Basic Assessment report:

Proposed power lines and substation for the Boynton project.

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Executive summary

The following important issues per route and alternative are noted. The natural vegetation along the proposed corridors investigated are in a “poor to fair state” with impacts related to grazing, cultivation, erosion, mining and poor infra-structure development.

The following is important for each section:

- Section 1:
    - From an ecological perspective, both alternatives are viable.
    - The route for Alternative 1 is preferred. It follows the existing power line and this servitude can be used as an access road during construction.
    - Alternative 2 follows a route with few roads and is therefore not preferred. More clearing of natural vegetation, especially in the mountainous areas are needed.
    - The low mountainous areas are prone to erosion, but the current access route must be used to lower the risk of erosion. All stream crossings must be treated as sensitive and existing roads must be used to lower the risk of erosion.
    - The route between the residential areas (south of the hospital) is modified, but a few large *Sclerocarya birrea* is present. Permits are needed for cutting or trimming.
    - To the south of the residential areas, the route will cross a low hill (koppie).
    - The corridor is near the Tudumo/Chunies River and all pylons must be placed outside the 1:100 year flood line.
    - Alternative 1 is the preferred route for this section (ecological perspective).
- Section 2:
    - Many impacts related to grazing, wood collection and general poor land use practices are present is this section of the proposed corridor.
    - Alternative 1 near the road is preferred, as it allow for easier access during construction.

  - The alternative further to the west (Alternative 2) will need the construction of more access roads and crossings of streams without proper bridges.
  - From an ecological perspective, Alternative 1 is preferred in this section.
- Section 3:
  - Some protected trees (*Sclerocarya birrea*) are present in the area.
  - Although no *Balanites maughamii, Philenoptera violacea* and *Combretum imberbe* were observed during the survey, it but must be confirmed.
  - Although there are streams, the substation can be constructed to avoid these.

Introduction

This report is to discuss the biological survey (excluding the avifaunal component) conducted for the project. During the survey, a 55m corridor was investigated for the proposed power lines between the substations (Figure 1). The project consists of two components: the new power line between the existing Lebowakgomo substation and the new Dithabaneng and Dwaalkop substations and the Loop-in-Loop-out line for the new Boynton substation.

Project description

The brief for the project supplied by Urgeneg Consultants was to investigate the corridors for:

- New proposed 132 kV power line from Lebowa Substation to Dithabaneng Substation.
- New proposed 132 kV power line from Dithabaneng Substation to Dwaalkop Substation.
- Proposed Loop-in Loop-out 132 kV lines from Middelpunt-Dithabaneng 132 kV power line to the proposed Boynton Substation.

Project locality

The proposed new power line between the substations will be constructed in the Lebowakgomo area (Limpopo Province) (Figure 1).

Addendum 1 is a summary of impacts, mitigation and management action suggested.

Addendum 2 is a summary of possible mammals in the area, with the probability of encountering them on a permanent basis (i.e. not moving through) on the study site.

Addendum 3 is a summary of the protected plant species according to the SANBI Précis list (2012).

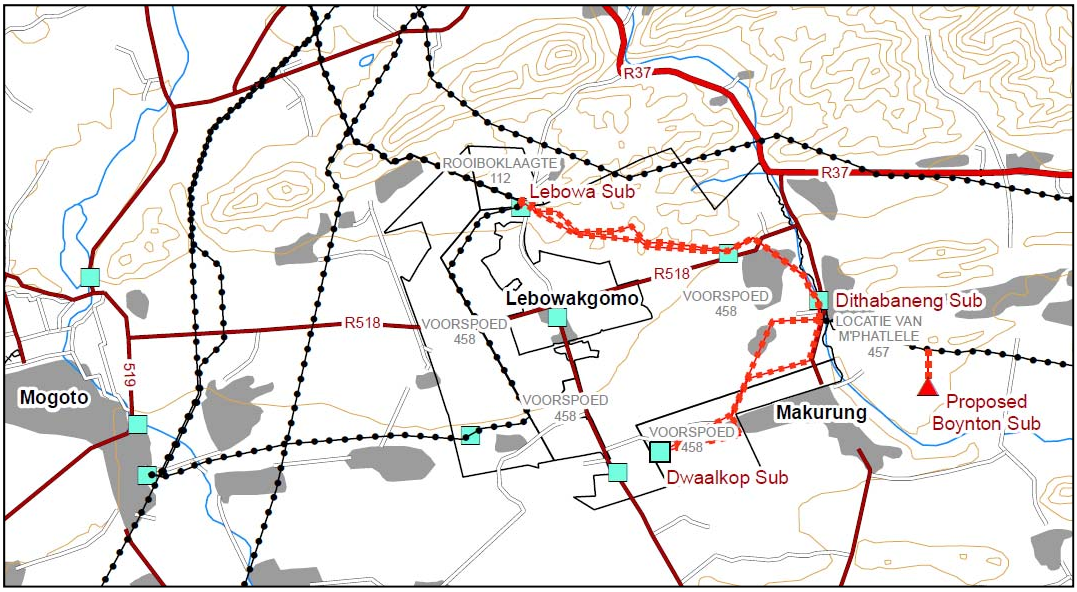

Figure 1: Approximate routes for the new power line between the Lebowakgomo and Dwaalkop substations (circled in yellow) and the LiLo line at the Boynton substation (circled in red).

Assumptions and limitations

Availability of baseline information

Baseline information about the plant community of the site was obtained from Mucina and Rutherford (2006) and the SANBI Précis list (2012). The desktop survey provided adequate baseline information for the area and therefore this was not a constraint.

Constraints

The survey was conducted during daytime only. All the different habitats at the site was investigated and it was therefore possible to complete a rapid survey and obtain information on the biological community (excluding avifaunal) that are present at the site, or that are likely to occur there.

Bio-physical constraints

Weather conditions during the period were warm with a light wind blowing. The region has received good rainfall prior to the site visit and the vegetation was lush and still green in areas. There was some standing water in the veld and the Tudumo/Chunies River was flowing during the time of the survey. This will have obvious implications on the biodiversity that are likely to occur in the area. The conditions during the survey were ideal for a survey of this nature.

Confidentially constraints

There were no confidentially constraints.

Implications for the study

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

Methods

Desktop study

Prior to the site visit and field survey, information of the study site was available. The appropriate 1:50 000 maps were used to identify the major habitat features such as roads, railways, drainage channels, old cultivated fields, wooded areas, wetlands, koppies etc in the area. Prior to the site visit, a desk top study was conducted to generate lists of species historically recorded at or near the study area, or that are likely to occur.

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, a walk-about was conducted to investigate the current vegetation and animal status in the proposed corridor for the new power line. All activity of animals was noted and a general plant list was completed. Photographs of important features were taken and will be included in the report. Three red data species supplied by SANBI (2012) occur in the ¼ degree for the study site. The following protected trees occur in the veld type (Mucina and Rutherford, 2006): *Sclerocarya birrea* was observed on the site investigated during the study, although *Acacia erioloba, Boscia albitrunca, Philenoptera violacea, Balanites maughamii* and *Combretum imberbe* is listed.

Three vegetation units are present in the study area (Figure 3): Poung Dolomite Mountain Bushveld (SVcb 25), Ohrigstad Mountain Bushveld (SVcb 26) and Sekhukhune Plains Bushveld (SVcb 27). It falls within the Savanna Biome (SV) and the larger cluster is known as the Central Bushveld (cb) (Mucina and Rutherford, 2006).

Vegetation:

The Poung Dolomite Mountain Bushveld (SVcb 25) occurs in the Limpopo and Mpumalanga Provinces and is known for its open to closed woodlands with a well developed shrub layer. It is found on low to high mountain slopes with varying slope

angles, aspects and altitude (600 – 1500m) (Mucina and Rutherford, 2006). It was previously referred to as the Sourish Mixed Bushveld and North-eastern Mountain Sourveld (Acocks, 1953) and the North-eastern Mountain Grassland (Low and Rebelo, 1996).

The Ohrigstad Mountain Bushveld (SVcb 26) was previously known as the Sourish Mixed Bushveld and Mixed Bushveld (Acocks, 1953) and the North-eastern Mountain Grassland (Low and Rebelo, 1996). The vegetation unit occurs in the Limpopo and Mpumalanga Provinces and the altitude varies between 400 and 1500m. The open to dense woody layer are characteristic and the terrain varies from flat, to moderate to steep slopes with some deep incised valleys present (Mucina and Rutherford, 2006).

