110km 400kV power line from Foskor MTS near Phalaborwa to Spencer MTS

DIGES

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EXECUTIVE SUMMARY

BioAssets cc was appointed by the DIGES Group to do a biodiversity study that includes the assessment of flora, fauna and habitat, the status and sensitivity of the area in relation to biodiversity for the project. This study exclude the avifaunal and water resource studies.

The objectives were:

- Undertake baseline survey and describe affected environment within the project footprint
- Assess the flora, fauna and habitat in relation to the current ecological status and the conservation priority within the project footprint
- Undertake sensitivity study to identify protected species, Red Data species, alien species and fauna within the servitude
- Recommend the preferred alternative and mitigation measures.

The findings from this report can be summarised as:

- Substation – it must be noted that more than 1 hectare of indigenous vegetation will be cleared at the Spencer Substation (9ha is required).
- General vegetation clearing for the project – in addition, it must be noted that more than 300m^2 of indigenous vegetation will be removed in the CBA areas.
- Alternative 1
    - The natural vegetation in the corridor north of the Groot Letaba River is modified.
    - The Deviation 1a is a viable option and is the rest of the alternative that was investigated.
    - There is a number of protected trees associated with the corridor and trimming will be required in some instances. The number of trees will only be verified once the final corridor is determined and the pylon positions pegged.
    - No red data plant species were noted. This must be confirmed during the walk down study, once the final route is known – will form part of the plant rescue operation.
    - A walk down survey consisting of the surveyor, the engineer and botanist must then be undertaken to see if it will be necessary to move pylons to lower the need of trimming or cutting of protected trees.
    - With the current impact to the broader habitat, clear corridors can be found for stream and river crossings that will lower the need to cut riparian trees.
    - South of the Groot Letaba River the natural vegetation is in a fair to good condition.
    - Historic and current land-use practices contributed to modifying the vegetation and encroachment of the shrubs and small tree layer was observed in large parts of the study area.
    - The route for Alternative 1 cut through some properties and it will result in the cutting and trimming of larger trees.
    - It is recommended that the route must follow existing roads, fences or servitudes, as this will lower the need of cutting and trimming of trees.
    - When looking at the Limpopo Conservation Plan version 2 (LCPv2) associated with this alternative (Alternative 1), the areas affected are CBA1 and CBA 2 with the associated support areas (Figure 39). As is recommended that the corridor for the new proposed

powerline must be only cleared from larger vegetation that will impact directly to the conductors. This entail that trimming of larger trees must be done and it is important that "no total clearing of the basal layer" must be allowed. This will ensure that the grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. No buffer around the corridor is needed, as only the narrow strip must be cleared for the proposed power line. The corridor will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.

- As is the case to the north, a walk down study must be conducted to map the protected trees in the final corridor. This information is needed for the permit applications to DAFF. No clearing of the corridor can commence before the permits are issued.
- A formal induction and monitoring of clearing must be done by the botanist to ensure that the permit regulations are carried out.
- With the comments received during consultation, it seems that a combination of Alternative 1 and 2 will be used.

- Alternative 2
  - The first section of the Alternative 2 north of the Groot Letaba River is similar in ecological integrity to Alternative 1.
  - The impacts in this section is high with the natural vegetation in a severely modified state. Using this route is therefore an ecological option.
  - As with Alternative 1, the natural vegetation south of the Groot Letaba River is in a fair to good condition.
  - The current and historic land-use practices contributed to the encroachment of the shrub and small tree layer.
  - Numerous protected trees are present south of the river in the corridor.
  - A walk down study must be conducted to map all protected trees.
  - The route for Alternative 1b is an option, as this deviation will follow the R71 and exiting roads, servitude and cleared corridors can be used as it will lower the need for clearing of vegetation.
  - It is clear that the area south of the Groot Letaba River is in a better ecological state compared to the general area north of the river.
  - When looking at the Limpopo Conservation Plan version 2 (LCPv2) associated with this alternative (Alternative 2), the areas affected are CBA1 and CBA 2 with the associated support areas (Figure 39). No red data plant species were noted. This must be confirmed during the walk down study, once the final route is known – will form part of the plant rescue operation. As is recommended that the corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. This entail that trimming of larger trees must be done and it is important that "no total clearing of the basal layer" must be allowed. This will ensure that the grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. No buffer around the corridor is

needed, as only the narrow strip must be cleared for the proposed power line. The corridor will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.

- The area south is not in great ecological condition, as the over grazing over the years contributed to the encroachment of large areas in the study area.

- Hunting and setting of snares is a problem during construction.
- The area north of the river is low in game, but illegal hunting is still a problem.
- In the area south of the Groot Letaba River the issue is a problem on game farms. In many cases, rare game is present a hunting/snares can be a problem.
- The list of game below is a general list for the region (Addendum 3). The issues on each farm must be assessed as part of the final route selection.

General comments

- During construction it will be important to liaise with the landowners with regard to the game present on the different farms (once the final route is selected). Where dangerous animals are present, it will be important to ensure that game is moved to other camps where possible. A ranger from the farm must be present during construction to ensure the safety of man and animals. A concern will be the areas where *Loxodonta africana* and *Giraffa camelopardalis* are present as the former can damage pylons and get electrocuted if conductors are to low and the latter is exposed to electrocution as well. One look at a reach of the elephant to 6m and giraffe can grow to 6m as well.
- With regard to the visual impacts, it is obvious that some structures will be seen from roads and other infrastructure (houses and camps). The best solution is to follow existing fences and roads where power lines and telephone lines are present. This will ensure that the power line is on the boundary of the property and that a minimal visual impact can be achieved. In addition, the use of compact structures can soften the visual load for tourists and farmers.

Declaration of Independence

The Environmental Impact Assessment Regulations (Appendix 6 of the EIA regulations R326 as amended), requires that certain information is included in specialist reports. The terms of reference, purpose of the report, methodologies, assumptions and limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below:

Expertise of author:

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

Declaration of independence:

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

Disclosure:

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

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

_____ 28 June 2017

Dr Wynand Vlok Date

Assumptions and limitations

Availability of baseline information

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

Constraints

The survey was conducted during daytime only. All the different habitat and vegetation types at the site was investigated and it was therefore possible to complete a rapid survey and obtain information on the habitats that are present and the site, or that are likely to occur there. Access to all sections of the corridor was not possible.

Bio-physical constraints

Weather conditions during the period were hot with a light wind blowing. The region has received rainfall prior to the site visit and the vegetation was flushing and moderately established after the severe drought of recent times. There was no standing water in the veld during the time of the survey. This will have obvious implications on the biodiversity (not applicable for this study) that are likely to occur in the area. Nevertheless, the conditions during the survey were suitable for a survey of this nature.

Confidentially constraints

There were no confidentiality constraints.

Implications for the study

Apart from the prevailing weather conditions at the site and the limited access to certain sections of the proposed corridors are not considered to negatively impact upon the study. All the different habitat types and vegetation units were observed during the field surveys. There is sufficient good quality data available in the literature that partially negates the negative effect that the type of survey had on the quality of the assessment.

Contents

1 INTRODUCTION

Eskom intends to construct a ±110km, 400kV power line from Foskor MTS near Phalaborwa to Spencer MTS near Tzaneen. This will include the establishment of 400/132kV transformation yard with the installation of 1x500MVA, 400/132kV transformer at Spencer MTS. Two alternatives and deviations will be assessed with a 3km corridor.

1.1 Terms of Reference

BioAssets CC was appointed by the DIGES Group to do a biodiversity study that includes the assessment of flora, fauna and habitat, the status and sensitivity of the area in relation to biodiversity for the project. This study exclude the avifaunal and water resource studies (Figure 1).

1.2 Objectives of the Survey

The objectives were:

- Undertake baseline survey and describe affected environment within the project footprint
- Assess the flora, fauna and habitat in relation to the current ecological status and the conservation priority within the project footprint;
- Undertake sensitivity study to identify protected species, Red Data species, alien species and fauna within the servitude; and
- Recommend the preferred alternative and mitigation measures.

1.3 The Study Area

The locality map for the study area is depicted in Figure 1 and 2. For the study, two (2) alternatives in the area were investigated and each will be discussed separately (Figure 3 - 4). Some additional deviations were investigated on each alternative and this will be discussed in the detail deliberations.

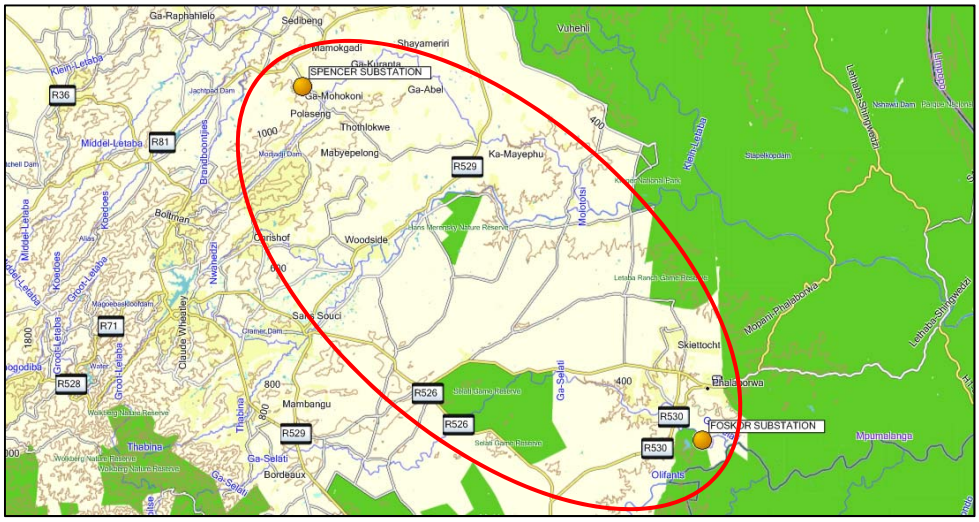

Figure 1: Map of the study area approximately between the Spencer and Foskor substations.

