivora*	*capensis*		Honey Badger
Mustelidae	*Poecilogale*	*albinucha*		African Striped Weasel

Myoxidae	*Graphiurus*	*platyops*		Rock Dormouse
Myoxidae	*Graphiurus*	*murinus*		Woodland Dormouse
Nycteridae	*Nycteris*	*thebaica*		Egyptian Slit-faced Bat
Orycteropodidae	*Orycteropus*	*afer*		Aardvark
Pteropodidae	*Epomophorus*	*gambianus*	*crypturus*	Gambian Epauletted Fruit Bat
Rhinocerotidae	*Ceratotherium*	*simum*		White Rhinoceros
Rhinocerotidae	*Diceros*	*bicornis*	*michaeli*	Black Rhinoceros
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat
Rhinolophidae	*Rhinolophus*	*darlingi*		Darling's Horseshoe Bat
Rhinolophidae	*Rhinolophus*	*hildebrandtii*		Hildebrandt's Horseshoe Bat
Rhinolophidae	*Rhinolophus*	*simulator*		Bushveld Horseshoe Bat
Sciuridae	*Paraxerus*	*cepapi*		Tree Squirrel
Sciuridae	*Xerus*	*inauris*		South-African Ground Squirrel
Soricidae	*Suncus*	*lixus*	*gratulus*	Greater Dwarf-shrew
Soricidae	*Crocidura*	*mariquensis*		Swamp Musk Shrew
Soricidae	*Crocidura*	*fuscomurina*		Tiny Musk Shrew
Soricidae	*Crocidura*	*cynnea*		Reddish-grey Musk Shrew
Soricidae	*Crocidura*	*silacea*		Lesser Grey-brown Musk Shrew
Soricidae	*Crocidura*	*hirta*		Lesser Red Musk Shrew
Suidae	*Phacochoerus*	*africanus*		Warthog
Suidae	*Potamochoerus*	*porcus*	*koiropotamus*	Bushpig
Vespertilionidae	*Mimiopterus*	*schriebersii*		Screibers' Long-fingered Bat
Vespertilionidae	*Pipistrellus*	*rusticus*		Rusty Pipistrelle
Vespertilionidae	*Neoromicia*	*capensis*		Cape Serotine Bat
Vespertilionidae	*Scotophilus*	*dinganii*		African Yellow Bat
Vespertilionidae	*Scotophilus*	*viridis*		Greenish Yellow Bat
Viveridae	*Civettictis*	*civetta*		African Civet
Viveridae	*Genetta*	*genetta*		Small-spotted Genet
Viveridae	*Genetta*	*maculata*		South African Large-spotted Genet (Rusty-spotted Genet)

APPENDIX B

Significance Rating Table for Alternative Alignment 1

Construction Phase

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1 bisects the western boundary of the Manavhela Ben Lavin Provincial Nature Reserve, the Soutpansberg Conservation area, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species.							Medium-High

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:								High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	
	without	2	4	6	5	**60**	**Medium**	-ve	
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1 bisects the Manavhela Ben Lavin Provincial Nature Reserve, Soutpansberg Conservation area, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species.							High

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1 bisects the Manavhela Ben Lavin Provincial Nature Reserve, Soutpansberg Conservation area, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species.							High

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities t-ve o the 55m servitude.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Southern African Python, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							Medium-High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1 bisects the Manavhela Ben Lavin Provincial Nature Reserve, Soutpansberg Conservation area, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species.							

Significance Rating Table for Alternative Alignment 1a

Construction Phase

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous/rocky outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1a bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species.							Medium-High

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:	The proposed Alternative alignment 1a bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous/rocky outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	
	without	2	4	6	5	**60**	**Medium**	-ve	
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed Alternative alignment 1a bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous/rocky outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed Alternative alignment 1a bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous/rocky outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	6	5	**55**	**Medium**		High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed Alternative alignment 1a bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous/rocky outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**		High
	without	2	4	6	5	**60**	**Medium**		High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed Alternative alignment 1a bisects rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous/rocky outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Significance Rating Table for Alternative Alignment 1b									
Construction Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	4	3	**27**	**Low**	-ve	High
	without	2	4	6	4	**48**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats (seasonal pan) and restrict vegetation clearance and activities to the 55m servitude.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1b bisects a seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	3	**27**	**Low**	-ve	High
	without	2	4	6	4	**48**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1b bisects a seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	3	**27**	**Low**	-ve	High
	without	2	4	6	4	**48**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:								High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	3	**27**	**Low**	-ve	Medium-High
	without	2	4	6	4	**48**	**Medium**	-ve	Medium-High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1b bisects a seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-low