The Sekhukhune Plains Bushveld (SVcb 27) vegetation unit was previously referred to as the Mixed Bushveld (Acocks, 1953; Low and Rebelo, 1996). It is distributed in the Limpopo and Mpumalanga Provinces and occurs on the low lying areas where the altitude ranges between 700 and 1 100m. The vegetation unit is described as semi-arid plains and open valleys, surrounded by low hills and mountains associated with the escarpment (Mucina and Rutherford, 2006). The vegetation is further described as open to closed Thornveld with *Aloe* species and succulents with large areas degraded and over exploited. This resulted in encroachment by indigenous and alien species (Mucina and Rutherford, 2006).

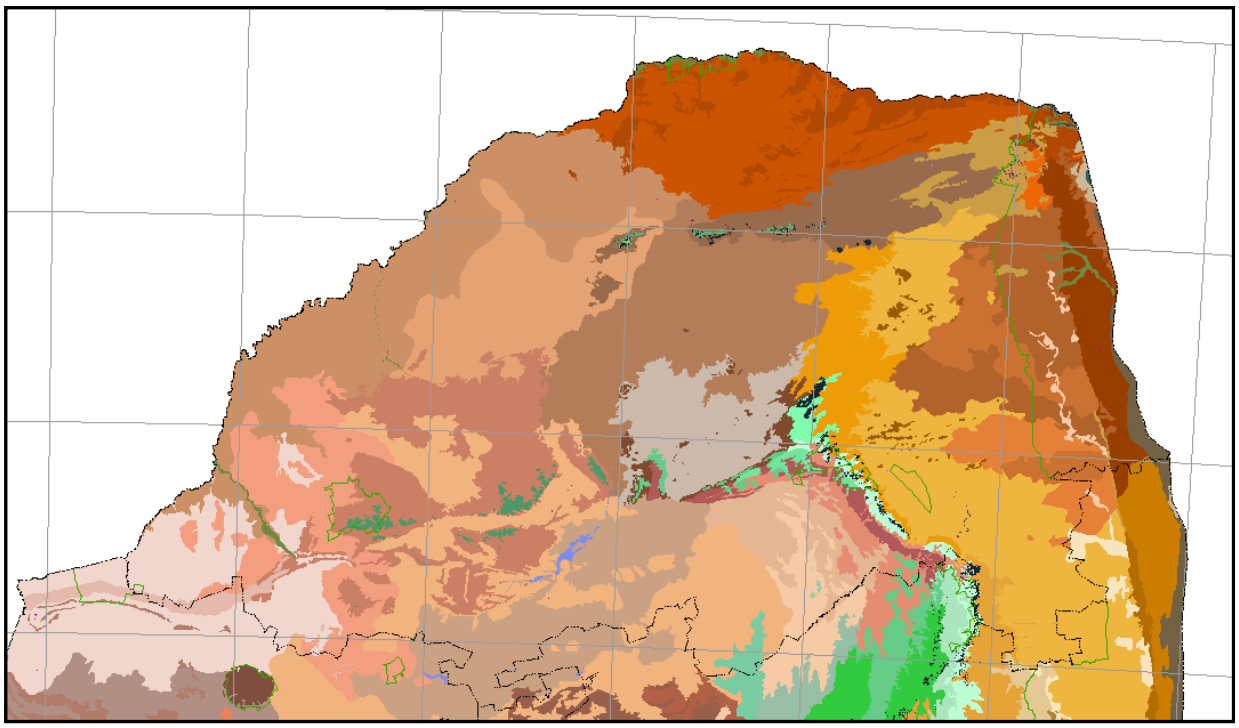

Figure 2: Regional vegetation map: vegetation map in the Limpopo Province according to Mucina and Rutherford (2006).

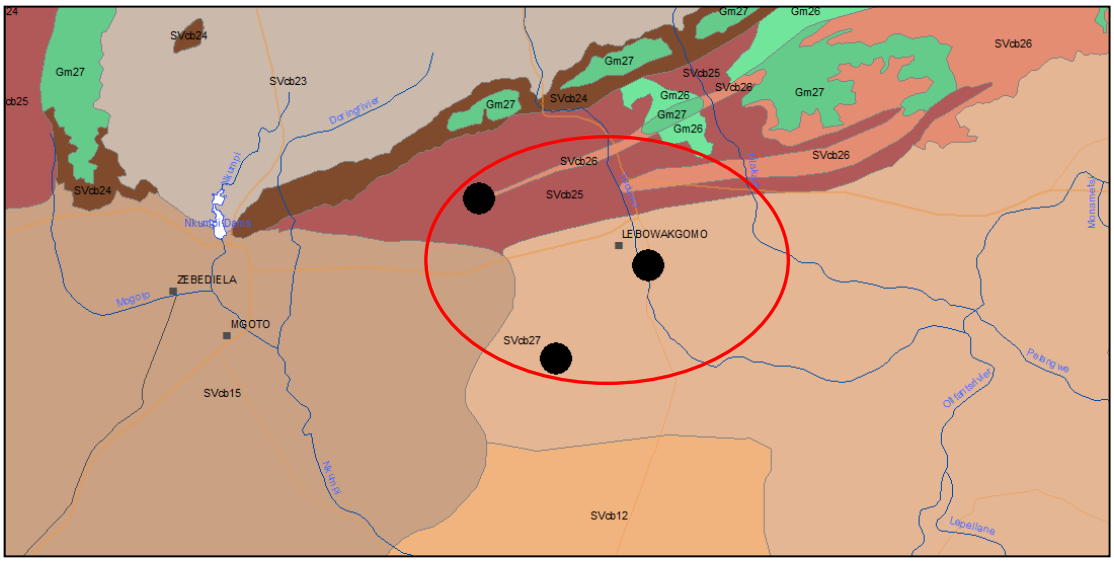

Figure 3: Vegetation types found in areas of the proposed project (circled in red).

Geology:

The Poung Dolomite Mountain Bushveld geological formation is almost entirely made up from the Malmani Formation dolomite from the Transvaal Group. In general the soils are of high pH and rich in magnesium and calcium, but low in phosphorus. Most of the soils are of the shallow Mispah form, but deeper soil (Hutton and Griffon) forms are present (Mucina and Rutherford, 2006).

The geology of the Ohrigstad Mountain Bushveld is dominated by Timeball Hill and Silverton formation quartzite and shale resulting in shallow rocky soils (Mispah or Glenrosa forms) (Mucina and Rutherford, 2006).

In the Sekhukhune Plains Bushveld the geology is complex with rocks mainly mafic and ultramafic intrusive rocks (Rustenburg Layered Suite and Bushveld Igneous Complex) dominated by norite belts, gabbro, anorthosite and pyroxenite, magnetite, chromatite, shales, dolomite and quartzite. Soils are mainly deep loamy Valsrivier soils with Glenrosa on the shallower areas (Mucina and Rutherford, 2006).

Climate:

The study area falls within the summer rainfall region and with very dry winters and infrequent frost. The Poung Dolomite Mountain Bushveld has a rainfall varying between 500 and 900mm with temperatures ranging between 36.3˚C and 1˚C (Mucina and Rutherford, 2006).

Ohrigstad Mountain Bushveld climate have a mean annual precipitation of 500 – 800mm and temperatures similar to the other to vegetation units (Mucina and Rutherford, 2006).

In the Sekhukhune Plains Bushveld the average rainfall varies between 400 and 600mm per annum. Temperatures varies between 37.3˚C and -0.9˚C (Mucina and Rutherford, 2006).

Conservation:

Poung Dolomite Mountain Bushveld is considered as least threatened and 10% of the targeted 24% is conserved. Erosion is low to moderate (Mucina and Rutherford, 2006).