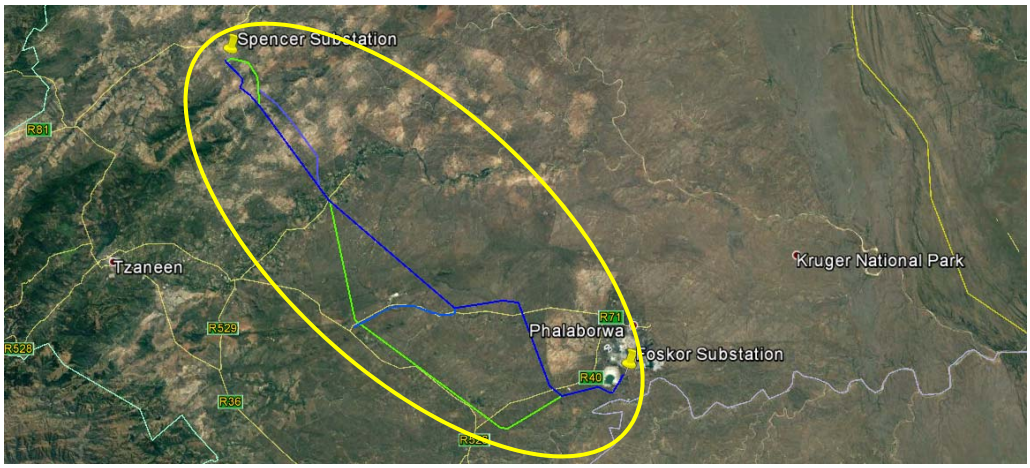

Figure 2: Aerial view of the study area (circled in yellow – Alternative 1 in blue and Alternative 2 in green).

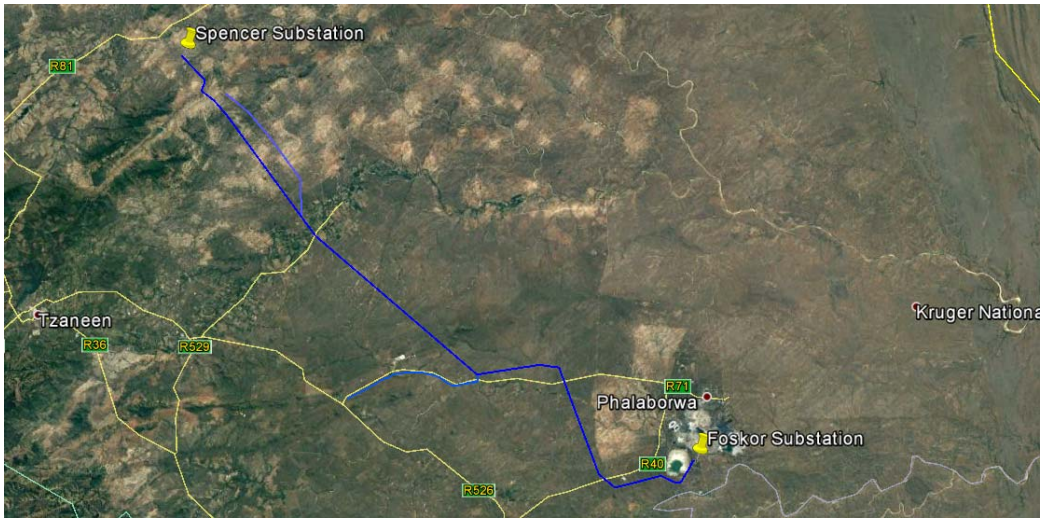

Figure 3: Proposed corridor for Alternative 1. The two deviations (light blue) will be linked to section of Alternative 2.

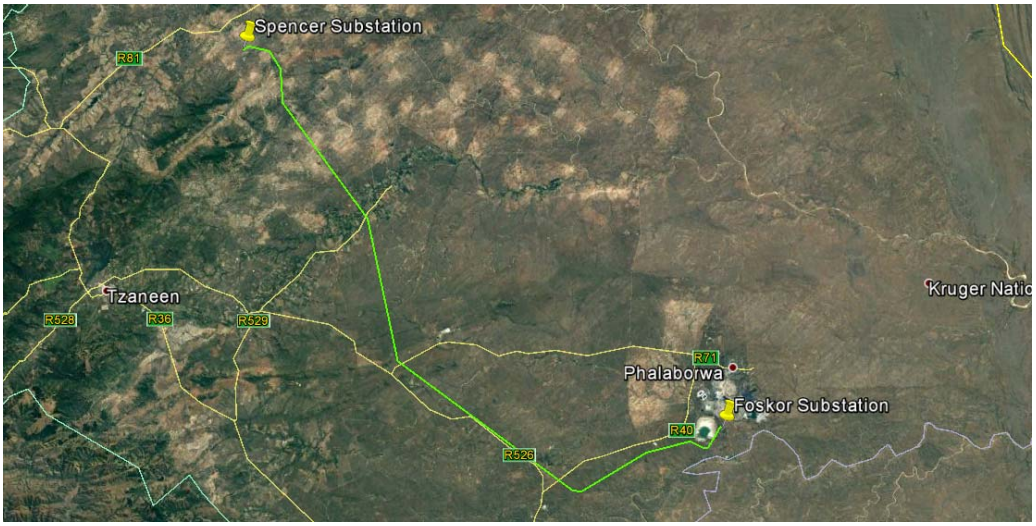

Figure 4: Proposed corridor for Alternative 2.

2 METHODOLOGY

The field survey was preceded by a desktop study to determine what possible impacts and concerns are associated with the study area. This is related to the biodiversity and protected fauna and flora.

Field survey

The field survey was planned to include all the different habitat types and to target threatened species that may occur in the area, to determine the likelihood of their presence and how the proposed activities will impact upon them.

During the survey (February and May/June 2017), a walk-about was conducted to determine the possible environmental impacts by the proposed power line and substation. All activity of animals was noted and a general plant list was compiled. Due to the time constraint, a full survey of plants was not possible. Photographs of important features were taken and will be included in the report. Eight red data species occur in the area when compared to the plant lists supplied by SANBI (2017) (Addendum 2). Addendum 3 is a list of historic records on red data mammals and the probability of occurrence currently. Protected trees listed in Mucina and Rutherford (2006) and SANBI Précis lists (2017) include *Combretum imberbe, Boscia albitrunca, Adansonia digitata, Balanites maughamii subsp. maughamii, Catha edulis, Pterocarpus angolensis, Elaeodendron transvaalense* and *Sclerocarya birrea subsp. caffra*. During the fieldwork, a number of protected trees were noted in the study area and once the final corridor is established, a walk-down survey must be conducted to map the protected trees. This information will be used in the permit application for the cutting or trimming of trees (from DAFF).

According to in the National Environmental Management Biodiversity Act (Act 10 of 2004) (NEMBA) the vegetation type is listed as vulnerable (NEMBA, 2004). Management and mitigations actions are discussed in the summary and Addendum 1 at the end of the report.

Vegetation and habitat

The vegetation along the total length of the alternatives for this project is diverse and include 6 different veld types (Figure 5): Tsende Mopaneveld (SVmp 5), Lowveld Rugged Mopaneveld (SVmp 6), Phalaborwa-Timbavati Mopaneveld (SVmp 7), Granite Lowveld (SVl 3), Gravelotte Rocky Bushveld (SVl 7) and Tzaneen Sour Bushveld (SVl 8) (Mucina and Rutherford, 2006).

Tsende Mopaneveld (SVmp 5)

This vegetation type was previously referred to as the Mopani Veld (Acocks, 1953) and later the Mopane Bushveld (Low and Rebelo, 1996). It is prevalent in the Limpopo Province (between 300 and 550 m) and occurs on undulating terrain west of the basalt plains from the Mphongolo River and Sirheni Bushveld Camp area in the north, southwards across the Shingwedzi River and extending slightly outside the Kruger National Park to include areas near to Malamulele and Mahlathi, through the upper Tsende River catchment area to around Mopani Camp in the south (Mucina and Rutherford, 2006).

Another belt occurs further south from the area around the Hans Merensky Nature Reserve in the west to the vicinity of Letaba Rest Camp in the east with a narrow irregular strip immediately to the east of the basalt plains as far south as the Shingwedzi River area (Mucina and Rutherford, 2006).

The **vegetation and landscape in known for its** slightly undulating plains with medium-high shrubby savanna and some trees and a dense ground layer dominated by *Colophospermum mopane*. The ratio of *C. mopane* to *Combretum apiculatum* decreases on the less clayey soils of the uplands. In the north western parts the tree cover is greater and together with the southern and north-eastern outliers of the unit, these flatter landscapes include several trees such as *Senegalia nigrescens* in addition to the dominant *Colophospermum mopane* (Mucina and Rutherford, 2006).

The **geology and soils** are dominated by a large area (75%) underlain by potassium-poor, quartz-feldspar rocks of the Goudplaats Gneiss Basement and to the north-eastern part of the area the Letaba basalts of the Karoo Supergroup is present. Typically clayey soils occur, but with less than 15% clay in the A-horizon on the upland positions with deeper clayey soils are found on the flats and to the northeast, more sandy soils (weathered products of basalt and Quaternary sand and gravel) are found (Mucina and Rutherford, 2006).

The **climate** is known as a summer rainfall region with very dry winters and generally a frost-free with a Mean Annual Precipitation (MAP) of 450 to 650 mm (Mucina and Rutherford, 2006).

Conservation status for this vegetation unity is listed as “Least threatened” with a target of 19% set for formal protection. Of this, about 63% is statutorily conserved in the Kruger National Park and the Hans Merensky Nature Reserve. A further 5% is conserved in private reserves, mainly in the Groot-Letaba Wildreservaat and more than 12% of the area has been transformed, mainly through cultivation and some settlement development outside the Kruger National Park (Mucina and Rutherford, 2006).

Lowveld Rugged Mopaneveld (SVmp 6)

This veld type (altitude ranging between 250 and 550 m) was known as the Arid Lowveld (Acocks, 1953) Mopane Bushveld (Low and Rebelo, 1996). It has a distribution in both the Limpopo and Mpumalanga Provinces where the broken veld from the area southeast of Giyani in the west to Shimuwini and Boulders Camps in the east and the rugged area of the Olifants River Valley south of Phalaborwa, from Grietjieberg in the west to the Maveni River tributary in the east and found (Mucina and Rutherford, 2006).

The **vegetation and landscape** is known for the slight to extreme irregular plains with steep slopes and a number of prominent hills. This is illustrated by the area around the Olifants River which is more dissected with steeper slopes when compared to the northern part of this unit. The vegetation is normally made up of dense shrubs with occasional trees and a sparse ground layer and the woody plants can become particularly dense where fire is excluded by very rocky terrain. In the north-eastern parts of this unit, particularly outside the Kruger National Park, the vegetation is more open (Mucina and Rutherford, 2006).

When looking at the **geology and** soils in the vegetation unit, the Goudplaats Gneiss and Makhutswi Gneiss underlie most of this area, with a smaller contribution from the ultramafic metavolcanics (rocks rich in chlorite, amphibole, talc and serpentine) and metasediments of the Giyani Greenstone Belt (all Swazian Erathem). With regard to the soils, the red-yellow apedal and freely drained soil forms of the Hutton, Mispah and Glenrosa are shallow and stony (Mucina and Rutherford, 2006).

The **climate** is associated with a summer rainfall area with very dry winters and frost can occur in the low-lying areas. Rainfall (MAP) ranges between 400 to 600 mm per year (Mucina and Rutherford, 2006).

