



**An evaluation of the vegetation and plant diversity
along the proposed route between the Eskom
Merensky and Foskor substations**

February 2012



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Prepared for:

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DECLARATION OF INDEPENDENCE

I, George Johannes Bredenkamp, Id 4602105019086, declare that I:

- Am the owner of Eco-Agent CC, CK 95/37116/23
- am committed to biodiversity conservation but concomitantly recognize the need for economic development. Whereas we appreciate the opportunity to also learn through the processes of constructive criticism and debate, we reserve the right to form and hold our own opinions and therefore will not willingly submit to the interests of other parties or change our statements to appease them;
- abide by the Code of Ethics of the S.A. Council for Natural Scientific Profession;
- Act as independent specialist consultants respectively in the fields of ecology, vegetation science and botany,
- am assigned as specialist consultant by Nsovo Environmental Consulting for the proposed project "An evaluation of the vegetation and plant diversity along the proposed route between the Eskom Merensky and Foskor substations" described in this report;
- do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work performed;
- have or will not have any vested interest in the proposed activity proceeding;
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2006;
- will provide the client and competent authority with access to all information at our disposal, regarding this project, whether favourable or not.

GJ Bred



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EXECUTIVE SUMMARY

The vegetation of all four alternatives was investigated. From the desktop study, confirmed by the field survey, option 3, which runs from Burgersfort to Ohrigstad along the R555, was eliminated. This is because the route along the R555 runs for most of the way in a narrow valley, with the Mabitsana River and the tarred R555 in this valley. The line will have to run for most of the way on the sensitive mountain foot slopes and cross the river and road several times. Furthermore, many irrigated agricultural enterprises occur in the Ohrigstad area, stretching all the way to Marapeng. This mosaic of narrow river valley, river, mountain slopes and agriculture where-ever the valley is a bit broader, causes the route to be unsuitable. From an ecological perspective both the riverine vegetation and the vegetation of the mountain slopes have a high ecological sensitivity. Therefore this entire valley forms an ecologically sensitive ecosystem. This is also a much longer route.

Furthermore, from the desktop study, confirmed by the field survey, option 4, was eliminated. The line of this option runs through nine vegetation types, and over very high and steep mountains of Sekhukhune Mountain Bushveld and Ohrigstad Mountain Bushveld with two endangered ecosystems (Sekhukhune Mountainlands and Sekhukhune Norite Bushveld, SANBI & DEAT 2009), Pong Dolomite Mountain Bushveld with endangered Malmani Karstland (SANBI & DEAT 2009), the vulnerable Northern Escarpment Quartzite Sourveld (Mucina & Rutherford (2006), Northern Mistbelt Forest area and the vulnerable Tzaneen Sour Bushveld (SANBI & DEAT 2009). Especially the Great Escarpment area consists of very rugged and high mountains, resulting in a very difficult route with several threatened ecosystems.

Alternative Routes 1 and 2 were further investigated in more detail by field surveys. However, after the Social Impact Assessment, a further alternative route (Alternative 5) was proposed. From a vegetation perspective, Alternative route 5 is very similar to Alternative 1. The vegetation along these routes is described in detail, including the protected and red data species. Medicinal plants and aliens and weeds are indicated.

The most difficult part of the route is from the Merensky substation through Ohrigstad Mountain Bushveld which is an extremely mountainous area with sensitive vegetation. This part of the line transects quite sensitive vegetation and it is suggested that a walkthrough in this area is essential.

The most serious limitation on the Lowveld plains where the line transects the Granite Lowveld vegetation type, is the abundance of the protected tree *Sclerocarya birrea*. It is certain that several of these trees will be in the way of the transect.

Locally are also the river and spruit crossings. No river or spruit is very wide, so the lines can easily cross these rivers or spruits systems. Care should be taken to place pylons adequately away from river or spruit banks, avoiding any damage to the banks or water courses. Erosion should be avoided at all times.

Another factor in this area is that large properties are game farms and lodges. These areas are effectively conserved by the owners, and it is realised that the public participation is an important issue. After finalisation of the exact transect, a walkthrough will have to confirm any issues regarding vegetation.

From an ecological perspective, Alternative 5 was the preferred route Alternative route 5 is very similar to Alternative 1, but avoids crossing the Olifant River twice.

THE PROPOSED DEVELOPMENT

Eskom proposed the development of a new power line from the Merensky substation near Steelpoort to the Foskop substation near Phalaborwa. This power line is more than 120 km long. Alternative routes were proposed.

2. ASSIGNMENT

EcoAgent Ecological Consultants CC was appointed by Nsovo Environmental Consulting to assess the vegetation and flora for the entire route of proposed routes. This assignment is in accordance with the 2010 EIA Regulations (No. R. 543-546, Department of Environmental Affairs and Tourism, 18 June 2010) emanating from Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The assignment is interpreted as follows: Compile a study of the vegetation and flora of the route, with emphasis on Red Data or Protected plant species that occur or may occur along the route. In order to compile this, the following had to be done:

2.1. Initial preparations:

- Obtain relevant maps and information on the natural environment of the concerned area.
- This includes information on Red Data plant species that may occur in the area.
- Obtain the Vegetation Types (Mucina & Rutherford, 2006) along the routes.

2.2. Vegetation and habitat survey:

- Use the Vegetation Types as basis for ecosystem delimitation.
- List the plant species (trees, shrubs, grasses and herbaceous species) present in the ecosystem recognised.
- Identify potential red data plant species, alien plant species, and medicinal plants.

2.3. Plant community delimitation and description

- Describe the habitat and vegetation.
- Determine the sensitivity of the site for biodiversity, veld condition and presence of rare or protected species.

2.4. General

- Identify and describe particular ecologically sensitive areas.
- Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, water pollution, degraded areas, reclamation areas.

- This includes information on Red Data plant species that may occur in the area.



3. RATIONALE

It is widely recognised that it is of the utmost importance to conserve natural resources in order to maintain ecological processes and life support systems for plants, animals and humans. To ensure that sustainable development takes place, it is therefore important that the environment is considered before relevant authorities approve any development. This led to legislation protecting the natural environment. The Environmental Conservation Act (Act 73 of 1989), the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998) and the National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004) ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. They also ensure the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities. A draft list of Threatened Ecosystems was published (Government Gazette 2009) as part of the National Environmental Management Biodiversity Act, 2004 (Act 10 Of 2004). These Threatened Ecosystems are described by SANBI & DEAT (2009).

All components of the ecosystems (physical environment, vegetation, animals) of a site are interrelated and interdependent. A holistic approach is therefore imperative to include effectively the development, utilisation and where necessary conservation of the given natural resources in an integrated development plan, which will address all the needs of the modern human population (Bredenkamp & Brown 2001).

It is therefore necessary to make an inventory of the plant communities and biodiversity on the alternative routes, in order to evaluate the biodiversity and possible rare species. This inventory should then serve as a scientific and ecological basis for the planning exercises.

4. STUDY AREA

4.1. General

The different options suggested for the Merensky - Foskor Eskom power line are indicated in Figure 1. The northern parts of all options will traverse through conservation areas (Figure 2). All options start at the Merensky substation near Steelpoort. As the area is very large, many spruit systems are found along the routes (Figure 3). A few larger rivers or spruits are mentioned, but the numerous smaller spruit systems will have to be identified during a walk-down.

Option 1 (the preferred option) will run along the Steelpoort – Burgersfort road (R555) but before reaching Burgersfort it will turn north-eastwards and cross the rugged mountainous area towards the Strydom tunnel on the R36. It will then cross the mountains east of the Strydom tunnel and run towards Mica and from there towards the Foskor substation south of Phalaborwa.

Option 2 will follow the same route as option 1 up to the Mica area, but will then turn more east to run south and east of option 1, in the direction of Hoedspruit, and then turn northwards to the Foskor substation.

Option 3 will initially also follow the same route as option 1 for a short distance, but at Burgersfort it will turn eastwards and follow the R555 to Ohrigstad and further on to the Strydom tunnel. From here on the route is similar to that of option 1.

Option 4 will run northwards from the Merensky substation, over undulating and mountainous area towards Penge and then over the rugged mountains over the great escarpment to cross the R36 between Trichardsdal and Diputhi and then run through the Kapama / Madrid Nature Reserve area towards Phalaborwa.

However, after the Eco Tourism Assessment, a further alternative route (Alternative Option 5) was proposed. This route is very similar to the Option 1 route, but at turns northwards, just south of Diputhi and then turns north-eastwards and runs via Mica towards Phalaborwa. An advantage, from an ecological perspective, is that it now avoids crossing the Olifants River twice

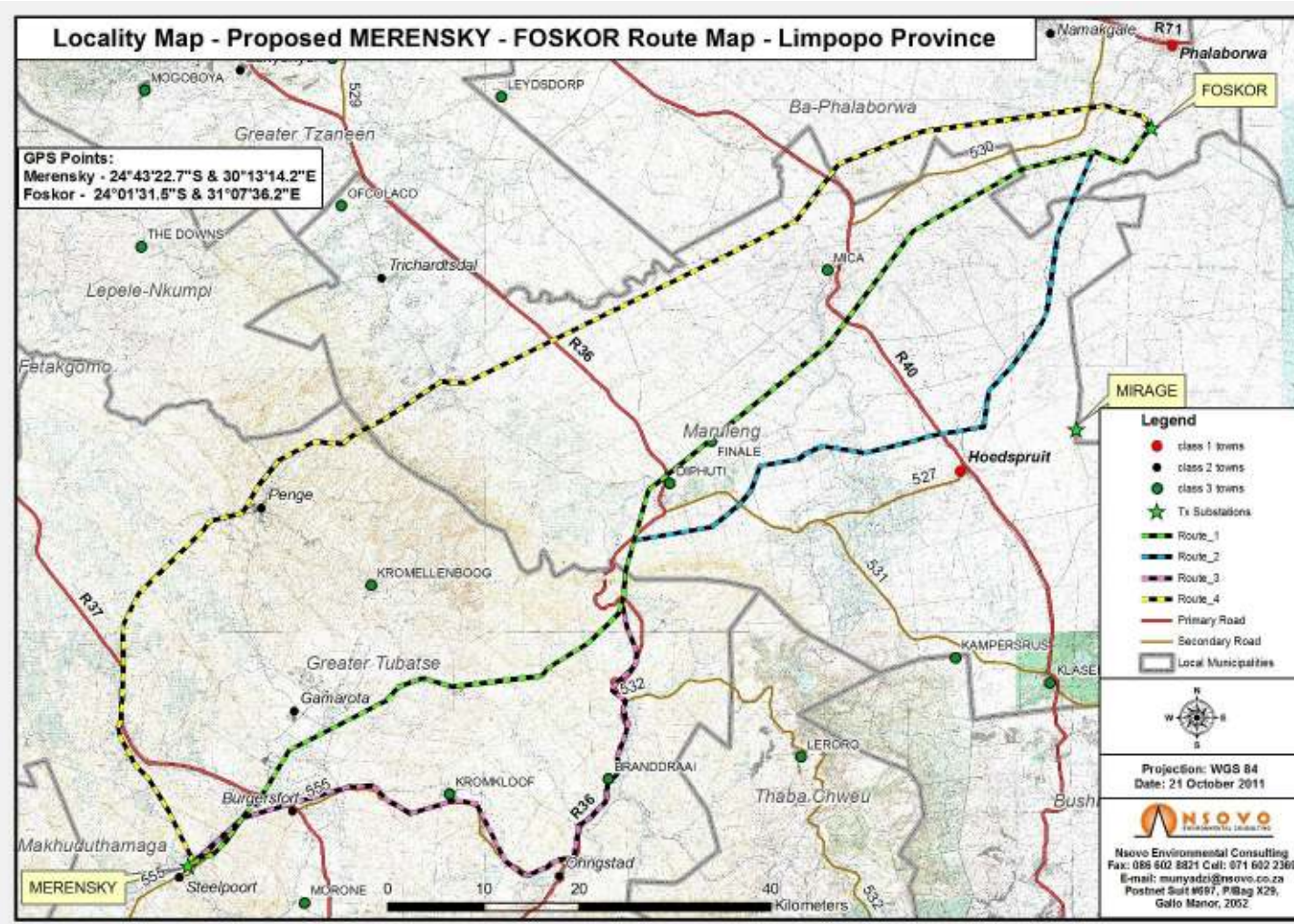


Figure 1: A locality map showing the different options for the Merensky Foskor Eskom power line