Ohrigstad Mountain Bushveld is considered to be least threatened with approximately 85 of the targeted 24% conserved. The erosion vary from very low to very high

(Sekhukhune) and aliens include *Melia azedarach, Caesalpinia decapetala* and *Nicotiana glauca* (Mucina and Rutherford, 2006).
Sekhukhune Plains Bushveld is considered to be vulnerable, with only 2% of the targeted 19% conserved. More than 25% is transformed by mining, rural villages, farming and over grazing. The erosion potential is high to very high and aliens include *Agave* species, *Caesalpinia decapetala, Lantana camara, Melia azedarach, Nicotiana glauca, Opuntia* species, *Verbesina encelioides* and *Xanthium strumarium* (Mucina and Rutherford, 2006).

Results

The report will consist of three sections:

- Section 1 – the new 132kV power line between the existing Lebowakgomo substation and the new Dithabaneng substation.
- Section 2 – the new 132kV power line between the Dithabaneng substation and the new Dwaalkop substation.
- Section 3 – the 132kV Loop-in-Loop-out (LiLo) line at the new Boynton substation.

Two alternatives for the new proposed Lebowakgomo/Dithabaneng/Dwaalkop power line were investigated. The corridor investigated was 100m wide.

Once the final route is confirmed, it will be very important to do a walk down study to determine how many protected trees will be compromised by the clearing of the servitude. A number of protected tree species is present in the area and the numbers must be determined (GPS and mapped) in order to apply for the relevant permits before cutting or trimming can be done. These permits must be acquired prior to the clearing of the servitude and construction of the new power lines.

Section 1 – new 132kV power line between the Lebowakgomo substation and the new Dithabaneng substation

The power line follows a route to the east from the Lebowakgomo substation north of Lebowakgomo, before turning to the south towards the Dithabaneng substation (Figure 4 and 5).

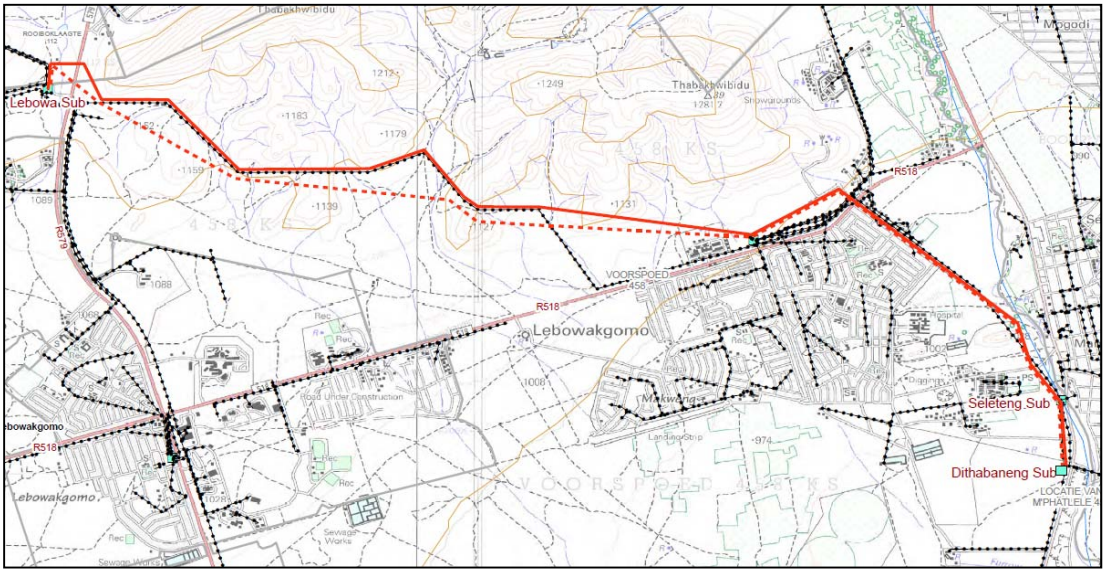

Figure 4: View of the proposed servitude corridor investigated.

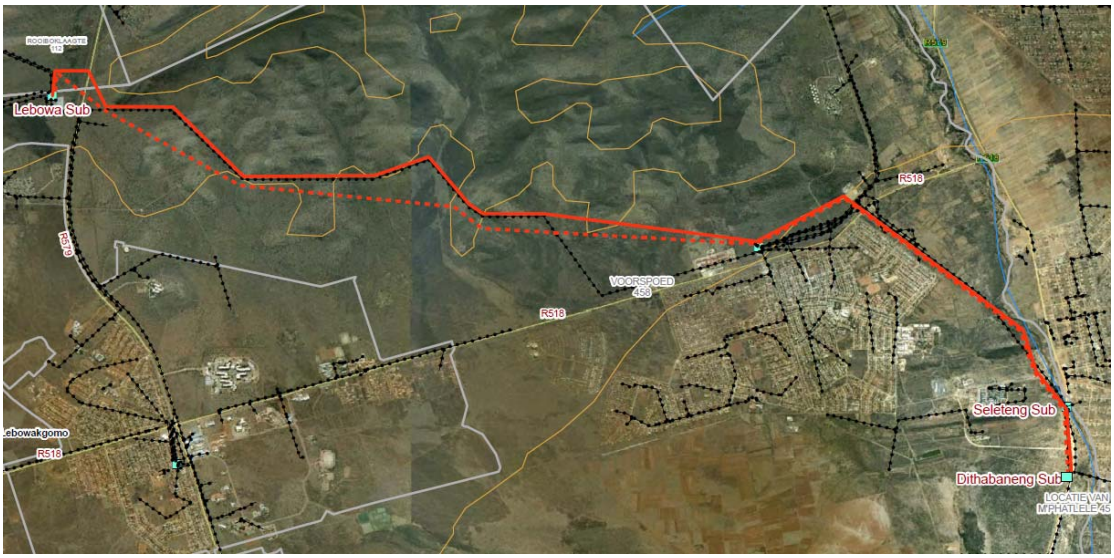

Figure 5: Aerial view of the route.

Two alternatives were investigated.

The natural vegetation around the Lebowakgomo substation is slightly modified due to some recent construction in the area and the fact that the site is in the town boundaries. Wood collection is a further impact observed in the area. The proposed power line (Alternative 1) will cross to the east of the R579 and will follow the existing power line to the Lebowakgomo Hospital along a more or less direct route. The route for Alternative 2 follows a corridor to the east of Alternative 1 and there are no current access along this corridor (Figure 6 and 7). Vegetation to the east of the substation include *Acacia mellifera, A. tortilis, A. gerrardii, A. karroo, A. nilotica, A. nigrescens, Boscia foetida, Euphorbia tirucalli, Combretum molle, C. zeyheri, C. apiculatum, Dichrostachys cinerea, Peltophorum africanum, Pterocarpus rotundifolius, Searsia leptodictya, Grewia flava, G. monticola, G. bicolor, Sclerocarya birrea, Ziziphus mucronata, Kirkia wilmsii, Berchemia zeyheri* and *Terminalia sericea.*

To the east of the road, the proposed corridor crosses a low mountain range. The natural vegetation is in a fair condition and impacts are related to wood collection, dumping of refuse, heavy grazing and some borrow pits and dumping of soil and rock. The first section of the route has a number of drainage lines and small streams that are considered as sensitive areas (Figure 8 - 14). Pylons must be placed at least 100m from the stream banks/edge. A few steep slopes and koppies are also indicated in Figure 6 and 7 and are sensitive areas. The slopes are prone to erosion once the natural vegetation is cleared. It is suggested that the corridor must be as close as possible to the hospital to ensure that the steeper slopes are not compromised.