This unit is "least threatened" (**conservation status**) with a target set for 19%, with approximately 34% statutorily conserved (mostly in the Kruger National Park) and an additional 5% conserved in private reserves - Klaserie, Letaba Ranch and Selati Game Reserve. About 20% is already transformed by cultivation and urban and built-up areas and the natural vegetation occurring outside the conserved areas is under pressure from high-density rural human population and associated urban sprawl and agricultural activities that include moderate erosion (Mucina and Rutherford, 2006).

Phalaborwa-Timbavati Mopaneveld (SVmp 7)
Previously this vegetation unit (altitude from 300 to 600 m) formed part of the larger Arid Lowveld (Acocks, 1953) and more recently is was referred to as the Mopane Bushveld (Low and Rebelo, 1996). The vegetation unit is found in the Limpopo and Mpumalanga Provinces in a band about 40 km west and east of Phalaborwa and south of the Olifants River on the boundary between the Timbavati Game Reserve and the Kruger National Park, including parts of the Umbabat and Klaserie Nature Reserves (Mucina and Rutherford, 2006).

When looking at the broad **vegetation and** landscape pattern it is known for the open tree savanna on undulating plains with the sandy uplands dominated by *Combretum apiculatum*, *Terminalia sericea* and *Colophospermum mopane* trees. The *T. sericea* disappears and *Combretum apiculatum* becomes less common in the clayey bottomlands where it is replaced by mainly *Senegalia nigrescens* and with an increased dominance of *Colophospermum mopane*. Apart from the well-developed field layer the northern section of this unit is famous for the large number of termite mounds on the uplands areas (Mucina and Rutherford, 2006).

The **geology and soils** are dominated by the Quartz-feldspar rocks of the Makhutswi Gneiss (Swazian) with intrusions of the Lekkersmaak Granite (Randian) in the northwest and sandy soils (usually less than 10% clay in the A-horizon) on the uplands (e.g. Clovelly soil form) and clay soils in the bottomlands (e.g. Valsrivier and Sterkspruit soil forms) (Mucina and Rutherford, 2006).

As with the other vegetation units, the **climate** of this community forms part of summer rainfall region with very dry, frost free winters and an average rainfall of 400–600 mm. the mean monthly maximum and minimum temperatures for Phalaborwa range between 38.4°C and 5.7°C for January and July (Mucina and Rutherford, 2006).

The **conservation** status for the unit is "least threatened" with 38% of the targeted 19% statutorily conserved in the Kruger National Park and the rest in the Selati Game Reserve and Umbabat, Timbavati, Klaserie Nature Reserves Target. About 5% has been transformed, mainly by development of human settlements and mining (Mucina and Rutherford, 2006).

Granite Lowveld (SVl 3)

This unit (altitude 250 – 700 m) previously were known as the Arid Lowveld and the Lowveld (Acocks, 1953) and later as the Mixed Lowveld Bushveld (Low and Rebelo, 1996) and is mainly found in the Limpopo and Mpumalanga Provinces with pockets in Swaziland and KwaZulu-Natal. The north-south belt on the plains east of the escarpment from Thohoyandou in the north, interrupted in the Bolobedu area, continued in the Bitavi area, with an eastward extension on the plains around the Murchison Range and southwards to Abel Erasmus Pass, Mica and Hoedspruit areas to the area east of Bushbuckridge. Substantial parts are found in the Kruger National Park spanning areas east of Orpen Camp southwards through Skukuza and Mkuhlu, including undulating terrain west of Skukuza to the basin of the Mbyamiti River (Mucina and Rutherford, 2006).

It continues further southward to the Hectorspruit area with a narrow westward extension up the Crocodile River Valley past Malelane, Kaapmuiden and the Kaap River Valley, entering Swaziland between Jeppe's Reef in the west and the Komati River in the east, through to the area between Manzini and Siphofaneni, including the Grand Valley, narrowing irregularly and marginally entering KwaZulu-Natal near Pongola (Mucina and Rutherford, 2006).

The tall shrubland with few trees to moderately dense low woodland on the deep sandy uplands is the characteristic **vegetation and landscape** with *Terminalia sericea*, *Combretum zeyheri* and *C. apiculatum* forming the tree layer. The ground layer is dominated by *Pogonarthria squarrosa*, *Tricholaena monachne* and *Eragrostis rigidior* and the dense thicket to open savanna in the bottomlands are known for the *Senegalia nigrescens*, *Dichrostachys cinerea* and *Grewia bicolor* in the woody layer (Mucina and Rutherford, 2006).

The dense herbaceous layer contains the dominant *Digitaria eriantha*, *Panicum maximum* and *Aristida congesta* on fine-textured soils, while brackish bottomlands support *Sporobolus nitens*, *Urochloa mosambicensis* and *Chloris virgata*. At seep lines, where convex topography changes to concave, a dense fringe of *Terminalia sericea* occurs with *Eragrostis gummiflua* in the undergrowth (Mucina and Rutherford, 2006).

As for the **geology and soils**, it is dominated by the Swazian Goudplaats Gneiss, Makhutswi Gneiss and Nelspruit Suite (granite gneiss and migmatite - north to south) with the younger Mpuluzi Granite (Randian) form the major basement geology further south. In this unit, the Archaean granite and gneiss weathered into sandy soils in the uplands and clayey soils with high sodium content in the lowlands (Mucina and Rutherford, 2006).

Climatically the unit is part of the summer rainfall region with frost-free, dry winters and an average rainfall that varies from 450 mm on the eastern flats to 900 mm near the escarpment in the west, with a north-south average peak in Swaziland. The mean monthly maximum and minimum temperatures for Skukuza 39.5°C and –0.1°C for January and June and corresponding values for is Hoedspruit 38.0°C and 3.7°C for January and July (Mucina and Rutherford, 2006).

This vegetation unit is classes as "vulnerable" (**conservation** status) with only 17% of the targeted 19% statutorily conserved in the Kruger National Park and a similar percentage is conserved in private reserves mainly the Selati, Klaserie, Timbavati, Mala Mala, Sabi Sand and Manyeleti Reserves. More

than 20% already transformed as a result of cultivation and by settlement development and the area is having a very low to moderate erosion potential (Mucina and Rutherford, 2006).

Gravelotte Rocky Bushveld (SVl 7)
Previously referred to as the Arid Lowveld (Acocks, 1953) and the Mixed Lowveld Bushveld (Low and Rebelo, 1996), this unit is found in the Murchison Range neat Gravelotte and include surrounding mountains and hills (e.g. Ga-Mashishimale north of Mica and Seribana) and extending northwards towards Thohoyandou (e.g. hills including Mangombe and Sionwe). The altitude ranges between 450 and 950 m with the highest peaks reaching 1 025 m (Mucina and Rutherford, 2006).

The **vegetation and landscape** is featured by the open deciduous to semi deciduous woodland on rocky slopes and inselbergs that contrasts strongly with the surrounding plains (Mucina and Rutherford, 2006).

The varied **geology and soils** is largely composed of schist and amphibolite of the Gravelotte and Giyani Groups, with a few quartzitic and granitic hills with shallow soils (Glenrosa and Mispah forms most common) (Mucina and Rutherford, 2006).

As is the case with the other units, this vegetation type **climate** is associated with the summer rainfall region where infrequent frost occur during the dry winters. The mean annual precipitation ranges 500 mm in the east to 900 mm in the west with the higher rainfall on the higher mountains (Mucina and Rutherford, 2006).

With regard to its **conservation** status, this vegetation unit is listed as “least threatened” with a target set at 19% for formal conservation. However, no parts are conserved in statutory conservation areas with only approximately 7% that is protected in the northern part of the Selati Game Reserve. Conservation of this unit is promoted due to the land use of game and cattle ranching and due to its low agronomic potential. Of the total unit area, more than 15% is transformed as a result of cultivation and settlements. The erosion potential is considered to be very low to moderate (Mucina and Rutherford, 2006), but is higher were slopes are exposed (Mucina and Rutherford, 2006).

Tzaneen Sour Bushveld (SVl 8)
The last vegetation unit was known as the Lowveld Sour Bushveld (Acocks, 1953) and the Sour Lowveld Bushveld (Low and Rebelo, 1996) and is found exclusively in the Limpopo Province with a band extending along the foot slopes and hills of the north-eastern escarpment, from the Soutpansberg Mountains in the north via Tzaneen and narrowing to the Abel Erasmus Pass area in the south where the general altitude varies from 600 to 1 000 m and higher in the mountains.

The **vegetation and landscape** features Deciduous, tall open bushveld (parkland) with a well-developed, tall grass layer, occurring on low to high mountains with undulating plains mainly at the base of, and on the lower to middle slopes of the north-eastern escarpment.

The potassium-poor gneisses of the Goudplaats gneiss (Swazian Erathem) and an Archaean granite dyke underlie most of this area which dominate the **geology and soils**. Shales and quartzite of the Wolkberg Group are present, but not common and the soils are Mispah, Glenrosa or Hutton forms, shallow to deep, sandy or gravelly and well-drained.

Climatically, the unit is part of the summer rainfall region where infrequent frost are part of the dry winters. Rainfall varies from 550 mm on the foot slopes of the escarpment in the east to more than 1 000 mm, where it borders grassland at higher altitudes to the west. Mean monthly maximum and minimum temperatures for Tzaneen are 36.4°C and 3.9°C for January and June.

This vegetation unit is classified as "endangered" as far as its **conservation** status is concerned with little over 1% statutorily conserved (target 19%) in the Lekgalameetse Nature Reserve and about 2% in private reserves such as the Selati Game Reserve and Wolkberg (Serala) Wilderness Area. A high proportion (41%) is transformed by cultivation (29%) and plantations (9%). Scattered alien plants include *Solanum mauritianum*, *Melia azedarach* and *Caesalpinia decapetala*. The subtropical climate is conducive to the spread of *Chromolaena odorata*, *Lantana camara* and *Psidium guajava*. Erosion is very variable - from very low to high in some areas (Mucina and Rutherford, 2006).