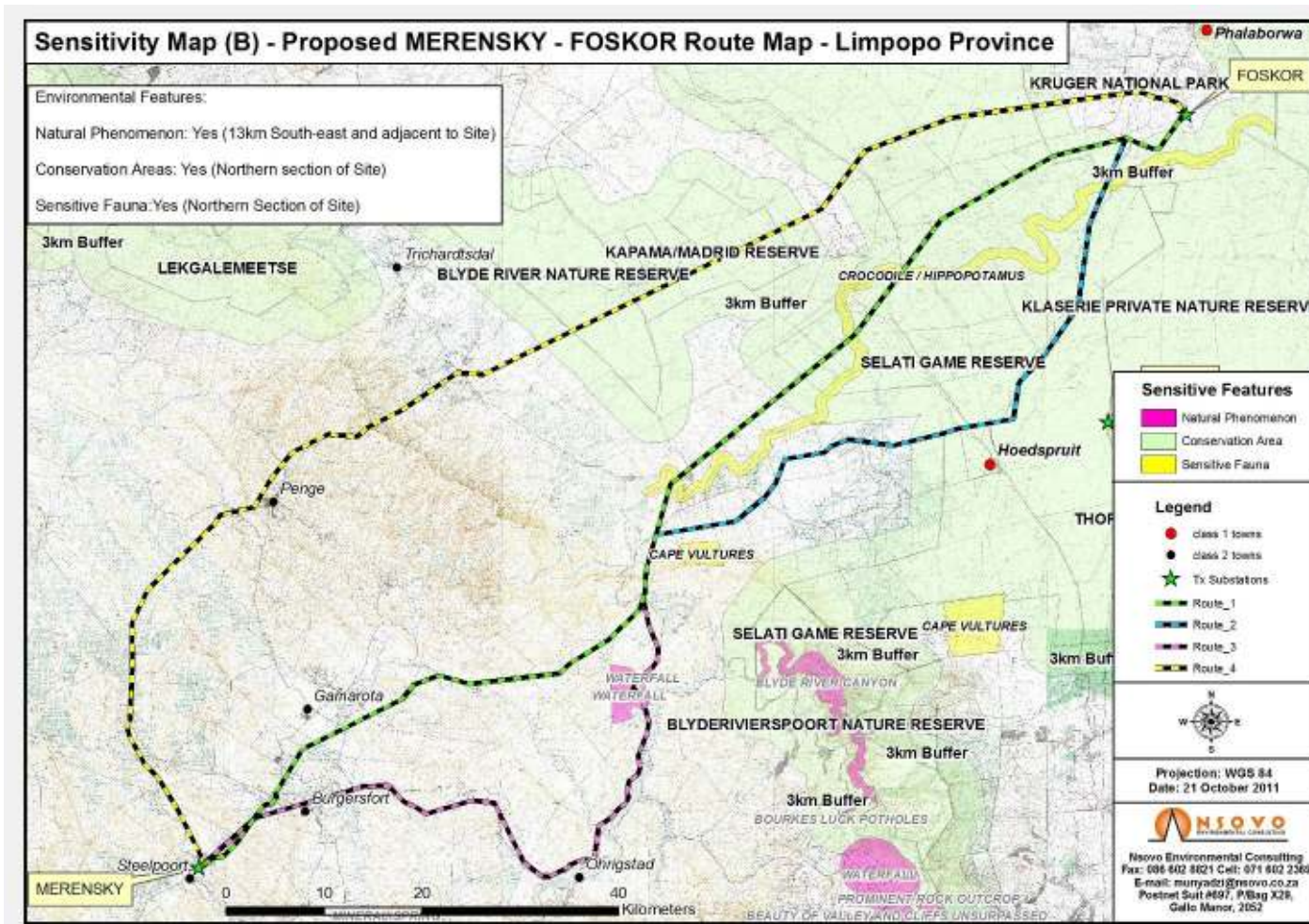


Figure 2: A locality map showing the different options for the Merensky Foskor Eskom power line with conservation and sensitive areas

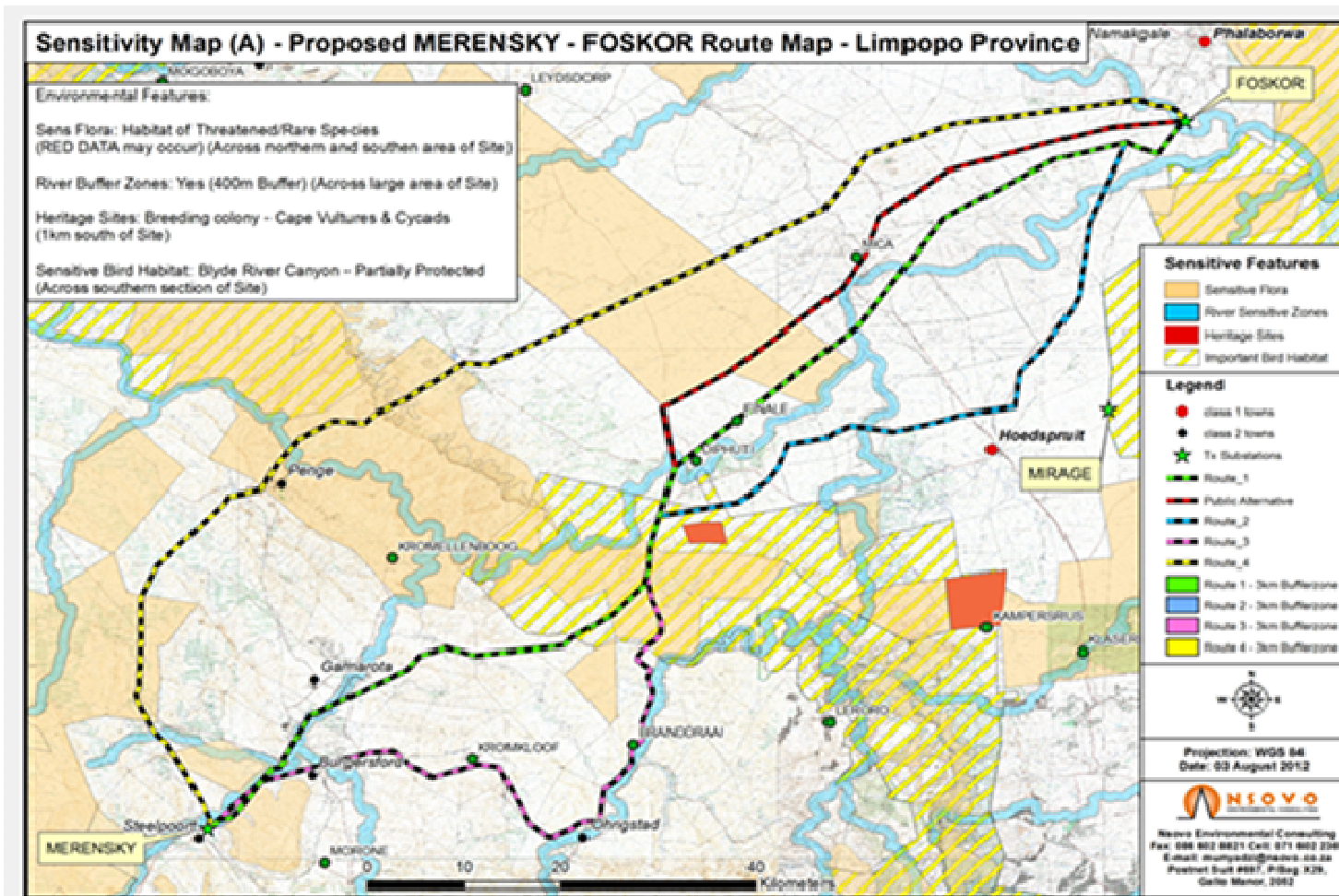


Figure 2a: Locality map showing the Alternative 5 route (red line)

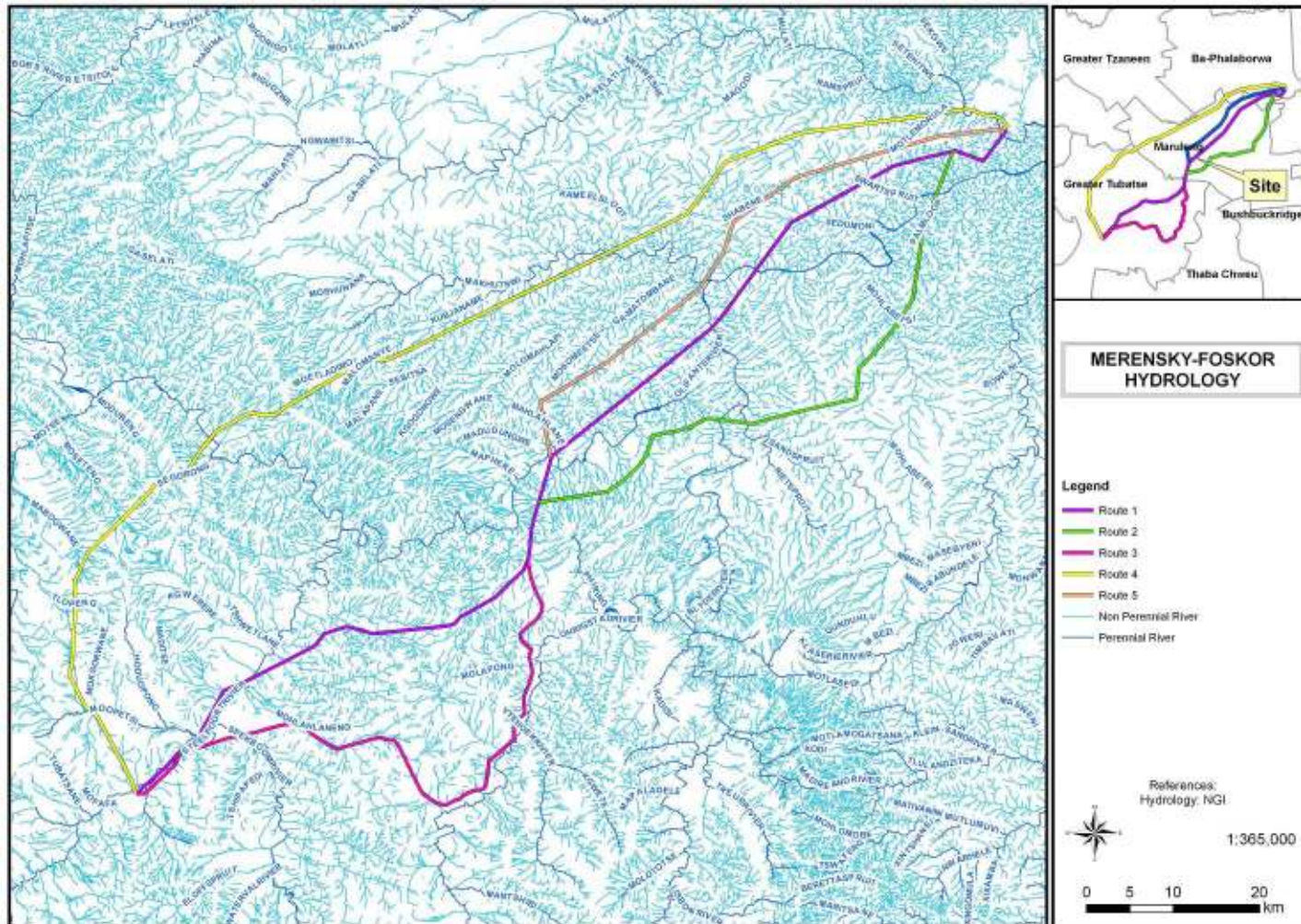


Figure 3: The hydrology of the area showing major river systems and numerous smaller spruits along all the route options

6. METHODS

6.1 Vegetation and habitat survey

A desktop study was made on the vegetation and flora fauna and general ecology and ecological sensitivity of the area along all options suggested for this power line. A site visit followed the desktop study.