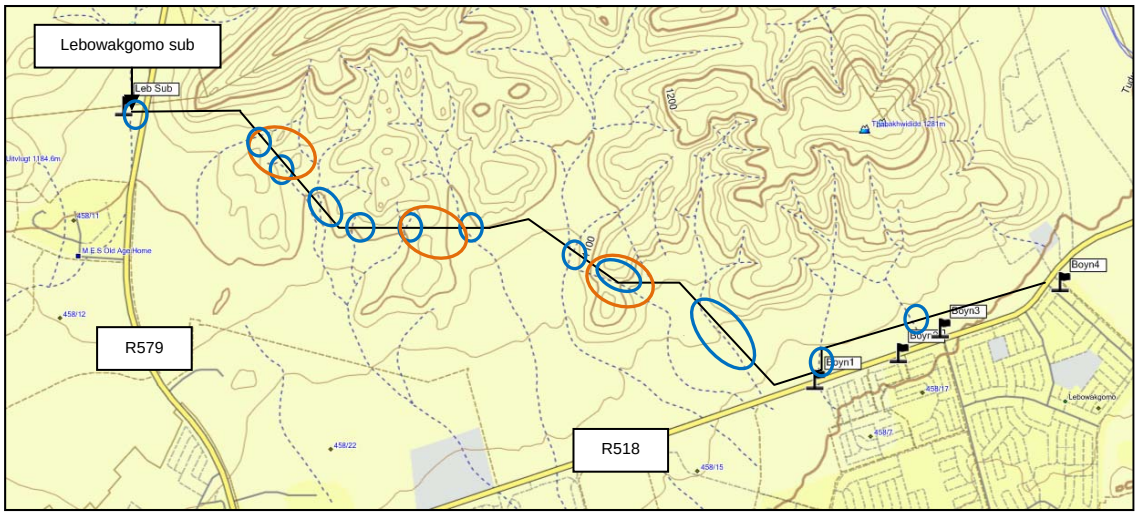

Figure 6: First section of the new proposed power line (Alternative 1 - black line) from the Lebowakgomo substation, east towards the hospital. The streams are circled in blue. Other sensitive areas are circled in brown. Aerial views depicted in Figure 15 and 16.

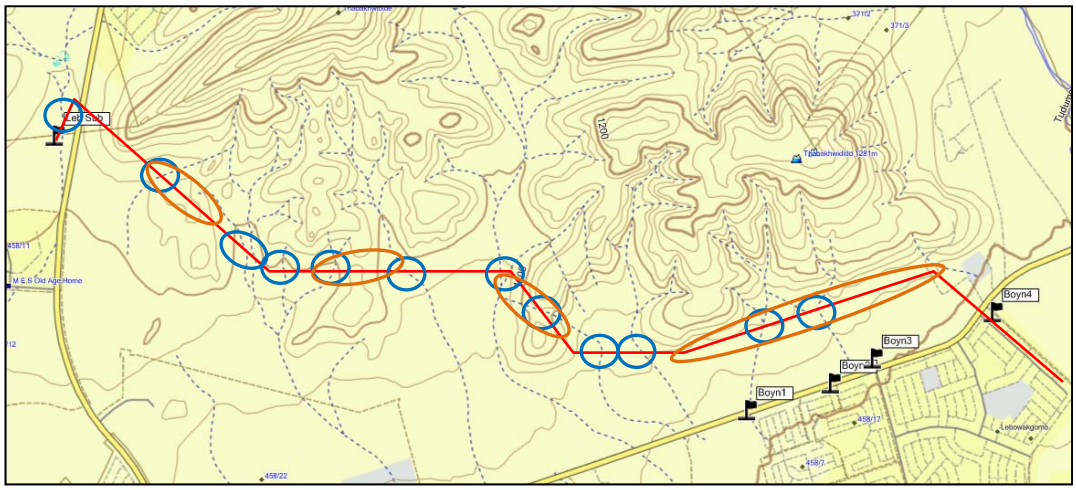

Figure 7: Alternative 2 route in the first sector.

It is suggested that the basal layer (grass) must be left intact as this will help to prevent erosion during and after the construction of the power line (Figure 14). The corridor along the existing power line must be used as access road.

Figure 8: View of natural vegetation and impacts at the Lebowakgomo substation.

Figure 9: View to the east of the R579.

Figure 10: The low mountain range to the east of the substation.

Figure 11: Example of a drainage line encountered in the first section of the corridor.

Figure 12: Example of rock dumping and borrow pits in the area.

Figure 13: Dumping of refuse and wood collection some of the impacts in the section of the corridor.

Figure 14: Steep slopes when exposed are prone to erosion.

Figure 15: First part of the corridor, indicating mountainous terrain and a number of small streams and drainage lines.

Figure 16: Modified natural vegetation to the north and east of the hospital complex (Boyn 2).

To the north of the hospital (near the border fence) the natural vegetation is severely modified, mostly by overgrazing and wood collection and the encroachment of *Dichrostachys cinerea* is clear evidence of this (Figure 17 and 18). Further to the north, the slopes are steeper and the vegetation more dense. It is suggested that the power line must be constructed as near as possible to the hospital boundary, as it will lower the risk of erosion on the steeper slopes.

Figure 17: Cutting of trees for cooking fuel.

Figure 18: Example of encroachment as a result of over grazing and wood collection.

Other species prominent in the area includes: *Ziziphus mucronata, Kirkia wilmsii, Sclerocarya birrea, Sterculia rogersii, Dombeya rotundifolia, Searsia leptodictya, Peltophorum africanum, Ximenia caffra, X. americana, Acacia karroo, A. tortilis* and exotics such as *Agave americana, Melia azedarach* and *Opuntia spp.*

To the east of the hospital, the corridor swings to the south and follow a route between Lebowakgomo and Legwareng. The Tudumo/Chunies River is to the east of the proposed corridor (Figure 19 and 20). From this point, both alternatives follow the same corridor.

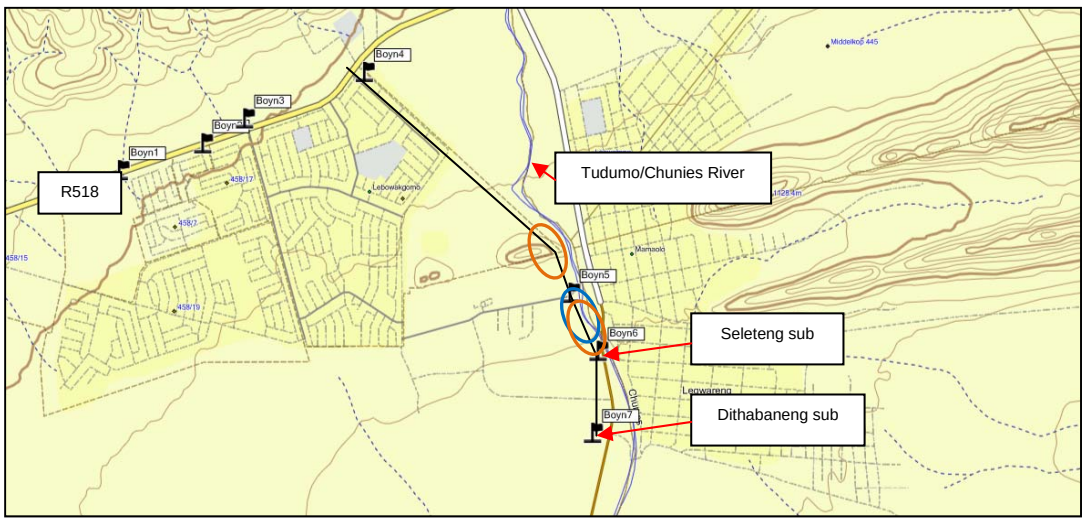

Figure 19: Corridor from the hospital area to the new Dithabaneng substation.

The section to the south of the R518 is in a residential area and the natural vegetation is severely modified. There are some large *Sclerocarya birrea, Acacia caffra* and the exotic invasive *Melia azedarach* present. To the south the corridor passes over some cultivated lands and modified natural vegetation (grazing areas) (Figure 16, 21 - 23). A koppie is crossed and the power line corridor is just to the west of the Chunies River (Figure 24).

Figure 20: The alternative to the option follow the same corridor through Lebowakgomo, due to a suitable corridor.

Figure 21: View of the corridor in the residential area.

Figure 22: Natural vegetation modified in the residential area.

Figure 23: Some cultivated areas in the corridor in the residential area.

Figure 24: View of the koppie to the south – suggested crossing of power line on the low point (arrow).

It is suggested to make the crossing over the koppie as far as possible to the east, as this will ensure that the lowest point is impacted. Care must be taken to keep the corridor 100m or outside the 1 ;100 year flood line from the edge of the riparian area of the Chunies River (Figure 25 – 27). This point must be confirmed by the specialist once the final route is selected during the walk down study.

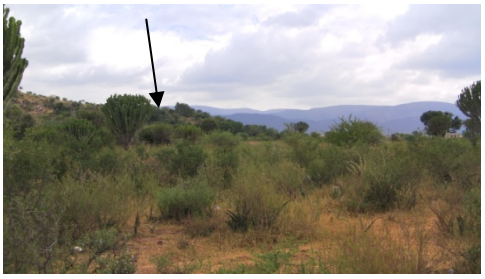

Figure 25: Low point for the crossing of the koppie.