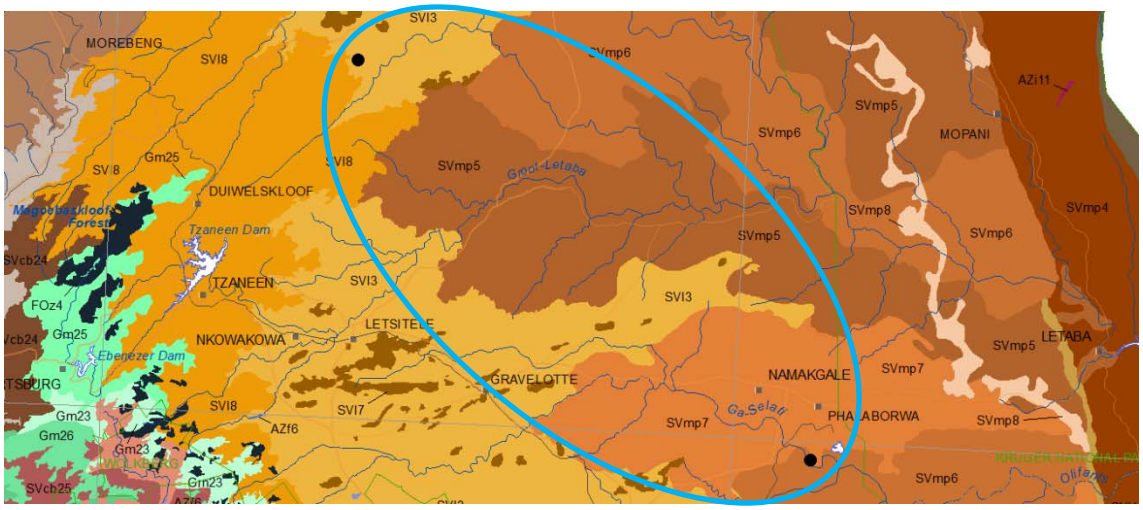

Figure 5: The vegetation map (Mucina and Rutherford 2006) of the study area, indicating the different vegetation units.

Limpopo Conservation Plan (v2)

The Limpopo Conservation Plan version 2 (LCPv2) is designed to support integrated development planning and sustainable development by identifying an efficient set of Critical Biodiversity Areas that are required to meet national and provincial biodiversity objectives, in a configuration that is least conflicting with other land uses and activities (Desmet et al., 2013). Rivers, wetlands, priority catchments and strategic water source areas formed a critical spatial backbone to the LCPv2 (Desmet et al., 2013). According to the LCPv2, the study area runs through areas classified as CBA1, CBA2, ESA1 and ESA2 (Figure 6) and Table 1 list the definitions of these categories.

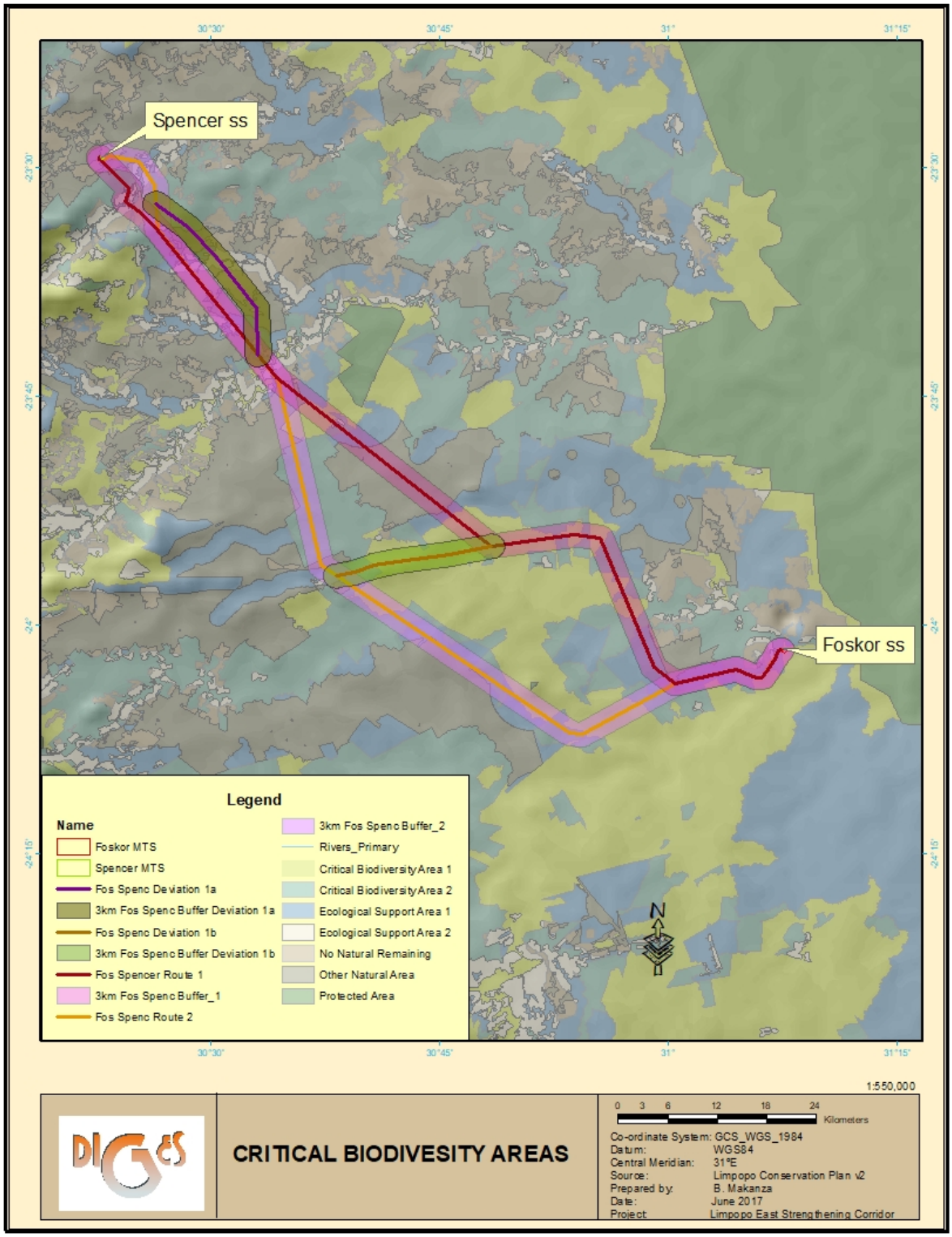

Figure 6: Study area in relation to the LCPv2; CBA = Critical Biodiversity Area; ESA = Ecological Support Area.

Table 1: General description of CBA map categories (Desmet et al., 2013).

CBA Map Category	Description
Protected Areas (PA)	Formal Protected Areas and Protected Areas pending declaration under NEMBA.
Critical Biodiversity Areas (1) (CBA 1)	Irreplaceable Sites. Areas required to meet biodiversity pattern and/or ecological process targets. No alternative sites are available to meet targets.
Critical Biodiversity Areas (2) (CBA 2)	Best Design Selected Sites. Areas selected to meet biodiversity pattern and/or ecological process targets. Alternative sites may be available to meet targets.
Ecological Support Areas (1) (ESA 1)	Natural, near natural and degraded areas supporting CBAs by maintaining ecological processes.
Ecological Support Areas (2) (ESA 2)	Areas with no natural habitat that are important for supporting ecological processes.
Other Natural Areas	Natural and intact but not required to meet targets, or identified as CBA or ESA
No natural habitat remaining	Areas with no significant direct biodiversity value. Not Natural or degraded natural areas that are not required as ESA, including intensive agriculture, urban, industry, and human infrastructure.

Plant rescue and rehabilitation plan

Management and mitigations actions are discussed in detail in the summary and Addendum 1 at the end of the report. As part of the project, the "plant rescue and rehabilitation plan" is incorporated. Once the final route is known and the route is pegged, a walk down survey for rare and protected plants will be conducted. The plants will be marked and then the local community in consultation with the land-owners will have the opportunity to collect medicinal plants. In addition, rare plants can be collected by other organisations interested in the propagation and rehabilitation of the plants. This process will be done under the auspices of the local conservation agencies, as they must be present to issue the relevant collection and transport permits.

General Faunal comments

With regard to the fauna, a general survey was conducted to look at the possible impacts related to the mammals in particular. Comments will be listed in the discussion section of this report.

3 RESULTS and DISCUSSION

3.1 General Survey

The study was conducted when a physical site walk-down was conducted on site. In addition, the presence of any drainage areas or water resources not on the maps or aerial images was confirmed. This entailed a study outside the proposed corridor for the new power line (Figure 1 and 2).

Alternative 1

This corridor (Figure 3) is the more direct route from the existing Spencer Substation to the Foskor Substation and is to the north in the study area, compared to Alternative 2 which follow a corridor to the south in the study area. The northern sector of the proposed route follows a corridor southeast from the Spencer substation to the Foskor area. This sector is considered from Spencer to the crossing of the Groot Letaba River and include the deviation (Deviation 1a) to the east. For it to be linked to Alternative 1, the first section of Alternative 2 is included (Figure 7 – green section).

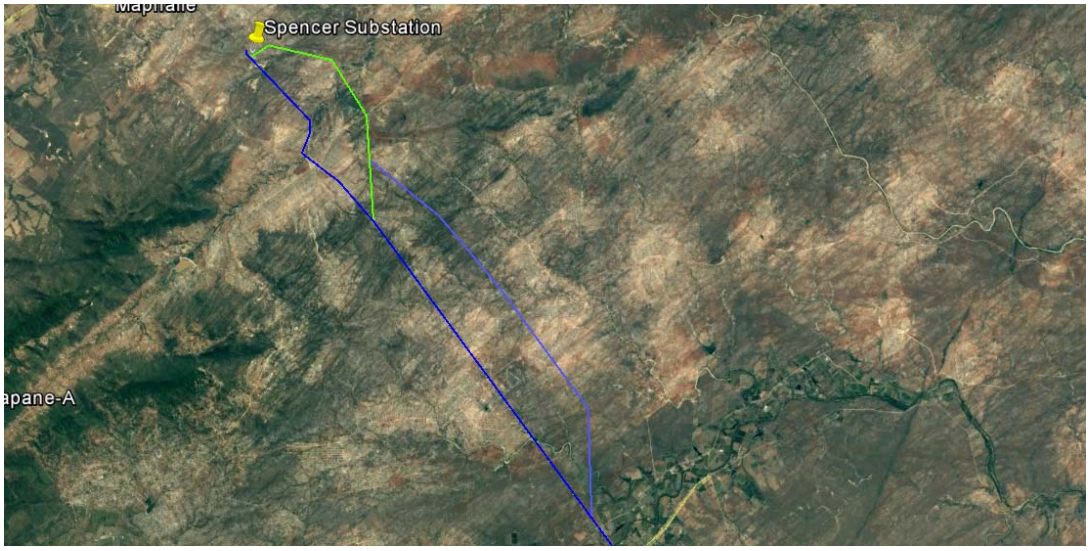

Figure 7: The area southeast of the Spencer substation – Alternative 1 in dark blue, Deviation 1a in light blue with the section of Alternative 2 in green.