The routes were driven on 24 and 25 October 2011 by Prof G.J. Bredenkamp, a delegation of Nsovo Environmental Consulting and also a delegation of Eskom. Staff members of Eskom gave guidance in the field on the location of the various options. Parts of the route, especially the south-western mountainous parts, were again visited during February 2012.

The vegetation of the route was stratified into relatively homogeneous units based on Vegetation Type Units (Mucina & Rutherford 2006). Regular stops were made in each vegetation unit identified, to record vegetation and plant species present and also on the conservation status, sensitivity and condition of the vegetation. Special features were identified as major river crossings, wetlands, rocky ridges or any other features considered to be of importance for the biodiversity assessment.

The Alternative 5 route was additionally assessed in early October 2012.

The general vegetation of the each was described using both the desktop study and the field observations. For the particular vegetation type a description of the dominant and characteristic species was made at several sites within each Vegetation Type unit. These descriptions were based on total floristic composition, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978). Data recorded included a list of the plant species present, including trees, shrubs, grasses and forbs. Comprehensive species lists were therefore derived for each plant community / ecosystem present on the site. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al.* 2000) and are considered to be an



efficient method of describing vegetation and capturing species information. Notes were additionally made of any other features that might have an ecological influence.

The identified systems are not only described in terms of their plant species composition, but also evaluated in terms of the potential habitat for red data plant species.

Red data plant species for the area were obtained from the SANBI data bases, with updated threatened status, (Raimondo *et al* 2009). These lists were then evaluated in terms of habitat available on the site, and also in terms of the present development and presence of man in the area.

Protected trees are according to the list provided by the National Forests Act 1998 (Act 84 of 1998). Other protected plants are according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), or provincial regulations.

Alien invasive species, according to the Conservation of Agricultural Resources Act (Act No.43 of 1983) as listed in Henderson (2001), are indicated.

Medicinal plants are indicated according to Van Wyk, Van Oudthoorn & Gericke (1997), these are mentioned in the species lists.

6.2 Conservation Priority / Sensitivity

The following **conservation priority / ecological sensitivity** categories were used for each site:

High: Ecologically sensitive and valuable land with high species richness and/or sensitive ecosystems or red data species that should be conserved and no developed allowed.

Medium-high: Land where sections are disturbed but which is in general ecologically sensitive to development/disturbances.

Medium: Land on which low impact development with limited impact on the vegetation / ecosystem could be considered for development. It is recommended that certain portions of the natural vegetation be maintained as open space.

Medium-low: Land of which small sections could be considered to conserve but where the area in general has little conservation value.

Low: Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation.

Species status

Plant species recorded in each plant community with an indication of the status of the species by using the following symbols:

A = Alien woody species

D = Dominant

d = subdominant

G = Garden or Garden Escape

M = Medicinal plant species

P = Protected trees species

p = provincially protected species

RD = Red data listed plant

W = weed

The field observations were supplemented by literature studies from the area (Bredenkamp 1982, Gertenbach 1983a, 1983b, Mathews 1991, Siebert 2001, Siebert *et al.* 2002a, 2002b, 2002c, 2002d 2002e and 2003).



7. RESULTS:

7.1 Vegetation Classification

According to the new vegetation map of South Africa (Mucina & Rutherford 2006) the routes transect the following vegetation types, Threatened Ecosystem Status is according to SANBI & DEAT (2009):

Vegetation Type	Route	Conservation status (Mucina & Rutherford 2006)	Threatened Ecosystems (SANBI & DEAT 2009)	Threatened Status
1. Sekhukhune Plains Bushveld	1, 3, 4	Vulnerable		
2. Sekhukhune Mountain Bushveld	4	Least Threatened	Sekhukhune Mountainlands Sekhukhune Norite Bushveld	Endangered Endangered
3. Ohrigstad Mountain Bushveld	1, 3, 4	Least Threatened	Sekhukhune Mountainlands	Endangered
4. Lydenburg Thornveld	1	Vulnerable		
5. Pong Dolomite Mountain Bushveld	1, 3, 4	Least Threatened	Malmani Karstlands	Endangered
6. Northern Escarpment Quartzite Sourveld	4	Vulnerable		
7. Northern Mistbelt Forest	4	Least Threatened		
8. Tzaneen Sour Bushveld	4 (1, 2)	Least Threatened	Tzaneen Sour Bushveld	Vulnerable
9. Granite Bushveld	1, 2, 4, 5	Least Threatened		
10. Lowveld Rugged Mopaneveld	1, 2, 5	Least Threatened		
11. Phalaborwa-Timbavati Mopaneveld	1, 4, 5	Least Threatened		
12. River Crossings	all			



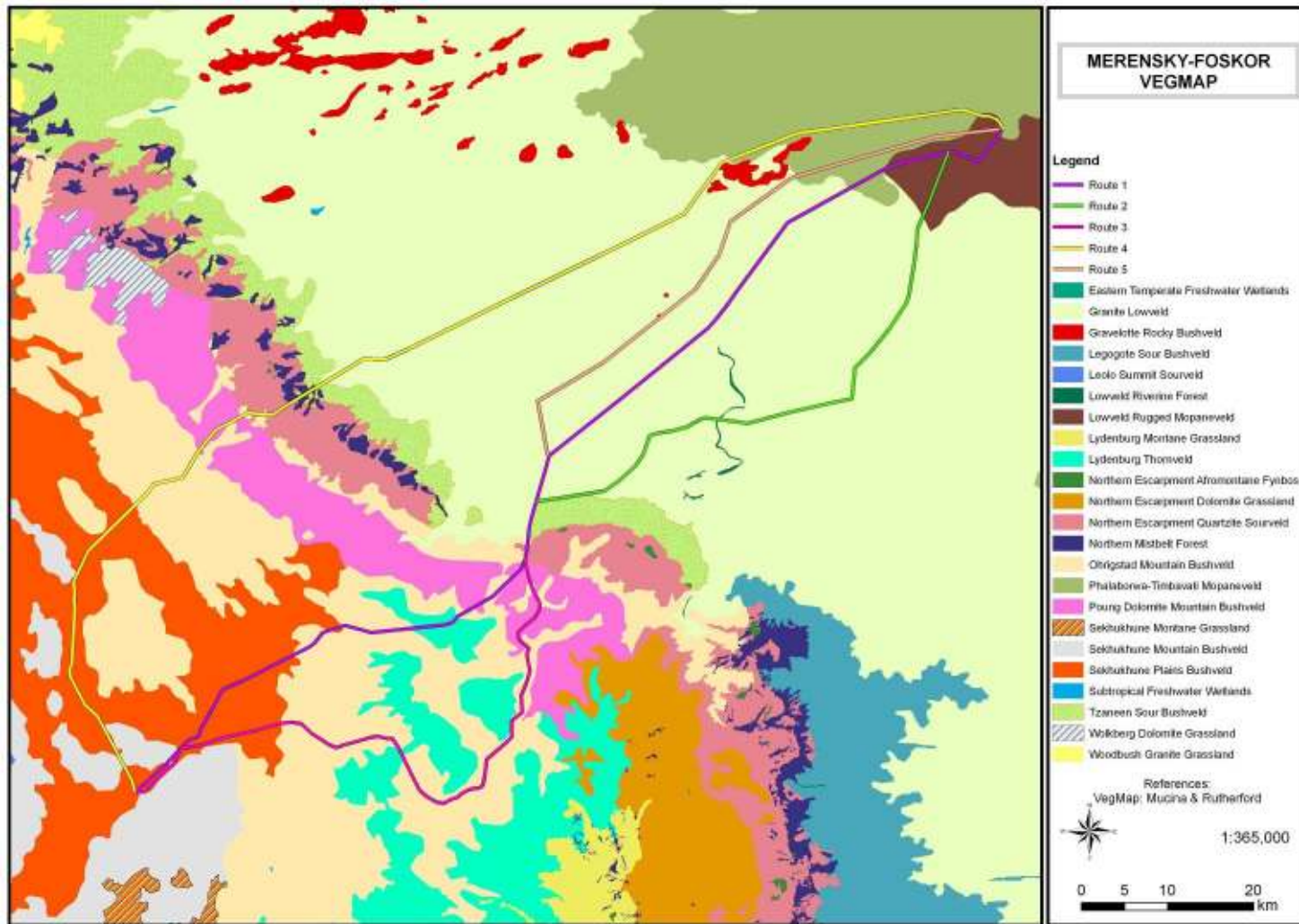


Figure 4: The vegetation types (Mucina & Rutherford 2006) along the optional routes

From the desktop study, confirmed by the field survey, option 3, which runs from Burgersfort to Ohrigstad along the R555, was eliminated. This is because the route along the R555 runs for most of the way in a narrow valley, with the Mabitsana River and the tarred R555 in this valley. The line will have to run for most of the way on the sensitive mountain foot slopes and cross the river and road several times. Furthermore, many irrigated agricultural enterprises occur in the Ohrigstad area, stretching all the way to Marapeng. This mosaic of narrow river valley, river, mountain slopes and agriculture where-ever the valley is a bit broader, causes the route to be unsuitable. From an ecological perspective both the riverine vegetation and the vegetation of the mountain slopes have a high ecological sensitivity. Therefore this entire valley forms an ecologically sensitive ecosystem. This is also a much longer route.

Furthermore, from the desktop study, confirmed by the field survey, option 4, was eliminated. The line of this option runs through nine vegetation types, and over very high and steep mountains of Sekhukhune Mountain Bushveld and Ohrigstad Mountain Bushveld with two endangered ecosystems (Sekhukhune Mountainlands and Sekhukhune Norite Bushveld, SANBI & DEAT 2009), Pong Dolomite Mountain Bushveld with endangered Malmani Karstland (SANBI & DEAT 2009), the vulnerable Northern Escarpment Quartzite Sourveld (Mucina & Rutherford (2006), Northern Mistbelt Forest area and the vulnerable Tzaneen Sour Bushveld (SANBI & DEAT 2009). Especially the Great Escarpment area consists of very rugged and high mountains, resulting in a very difficult route with several threatened ecosystems.

Alternative Routes 1 and 2 were further investigated in more detail by field surveys. The vegetation along these routes is described in detail, including the protected and red data species. Medicinal plants and aliens and weeds are indicated.

Locally are also the river and spruit crossings. No river or spruit is very wide, so the lines can easily cross these rivers or spruits systems. Care should be taken to place pylons adequately away from river or spruit banks, avoiding any damage to the banks or water courses. Erosion should be avoided at all times.

Another factor in this area is that large properties are game farms and lodges. These areas are effectively conserved by the owners, and it is realised that the public participation is an important issue. After finalisation of the exact transect, a walkthrough will have to confirm any issues regarding vegetation.

From an ecological perspective, Alternative 1 was the preferred route.

However, after the Social Impact Assessment, a further alternative route (Alternative 5) was proposed. From a vegetation perspective, Alternative route 5 is very similar to Alternative 1, and Alternative 5 can be supported.