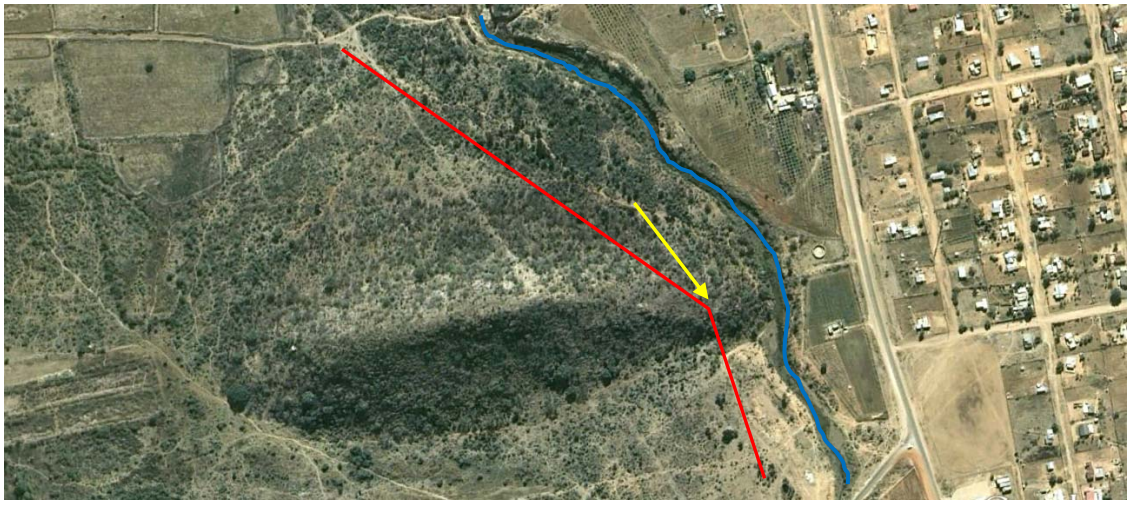

Figure 26: Aerial view of approximate power line route (red line) for the crossing of the hill (yellow arrow) with the Chunies River to the east (blue line).

Figure 27: View on the map indicating proposed route over the low hill.

The corridor then follows a route to the south over another low hill to the new Dithabaneng substation (Figure 28 and 29). The natural vegetation on and around the outcrop is in a fair condition and include species such as *Boscia foetida, Acacia nilotica, A. tortilis, A. caffra, Euphorbia cooperi, E. ingens, Ziziphus mucronata, Spirostachys africana, Aloe marlothii, Combretum apiculatum, C. molle, Sterculia rogersii, Croton gratissimus, Ximenia caffra, Ficus abutilifolia, F. Ingens* and the exotic invasive *Opuntia ficus-indica*.

Figure 28: The koppie just to the north of the new Dithabaneng substation with the point where the line will cross indicated by the arrow.

The vegetation around the Dithabaneng substation site is modified due to historic activities (grazing, cultivation and wood collection) and recent road building and construction of the substation (Figure 29 and 30).

Figure 29: Natural vegetation modified due to construction.

Figure 30: Historic impacts led to moderate to severe encroachment of the vegetation.

Section 2 – the 132kV power line from the new Dithabaneng substation to the new Dwaalkop substation

Two alternatives were investigated (Figure 31). From the new Dithabaneng substation, the corridor for Alternative 1 follows the route south to Makurung (Figure 31 and 32). Alternative 2 exits the new Dithabaneng substation to the west, before swinging to the south to Makurung (Figure 31 and 33). At the residential area, the corridor for Alternative 1 turns to the west and swings to the south and then southeast towards the Dwaalkop substation, whilst the route for Alternative 2 follows a more direct south-westerly course.

The natural vegetation is general is severely modified due to cultivation, heavy grazing and wood collection (Figure 34). In addition recent construction activities, sand mining and illegal dumping of refuse contribute to the negative impacts in the area (Figure 35).

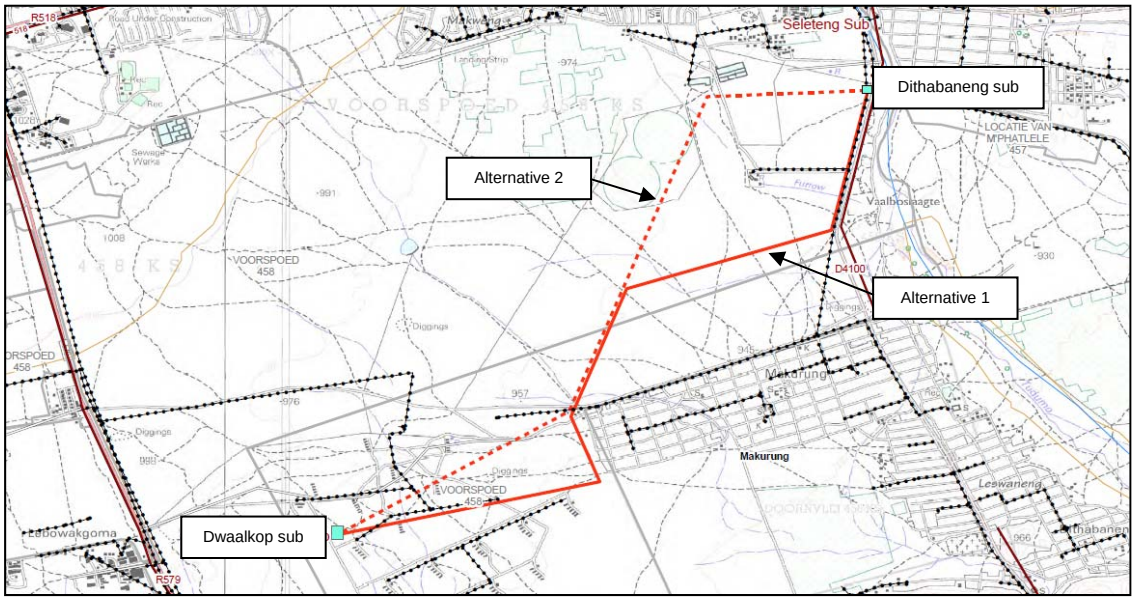

Figure 31: Routes for Alternative 1 (solid red line) and Alternative 2 (dotted red line) between the Dithabaneng and Dwaalkop substations.

The natural vegetation is dominated by low *Acacia* shrubs and *Dichrostachys cinerea* and is encroached. A few large *Sclerocarya birrea* and *Boscia foetida* are present in the grazing areas and cultivated lands.

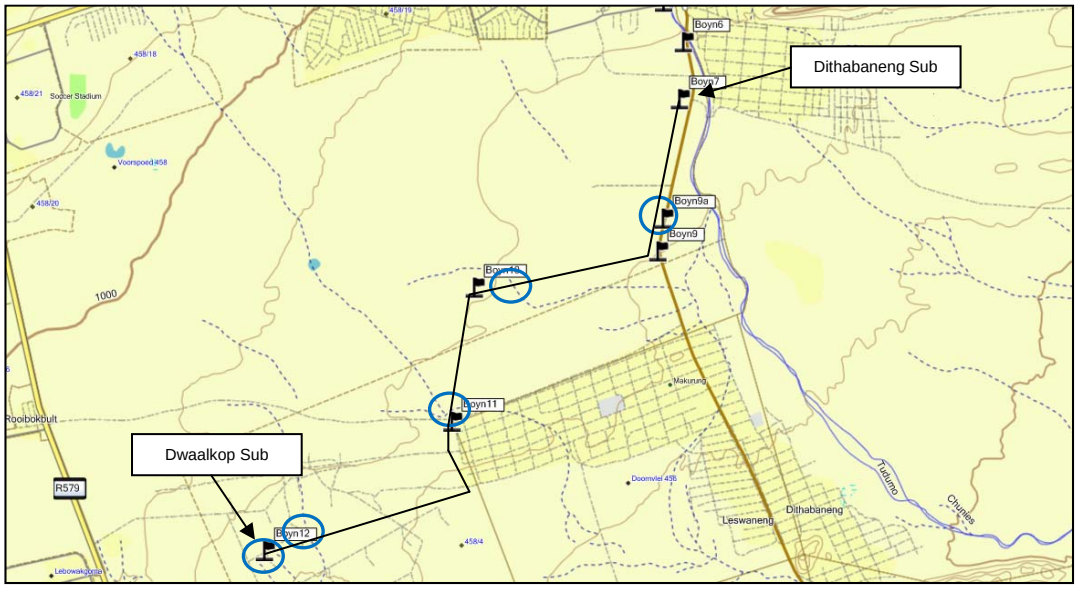

Figure 32: Approximate route investigated of the power line from the Dithabaneng to Dwaalkop substations.