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1b bisects a seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-low

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	4	3	**27**	**Low**	-ve	High
	without	2	4	6	4	**48**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1b bisects a seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	4	**48**	**Medium**		High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 1b bisects a seasonally inundated pans, rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low

Significance Rating Table for Alternative Alignment 2									
Construction Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	
	without	2	4	6	5	**60**	**Medium**	-ve	
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 2 bisects rivers (non-perennial drainage lines), seasonally inundated pans as well as suitable habitat for several red listed faunal species including Giant Bullfrog and Southern African Python							Medium-Low

Significance Rating Table for Alternative Alignment 3									
Construction Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena							Medium-Low

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:	Medium-High the proposed alignment bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena.							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	
	without	2	4	6	5	**60**	**Medium**	-ve	
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 3 bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena.							Medium-Low

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 3 bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena.							Medium-Low

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 3 bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena.							Medium-Low
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 3 bisects rivers (non-perennial drainage lines), rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Ground Pangolin and Brown Hyaena.							Medium-Low

Significance Rating Table for Alternative Alignment 4									
Construction Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign alternative alignment 4 to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	
	without	2	4	6	5	**60**	**Medium**	-ve	
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	5	**60**	**Medium**	-ve	High
	without	2	4	8	5	**70**	**High**	-ve	High
	degree to which impact can be reversed:	Extremely limited due to the sensitivity of large sections of the alignment especially through the Sand River Gorge							Low
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alignment bisects the Soutpansberg through the Sand River Gorge, rivers (non-perennial drainage lines), seasonally inundated pans, rupicolous outcrops, Northern Mistbelt Forest as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Northern Forest Rain Frog, Soutpansberg Flat Lizard, Muller's Velvet Gecko, Ground Pangolin, Brown Hyaena, Lion, Wild Dog, Cheetah and White Rhinoceros							High

Significance Rating Table for Alternative Alignment 5									
Construction Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	2	4	6	4	**48**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	2	4	4	4	**40**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium-Low
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium

Operational Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat with clearance of vegetation within the 55m servitude	**Nature of impact:**	Adverse Impact							
	with	1	4	4	5	**45**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	The clearance of the vegetation should be restricted to the 55m servitude and only larger tree species impacting which could potential impact on the lines should be removed. The vegetation of the servitude should not be totally removed providing refuge habitat for remaining faunal species (especially arboreal species)							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	
	without	2	4	6	5	**60**	**Medium**	-ve	
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing or disturbances of any faunal species. No illegal poaching or hunting activities.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium

Decommissioning Phase									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	1	2	5	**20**	**Low**	-ve	High
	without	2	1	4	5	**35**	**Medium**	-ve	High
	degree to which impact can be reversed:	The removal of the tower pylons and lines must be restricted to the 55m servitude. Rehabilitation of the vegetation within the cleared servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium

Cumulative Impacts									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of faunal habitat	**Nature of impact:**	Adverse Impact							
	with	1	4	6	5	**55**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Low- Realign preferred alignment to avoid sensitive habitats and restrict vegetation clearance and activities to the 55m servitude.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium
Direct Impact on associated fauna and interactions with structures and personnel	**Nature of impact:**	Adverse Impact							
	with	1	4	4	4	**36**	**Medium**	-ve	High
	without	2	4	6	5	**60**	**Medium**	-ve	High
	degree to which impact can be reversed:	Medium-Restrict construction activities to the 55m servitude. No intentional killing of any faunal species.							Medium
	degree of impact on irreplaceable resources:	The proposed alternative alignment 5 bisects the northern boundary of the Soutpansberg Conservation area, rivers (non-perennial drainage lines), rupicolous outcrops as well as suitable habitat for several red listed faunal species including Giant Bullfrog, Southern African Python, Mullers' Velvet Gecko, Ground Pangolin, Brown Hyaena, Wild Dog and Cheetah.							Medium