7.2 Description of the vegetation types

Sekhukhune Plains Bushveld (Vulnerable)

The Merensky substation is located in the Sekhukhune Plains Bushveld. Although the vegetation of these plains falls within the Sekhukhune Centre of plant endemism (Siebert 2001, Siebert *et al.* 2002a-e) this area is highly transformed by many villages and their agricultural fields. Within the study area this bushveld is restricted to the valley floors of the rivers that dissect the mountains. These areas are heavily grazed and often not in prime condition. This resulted in Mucina & Rutherford (2006) labelling the conservation status of this vegetation as Vulnerable.

Large parts of these plains are dominated by *Dichrostachys cinerea*, *Acacia tortilis*, *Acacia mellifera* and *Acacia nilotica*. Other plant species found here include the trees *Boscia foetida*, *Euclea linearis*, *Searsia batophylla* (along spruits and dongas) with the forbs *Felicia clavipilosa*, *Hermannia odorata*, *Gisekia africana*, *Melhania rehmannii* and the grasses *Aristida congesta*, *Enneapogon cenchroides*, *Urochloa mosambicensis*. Alien plant species are often found close to villages or along roads and tracks.

The following species were listed for this plant community:

TREES AND SHRUBS

<i>Acacia gerrardii</i>		<i>Grewia bicolor</i>	
<i>Acacia mellifera</i>	d	<i>Grewia flava</i>	
<i>Acacia nilotica</i>	d	<i>Lantana camara</i>	A
<i>Acacia tortilis</i>	D	<i>Melia azedarach</i>	A
<i>Agave americana</i>	A	<i>Rhigozum obovatum</i>	
<i>Aloe castanea</i>	p	<i>Sarcostemma viminale</i>	
<i>Aloe cryptopoda</i>	p	<i>Schotia latifolia</i>	RD
<i>Aloe globuligemma</i>	p	<i>Sclerocarya birrea</i>	P
<i>Balanites maughamii</i>	P	<i>Searsia batophylla</i>	RD
<i>Boscia foetida</i>		<i>Searsia engleri</i>	
<i>Dichrostachys cinerea</i>	D	<i>Tinnea rhodesiana</i>	
<i>Ehretia rigida</i>		<i>Triaspis glaucophylla</i>	
<i>Euphorbia tirucalli</i>		<i>Ziziphus mucronata</i>	M

GRASSES

<i>Aristida adscensionis</i>		<i>Eragrostis superba</i>	
<i>Aristida congesta s. barbicollis</i>		<i>Fingerhuthia africana</i>	
<i>Cenchrus ciliaris</i>		<i>Melinis repens s. repens</i>	
<i>Chloris virgata</i>		<i>Panicum maximum</i>	
<i>Dactyloctenium aegyptium</i>		<i>Sporobolus ioclados</i>	
<i>Enneapogon cenchroides</i>		<i>Stipagrostis hirtigluma</i>	
<i>Enneapogon scoparius</i>		<i>Themeda triandra</i>	
<i>Eragrostis heteromera</i>		<i>Tragus berteronianus</i>	
<i>Eragrostis lehmanniana</i>		<i>Urochloa mosambicensis</i>	

FORBS

<i>Abutilon angulatum</i>		<i>Datura stramonium</i>	WM
<i>Acalypha indica</i>		<i>Felicia clavipilosa</i>	
<i>Achyranthes aspera v. sicula</i>		<i>Flaveria bidentis</i>	W
<i>Asparagus suaveolens</i>		<i>Galenia sarcophylla</i>	
<i>Bidens bipinnata</i>	W	<i>Geigeria burkei</i>	
<i>Blepharis integrifolia</i>		<i>Gossypium herbaceum</i>	
<i>Clerodendrum ternatum</i>		<i>Hermannia modesta</i>	
<i>Corchorus asplenifolius</i>		<i>Hermbstaedtia odorata</i>	

<i>Hibiscus caesius</i>	<i>Pavonia burchellii</i>	
<i>Hibiscus micranthus</i>	<i>Phyllanthus maderaspatensis</i>	
<i>Jamesbrittenia atropurpurea</i>	<i>Pollichia campestris</i>	
<i>Jatropha latifolia</i>	<i>Schkuhria pinnata</i>	W
<i>Justicia flava</i>	<i>Seddera fruticosa</i>	
<i>Justicia protracta s. rhodesiana</i>	<i>Sesamum triphyllum</i>	W
<i>Kohautia cynanchica</i>	<i>Sesbania bispinosa</i>	
<i>Lantana rugosa</i>	<i>Sida alba</i>	
<i>Kleinia longiflora</i>	<i>Solanum panduriforme</i>	W
<i>Leonotis ocymifolia</i>	<i>Tephrosia purpurea</i>	
<i>Melhania acuminata</i>	<i>Tribulus terrestris</i>	W
<i>Melhania rehmannii</i>	<i>Vernonia poskeana</i>	
<i>Monechma divaricatum</i>	<i>Waltheria indica</i>	W
<i>Ocimum americanum</i>	<i>Zinnia peruviana</i>	W

Sekhukhune Plains Bushveld			
Status	Dense to Disturbed plains bushveld		
Soil	Clay-loam	Rockiness %	5-25
Conservation priority:	Medium	Sensitivity:	Medium
Agricultural potential:	Medium-Low	Need for rehabilitation	Medium
Dominant spp.	<i>Acacia tortilis</i> , <i>Acacia mellifera</i> , <i>Dichrostachys cinerea</i> , <i>Euclea linearis</i>		

Species of Conservation Concern

A list of Species of Conservation Concern for the Grid 2627BB was obtained from the database on the SANBI website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered (CE), Endangered (EN) and Vulnerable (VU). Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened (NT),

Data Deficient (DD), Critically Rare (CR), Rare (R) and Declining (D). This is in accordance with the new Red List for South African Plants (Raimondo *et al.* 2009).

The following species of conservation concern were previously recorded from the Grid 2430CA (SANBI, POSA website):

Species	Status
<i>Dicliptera fruticosa</i> K.Balkwill	NT
<i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	NT
<i>Lydenburgia cassinoides</i> N.Robson	NT
<i>Adenia fruticosa</i> Burt Davy subsp. <i>fruticosa</i>	NT
<i>Searsia sekhukhuniensis</i> (Moffett) Moffett	Rare
<i>Combretum petrophilum</i> Retief	Rare
<i>Euphorbia sekukuniensis</i> R.A.Dyer	Rare
<i>Searsia batophylla</i> (Codd) Moffett	VU
<i>Zantedeschia jucunda</i> Letty	VU
<i>Gladiolus sekukuniensis</i> P.J.D.Winter	VU
<i>Acacia sekhukhuniensis</i> P.J.H.Hurter	CR
<i>Delosperma rileyi</i> L.Bolus	DDD
<i>Asparagus intricatus</i> (Oberm.) Fellingham & N.L.Mey.	DDT
<i>Acalypha caperonioides</i> Baill. var. <i>caperonioides</i>	DDT
<i>Myrothamnus flabellifolius</i> Welw.	DDT
<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining
<i>Drimia altissima</i> (L.f.) Ker Gawl.	Declining
<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining
<i>Eulophia speciosa</i> (R.Br. ex Lindl.) Bolus	Declining

Searsia batophylla, *Hypoxis hemerocallidea* and *Eulophia speciosa* were observed within the transect area. For most of the other species the plains habitat is not suitable, they are present on the mountain areas of Sekhukhuneland.

Balanites maughamii and *Sclerocarya birrea* are nationally protected trees observed along the route while the *Aloe* species are all provincially protected.

Conclusion

The vegetation within on the plains are quite disturbed, there are often villages, roads, tracks and current or old agricultural fields present. As the pylons of the power line will have a relatively small footprint, the impact on the vegetation will be small. However, due to the presence of red data and possibly protected plant species, a

walkthrough is recommended for this area, to ensure that sensitive areas are excluded for construction of pylons.



Figure 5: Sekhukhune Plains Bushveld in the foreground and Sekhukhune Mountain Bushveld in the Background

2. Sekhukhune Mountain Bushveld

This Open Mountain Bushveld occurs patchy throughout the area, the soils contain high concentrations of heavy metals and the area is often prone to mining operations. In this study very small part of this Bushveld is affected, the largest piece is just north of Steelpoort along route option 4, which was already eliminated. However, being a very sensitive ecosystem, due to several endemic and threatened species, the description is included.

Trees and Shrubs

<i>Acacia ataxacantha</i> ,		<i>Elephantorrhiza praetermissa</i>	
<i>Acacia gerrardii</i>		<i>Elaeodendron transvaalense</i>	RD
<i>Acacia mellifera s. detinens</i>		<i>Euclea linearis</i>	
<i>Acacia nigrescens</i> ,		<i>Euclea undulata</i>	M
<i>Acacia nilotica</i>		<i>Grewia flava</i>	
<i>Acacia senegal v. leiorrhachis</i>		<i>Grewia vernicosa</i>	
<i>Acacia senegal v. rostrata</i>		<i>Hippobromus pauciflorus</i>	
<i>Acacia tortilis s. heteracantha</i>		<i>Kirkia wilmsii</i>	
<i>Aloe arborescens</i>	p	<i>Maerua cafra</i>	
<i>Aloe castanea</i>	p	<i>Maytenus undata</i>	
<i>Aloe cryptopoda</i>	p	<i>Lydenburgia cassinoides</i>	RDP
<i>Boscia foetida</i>		<i>Ormocarpum trichocarpum</i>	
<i>Brachylaena ilicifolia</i>		<i>Ozoroa sphaerocarpa</i>	
<i>Carissa bispinosa</i>		<i>Rhoicissus sekhukhuniensis</i>	
<i>Celtis africana</i>		<i>Sclerocarya birrea</i>	P
<i>Combretum apiculatum</i>		<i>Searsia keetii</i>	
<i>Combretum hereroense</i>		<i>Searsia sekhukhuniensis</i>	RD
<i>Combretum molle</i>		<i>Searsia wilmsii</i>	
<i>Combretum petrophilum</i>	RD	<i>Terminalia prunioides</i>	
<i>Commiphora mollis</i>		<i>Tinnea rhodesiana</i>	
<i>Croton gratissimus</i>		<i>Vitex obovata subsp wilmsii</i>	
<i>Cussonia transvaalensis</i>			
<i>Dichrostachys cinerea</i>			

Grasses

<i>Aristida canescens</i>		<i>Eragrostis lehmanniana</i>
<i>Aristida canescens</i> ,		<i>Eragrostis superba</i>
<i>Aristida transvaalensis</i>		<i>Fingerhuthia africana</i>
<i>Bothriochloa insculpta</i>		<i>Heteropogon contortus</i>
<i>Brachiaria eruciformis</i>		<i>Loudetia simplex</i>
<i>Digitaria eriantha</i>		<i>Melinis repens</i>
<i>Diheteropogon amplexans</i>		<i>Panicum deustum</i>
<i>Elionurus muticus</i>		<i>Sporobolus ioclados</i>
<i>Enneapogon scoparius</i>		<i>Themeda triandra</i>