A few sensitive areas are encountered (Figure 32 and 33). These are mainly seasonal streams in the area, but no traffic is allowed to cross through it during construction (Figure 36). The areas must be pointed to construction teams prior to the start of the project. This must be done during the walk down study and will coincide with the identifying of all protected trees that must be mapped. Once this map is done, permits must be acquired before clearing of the servitude can commence.

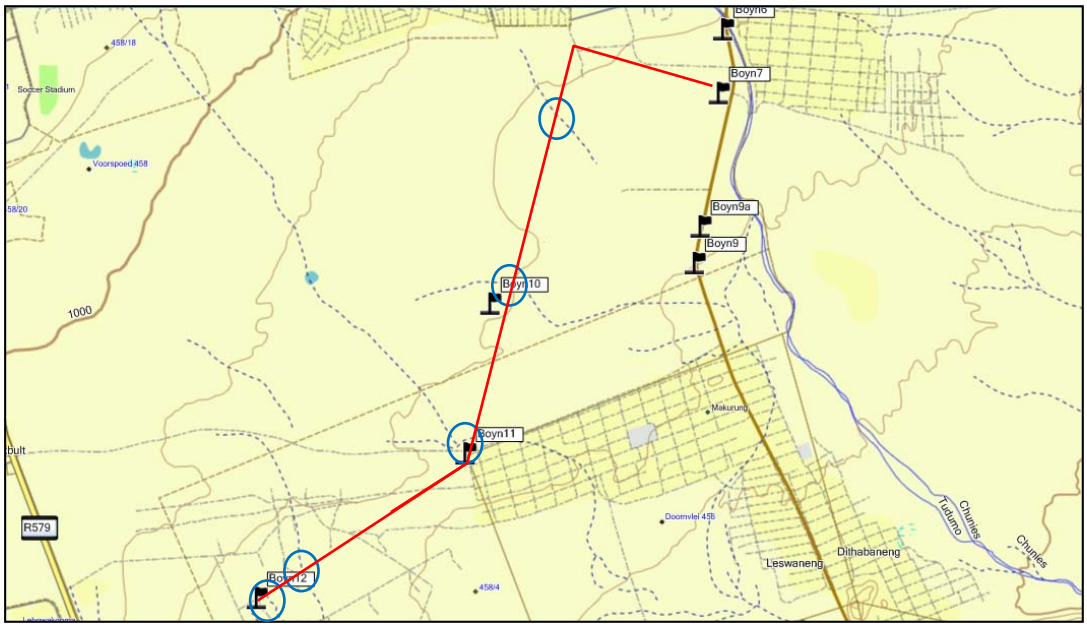

Figure 33: The alternative route to the west of the first alternative (Figure 32).

To the west of Makurung, the large trees consist of *Boscia foetida* and *Sclerocarya birrea* with some *Acacia tortilis* and large *Aloe marlothii*. The presence of *Balanites maughamii, Philenoptera violacea* and *Combretum imberbe* is mentioned by Mucina and Rutherford (2006), but is not listed in the SANBI list (SANBI, 2012). None were observed during the field survey, but it must be confirmed during the walk down study once the final route is pegged. Around the substation site (Dwaalkop) encroachment of *Dichrostachys cinerea* indicated the impact of the previous activities associated with the chicken production units (Figure 37). Other species include *Ziziphus mucronata, Acacia karroo, A. tortilis, A. niloticus, A. mellifera, Boscia foetida, Grewia vernicosa, Sclerocarya birrea, Ehretia rigida, Aloe marlothii* and *A. greatheadii*.

Figure 34: Natural vegetation modified – some large trees present.

Figure 35: Example of dumping of refuse in the area.

Figure 36: Example of streams – sensitive areas.

Figure 37: Encroachment at the site.

From the study, it is clear that some sensitive areas are present. The natural vegetation in general along this section of the study area is severely modified. The impacts from agricultural activities, wood collection and town development are the main drivers for the changes. From an ecological perspective, Alternative 1 is the preferred option. The first sector from the Dithabaneng substation follows the existing road and will lower the need to clear an access road during construction. The stream crossings have bridges and will lower the impact on these sensitive areas. Alternative 2 follows a corridor to the west of Alternative 1 and here new access roads are needed. The stream crossings don’t have proper bridges and will increase the risk of erosion. To the south of Makurung the corridors are similar and only informal roads are present. These can be used as access during construction. Stream crossings must be well maintained to ensure that erosion is limited.

Section 3 – the 132kV Loop-in-Loop-out power line from the 132kV Middelpunt/Dithabaneng power line to the proposed new Boynton substation

The area to the southwest of Mphahlele (Figure 38 - 40) is severely impacted due to poor land use practices that include overexploitation of trees, over grazing and poorly constructed roads (Figure 41 – 43). Erosion resulted and in some areas and the encroachment of vegetation is a result. Trees at the site include *Sclerocarya birrea, Ziziphus mucronata, Acacia tortilis, A. karroo, A. mellifera, Boscia foetida, Ehretia rigida, Aloe marlothii* and *Euphorbia ingens*. The encroached areas are dominated by *Dichrostachys cinerea, Acacia mellifera* and *A. tortilis*.

The presence or absence of *Balanites maughamii, Philenoptera violacea* and *Combretum imberbe* must be confirmed during the walk down study. All protected trees must be mapped (GPS) and permits acquired before clearing for the LiLo line can commence.

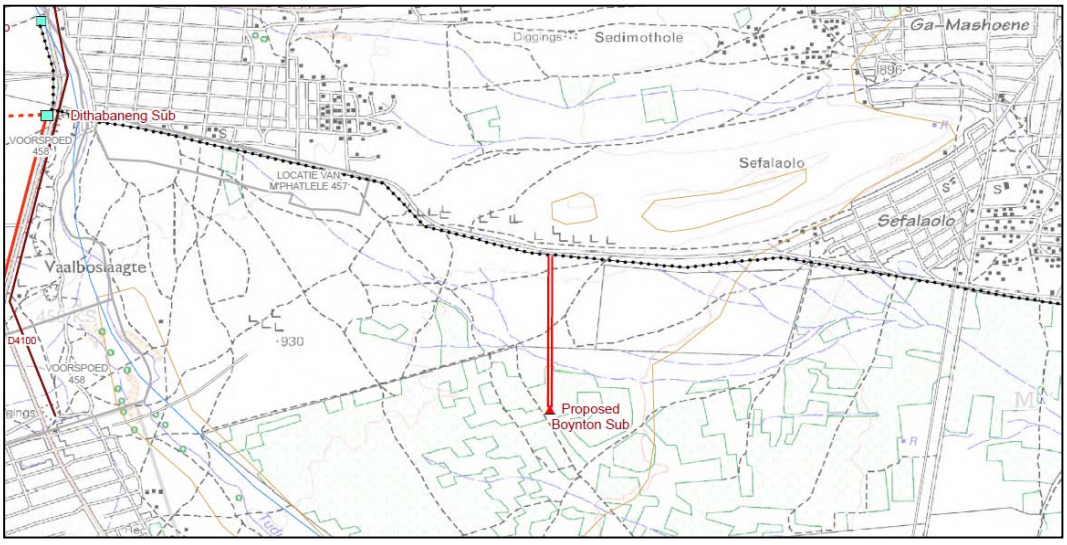

Figure 38: The proposed project indicated on the map.