The vegetation at the Spencer substation is modified due to construction activities, grazing of cattle and wood collection from the surrounding communities. The other impacts are related to the power lines and corridors associated with the substation complex and access roads. The corridor crosses the road and follows a corridor to the east. Impacts in the area to the southeast include cultivation, homesteads, grazing, wood collection and erosion. Trees include *Senegalia nigrescens, Vachellia rehmanniana, V. sieberiana, V. permixta, Albizia harveyi, Combretum collinum, C. imberbe, C. molle, C. apiculatum, Colophospermum mopane, Balanites maughamii, Ziziphus mucronata, Cassia abbreviata, Philenoptera violacea, Peltophorum africanum, Dichrostachys cinerea, Terminalia sericea, Sclerocarya birrea, Pterocarpus rotundifolia, Euclea divinorum, Berchemia zeyheri, Flueggea virosa, Grewia monticola, G. flavescens, G. bicolor, Gymnosporia glaucophylla, Olea africana, Spirostachys africana, Ozoroa paniculosa* and *Diospyros mespiliformis* (Figure 8 - 12). The corridor crosses a few streams and the Molototsi River in this first sector. All stream and river crossings are considered sensitive, as they

are prone to erosion. During construction, only proper constructed roads must be used and any damage that can cause erosion must be rehabilitated. All pylons must be placed at least 32m from any drainage line and outside the 1:100 year flood line of the Molototsi River.

The proposed corridor continue southeast through rural areas where cultivation and grazing are the main activities (Figure 13 and 14). The area is overgrazed and with the wood collection removing most of the trees and shrubs resulted in some erosion. The power line then crosses the mountain to the south of Ga-Moloko. The natural vegetation is severely modified and some *Sclerocarya birrea, Philenoptera violacea, Senegalia nigrescens, Vachellia rehmanniana, Combretum collinum, C. apiculatum, Balanites maughamii, Ziziphus mucronata, Cassia abbreviata, Philenoptera violacea, Peltophorum africanum, Dichrostachys cinerea, Terminalia sericea, Pterocarpus rotundifolia, Euclea divinorum, Flueggea virosa, Grewia monticola, G. flavescens, G. bicolor, Gymnosporia glaucophylla, Ozoroa paniculosa* and *Diospyros mespiliformis*.

To the south many villages and roads are present, but the general vegetation cover is fair. This is however changing as many areas are stripped of trees for housing material and fuel and erosion is a problem. The access to the corridor will expose soils and increase the erosion potential. Limited traffic must be allowed during construction and the servitude for the existing power line can be used. This will lower the need to clear natural vegetation and lower the exposed areas. In addition, a stringent management plan to rehabilitate any erosion must be in place during construction.

The mountain area is an extensive area and the terrain very undulating. The route will be susceptible to erosion and the current land use practices which include expansions to residential areas, many small roads into vegetated areas for wood harvesting, cattle paths and grazing and cultivation on slopes all contribute to the modification of the natural vegetation. Erosion is a problem in the area and the corridor for the power line will have some limited impacts in this regard (Figure 15 and 16). Pylons must be placed at least 32m from all streams to prevent any additional impacts to the integrity of the streams and surrounding landscape.

To the south of the mountain the area is more densely populated with an associated increase in impacts which are related to grazing, cultivation, wood harvesting, town development, poor infrastructure maintenance and pollution. The vegetation in general is in a poor condition and trees include *Sclerocarya birrea, Lannea schweinfurthii, Bauhinia galpinii, Terminalia sericea, Burkea africana, Dichrostachys cinerea, Ficus sycomorus, F. abutilifolia, Vachellia sieberiana, V. karroo, V. rehmanniana, Combretum collinum, C. apiculatum, C. imberbe, Peltophorum africanum, Diospyros mespiliformis* and *Ziziphus mucronata.*

The natural vegetation in this sector is modified due to the land use practices. Apart from grazing and cultivation, the wood harvesting, roads and residential developments impact on the landscape. There are a number of small streams that must be negotiated during construction and care must be taken to ensure the vehicles use existing roads. Erosion can increase if the heavy construction vehicles cross the streams and a rehabilitation plan must be in place prior to construction commences.

The trees in the area include *Vachellia karroo, Senegalia. nigrescens, Sclerocarya birrea, Lannea schweinfurthii, Combretum apiculatum, C. imberbe* and *Ficus sycomorus*. Various exotics are present

and include *Jacaranda mimosifolia, Melia azedarach* and *Psidium guajava* (Figure 17 - 18). The presence or absence of *Breonadia salicina* at stream crossings must be confirmed once the final route is pegged (walk down study). Just north of the Groot Letaba River the corridor then enters the intensive cultivated (orchards) area. The corridor follows the farm boundaries to the river crossing.

With regard to the Limpopo Conservation Plan version 2 (LCPv2), the areas affected are CBA 2 and ESA 2 only. The corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. It is important that "no total clearing of the basal layer" must be allowed, as this grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor.

Figure 8: View of the corridor near the Spencer substation.

Figure 9: Natural vegetation modified and encroachment evident.

Figure 10: Example of stream crossings – must use exiting crossing and rehabilitate regularly.

Figure 11: General view of corridor north of mountain areas.

Figure 12: High erosion potential – need to rehabilitate corridor and access routes regularly.

Figure 13: Modified natural vegetation around the settlements.

Figure 14: Impacts associated with villages visible.

Figure 15: View of the mountain area – vegetation in a fair condition.

Figure 16: Recommend that the corridor follow the existing road across the mountain – will lower the clearing need of vegetation.

Figure 17: View of corridor north of Groot Letaba River – cultivation and orchards dominate.

Figure 18: Exiting roads give open access to the Groot Letaba River – will be more effective to lower need for clearing.

South of the Groot Letaba River (Figure 19), the land-use changes and most farms are either cattle/game farms, game farms or private nature reserves. A portion of the corridor crosses farms used by the National Defence Force (NDF) as training areas and it is therefore deemed not suitable to have the power line crossing these areas. It is with this in mind that the deviation (Deviation 1b) was considered (Figure 19 – light blue line following the R71 and exiting power lines). This deviation corridor will be a link between Alternative 2 and the remainder of Alternative 1.

The vegetation along the corridor for Alternative 1 is in a good conditions. Some encroachment due to historic poor land-use practices are present along most of the route and the natural vegetation is unnaturally dense. There are a number of small stream that must be negotiated during construction and care must be taken to ensure the vehicles use existing roads. Erosion can increase if the heavy construction vehicles cross the streams and a rehabilitation plan must be in place prior to construction commences (Figure 20 – 24).

Trees in the area include *Breonadia salicina, Sclerocarya birrea, Lannea schweinfurthii, Senegalia caffra, S. nigrescens, Vachellia sieberiana, V. karroo, Dichrostachys sericea, Ziziphus mucronata, Diospyros mespiliformis, Ficus sur, F. sycomorus, Philenoptera violacea, Combretum imberbe, C. apiculatum, C. collinum* and *Philenoptera violacea*. The ecological integrity of this corridor is moderate to high with regard to the vegetation, but the encroached nature do have a negative impact on the ecological value.

With regard to the Limpopo Conservation Plan version 2 (LCPv2) in this section of the proposed corridor, the areas affected are CBA1 and CBA 2 with the associated support areas. The corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. Only trimming of larger trees must be done and it is important that “no total clearing of the basal layer” must be considered. The grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. As this is a narrow strip that must be worked, no buffer is needed, as clearing will be limited to the proposed power line corridor only. The corridor will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.

The fact that Deviation 1b is an option, is important from an ecological perspective. This corridor follows the existing power line along the R71 and the vegetation next to the road, fences and the existing power line is in a fair to poor condition. From an ecological perspective, this section is preferred to the original corridor for Alternative 1 that cross the reserves and NDF farms (area with lower current impacts).

Figure 19: View of the corridor (Alternative 1) crossing the Groot Letaba River with the associated farming activities visible. Further south, land use is mostly cattle and game farming. Alternative 1b is the pale blue line south of the R71.

Figure 20: Vegetation near the road very dense – due to increased runoff from the hard surfaces.

Figure 21: Some areas in the protected areas (private reserves) have vegetation in a good condition.

Figure 22: Some poor land use practices resulted in encroachment of the shrub and small tree layer.

Figure 23: Some open corridors present to use as access for the power line.

Figure 24: Historic land use resulted in encroachment – clearing will be needed in this sector.

The third sector of the Alternative 1 corridor follows the R71 and then crosses south at the Croc Ranch Reserve. The route crosses the Ga-Selati River and then continues south to the R530. The corridor cross a number of game farms and private reserves where the natural vegetation is in a fair to good condition (Figure 24). As was the case with sector 2, the encroachment due to historic poor land-use practices lower the overall ecological integrity of the area. This said, the ecological integrity and importance can still be considered to the moderately high to high. The tree composition is similar to sector 2 and here some *Adansonia digitata* is present in the landscape. None will be impacted by the power line as it is recommended that structures must be moved if any are encountered during the walk down study (Figure 25 – 29).

There are a number of small streams and the river crossing that must be negotiated during construction and care must be taken to ensure the vehicles use existing roads. Erosion can increase if the heavy construction vehicles cross the streams and a rehabilitation plan must be in place prior to construction commences. The structures must be outside the 1:100 year flood line for the Ga-Selati River and at least 32m from the smaller ephemeral and seasonal streams.

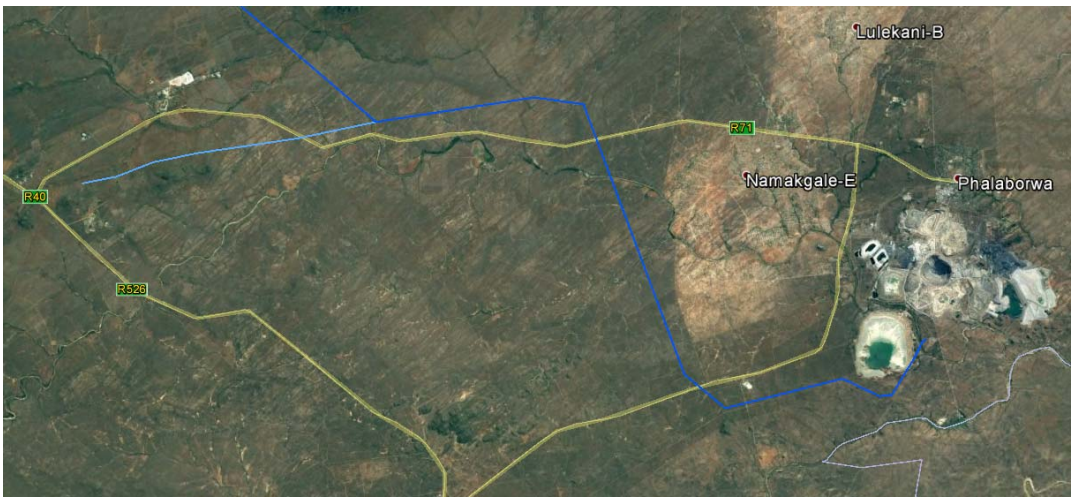

Figure 24: The last sector of Alternative 1 – some river crossings present.