Forbs

<i>Abutilon angulatum</i>		<i>Kohautia cynanchica</i>	
<i>Adenia fruticosa</i>	RD	<i>Kyphocarpa angustifolia</i>	
<i>Asparagus cooperi</i>		<i>Melhanie rehmannii</i>	
<i>Asparagus suaveolens</i>		<i>Merwillia plumbea</i>	RD
<i>Barleria kaloxytone</i>		<i>Monechma divaricatum</i>	
<i>Barleria saxatilis</i>		<i>Myrothamnus flabellifolius</i>	RD
<i>Berkheya insignis</i>		<i>Ocimum americanum</i>	
<i>Blepharis aspera</i>		<i>Phyllanthus glaucophyllus</i>	
<i>Blepharis integrifolia</i>		<i>Polygala hottentotta</i>	
<i>Clerodendrum ternatum</i>		<i>Ptychlobium plicatum</i>	
<i>Commelina africana</i>		<i>Rhynchosia minima</i>	
<i>Corchorus asplenifolius</i>		<i>Sansevieria hyacinthoides</i>	
<i>Crabbea angustifolia</i>		<i>Seddera capensis</i>	
<i>Cyphostemma coddii</i>		<i>Senna italica</i>	
<i>Ectadiopsis oblongifolia</i>		<i>Stylochiton natalensis</i>	
<i>Euphorbia enormis</i>		<i>Stylochiton sp</i>	
<i>Euphorbia schinzii</i>		<i>Syncolostemon concinnus</i>	
<i>Evolvulus alsinoides</i>		<i>Tephrosia purpurea</i>	
<i>Geigeria burkei</i>		<i>Tetradenia brevispicata</i> ,	
<i>Gerbera jamesonii</i>		<i>Tragia dioica</i>	
<i>Hibiscus aethiopicus</i>		<i>Waltheria indica</i>	W
<i>Hypoestes forskalii</i>		<i>Xerophyta retinervis</i>	

Sekhukhune Mountain Bushveld			
Status	Dense to Disturbed mountain bushveld		
Soil	Clay-loam	Rockiness %	5-25
Conservation priority:	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Combretum apiculatum</i> , <i>Grewia vernicosa</i> , <i>Dichrostachys cinerea</i> , <i>Euclea linearis</i> and <i>Euclea undulata</i>		

Species of Conservation Concern

A Threatened species and Species of Conservation Concern list for the Grid 2627BB was obtained from the POSA database on the SANBI website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered (CE), Endangered (EN) and Vulnerable (VU). Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened (NT), Data Deficient (DD), Critically Rare (CR), Rare (R) and Declining (D). This is in accordance with the new Red List for South African Plants (Raimondo *et al.* 2009).

The following species of conservation concern were previously recorded from the Grid 2430CA (SANBI, POSA website):

Species	Status
<i>Dicliptera fruticosa</i> K.Balkwill	NT
<i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	NT
<i>Lydenburgia cassinoides</i> N.Robson	NT
<i>Adenia fruticosa</i> Burt Davy subsp. <i>fruticosa</i>	NT
<i>Searsia sekhukhuniensis</i> (Moffett) Moffett	Rare
<i>Combretum petrophilum</i> Retief	Rare
<i>Euphorbia sekukuniensis</i> R.A.Dyer	Rare
<i>Searsia batophylla</i> (Codd) Moffett	VU
<i>Zantedeschia jucunda</i> Letty	VU
<i>Gladiolus sekukuniensis</i> P.J.D.Winter	VU



<i>Acacia sekhukhuniensis</i> P.J.H.Hurter	CR
<i>Delosperma rileyi</i> L.Bolus	DDD
<i>Asparagus intricatus</i> (Oberm.) Fellingham & N.L.Mey.	DDT
<i>Acalypha caperonioides</i> Baill. var. <i>caperonioides</i>	DDT
<i>Myrothamnus flabellifolius</i> Welw.	DDT
<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining
<i>Drimia altissima</i> (L.f.) Ker Gawl.	Declining
<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining
<i>Eulophia speciosa</i> (R.Br. ex Lindl.) Bolus	Declining

Elaeodendron transvaalense, *Combretum petrophilum*, *Lydenburgia cassinoides*, *Adenia fruticosa*, *Myrothamnus flabellifolius* and *Searsia sekhukhuniensis* were observed close to the transect area. *Merwillia plumbea*, not listed above, was also seen. The habitat is also suitable for most of the other threatened species listed.

The protected trees *Lydenburgia cassinoides* and *Sclerocarya birrea* are present.

Conclusion

The vegetation on the mountains contains several red data and protected plant species, where-ever possible the mountain areas of Sekhukhuneland should be avoided. It seems that although this type of Bushveld is prominent between Steelpoort and Burgersfort, the proposed line will seldom transect these mountains, except for Route 4, which is already eliminated. However, should any line cross this vegetation type, a walkthrough is recommended for this area, to ensure that sensitive areas are excluded for construction of pylons.

3. Ohrigstad Mountain Bushveld

Ohrigstad Mountain Bushveld is present in the Burgersfort – Ohrigstad and Penge areas. (present for options 1, 3 and 4, not for option 2). This Mountain Bushveld also has, as the Sekhukhune Mountain Bushveld, high species diversity and several plant species of conservation concern. However, this area consists of mountains and valleys, both being important for this survey. Option 3 runs for most of the way in a prominent valley, containing plains bushveld, but often has to run over the footslopes of the mountains.

Option 3, which runs from Burgersfort to Ohrigstad along the R555, was eliminated. This is because the route along the R555 runs for most of the way in a narrow valley, with the Mabitsana River and the tarred R555 in this valley. The line will have to run for most of the way on the sensitive mountain foot slopes and cross the river and road several times. Furthermore, many irrigated agricultural enterprises occur in the Ohrigstad area, stretching all the way to Marapeng. This mosaic of narrow river valley, river, mountain slopes and agriculture where-ever the valley is a bit broader, causes the route to be unsuitable. From an ecological perspective both the riverine vegetation and the vegetation of the mountain slopes have a high ecological sensitivity. Therefore this entire valley forms an ecologically sensitive ecosystem. This is also a much longer route.

The two main plant communities found in this area are: a) The Plains Bushveld in the Valleys and b) the Mountain slope Bushveld. These are described separately.

a. Plains Bushveld

The Dense Plains Bushveld is restricted to the Ohrigstad valley, the route of Option 3. This is degraded to pristine bushveld with a dense woody cover. The vegetation is dominated by *Acacia tortilis*, *Dichrostachys cinerea*, *Combretum apiculatum*, *Euclea linearis* and *Euclea undulata*, while *Eragrostis rigidior*, *Enneapogon scoparius* and *Themeda triandra* are prominent in the grass layer.

The following plant species were recorded from this plant community:

Trees and Shrubs

<i>Acacia tortilis</i>	d	<i>Euphorbia tirucalli</i>	M
<i>Aloe castanea</i>	p	<i>Grewia monticola</i>	
<i>Aloe marlothii</i>	p	<i>Gymnosporia senegalensis</i>	M
<i>Berchemia zeyheri</i>	M	<i>Hexalobus monopetalus</i>	
<i>Combretum apiculatum</i>	M	<i>Karomia speciosa</i>	
<i>Dichrostachys cinerea</i>	d	<i>Mundulea sericea</i>	M
<i>Ehretia rigida</i>	M	<i>Ormocarpum trichocarpum</i>	
<i>Euclea linearis</i>	d	<i>Peltophorum africanum</i>	M
<i>Euclea undulata</i>	dM	<i>Ptaeroxylon obliquum</i>	M
<i>Euphorbia cooperi</i>		<i>Rhoicissus tridentata</i>	M

<i>Sclerocarya birrea</i>	PM	<i>Ximenia americana</i>	M
<i>Searsia leptodictya</i>		<i>Ziziphus mucronata</i>	M
<i>Tarchonanthus camphoratus</i>	M		

Grasses

<i>Aristida congesta</i>		<i>Eragrostis superba</i>	
<i>Aristida congesta</i> subsp <i>barbicollis</i>		<i>Heteropogon contortus</i>	d
<i>Bothriochloa insculpta</i>		<i>Melinis repens</i>	
<i>Brachiaria nigropedata</i>		<i>Panicum maximum</i>	
<i>Cymbopogon excavatus</i>		<i>Pogonarthria squarrosa</i>	
<i>Digitaria eriantha</i>		<i>Setaria sphacelata</i>	
<i>Enneapogon scoparius</i>	d	<i>Themeda triandra</i>	d
<i>Eragrostis rigidior</i>	d	<i>Urochloa mosambicensis</i>	

Forbs

<i>Abutilon austroafricanum</i>		<i>Hypoestes aristata</i>	M
<i>Aloe cryptopoda</i>	p	<i>Ipomoea magnusiana</i>	
<i>Aloe fosteri</i>	p	<i>Kyphocarpa angustifolia</i>	
<i>Barleria cf guenzii</i>		<i>Pentarrhinum insipidum</i>	M
<i>Chascanum hederaceum</i>		<i>Senecio tamoides</i>	M
<i>Commelina africana</i>	M	<i>Solanum incanum</i>	M
<i>Cucumis zeyheri</i>	M	<i>Solanum nigrum</i>	WM
<i>Datura stramonium</i>	WM	<i>Solanum panduriforme</i>	M
<i>Evolvulus alsinoides</i>	M	<i>Tephrosia sp</i>	
<i>Hibiscus micrantha</i>			
<i>Hibiscus trionum</i>			

Ohrigstad Mountain Bushveld: Plains Bushveld			
Status	Dense to Disturbed plains bushveld		
Soil	sandy-loam	Rockiness %	1
Conservation priority:	Medium-High	Sensitivity:	Medium-High
Agricultural potential:	Medium to High (irrigation)	Need for rehabilitation	Low
Dominant spp.	<i>Acacia tortilis</i> , <i>Combretum apiculatum</i> , <i>Dichrostachys cinerea</i> , <i>Euclea linearis</i> and <i>Euclea undulata</i>		



Figure 6: The Dense Plains Bushveld of the area

b. Mountain Slope Bushveld

The mountain slopes, facing in all directions, as the valley curves through the mountains are covered with dense Mountain Slope Bushveld. This is often pristine mountain bushveld with a dense woody cover, though the herbaceous layer is poorly

developed due to the dense woody layer. Many woody species occur in this plant community, with *Combretum apiculatum* and *Tarchonanthus camphoratus* prominent. *Aristida congesta* subsp *barbicollis*, *Eragrostis rigidior*, *Eragrostis lehmanniana* and *Enneapogon scoparius* are the most conspicuous grass species in the scanty herbaceous layer.

The following plant species were recorded from this plant community:

Trees and Shrubs

<i>Acacia exuvialis</i>		<i>Gymnosporia senegalensis</i>	M
<i>Acacia tortilis</i>	d	<i>Hexalobus monopetalus</i>	
<i>Berchemia zeyheri</i>	M	<i>Karomia speciosa</i>	
<i>Combretum apiculatum</i>	DM	<i>Mundulea sericea</i>	M
<i>Crotalaria monteiroi</i>		<i>Opuntia ficus-indica</i>	A
<i>Dichrostachys cinerea</i>		<i>Ormocarpum trichocarpum</i>	
<i>Ehretia rigida</i>	M	<i>Pappea capensis</i>	
<i>Elaeodendron transvaalense</i>	PM	<i>Peltophorum africanum</i>	M
<i>Euclea linearis</i>	d	<i>Phyllanthus reticulatus</i>	
<i>Euclea natalensis</i>	M	<i>Ptaeroxylon obliquum</i>	M
<i>Euclea undulata</i>	dM	<i>Rhoicissus tridentata</i>	M
<i>Euphorbia ingens</i>		<i>Sclerocarya birrea</i>	P
<i>Euphorbia tirucalli</i>	M	<i>Searsia leptodictya</i>	
<i>Flueggea virosa</i>	M	<i>Tarchonanthus camphoratus</i>	dM
<i>Grewia bicolor</i>		<i>Ximenia americana</i>	M
<i>Grewia monticola</i>		<i>Ziziphus mucronata</i>	M

Grasses

<i>Aristida congesta</i> subsp <i>barbicollis</i>	d	<i>Eragrostis rigidior</i>	d
<i>Digitaria eriantha</i>		<i>Heteropogon contortus</i>	
<i>Enneapogon scoparius</i>	d	<i>Panicum maximum</i>	
<i>Eragrostis lehmanniana</i>	d	<i>Sporobolus fimbriatus</i>	

Forbs

<i>Abutilon austroafricanum</i>		<i>Asparagus</i> sp	
<i>Aloe cryptopoda</i>	p	<i>Barleria cf guenzii</i>	
<i>Aloe fosteri</i>	p	<i>Commelina africana</i>	M

<i>Evolvulus alsinoides</i>	M	<i>Pentarrhinum insipidum</i>	M
<i>Hibiscus micrantha</i>		<i>Solanum incanum</i>	M
<i>Kalanchoe paniculata</i>	M	<i>Stylosanthes fruticosa</i>	
<i>Kyphocarpa angustifolia</i>		<i>Waltheria indica</i>	W
<i>Melhania prostrata</i>			

Ohrigstad Mountain Bushveld: Mountain Slope Bushveld			
Status	Pristine mountain bushveld		
Soil	Rocky shallow sandy	Rockiness %	5-20
Conservation priority:	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Combretum apiculatum</i> , <i>Euclea linearis</i> , <i>Euclea undulata</i> , <i>Tarchonanthus camphoratus</i>		

Species of Conservation Concern

A Threatened species and Species of Conservation Concern list for the Grid 3325DB was obtained from the POSA database on the SANBI website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered, Endangered and Vulnerable. Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo *et al.* 2009).