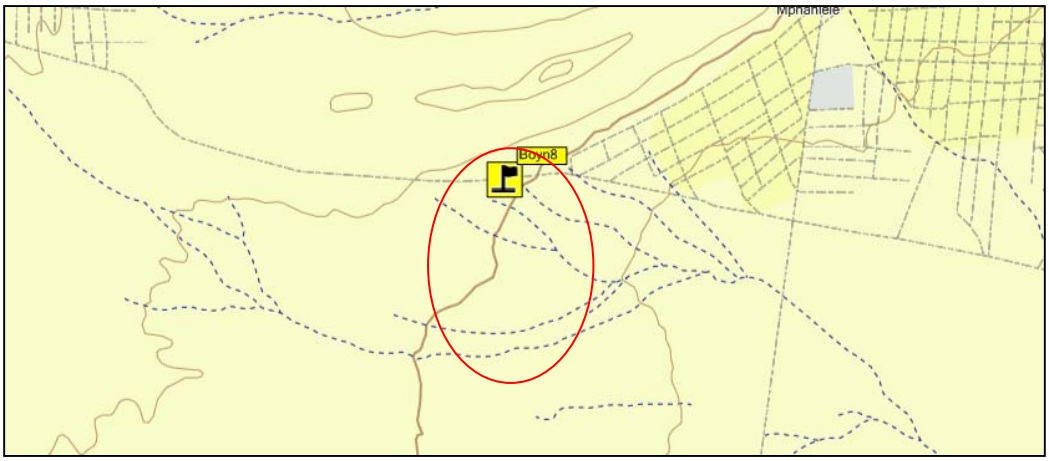

Figure 39: View of the study site – note many streams in the area.

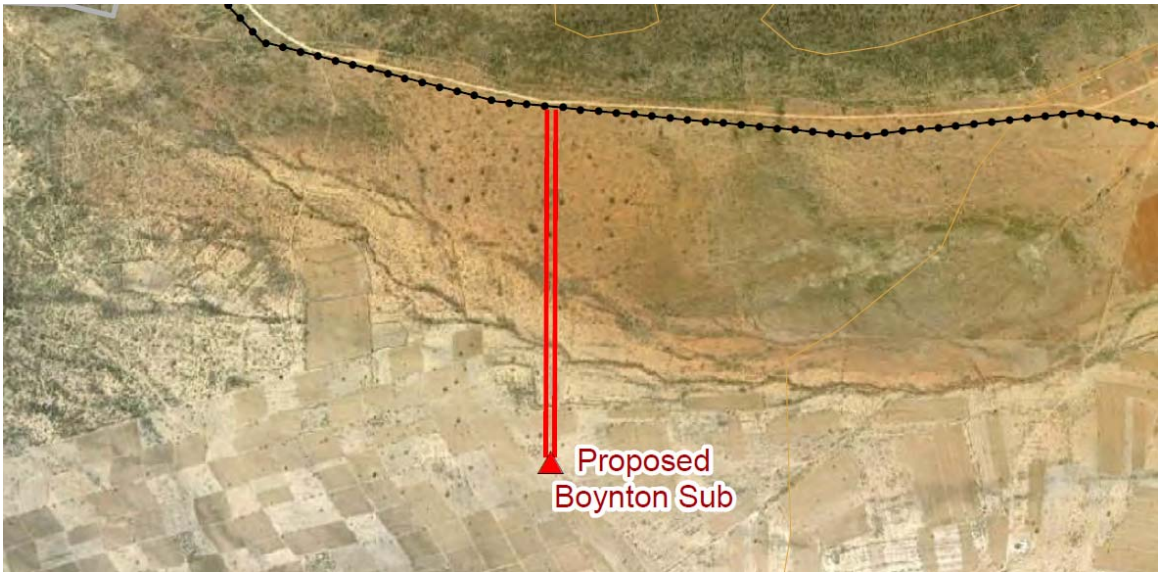

Figure 40: Aerial view of the study site.

Figure 41: Modified natural vegetation with some large trees present.

Figure 42: Natural vegetation modified due to poor land use practices.

Figure 43: Area prone to erosion due to poor maintenance and land use practices.

The suggested corridor for the new Loop-in-Loop-out power line is in an area where the new mine will be developed. The natural vegetation and habitat is currently severely modified and the power line will have no impact compared to the current activities and future mine developments.

Summary

- The natural vegetation along the proposed corridors investigated are in a “poor to fair state” with impacts related to grazing, cultivation, erosion, mining and poor infra structure development.
- Section 1:
    - From an ecological perspective, both alternatives are viable. The mountainous terrain to the north of the Lebowakgomo Hospital can be a little problematic. The steep slopes will be prone to erosion and more clearing of trees and basal cover is needed compared to the alternative nearer to the hospital boundary. Minimum clearing for this servitude is needed and access is better. The natural vegetation just to the north of the hospital in encroached by *Dichrostachys cinerea* and *Acacia*s shrubs with many exotic invasives present.
    - The route for Alternative 1 is preferred. It follows the existing power line and this servitude can be used as an access road during construction. This will lower the need of clearing of natural vegetation during construction.
    - Alternative 2 follows a route with few roads and is therefore not preferred. More clearing of natural vegetation, especially in the mountainous areas are needed. This can increase the possibility of erosion, especially after construction when maintenance of the corridor is not enforced.
    - The low mountainous areas are prone to erosion, but the current access route must be used to lower the risk of erosion. All stream crossings must be treated as sensitive and existing roads must be used to lower the risk of erosion.
    - Regular inspections by the Environmental Control Officer must be carried out and any erosion must be rehabilitated immediately.
    - The route between the residential areas (south of the hospital) is modified, but a few large *Sclerocarya birrea* is present. Permits are needed for cutting or trimming.
    - To the south of the residential areas, the route will cross a low hill (koppie). It is suggested that the crossing point must be near the foot of

the outcrop, as this will lower any possible erosion impacts. It will further lower the need to cut many indigenous trees.

- The corridor is near the Tudumo/Chunies River and all pylons must be placed outside the 1:100 year flood line.
- Just to the north of the Seleteng substation the proposed corridor crosses another low outcrop. Clearing of trees are needed, but no red data species or protected trees were observed.
- Alternative 1 is the preferred route for this section (ecological perspective).

- Section 2:
  - Many impacts related to grazing, wood collection and general poor land use practices are present is this section of the proposed corridor.
  - Alternative 1 near the road is preferred, as it allow for easier access during construction. The alternative further to the west (Alternative 2) will need the construction of more access roads and crossings of streams without proper bridges (Figure 35). The existing road has proper bridges, lowering the risk of impacts to the stream.
  - From an ecological perspective, Alternative 1 is preferred in this section.
- Section 3:
  - Some protected trees (*Sclerocarya birrea*) are present in the area.
  - Although no *Balanites maughamii, Philenoptera violacea* and *Combretum imberbe* were observed during the survey, it but must be confirmed. A walk down study is needed for the project to confirm and GPS all protected trees. Permits must be acquired before clearing of the servitudes can commence.
  - Although there are streams (Figure 38), the substation can be constructed to avoid these.
- Before any clearing or trimming commences, this specialist must accompany Eskom and the contractors to verify trees to be trimmed or cut.
- The following protected tree species were seen on the site: *Sclerocarya birrea*. The presence of *Balanites maughamii, Philenoptera violacea* and *Combretum imberbe* is mentioned, but were not observed during the survey.

- A walk down study is needed to confirm the presence/absence of all protected trees once the final route is demarcated (pegged). The protected trees must be mapped (GPS) and applications for trimming, cutting and removal must be acquired before the clearing of the servitude can commence.
- In addition, the placement of pylons around all drainage lines, streams and rivers must be confirmed to ensure it is outside the 100m zone for drainage lines and streams and the 1:100 year flood line for larger rivers.
- Three red book data plant species is recorded for the site. The species listed (Addendum 3), all occur in habitats not present along the corridor. Habitat severely modified in most areas.
- Although some rare mammals can occur in the area (suitable habitat), no current records or activity on the properties affected.
- During the survey only very little dung of hare and some activity (tracks and burrows) of rodents were observed. Impacts lower the presence of large diversity and numbers.
- The streams, river and drainage lines must be considered as corridors for the limited migration of species. The power lines won't impact on these corridors and therefore will have no large scale effect on the species or area.
- All pylons must be placed at least 100m from small drainage lines or outside the 1:100 flood lines for larger rivers.
- With regard to biodiversity patterns, little if any impacts will occur.
    - The vegetation type occurs over a large area and the narrow corridor for the power line will have no large-scale negative impact on it.
    - No red data plant species observed - no impact. Limited habitat for the species listed (1/4° square) occur in the study area.
    - As stated, some drainage lines occur, but very limited impacts may occur. If activities are limited to the servitude as access roads, impacts will be very low (high confidence).
    - Alien plant infestations observed on the site and in the near vicinity. Clearing of soil can always lead to some infestations. The chance of that happening is high. It is suggested that the "maintenance plan" of the site must include regular inspections to ensure no alien or exotic plants establish itself on site.