When looking at the Limpopo Conservation Plan version 2 (LCPv2) associated with this section of the proposed power line corridor, the areas affected are CBA1 and CBA 2 with the associated support areas. As was recommended in the previous section, the corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. This entail that trimming of larger trees must be done and it is important that “no total clearing of the basal layer” must be allowed. This action will ensure that the grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. No buffer around the corridor is needed, as only the narrow strip must be cleared for the proposed power line. The corridor will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.

Figure 25: Some ephemeral stream present in the undulating landscape – caution with erosion needed.

Figure 26: Areas with impacts related to historic and current land use practices.

Figure 27: Section in game areas with dense vegetation present.

Figure 28: The Ga-Selati River – care with selection of crossing point – need existing bridge nearby during construction.

Figure 29: Example of well managed vegetation – natural vegetation in a good condition.

In summary it is clear that the route is viable from an ecological perspective. The natural vegetation north of the Groot Letaba River is modified and many activities have a negative impact on the habitat in general. The area on the banks of the river is associated with the narrow band of intensive agricultural activities (mostly orchards) but it is possible to get a clear corridor for the power line. The riparian vegetation along the Groot Letaba River is modified and it is possible to get a corridor to cross the river without a need to remove large riparian trees.

South of the river the vegetation s modified, but still in a fair to good condition. The result of previous over grazing is encroachment of the shrub and small tree layer. This result in the fact that the ecological integrity is modified and it is lower that one would expect in the well manged area. With regard to the Limpopo Conservation Plan version 2 (LCPv2) the area south of the Groot Letaba River affects CBA1 and CBA 2 zones with the associated support areas. It is recommended that only the servitude for the new proposed powerline must be cleared (trimming of larger trees) and that the grass and small shrub layer must not be cleared (minimum 300mm)) as this will lower the risk of erosion and the establishment of alien invasive plants in the servitude. No buffer is needed, as clearing will be limited to the proposed power line servitude only and the areas around the power line is considered to be the buffers. All access to the construction areas must be limited to the servitude only and limited traffic must be allowed in the area.

The deviation in the north (Deviation 1a) is viable and the area is similar to the route for Alternative 1. The second deviation (Deviation 1b) is a better option as this corridor follows the R71, open corridors next to fences and the corridor for existing power and telephone lines. Ease of access and the use of existing roads will lower the impact of cutting natural vegetation.

Alternative 2

This part of the study area focus on the route for Alternative 2 (Figure 30). The first small section differ from Alternative 1, but the main section is the same to the crossing of the Groot Letaba River. The small deviation from the Spencer Substation to the east of Alternative 1 crosses similar terrain and vegetation and therefore the impacts and low ecological value is similar to Alternative 1.

With regard to the Limpopo Conservation Plan version 2 (LCPv2), the areas affected are CBA 2 and ESA 2 only. The corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. It is important that "no total clearing of the basal layer" must be allowed, as this grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. Currently the ecological importance is low and modification to the habitat and vegetation is high. The construction of the power line will have a low impact on the ecosystem.

Refer to the discussion for Alternative 1 for more detail.

Figure 30: The sector north of the Groot Letaba River. The section circled in red is the corridor that differ from Alternative 1.

After crossing the Groot Letaba River the second sector for Alternative 2 (Figure 31) follows a corridor further west of Alternative 1 (Figure 2) and cross a number of cattle/game and game farms. Here the vegetation is in a fair to good condition with historic over grazing resulting in encroachment of the shrubs and small tree layer. This impact on the basal layer resulting in poorer grass cover than would be in more pristine areas. This therefore lower the overall ecological integrity of the area.

When looking at the Limpopo Conservation Plan version 2 (LCPv2) associated with this section of the proposed power line corridor, the areas affected are CBA1 (very small section) and CBA 2 with the associated support areas. It is recommended that the corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. This entail that trimming of larger trees must be done and it is important that "no total clearing of the basal layer" must be allowed. This action will ensure that the grass and small shrub layer will lower the risk of

erosion and the establishment of alien invasive plants in the corridor. No buffer around the servitude is needed, as only the narrow strip must be cleared for the proposed power line. The servitude will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.

Where the corridor cross the R71, the proposed Deviation 1b branches to the east, following the R71 and existing power lines (See discussion above for detail). South of the R71, the proposed corridor still crosses the game and cattle farms and some private reserves (Figure 32). An option is to move the power line to the west to follow the R526, as this will lower the impact on the more natural areas. The power line can then follow the farm boundaries, fences, roads and existing power and telephone lines.

Figure 30: Alternative 2 (green line) south of the Groot Letaba River follows a corridor south to the junction of the R71 and the R526. The deviation 1b is in pale blue.

Figure 31: The last sector of Alternative 2 following the R526, crossing the R530 and then swings east to the Foskor substation.

The last sector for Alternative follows the R526 to a large extent to the R530. It is recommended that it then follows the R530 and not to cross through the middle of properties. Again, by having the corridor near the road, fences and existing power and telephone lines, impacts on the natural vegetation can be lowered. The vegetation is in a fair to good condition with impacts from historic

and-use practices lowering the overall ecological integrity (Figure 32 – 38). From an ecological perspective this route is viable. Although some dense vegetated areas are present, it is noted that the historic land use practices have resulted in modifications to the landscape and associated floral composition. One can however look at a combination of the routes that will definitely lower the impact on the existing natural vegetation and the private reserves and military training areas.

The Limpopo Conservation Plan version 2 (LCPv2) associated with this section of the proposed power line corridor shows impacts with the CBA1 and CBA 2 with the associated support areas. In this sector it is recommended that only clearing of the larger trees is done (those that will impact directly on conductors) in the corridor for the new proposed powerline. This will mean the trimming of larger trees must be done and it is important that “no total clearing of the basal layer” must be allowed. This will ensure that the grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. No buffer around the servitude is needed, as only the narrow strip must be cleared for the proposed power line. The servitude will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.

Figure 32: Example of the natural vegetation in the second and last sector where the corridor crosses game farms.

Figure 33: Some modifications to the natural vegetation lowered the overall ecological integrity.

Figure 34: Although the vegetation is good in areas, open corridors are present – old roads or existing servitudes.

Figure 35: Example of good natural vegetation cover on game farms and private reserves.

Figure 36: Example of open areas for the power line to be constructed – existing roads and servitudes.

Figure 37: If the existing farm roads are used, limited clearing for the servitude is needed.

Figure 38: Example of cleared areas for the power line to be constructed – existing roads and servitudes.

General Faunal Comments

The faunal component along the full corridor of the power lines vary considerably. In the northern section (north of the Groot Letaba River) game was not observed and very little evidence of activity was noted. Some spoor and droppings of *Sylvicapra grimmia, Aepyceros melampus, Tragelaphus strepsiceros, Hystrix africaeaustralis* and some smaller rodents were seen. The power line will have a very limited impact on these with some possible disturbance of the rodents if burrows are impacted during construction (planting of poles).

To the south, the diversity of the animals increased mostly were the game farms are present. In the cattle areas, more *Sylvicapra grimmia, Aepyceros melampus, Tragelaphus strepsiceros* and *Raphicerus campestris* activity were noted (higher protection and better habitat). Larger species and rare game are present and include *Loxodonta africana, Syncerus caffer, Panthera pardus, Panthera leo, Crocuta crocuta, Equus quagga, Connochaetes taurinus, Giraffa camelopardalis, Hippotragus niger, Hippotragus equinus* and *Damaliscus lunatus*.

During construction it will be important to liaise with the landowners with regard to the game present on the different farms (once the final route is selected). Where dangerous animals are present, it will be important to ensure that game is moved to other camps where possible. A ranger from the farm must be present during construction to ensure the safety of man and animals. A concern will be the areas where *Loxodonta africana* and *Giraffa camelopardalis* are present as the former can damage pylons and get electrocuted if conductors are to low and the latter is exposed to electrocution as well. One look at a reach of the elephant to 6m and giraffe can grow to 6m as well.

Visual impacts

With regard to the visual impacts, it is obvious that some structures will be seen from roads and other infrastructure (houses and camps). The best solution is to follow existing fences and roads where power lines and telephone lines are present. This will ensure that the power line is on the boundary of the property and that a minimal visual impact can be achieved. In addition, the use of compact structures can soften the visual load for tourists and farmers.

4 GENERAL COMMENTS and RECOMMENDATIONS

- Substation – it must be noted that more than 1 hectare of indigenous vegetation will be cleared at the Spencer Substation (9ha is required).
- General vegetation clearing for the project – in addition, it must be noted that more than 300m^2 of indigenous vegetation will be removed in the CBA areas.
- Alternative 1
    - The natural vegetation in the corridor north of the Groot Letaba River is modified.
    - The Deviation 1a is a viable option and is the rest of the alternative that was investigated.
    - There is a number of protected trees associated with the corridor and trimming will be required in some instances. The number of trees will only be verified once the final corridor is determined and the pylon positions pegged.
    - No red data plant species were noted. This must be confirmed during the walk down study, once the final route is known – will form part of the plant rescue operation.
    - No red data plant species were noted. This must be confirmed during the walk down study, once the final route is known – will form part of the plant rescue operation.
    - A walk down survey consisting of the surveyor, the engineer and botanist must then be undertaken to see if it will be necessary to move pylons to lower the need of trimming or cutting of protected trees.
    - With the current impact to the broader habitat, clear corridors can be found for stream and river crossings that will lower the need to cut riparian trees.
    - South of the Groot Letaba River the natural vegetation is in a fair to good condition.
    - Historic and current land-use practices contributed to modifying the vegetation and encroachment of the shrubs and small tree layer was observed in large parts of the study area.
    - The route for Alternative 1 cut through some properties and it will result in the cutting and trimming of larger trees.
    - It is recommended that the route must follow existing roads, fences or servitudes, as this will lower the need of cutting and trimming of trees.
    - When looking at the Limpopo Conservation Plan version 2 (LCPv2) associated with this alternative (Alternative 1), the areas affected are CBA1 and CBA 2 with the associated support areas (Figure 39). As is recommended that the corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. This entail that trimming of larger trees must be done and it is important that “no total clearing of the basal layer” must be allowed. This will ensure that the grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. No buffer around the corridor is needed, as only the narrow strip must be cleared for the proposed power line. The corridor will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.
    - As is the case to the north, a walk down study must be conducted to map the protected trees in the final corridor. This information is needed for the permit