The following species of conservation concern were previously recorded from the Grid 2430DA (SANBI, POSA website April 2011):

Species	Status
<i>Adenia fruticosa</i> Burt Davy subsp. <i>fruticosa</i>	NT
<i>Aloe fouriei</i> D.S.Hardy & Glen	DDT
<i>Ansellia africana</i> Lindl.	Declining
<i>Ceropegia distincta</i> N.E.Br. subsp. <i>verruculosa</i> R.A.Dyer	DDD

<i>Combretum petrophilum</i> Retief	Rare
<i>Dicliptera fruticosa</i> K.Balkwill	NT
<i>Dracaena transvaalensis</i> Baker	Rare
<i>Eulophia speciosa</i> (R.Br. ex Lindl.) Bolus	Declining
<i>Euphorbia sekukuniensis</i> R.A.Dyer	Rare
<i>Gladiolus macneilii</i> Oberm.	CR
<i>Gladiolus pavonia</i> Goldblatt & J.C.Manning	CR
<i>Indigofera leendertziae</i> N.E.Br.	DDT
<i>Jamesbrittenia macrantha</i> (Codd) Hilliard	NT
<i>Khadia alticola</i> Chess. & H.E.K.Hartmann	Rare
<i>Lydenburgia cassinoides</i> N.Robson	NT
<i>Ocimum tubiforme</i> (R.D.Good) A.J.Paton	CR
<i>Orbea gerstneri</i> (Letty) Bruyns subsp. <i>gerstneri</i>	Rare
<i>Pentatrachia alata</i> S.Moore	DDD
<i>Rhoicissus laetans</i> Retief	Rare
<i>Searsia batophylla</i> (Codd) Moffett	VU
<i>Thesium davidsonae</i> Brenan	VU

Lydenburgia cassinoides was found during the field visit in this area. There is suitable habitat for several of the threatened plant species along the transect of this Option of the power line, especially for *Adenia fruticosa* subsp. *fruticosa*, *Ocimum tubiforme*, *Orbea gerstneri* subsp. *gerstneri* and *Combretum petrophilum*, but none of these species were found on the site during the field visit.

Conclusion

This plant community is high in species richness with several red data species. A few individuals of the protected *Elaeodendron transvaalensis*, *Sclerocarya birrea*, *Aloe fosteri* and *Aloe cryptopoda* are found in this vegetation. The conservation value and sensitivity are regarded as being high, due to biodiversity and also due to the ecological function of the mountains and the valley as a dispersal corridor for plants and animals. There is also abundant farming activities in the valley, including irrigated crops. There will be several turning points for the line, as the road winds through the valley. It is suggested that this option not be used due to the several constraints.



Figure 7: Cleared Open Plains Bushveld in the foreground, Open Plains Bushveld in the middle and Mountain Slope Bushveld in the background

4. Lydenburg Thornveld

The Option 1 route crosses a small section of the Lydenburg Thornveld on the undulating mountain plateau area above the Strydom tunnel. This area is a wooded grassland, quite cold with frost during winter. Species such as the frost hardy *Acacia karroo*, *Acacia caffra*, *Cussonia paniculata* *Diospyros lycioides* and *Euclea crispa* are prominent.

The following plant species were recorded from this plant community:

Trees and Shrubs

<i>Acacia caffra</i>	d	<i>Euclea crispa</i>	M
<i>Acacia karroo</i>	dM	<i>Dombeya rotundifolia</i>	
<i>Acacia robusta</i>		<i>Rubus transvaalensis</i>	
<i>Cussonia paniculata</i>		<i>Ehretia rigida</i>	M
<i>Diospyros lycioides</i>		<i>Gymnosporia buxifolia</i>	M

<i>Mundulea sericea</i>	M	<i>Searsia pyroides</i>	
<i>Rhoicissus tridentata</i>	M	<i>Ziziphus mucronata</i>	M
<i>Searsia leptodictya</i>			

Grasses

<i>Aristida congesta</i>		<i>Melinis repens</i>	
<i>Aristida congesta</i> subsp <i>barbicollis</i>		<i>Microchloa caffra</i>	
<i>Aristida diffusa</i>		<i>Monocymbium ceresiiforme</i>	
<i>Bewsia biflora</i>		<i>Panicum maximum</i>	
<i>Brachiaria serrata</i>		<i>Panicum natalense</i>	
<i>Cymbopogon excavatus</i>		<i>Pogonarthria squarrosa</i>	
<i>Digitaria eriantha</i>		<i>Schizachyrium sanguineum</i>	
<i>Diheteropogon amplexans</i>		<i>Setaria sphacelata</i>	
<i>Eragrostis superba</i>		<i>Themeda triandra</i>	d
<i>Heteropogon contortus</i>	d	<i>Tristachya leucothrix</i>	

Forbs

<i>Anthospermum rigidum</i>		<i>Lippia javanica</i>	
<i>Commelina africana</i>	M	<i>Pentarrhinum insipidum</i>	M
<i>Dicoma anomala</i>		<i>Schistostephium crataegifolium</i>	
<i>Elephantorrhiza elephantina</i>	M	<i>Senecio coronatus</i>	
<i>Euphorbia clavarioides</i>		<i>Senecio microglossus</i>	
<i>Evolvulus alsinoides</i>	M	<i>Senecio tamoides</i>	M
<i>Helichrysum cephaloideum</i>		<i>Solanum incanum</i>	M
<i>Helichrysum rugulosum</i>		<i>Solanum panduriforme</i>	M
<i>Hibiscus trionum</i>		<i>Tephrosia</i> sp	
<i>Kohautia amatymbica</i>		<i>Vernonia oligocephala</i>	



Lydenburg Thornveld			
Status	Open wooded grassland		
Soil	sandy-loam	Rockiness %	1
Conservation priority:	Medium	Sensitivity:	Medium
Agricultural potential:	Medium	Need for rehabilitation	Low
Dominant spp.	<i>Acacia karroo</i> , <i>Acacia caffra</i> , <i>Euclea crispa</i>		

Species of Conservation Concern

A Threatened species and Species of Conservation Concern list for the Grid 2430CB was obtained from the POSA database on the SANBI website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered, Endangered and Vulnerable. Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo *et al.* 2009).

The following species of conservation concern were previously recorded from the Grid 2430DA (SANBI, POSA website April 2011):

Species	Status
<i>Adenia fruticosa</i> Burt Davy subsp. <i>fruticosa</i>	NT
<i>Aloe fouriei</i> D.S.Hardy & Glen	DDT
<i>Ansellia africana</i> Lindl.	Declining
<i>Ceropegia distincta</i> N.E.Br. subsp. <i>verruculosa</i> R.A.Dyer	DDD
<i>Combretum petrophilum</i> Retief	Rare
<i>Dicliptera fruticosa</i> K.Balkwill	NT
<i>Dracaena transvaalensis</i> Baker	Rare
<i>Eulophia speciosa</i> (R.Br. ex Lindl.) Bolus	Declining
<i>Euphorbia sekukuniensis</i> R.A.Dyer	Rare
<i>Gladiolus macneilii</i> Oberm.	CR
<i>Gladiolus pavonia</i> Goldblatt & J.C.Manning	CR

<i>Indigofera leendertziae</i> N.E.Br.	DDT
<i>Jamesbrittenia macrantha</i> (Codd) Hilliard	NT
<i>Khadia alticola</i> Chess. & H.E.K.Hartmann	Rare
<i>Lydenburgia cassinoides</i> N.Robson	NT
<i>Ocimum tubiforme</i> (R.D.Good) A.J.Paton	CR
<i>Orbea gerstneri</i> (Letty) Bruyns subsp. <i>gerstneri</i>	Rare
<i>Pentatrachia alata</i> S.Moore	DDD
<i>Rhoicissus laetans</i> Retief	Rare
<i>Searsia batophylla</i> (Codd) Moffett	VU
<i>Thesium davidsonae</i> Brenan	VU

None of these species occur in this plant community as the habitat is not suitable for any of them.

Conclusion

This plant community is fairly high in species richness with no red data species or protected species found in the survey. It is also a very small area that will be crossed by the line. The construction of the line can be supported.



5. Pong Dolomite Mountain Bushveld

This is a narrow band of bushveld on dolomite, in the vicinity of the Strydom tunnel. It is situated along the western drier part of the Escarpment. The vegetation is woodland with a dense shrub layer. It occurs on the low and high mountain slopes in the area. The geology is dolomite and the shallow, rocky soils are of the Mispah soil Form. A very small, almost negligible part of this vegetation is crossed by Options 1, 3 and 4.

Pong Dolomite Mountain Bushveld			
Status	Open to dense bushveld		
Soil	sandy-loam	Rockiness %	1
Conservation priority:	Medium-High	Sensitivity:	Medium-High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Acacia nigrescens, Acacia nilotica, Combretum apiculatum</i>		

The vegetation is dominated by the woody layer with several woody species present.

Trees and Shrubs

<i>Acacia ataxacantha</i>		<i>Combretum molle</i>	
<i>Acacia gerrardii</i>		<i>Croton gratissimus</i>	
<i>Acacia nigrescens</i>	d	<i>Cussonia spicata</i>	
<i>Acacia nilotica</i>	d	<i>Dichrostachys cinerea</i>	
<i>Acacia tortilis</i>		<i>Dombeya rotundifolia</i>	
<i>Aloe cryptopoda</i>	p	<i>Euclea crispa</i>	M
<i>Boscia albitrunca</i>	M	<i>Euclea undulata</i>	M
<i>Brachylaena ilicifolia</i>		<i>Euphorbia tirucalli</i>	M
<i>Carissa bispinosa</i>		<i>Grewia bicolor</i>	
<i>Celtis africana</i>		<i>Grewia flava</i>	
<i>Combretum apiculatum</i>	d	<i>Gymnosporia senegalensis</i>	M
<i>Combretum hereroense</i>		<i>Hippobromus pauciflorus</i>	

Kirkia wilmsii
Ozoroa albicans
Pouzolzia mixta
Rhoicissus tridentata

Searsia leptodictya
Senna petersiana
Tecoma capensis
Vitex obovata subsp wilmsii

Grasses

Aristida canescens
Aristida congesta
Aristida transvaalensis
Bewisia biflora
Bothriochloa insculpta
Brachiaria serrata
Digitaria eriantha
Diheteropogon amplexans
Elionurus muticus
Enneapogon scoparius

Eragrostis lehmanniana
Eragrostis superba
Heteropogon contortus
Loudetia simplex
Melinis nerviglume
Melinis repens s. repens
Panicum deustum
Panicum maximum
Themeda triandra

Forbs

Abutilon angulatum
Asparagus intricatus
Asparagus suaveolens
Barleria saxatilis
Blepharis integrifolia
Cheilanthes dolomitica
Clerodendrum ternatum
Commelina africana M
Corchorus asplenifolius
Euphorbia schinzii
Evolvulus alsinoides
Geigeria burkei
Hibiscus aethiopicus
Hypoestes forskalii

Kohautia cynanchica
Kyphocarpa angustifolia
Ocimum americanum
Phyllanthus glaucophyllus
Polygala hottentotta
Rhynchosia nitens
Sansevieria hyacinthoides
Stylochiton natalensis
Tephrosia purpurea
Tetradenia brevispicata,
Tragia dioica
Waltheria indica W
Xerophyta retinervis

Species of Conservation Concern

Although Matthews (1991), Van Wyk & Smith (2001) and Mucina & Rutherford (2006) mention that several endemic plant species occur on this dolomite area, the area crossed by the lines is so small that none of these species were recorded.