- Currently the landscape for the larger part of the study area is in a poor condition with a small area to the east of the Lebowakgomo substation in a fair condition. Historic and current land use is responsible for the modification to the natural vegetation and the habitat. Apart from roads and the existing power line, the other land-use impacts are grazing, houses and infra structure development, exotic vegetation, erosion and mining.
- The activity (power line construction and substation) will have no real impact on biodiversity processes. The only possible impact can be oil or fuel spillages that can occur during construction or the installation and maintenance of the transformers. It is suggested that fuel and oil must not be stored on site during the construction phase and that containment dams or berms are constructed around transformers. In addition, a clear plan how to manage accidental spills must be included in the EMP for the site.
- As stated, the impact on the system is low and this development won't have a negative impact on the region with regard to plants, plant communities and water courses – when looking at it in a regional perspective.

Addendum 1 is a summary of the potential impacts related to the project (construction of the substation and power line) and some mitigating and management suggestions are listed in the table.

Addendum 2 is a summary of mammals that historically occurred in the area. It also indicates habitat availability and possibility of occurrence on the site.

From the SANBI database, three species are listed as red data species, none likely to occur as habitat are not present or modified (Addendum 3).

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Addendum 1: Impacts and mitigating recommendations.

Boynton – Lebowakgomo/Dithabaneng/Dwaalkop project		
Theme	Natural environment	
Nature of issue	Erosion	
Stage	Construction and maintenance	Possibility for erosion during construction possible due to soil types. Mountain slopes, koppies and river crossings.
Extent of impact	Site, local and region	The impact will be moderate to high on-site, but limited to low on a regional scale. Silt will have a negative impact in streams and rivers, but will be very for this project.
Duration of impact	Immediate	If not addressed on constant basis, permanent damage is a reality.
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	Moderate.	If no maintenance is done, the impact will have a compounding impact on the environment.
Level of significance	Very low if controlled.	Will be very moderate-high if not managed.
Mitigation measures	• Limited traffic during construction. • Constant rehabilitation during construction. • Must have maintenance strategy as part of EMP. • Use existing road (servitude) as access road were possible.	
Level of significance after mitigation	Low.	
EMP requirements	• No surface storm water generated as a result of the development may be directed directly into any natural drainage system or wetland. • Use permeable surfaces at new substations. • 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). • No activity such as temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment or any other use of the buffer/flood zone whatsoever, may be permitted during the construction phase. • An on-site ecological management plan must be implemented for drainage lines including management recommendations as well as potential rehabilitation of 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 at any time. No storing of hazardous material on site (oil, fuel)
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	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 if controlled.	Will be very high if not managed.
Mitigation measures	• Proper ablution facilities on site. • Constant management during construction.	This refers to storage of material, oil and fuel spills, ablution facilities and rehabilitation of construction sites at the

	• Must have rehabilitation strategy as part of EMP.	completion of the project.
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 nocturnal activities of certain species. • Alien vegetation removal will continue through all phases of the development especially in the open spaces. • 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 line – preferably off-site. • The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) 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	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 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. • Cleanup plan/strategy if spills occur. • Proper facilities (ablution) to ensure no sewerage spills into streams and rivers. • Proper storage of material during construction and cleanup after the construction is completed. • Proper strategy to remove and dispose of oil from transformers.	
Nature of issue	Alien vegetation	Includes all exposed areas – substation sites and servitudes for the power lines.
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. Many exotics are present and can invade exposed areas during and after construction.
Intensity	Low	If not properly managed as part of operational plan, it will be high.
Probability of occurrence	Low	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 if controlled.	Will be 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 plant/re-seed with indigenous grasses as part of EMP. • Disturbed areas around the construction sites should be re-vegetated. • Exposed areas should be rehabilitated. • 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	Wood collection and illegal hunting	Includes all areas around the construction site and adjacent properties. Trees present as well as small game.

Stage	Construction and maintenance	Must have a strict environmental guidelines and management plan in place.
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	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	• Must ensure no wood collection takes place (by construction workers for cooking). • Although little game animals are present, care must be taken that no illegal hunting takes place – mostly by snares. • The construction teams must be informed – strategy must form 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 hunting and wood collection. • Regular inspections.	

Addendum 2: List of red data species and CITES species in Limpopo Province (LEDET State of the Environment Report, 2004). The probability of occurrence is obtained from Skinner and Chimimba (2005).

Category	Common Name	Scientific Name	Does suitable habitat occur on site? (Yes/No)	Probability of the species occurring on site? (high/medium/low)
Critically Endangered	Black rhinoceros	*Diceros bicornis*	No	No
	Juliana's golden mole	*Neamblysomus julianae*	No	No
Endangered	African wild dog	*Lycaon pictus*	No	No
Vulnerable	African elephant	*Loxodonta africana*	No	No
	Gunning's golden mole	*Neamblysomus gunningi*	No	No
	Cheetah	*Acinonyx jubatus*	No	No
	Lion	*Panthera leo*	No	No
	Black-footed cat	*Felis nigripes*	No	No
Near Threatened	White rhinoceros	*Ceratotherium simum*	Yes	No
CITES Appendix	**Common Name**	**Scientific Name**	**Does suitable habitat occur on site? (Yes/No)**	**Probability of the species occurring on site? (high/medium/low)**
Appendix 1	Black-footed cat	*Felis nigripes*	No	Very low
	Leopard	*Panthera pardus*	Yes	Low
	Cheetah	*Acinonyx jubatus*	No	No
	Black rhinoceros	*Diceros bicornis*	No	No
Appendix 2	African elephant	*Loxodonta africana*	No	No
	Chacma baboon	*Papio ursinus*	Yes	No
	Vervet monkey	*Cercopithecus aethiops*	Yes	Low
	Samango monkey	*Cercopithecus mitis*	No	No
	Greater galago	*Otolemur crassicaudatus*	No	No
	South African galago	*Galago moholi*	Yes	Very low
	Spotted-necked otter	*Lutra maculicollis*	No	No
	African clawless otter	*Aonyx capensis*	No	No
	Caracal	*Caracal caracal*	Yes	No
	Serval	*Leptailurus serval*	Yes	No
	African wild cat	*Felis sylvestris*	No	No
	Lion	*Panthera leo*	No	No
	Hippopothamus	*Hippopothamus amphibious*	No	No
	White rhinoceros	*Ceratotherium simum*	No	No
	Pangolin	*Manis temminckii*	Yes	No

Addendum 3: List of Red data species from the ¼ degree square (SANBI, 2012).

Family	***Genus/species***	**Status**	**Distribution, area and threats**	**Probability of occurrence**
ACANTHACEAE	*Dicliptera fruticosa*	NT	Strydpoort Mountains to Ohrigstad. Savanna and open woodland, shady areas on rocky magnetite and dolomite slopes. Threatened within some parts of its range by expanding human settlements and agriculture. This shade-loving species may also be sensitive to excessive wood extraction which reduces tree cover in savanna habitat.	Low
COMMELINACEAE	*Aneilema longirrhizum*	NT	Sekhukhuneland, northern Leolo Mountains and Olifants River Valley. Sekhukhune Plains Bushveld, on well-drained, gravel slopes and along dry riverbeds.	Moderate
PASSIFLORACEAE	*Adenia fruticosa* subsp. *fruticosa*	NT	Strydpoort Mountains southwards to Ohrigstad and the Steelpoort River Valley. Arid woodland, rocky outcrops, slopes and sandy flats, on dolomite, granite and quartzite, 800-1400 m. Habitat in low-lying areas is transformed by agriculture, human settlements and mines.	Low