applications to DAFF. No clearing of the corridor can commence before the permits are issued.
    - A formal induction and monitoring of clearing must be done by the botanist to ensure that the permit regulations are carried out.
    - With the comments received during consultation, it seems that a combination of Alternative 1 and 2 will be used.
- Alternative 2
    - The first section of the Alternative 2 north of the Groot Letaba River is similar in ecological integrity to Alternative 1.
    - The impacts in this section is high with the natural vegetation in a severely modified state. Using this route is therefore an ecological option.
    - As with Alternative 1, the natural vegetation south of the Groot Letaba River is in a fair to good condition.
    - The current and historic land-use practices contributed to the encroachment of the shrub and small tree layer.
    - When looking at the Limpopo Conservation Plan version 2 (LCPv2) associated with this alternative (Alternative 2), the areas affected are CBA1 and CBA 2 with the associated support areas (Figure 39). As is recommended that the corridor for the new proposed powerline must be only cleared from larger vegetation that will impact directly to the conductors. This entail that trimming of larger trees must be done and it is important that “no total clearing of the basal layer” must be allowed. This will ensure that the grass and small shrub layer will lower the risk of erosion and the establishment of alien invasive plants in the corridor. No buffer around the corridor is needed, as only the narrow strip must be cleared for the proposed power line. The corridor will further act as the access route during construction. In addition, limited traffic must be allowed in the area and smaller construction vehicles must be used to transport the materials.
    - Numerous protected trees are present south of the river in the corridor.
    - A walk down study must be conducted to map all protected trees. No red data plant species were noted. This must be confirmed during the walk down study, once the final route is known – will form part of the plant rescue operation.
    - The route for Alternative 1b is an option, as this deviation will follow the R71 and exiting roads, servitude and cleared corridors can be used as it will lower the need for clearing of vegetation.
    - It is clear that the area south of the Groot Letaba River is in a better ecological state compared to the general area north of the river.
    - The area south is not in great ecological condition, as the over grazing over the years contributed to the encroachment of large areas in the study area.
- Hunting and setting of snares is a problem during construction.
- The area north of the river is low in game, but illegal hunting is still a problem.
- In the area south of the Groot Letaba River the issue is a problem on game farms. In many cases, rare game is present a hunting/snares can be a problem.
- The list of game below is a general list for the region (Addendum 3). The issues on each farm must be assessed as part of the final route selection.

General comments

- During construction it will be important to liaise with the landowners with regard to the game present on the different farms (once the final route is selected). Where dangerous animals are present, it will be important to ensure that game is moved to other camps where possible. A ranger from the farm must be present during construction to ensure the safety of man and animals. A concern will be the areas where *Loxodonta africana* and *Giraffa camelopardalis* are present as the former can damage pylons and get electrocuted if conductors are to low and the latter is exposed to electrocution as well. One look at a reach of the elephant to 6m and giraffe can grow to 6m as well.
- With regard to the visual impacts, it is obvious that some structures will be seen from roads and other infrastructure (houses and camps). The best solution is to follow existing fences and roads where power lines and telephone lines are present. This will ensure that the power line is on the boundary of the property and that a minimal visual impact can be achieved. In addition, the use of steel structures can soften the visual load for tourists and farmers.

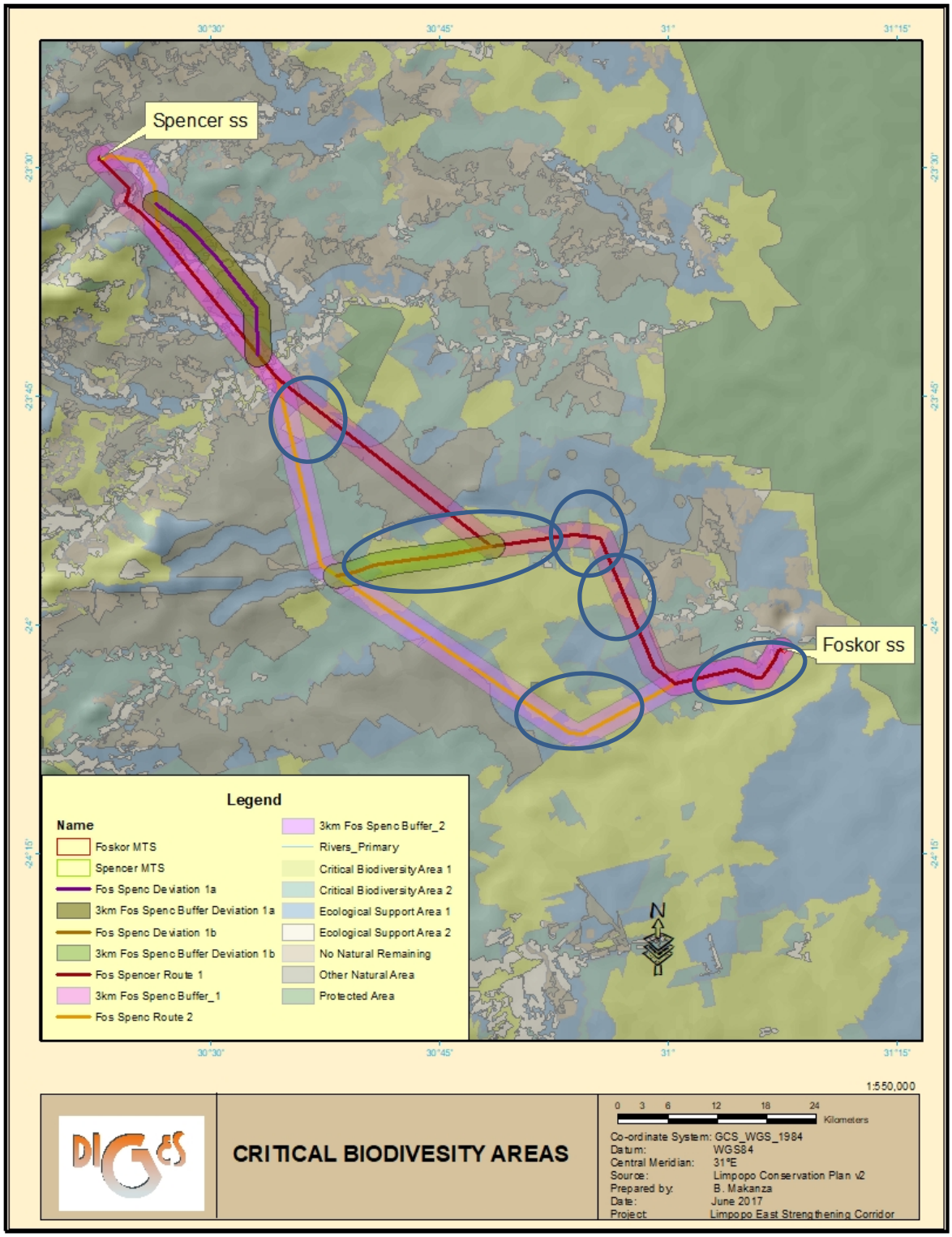

Figure 39: Routes on the map of the CBAs – circled area indicate the areas of the CBA1.

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Addendum 1: List of impacts and suggested mitigating and management strategies.

Foskor MTS/SpencerMTS project		
Theme	Natural environment	
Nature of issue	Erosion	
Stage	Construction and maintenance	Possibility moderate for erosion during construction due to soil types and slopes in certain areas.
Extent of impact	Site, local and region	The impact will be low on-site (power line servitude), but limited to low on a regional scale. Silt will have a negative impact in streams and rivers, but will be low to moderate for this project, if well managed.
Duration of impact	Immediate	If not addressed on constant basis, permanent damage is a reality. Currently erosion is a problem in some area – mostly north of the Groot Letaba River.
Intensity	Moderate	If not properly managed as part of operational plan, it will be high.
Probability of occurrence	High	Must be managed on daily basis.
Status of the impact	Project: negative Environment: negative	If well managed, can be neutral for both.
Cumulative impact	High.	If no maintenance is done, the impact will have a compounding impact on the environment.
Level of significance	Low-medium if controlled.	Will be moderate if not managed.
Mitigation measures	• Limited traffic during construction. • Constant rehabilitation during construction. • Must have maintenance strategy as part of EMP.	Limit traffic along the power line servitude.

Level of significance after mitigation	Low.	
EMP requirements	• A surface runoff and storm water management plan, indicating the management of all surface runoff generated as a result of the development (during both the construction and operational phases) prior to entering any natural drainage system or wetland, must be submitted (e.g. storm water and flood retention ponds). • Special care needs to be taken during the construction phase to prevent surface storm water rich in sediments and other pollutants from entering the natural drainage systems/wetlands. In order to prevent erosion, mechanisms are required for dissipating water energy. • An on-site ecological management plan must be implemented including management recommendations as well as potential rehabilitation of severely disturbed areas.	
Nature of issue	Construction – material, by products and construction sites.	This includes accommodation, storing of material and ablution facilities for all workers during construction. It is recommended that no workers stay on the construction sites along the servitude for the power line at any time.
Stage	Construction and maintenance	Must have strict environmental guidelines and management plan in place before clearing and construction can commence.
Extent of impact	Site, local and region	Can have a medium impact on site, related to pollution, but the impact in the region will be low.
Duration of impact	Immediate	If not addressed on constant basis, permanent damage is a reality.
Intensity	Low/moderate	If not properly managed as part of operational plan, it will be high.

Probability of occurrence	High	Must be managed on daily basis.
Status of the impact	Project: negative Environment: negative	If well managed, can be neutral for both.
Cumulative impact	Marginal.	If no maintenance is done, the impact will have a compounding impact on the environment.
Level of significance	Low-medium if controlled.	Will be very high if not managed.
Mitigation measures	• Proper ablution facilities on site. • Constant management during construction. • Contain oils and fuel in berm area. • Must have rehabilitation strategy as part of EMP.	This refers to storage of material, oil and fuel spills, ablution facilities and rehabilitation of construction sites at the completion of the project. Build containment berms around oil and fuel storage areas. All by products and materials must be disposed at approved sites.
Level of significance after mitigation	Low.	Will have to form part of the EMP to ensure low impact/significance at completion.
EMP requirements	• During the construction phase, workers must be limited to areas under construction and access to neighbouring undeveloped areas must be strictly regulated. • Construction should be limited to the daylight hours preventing disturbances to the nearby human populations. • All temporary stockpile areas litter and rubble must be removed on completion of construction. All dumped material must be taken to an approved dump site in the area. • Soil stockpiling areas and storage facilities must follow environmentally sensitive practices and be situated a sufficient distance away from drainage areas or drainage lines. • The careful position of soil piles and runoff control during all phases of development will limit the extent of erosion occurring on the site.	