Conclusion

As far as vegetation is concerned, the development of the power lines can be supported in this area.



Figure 8: Pong Dolomite Mountain Bushveld

6. Northern Escarpment Quartzite Sourveld

A very small part of this veld type is close to the proposed route of Route 1, though it is so small that this vegetation is not discussed further.

7. Northern Mistbelt Forest

The proposed lines cannot go through indigenous forest. The proposed Route 4 seems to cross a patch of forest, but this will not be allowed by the authorities. This is one of the reasons why Route 4 was eliminated as an option. This vegetation is not discussed further.



8. Tzaneen Sour Bushveld

This vegetation stretches in a narrow band on the plains and all along the lower footslopes and hills of the escarpment. The vegetation is tall open bushveld with a tall grass layer. The geological substrate is gneiss and granite and the soils are shallow sandy and rocky lithosols. This is very dense, often tall bushveld, merging into forest-like vegetation. Only the route of Option 4 transects this vegetation, albeit a very narrow band. This vegetation contains many large trees and also has a very high species richness. Large *Ficus* trees (various species) together with several other large trees are prominent. Several threatened species occur in this vegetation.

The following species are present:

Trees and shrubs

<i>Acacia davyi</i>		<i>Ficus sansibarica</i>	
<i>Acacia polyacantha</i>		<i>Heteropyxis natalensis</i>	
<i>Acacia sieberiana</i>		<i>Parinari curatellifolia</i>	
<i>Albizia versicolor</i>		<i>Peltoporum africanum</i>	
<i>Antidesma venosum</i>		<i>Piliostigma thonningii</i>	
<i>Bauhinia galpinii</i>		<i>Pterocarpus angolensis</i>	P
<i>Catha edulis</i>	M	<i>Pterocarpus rotundifolius</i>	
<i>Faurea rochetiana</i>		<i>Sclerocarya birrea</i>	P
<i>Faurea saligna</i>		<i>Searsia pentheri</i>	
<i>Ficus burkei</i>		<i>Terminalia sericea</i>	
<i>Ficus petersii</i>		<i>Trichilia emetica</i>	

Grasses

<i>Alloteropsis semialata</i>		<i>Heteropogon contortus</i>	
<i>Andropogon schirensis</i>		<i>Hyparrhenia cymbaria</i>	
<i>Aristida congesta</i>		<i>Hyperthelia dissoluta</i>	
<i>Bothriochloa bladhii</i>		<i>Setaria nigrirostris</i>	
<i>Cymbopogon caesius</i>		<i>Setaria sphacelata</i>	
<i>Cynodon dactylon</i>		<i>Themeda triandra</i>	
<i>Diheteropogon amplexans</i>			



Forbs

Some forb species occur scattered in the grassy layer, and these are not abundant:

Agathisanthemum bojeri

Dicliptera clinopodia

Barleria elegans

Polygala producta

Species of Conservation Concern

Species	Status
<i>Aloe hardyi</i> H.F.Glen	Rare
<i>Combretum petrophilum</i> Retief	Rare
<i>Dracaena transvaalensis</i> Baker	Rare
<i>Encephalartos brevifoliolatus</i> Vorster	EW
<i>Encephalartos cupidus</i> R.A.Dyer	CR
<i>Encephalartos paucidentatus</i> Stapf & Burtt Davy	VU
<i>Gladiolus macneillii</i> Oberm.	CR
<i>Helichrysum junodii</i> Moeser	Rare
<i>Thesium davidsonae</i> Brenan	VU

Several species of conservation concern are present in this dense vegetation. Although none of these were recorded during the field survey, possibly due to the very narrow band of this vegetation, but also due to the inaccessibility, it is certain that some of them will occur on the route. This is one of the reasons why Route 4 is eliminated as an option.

Conclusion

Due to the dense vegetation, species richness and possible presence of threatened species, it is suggested to avoid this route.





Figure 9: Dense Tzaneen Sour Bushveld



9. Granite Bushveld

The granite bushveld on the granite Lowveld plains cover the largest part of all the transects in the study site. This large granite plain is covered with the “typical” Lowveld bushveld, well know, for example, from large parts of the Kruger National Park.

Prominent species are *Combretum apiculatum* on the sandy or gravelly upland sites, while *Acacia nigrescens* and other *Acacia* species are prominent on the more clayey bottomland sites. Many species could be recorded, as this area is often close to roads and accessible.

The following plant species were recorded in this plant community:

Trees and shrubs

<i>Acacia exuvialis</i>		<i>Dombeya rotundifolia</i>	M
<i>Acacia gerrardii</i>		<i>Ehretia amoena</i>	
<i>Acacia nigrescens</i>	d	<i>Ehretia rigida</i>	m
<i>Acacia nilotica</i>		<i>Erythrina lysistemon</i>	
<i>Acacia sieberiana</i>	M	<i>Euclea divinorum</i>	M
<i>Acacia tortilis</i>	d	<i>Euclea natalensis</i>	
<i>Agave sisalana</i>	A	<i>Ficus stuhlmanni</i>	
<i>Albizia harveyi</i>	d	<i>Flueggea virosa</i>	
<i>Bolusanthus speciosa</i>		<i>Gardenia volkensii</i>	
<i>Capparis tomentosa</i>		<i>Grewia bicolor</i>	
<i>Cassia abbreviata</i>		<i>Grewia flava</i>	
<i>Combretum apiculatum</i>	D	<i>Grewia flavescens</i>	
<i>Combretum collinum</i>		<i>Grewia monticola</i>	
<i>Combretum hereroense</i>		<i>Gymnosporia senegalensis</i>	M
<i>Combretum imberbe</i>	P	<i>Lannea discolor</i>	
<i>Combretum zeyheri</i>	M	<i>Lannea schweinfurthii</i>	
<i>Commiphora africana</i>		<i>Lantana camara</i>	A
<i>Cordia ovalis</i>		<i>Ozoroa engleri</i>	
<i>Dalbergia melanoxylon</i>		<i>Pappea capensis</i>	
<i>Dichrostachys cinerea</i>	dM	<i>Pavetta schumanniana</i>	
<i>Dodonaea angustifolia</i>	M	<i>Pavetta schumanniana</i>	M



<i>Peltophorum africanum</i>	M	<i>Searsia leptodictya</i>	
<i>Philenoptera violacea</i>	PM	<i>Senna didymobotrya</i>	A
<i>Pterocarpus angolensis</i>	PM	<i>Senna petersiana</i>	DM
<i>Pterocarpus rotundifolius</i>		<i>Spirostachys africana</i>	p
<i>Schotia brachypetala</i>		<i>Terminalia prunoides</i>	
<i>Schotia capitata</i>		<i>Terminalia sericea</i>	DM
<i>Sclerocarya birrea</i>	PM	<i>Xeromphis obovata</i>	
<i>Searsia guenzii</i>		<i>Ziziphus mucronata</i>	M

Grasses

<i>Aristida adscensionis</i>		<i>Hyperthelia dissoluta</i>	
<i>Aristida congesta</i>		<i>Melinis repens</i>	
<i>Aristida diffusa</i>		<i>Panicum maximum</i>	
<i>Bothriochloa insculpta</i>		<i>Perotis patens</i>	
<i>Brachiaria nigropedata</i>		<i>Pogonarthria squarrosa</i>	
<i>Cenchrus ciliaris</i>		<i>Sporobolus africanus</i>	
<i>Digitaria eriantha</i>		<i>Sporobolus ioclados</i>	
<i>Enneapogon cenchroides</i>		<i>Tricholaena monachne</i>	
<i>Enneapogon scoparius</i>		<i>Trichoneura grandiglumis</i>	
<i>Eragrostis rigidior</i>		<i>Urochloa mosambicensis</i>	d
<i>Heteropogon contortus</i>			

Forbs

<i>Achyranthes aspera</i>		<i>Helichrysum</i> sp	
<i>Acrotome inflata</i>		<i>Heliotropium steudneri</i>	
<i>Agathisanthemum bojeri</i>		<i>Heliotropium strigosum</i>	
<i>Aspilia mossambicensis</i>		<i>Hermannia</i> sp	
<i>Becium filamentosum</i>		<i>Hermannia tomentosa</i>	
<i>Bidens pilosa</i>	W	<i>Hermbstaedtia odorata</i>	
<i>Bulbostylis hispidula</i>		<i>Hibiscus cannabinus</i>	
<i>Chamaecrista absus</i>		<i>Hibiscus</i> sp	
<i>Commelina benghalensis</i>		<i>Indigofera filipes</i>	
<i>Commelina erecta</i>		<i>Kohautia virgata</i>	
<i>Cyperus esculentus</i>	W	<i>Kyphocarpa angustifolia</i>	
<i>Dicerocaryum zanguebarium</i>	M	<i>Leucas glabrata</i>	
<i>Evolvulus alsinoides</i>	M	<i>Ocimum americanum</i>	
<i>Geigeria burkei</i>		<i>Phyllanthus maderaspatensis</i>	
<i>Gomphrena celosioides</i>	W	<i>Rhynchosia totta</i>	



<i>Richardia braziliensis</i>	W	<i>Tephrosia grandiflora</i>	
<i>Schkuhria pinnata</i>	WM	<i>Waltheria indica</i>	W
<i>Solanum panduriforme</i>	W	<i>Zornia milneana</i>	
<i>Tagetes minuta</i>	W		

Species of Conservation Concern

Asphodelaceae	<i>Aloe hardyi</i> H.F.Glen	Rare
Asphodelaceae	<i>Aloe thompsoniae</i> Groenew.	Rare
Apocynaceae	<i>Brachystelma parvulum</i> R.A.Dyer	VU
Combretaceae	<i>Combretum petrophilum</i> Retief	Rare
Celastraceae	<i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	NT
Zamiaceae	<i>Encephalartos dyerianus</i> Lavranos & D.L.Goode	CR
Zamiaceae	<i>Encephalartos lebomboensis</i> I.Verd.	EN
Proteaceae	<i>Protea laetans</i> L.E.Davidson	VU
Rosaceae	<i>Prunus africana</i> (Hook.f.) Kalkman	VU
Anacardiaceae	<i>Searsia batophylla</i> (Codd) Moffett	VU

None of these species were recorded during the field survey. The flat granite plains are not suitable habitat for these species, which are all niche specialists, or occur on the mountain areas to the west of the granite plains.

Conclusion

Several game farms and cattle farms are found in this area.

Special care will be needed in the crossing of the spruit systems within this area. Alternative 5 will prevent the line crossing the Olifants River twice, but it will cross the smaller Makhutswi River (once).

The construction of the line can be supported.