Nature of issue	Pollution	Includes oil and fuel spills, erosion, storage of by-products and ablution facilities.
Stage	Construction and maintenance	Must have a strict environmental guidelines and management plan in place before clearing and construction can commence.
Extent of impact	Site, local and region	Can be severe if not well managed. Must be done on a daily basis (part of the EMP).
Duration of impact	Immediate	If not addressed on constant basis, permanent damage is a reality. Water pollution can be a severe problem.
Intensity	Low/moderate	If not properly managed as part of operational plan, it will be high.
Probability of occurrence	High	Must be managed on daily basis.
Status of the impact	Project: negative Environment: negative	If well managed, can be neutral for both.
Cumulative impact	Marginal - compounding	If no maintenance is done, the impact will have a compounding impact on the environment.
Level of significance	Low-medium if controlled.	Will be very high if not managed.
Mitigation measures	• Proper ablution facilities on site. • Constant rehabilitation of erosion problems. • Berms to contain spills. • Proper storage facilities of construction materials. • Waste management is very important. Proper storage and removal strategy must be in place. • Must have rehabilitation strategy as part of EMP.	This refers to storage of material, oil and fuel spills, ablution facilities and rehabilitation of construction sites at the completion of the project. Due to the nature of the slopes and soils, water pollution can be a problem if not properly managed.
Level of significance after mitigation	Low.	Will have to form part of the EMP to ensure low impact/significance at completion.
EMP requirements	• Proper strategy to prevent erosion – see above.	

	• Berms and containment measures for fuels and oils, also around transformers to prevent spills during accidents and maintenance. • Clean-up plan/strategy if spills occur. • Proper facilities (ablution) to ensure no sewerage spills into streams and rivers. • Proper storage of material during construction and clean-up after the construction is completed. • Proper strategy to remove and dispose of oil from transformers.	
Nature of issue	Alien vegetation	Includes all exposed areas – and servitude for the power line.
Stage	Construction and maintenance	Must have a strict environmental guideline and management plan in place before clearing and construction can commence.
Extent of impact	Site, local and region	Can be severe if not well managed. Must be done on a daily basis (part of the EMP).
Duration of impact	Immediate	If not addressed on constant basis, permanent damage is a reality. Many exotics are present and can invade exposed areas during and after construction.
Intensity	Low/moderate	If not properly managed as part of operational plan, it will be very high.
Probability of occurrence	High	Must be managed on regular basis.
Status of the impact	Project: negative Environment: negative	If well managed, can be neutral for both.
Cumulative impact	Marginal - compounding	If no maintenance is done, the impact will have a compounding impact on the environment.
Level of significance	Low-medium if controlled.	Will be very high if not managed.

Mitigation measures	• Need to ensure all alien plants on construction sites are removed. • Must clear alien vegetation on a regular basis. • Must have rehabilitation strategy as part of EMP.	
Level of significance after mitigation	Low.	Will have to form part of the EMP to ensure low impact/significance at completion.
EMP requirements	• Proper strategy to prevent invasive alien plants from establishing and this will further prevent pollution and erosion – see above. • Regular maintenance and inspections and removal of alien plants. • Possible to link with Working for Water in this regard.	
Nature of issue	Removal on natural vegetation	The servitude for the power line.
Stage	Construction and maintenance	Must have strict environmental guidelines and management plan in place before clearing and construction can commence.
Extent of impact	Site, local and region	Limited removal of vegetation for the servitude of the power line is needed. The impact on site will be low to moderate, with very low impact on local and regional level. Can be severe if not well managed. Must be monitored on a daily basis (part of the EMP) to ensure no illegal removing or cutting occur. Use existing roads for access where possible.
Duration of impact	Permanent	The removal of plants from the corridor for the power line will have permanent impact.
Intensity	Low/moderate	Although the duration of the impact is of a permanent nature, the intensity is low on a local and regional scale. The immediate habitat surrounding the power line corridor is in a fair-poor condition. The protection of the environment is the function of local and provincial authorities and this will be important. The construction of the power line will have negligible impacts if well managed.

Probability of occurrence	High	Again, the impact will be confined to the site of the substation. In the larger environment, the probability will be low.
Status of the impact	Project: negative Environment: neutral	If well managed, can be neutral for both.
Cumulative impact	Marginal	If maintenance is poor, the impact will have a compounding result on the environment. One refers to illegal or unnecessary cutting of trees on the power line servitude during routine clearing of vegetation. This must be well managed by all role players (Eskom and conservation authorities).
Level of significance	Low-medium if controlled.	Will be very high if not managed.
Mitigation measures	• Limited plants need to be removed when clearing the servitude for the new power line. Clear guidelines and proper plans must be given to the contractor. Daily inspections are needed to prevent problems. • Must clear alien vegetation on a regular basis. • Exposed areas should be rehabilitated with a grass mix that blends in with the surrounding vegetation. The grass mix should consist of indigenous grasses adapted to the local environmental conditions. The grass seeds should a variety of grass species including several pioneer species. • Must have rehabilitation strategy as part of EMP.	A clear plan must be in place before the project commence. The contractor must clearly understand where to clear. The area should be marked. All trees to be cut must be marked. Trees to be trimmed should be marked and the contractor should understand what branches must be cut/trimmed. A policy should be in place to penalise the contractor. Eskom and conservation services should have an official on site to ensure no problems occur.
Level of significance after mitigation	Low.	Will have to form part of the EMP to ensure low impact/significance at completion.
EMP requirements	• Proper strategy to prevent invasive alien plants from establishing and this will further prevent pollution and erosion – see above. • Regular maintenance and inspections and removal of alien plants. • Possible to link with Working for Water in this regard.	

Nature of issue	Wood collection/illegal hunting	Includes servitude for power line and where workers stay.
Stage	Construction and maintenance	Must have a strict environmental guidelines and management plan in place before clearing and construction can commence. Preferable no workers to stay on site. Wood collection (mostly illegal) is having serious environmental consequences. Must caution against snares and trapping of game and birds.
Extent of impact	Site, local and region	Must be monitored on a daily basis (part of the EMP) to ensure no illegal removing or cutting occur.
Duration of impact	Permanent	The removal of fire wood will have a permanent effect on the environment. Hunting can be problem especially in areas of the game farms – rare game present.
Intensity	Moderate to high	Although the duration of the impact is of a permanent nature, the intensity is moderate to high on a local and regional scale. The immediate habitat surrounding the corridor is in a poor to fair condition. The protection of the environment is the function of local and provincial authorities and this will be important.
Probability of occurrence	High	The impact to the surrounding environment will be high.
Status of the impact	Project: negative Environment: negative	If well managed, can be neutral for both.
Cumulative impact	Compounding	If not controlled the cumulative impact will have a compounding effect on animal and bird populations in the area. This must be well managed by conservation authorities.
Level of significance	Low if controlled.	Will be very high if not managed.

Mitigation measures	• It is suggested that no workers stay on site and must be limited to the construction site as far as possible.	The contractor must understand the importance of the issue and the impacts poor management will have on the environment.
Level of significance after mitigation	Low.	
EMP requirements	• Proper strategy to prevent illegal wood collection. • Regular inspections to monitor if illegal activities occur.	

Addendum 2: List of possible red data species present in 2330AD, 2330CB, 2330DA, 2330DC, 2330DD, 2430BA, 2430BB and 2431AA (SANBI Precis, 2017).

Family	***Genus and species***	**Status**	**Distribution and probability of presence**
HYACINTHACEAE	*Merwilla plumbea*	NT	Widespread in eastern half of South Africa. Also in Swaziland and Lesotho - Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m **Not suitable habitat, not expected**
ZINGIBERACEAE	*Siphonochilus aethiopicus*	CR	Sporadically from the Letaba catchment in the Limpopo Lowveld to Swaziland. Extinct in KwaZulu-Natal. Widespread elsewhere in Africa - Tall open or closed woodland, wooded grassland or bushveld **In distribution range, none observed – low probability**
CELASTRACEAE	*Elaeodendron transvaalense*	NT	Restricted to eastern, summer rainfall areas from the KwaZulu-Natal coast northwards through eastern Mpumalanga into Limpopo and North West provinces - Savanna or bushveld, from open woodland to thickets, often on termite mounds **In distribution range, none observed**
APOCYNACEAE	*Brachystelma villosum*	Rare	Haenertsburg - Scattered in grassland at an altitude of 500-1500 m **Not suitable habitat, not expected**
ASPHODELACEAE	*Aloe hardyi*	Rare	Olifants River Valley north of Burgersfort - Vertical dolomite cliffs in mistbelt **Not suitable habitat, not expected**
ASPHODELACEAE	*Aloe thompsoniae*	Rare	Wolkberg Mountains - Montane mistbelt grasslands, rock crevices on steep cliffs, among large boulders, or in seepages or shallow soils at the edges of large exposed rock sheets **Not suitable habitat, not expected**
ZAMIACEAE	*Encephalartos dyerianus*	CR	Phalaborwa - Open grassland and shrubland on the slopes of low granite hills **In distribution range, none observed**
PROTEACEAE	*Protea parvula*	NT	Drakensberg Escarpment in Swaziland, Mpumalanga and KwaZulu-Natal from Mariepskop to Vryheid - Most prominent in Lydenburg montane grassland **Not suitable habitat, not expected**

Addendum 3: List of red data species and CITES species in Limpopo Province (LEDET State of the Environment Report, 2004).

Category	Common Name	Scientific Name	Does suitable habitat occur on site? (Yes/No)
Critically Endangered	Black rhinoceros	*Diceros bicornis*	No
	Juliana's golden mole	*Neamblysomus julianae*	No
Endangered	African wild dog	*Lycaon pictus*	No/yes
Vulnerable	African elephant	*Loxodonta africana*	Yes
	Gunning's golden mole	*Neamblysomus gunningi*	No
	Cheetah	*Acinonyx jubatis*	Yes
	Lion	*Panthera leo*	Yes
	Black-footed cat	*Felis nigripes*	No
Near Threatened	White rhinoceros	*Ceratotherium simum*	Yes

CITES Appendix	Common Name	Scientific Name	Does suitable habitat occur on site? (Yes/No)
Appendix 1	Black-footed cat	*Felis nigripes*	No
	Leopard	*Panthera pardus*	Limited
	Cheetah	*Acinonyx jubatus*	Yes
	Black rhinoceros	*Diceros bicornis*	No
Appendix 2	African elephant	*Loxodonta africana*	Yes
	Chacma baboon	*Papio ursinus*	Yes
	Vervet monkey	*Cercopithecus aethiops*	Limited
	Samango monkey	*Cercopithecus mitis*	No
	Greater galago	*Otolemur crassicaudatus*	No
	South African galago	*Galago moholi*	Yes
	Spotted-necked otter	*Lutra maculicollis*	No
	African clawless otter	*Aonyx capensis*	No
	Caracal	*Caracal caracal*	Yes
	Serval	*Leptailurus serval*	No
	African wild cat	*Felis sylvestris*	No
	Lion	*Panthera leo*	Yes
	Hippopotamus	*Hippopothamus amphibious*	No
	White rhinoceros	*Ceratotherium simum*	No
	Pangolin	*Manis temminckii*	Yes