Figure 10: Typical Granite Lowveld vegetation



10. Lowveld Rugged Mopaneveld

Only Routes 1, 2 and 5 for a very short distance, will transect this vegetation type in the north-eastern extreme of the study area. The Foskor substation is located on the northern boundary of this vegetation type. This is the rugged hilly area of the Olifants River valley, south of Phalaborwa. The landscape is irregular plains and rocky hills, with moderate to steep slopes. *Colophospermum mopane* is often restricted to valleys, while the hills are dominated by *Acacia nigrescens* with *Combretum apiculatum* also present.

The following plant species were recorded in this plant community:

Trees and shrubs

<i>Acacia exuvialis</i>		<i>Gardenia volkensii</i>	
<i>Acacia nigrescens</i>		<i>Grewia bicolor</i>	
<i>Acacia nilotica</i>		<i>Grewia flavescens</i>	
<i>Berchemia discolor</i>		<i>Grewia hexamita</i>	
<i>Boscia albitrunca</i>	P	<i>Grewia monticola</i>	
<i>Colophospermum mopane</i>	D	<i>Grewia villosa</i>	
<i>Combretum apiculatum</i>		<i>Gymnosporia senegalensis</i>	M
<i>Combretum hereroense</i>		<i>Hexalobus monopetalus</i>	
<i>Combretum imberbe</i>	P	<i>Kirkia wilmsii</i>	
<i>Combretum zeyheri</i>	M	<i>Lannea discolor</i>	
<i>Commiphora africana</i>		<i>Manilkara mochisia</i>	
<i>Commiphora mollis</i>		<i>Ozoroa engleri</i>	
<i>Dalbergia melanoxylon</i>		<i>Pappea capensis</i>	
<i>Dichrostachys cinerea</i>	M	<i>Pavetta schumanniana</i>	M
<i>Dodonaea angustifolia</i>	M	<i>Peltophorum africanum</i>	M
<i>Dombeya rotundifolia</i>	M	<i>Philenoptera violacea</i>	PM
<i>Ehretia amoena</i>		<i>Pterocarpus rotundifolius</i>	
<i>Ehretia rigida</i>	M	<i>Rhigozum zambesiicum</i>	
<i>Erythrina lysistemon</i>		<i>Sclerocarya birrea</i>	PM
<i>Euclea natalensis</i>		<i>Terminalia prunoides</i>	
<i>Ficus abutilifolia</i>		<i>Terminalia sericea</i>	DM
<i>Flueggea virosa</i>			

Grasses



Aristida adscensionis
Aristida congesta
Bothriochloa radicans
Cenchrus ciliaris
Digitaria eriantha
Enneapogon cenchroides
Enneapogon scoparius
Eragrostis rigidior
Fingerhuthia africana

Heteropogon contortus
Melinis repens
Panicum maximum
Pogonarthria squarrosa
Sporobolus panicoides
Tricholaena monachne
Trichoneura grandiglumis
Urochloa mosambicensis d

Forbs

Achyranthes aspera
Agathisanthemum bojeri
Aspilia mossambicensis
Chamaecrista mimosoides
Commelina benghalensis
Commelina erecta
Crabbea velutina
Evolvulus alsinoides
Geigeria burkei
Gomphrena celosioides
Gossypium africanum
Heliotropium steudneri
Heliotropium strigosum
Hemizygia elliottii

Hermannia tomentosa
Hermbstaedtia odorata
Hibiscus sidiformis
Kohautia virgata
Kyphocarpa angustifolia
Leucas glabrata
Melhania forbesii
Melhania rehmannii
Ocimum americanum
Phyllanthus asperulatus
Solanum panduriforme
Waltheria indica
Xerophyta retinervis
Zornia milneana

Species of Conservation Concern

Species	Status
<i>Ansellia africana</i> Lindl.	Declining

This epiphytic orchid is often found growing on trees within this plant community.



Conclusion

Game farming is a special feature in this area.

Special care will be needed in the crossing of spruit systems.

The construction of the line can be supported.



Figure 11: Lowveld Rugged Mopaneveld in the background

11. Phalaborwa-Timbavati Mopaneveld

Only Routes 1 (small part) and 4 and 5 will transect this vegetation type in the north-eastern extreme of the study area. The Foskor substation is located on the southern boundary of this vegetation type. This is the flat plains west of Phalaborwa. The landscape is an undulating plain with *Colophospermum mopane* and *Acacia nigrescens* in the lower lying areas, while *Combretum apiculatum* and *Terminalia sericea* becomes more prominent on upland sites.

The following plant species were recorded in this plant community:

Trees and shrubs

Acacia exuvialis

Acacia nigrescens

<i>Acacia tortilis</i>		<i>Gardenia volkensii</i>	
<i>Albizia harveyi</i>		<i>Grewia bicolor</i>	
<i>Boscia albitrunca</i>	P	<i>Grewia flavescens</i>	
<i>Cassia abbreviata</i>		<i>Grewia hexamita</i>	
<i>Cissus cornifolia</i>		<i>Grewia monticola</i>	
<i>Colophospermum mopane</i>	D	<i>Grewia villosa</i>	
<i>Combretum apiculatum</i>	d	<i>Gymnosporia senegalensis</i>	M
<i>Combretum hereroense</i>		<i>Lannea discolor</i>	
<i>Combretum imberbe</i>	P	<i>Maerua parvifolia</i>	
<i>Combretum zeyheri</i>	M	<i>Ozoroa engleri</i>	
<i>Commiphora africana</i>		<i>Pappea capensis</i>	
<i>Commiphora mollis</i>		<i>Pavetta schumanniana</i>	M
<i>Dalbergia melanoxylon</i>		<i>Peltoporum africanum</i>	M
<i>Dichrostachys cinerea</i>	M	<i>Philenoptera violacea</i>	PM
<i>Ehretia amoena</i>		<i>Sclerocarya birrea</i>	PM
<i>Ehretia rigida</i>		<i>Strychnos madagascariensis</i>	
<i>Euclea divinorum</i>		<i>Terminalia prunoides</i>	
<i>Flueggea virosa</i>		<i>Terminalia sericea</i>	dM

Grasses

<i>Aristida adscensionis</i>		<i>Melinis repens</i>	
<i>Aristida congesta</i>		<i>Panicum maximum</i>	
<i>Bothriochloa radicans</i>		<i>Perotis patens</i>	
<i>Brachiaria nigropedata</i>		<i>Pogonarthria squarrosa</i>	
<i>Cenchrus ciliaris</i>		<i>Schmidtia pappophoroides</i>	
<i>Digitaria eriantha</i>		<i>Themeda triandra</i>	
<i>Andropogon gayanus</i>		<i>Tricholaena monachne</i>	
<i>Fingerhuthia africana</i>		<i>Trichoneura grandiglumis</i>	
<i>Enneapogon scoparius</i>		<i>Urochloa mosambicensis</i>	d
<i>Eragrostis rigidior</i>			
<i>Heteropogon contortus</i>			

Forbs

<i>Achyranthes aspera</i>		<i>Chamaecrista mimosoides</i>	
<i>Acrotome inflata</i>		<i>Clerodendrum ternatum</i>	
<i>Agathisanthemum bojeri</i>		<i>Commelina benghalensis</i>	
<i>Aspilia mossambicensis</i>		<i>Commelina erecta</i>	



Evolvulus alsinoides
Gomphrena celosioides
Heliotropium steudneri
Heliotropium strigosum
Hemizygia elliotii
Hermannia glanduligera
Hermannia tomentosa
Hermbstaedtia odorata
Ipomoea magnusiana

Kohautia virgata
Kyphocarpa angustifolia
Leucas glabrata
Melhania forbesii
Ocimum americanum
Solanum panduriforme
Tephrosia polystachya
Waltheria indica
Zornia milneana

Species of Conservation Concern

Species	Status
<i>Aloe thompsoniae</i> Groenew.	Rare
<i>Encephalartos dyerianus</i> Lavranos & D.L.Goode	CR
<i>Encephalartos lebomboensis</i> I.Verd.	EN

None of these species were found during the field survey.

Conclusion

Game farming is a special feature in this area.

Special care will be needed in the crossing of spruit systems.

The construction of the line can be supported.



Figure 12: Game farming in the Lowveld areas.

12 River and Spruit Systems

Several River or spruit crossings occur along the transect routes. At the smaller spruits no riparian zone is present, the vegetation is continuous with the adjacent bushveld vegetation. However, the larger rivers have a distinct riparian zone, with large trees for example *Faidherbia albida*, *Acacia galpinii*, *Acacia robusta* and *Philenoptera violacea*.

The following species were recorded at a larger river:

Woody species

<i>Acacia galpinii</i>		<i>Diospyros mespiliformis</i>	
<i>Acacia robusta</i>		<i>Faidherbia albida</i>	D
<i>Acacia tortilis</i>		<i>Ficus sycomorus</i>	
<i>Combretum apiculatum</i>		<i>Grewia bicolor</i>	
<i>Combretum imberbe</i>	P	<i>Grewia monticola</i>	
<i>Combretum microphyllum</i>		<i>Peltophorum africanum</i>	
<i>Dichrostachys cinerea</i>		<i>Philenoptera violacea</i>	P

Phoenix reclinata
Sclerocarya birrea MP

Terminalia sericea
Ziziphus mucronata M

Grasses

Aristida congesta
Cynodon dactylon
Dactyloctenium aegyptium
Digitaria eriantha
Eragrostis heteromera
Eragrostis rigidior d

Eragrostis superba
Heteropogon contortus D
Melinis repens
Pogonarthria squarrosa d
Tricholaena monachne
Trichoneura grandiglumis

Forbs

Agathisanthemum bojeri
Ageratum conyzoides W
Cyperus sexangularis
Lippia rehmannii
Schkruhria pinnata W

Melanthera scandens
Solanum incanum W
Solanum panduriforme W
Xanthium strumarium W

River and Spruit crossings			
Status	River and spruit linear wetlands		
Soil	Sandy or clayey	Rockiness	0%
Conservation priority:	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Combretum imberbe</i> , <i>Faidherbia albida</i> , <i>Acacia galpinii</i> , <i>Diospyros mespiliformis</i> , <i>Ficus sycomorus</i> , <i>Acacia robusta</i> , <i>Philenoptera violacea</i> , <i>Phoenix reclinata</i>		



Conclusion

No river or spruit is very wide, so the lines can easily cross these river or spruit systems. Care should however be taken to place pylons adequately away from river or spruit banks, avoiding any damage to the banks or water courses. Erosion should be avoided at all times. The Option 5 is preferred to Option 1 as it avoids crossing the Olifants River (twice) and crosses the Makhutswi River once.

8 DISCUSSION

The vegetation of all five alternatives was investigated. From the desktop study, confirmed by the field survey, option 3, which runs from Burgersfort to Ohrigstad along the R555, was eliminated. This is because the route along the R555 runs for most of the way in a narrow valley, with the Mabitsana River and the tarred R555 in this valley. The line will have to run for most of the way on the sensitive mountain foot slopes and cross the river and road several times. Furthermore, many irrigated agricultural enterprises occur in the Ohrigstad area, stretching all the way to Marapeng. This mosaic of narrow river valley, river, mountain slopes and agriculture where-ever the valley is a bit broader, causes the route to be unsuitable. From an ecological perspective both the riverine vegetation and the vegetation of the mountain slopes have a high ecological sensitivity. Therefore this entire valley forms an ecologically sensitive ecosystem. This is also a much longer route.

Furthermore, from the desktop study, confirmed by the field survey, option 4, was eliminated. The line of this option runs through nine vegetation types, and over very high and steep mountains of Sekhukhune Mountain Bushveld and Ohrigstad Mountain Bushveld with two endangered ecosystems (Sekhukhune Mountainlands and Sekhukhune Norite Bushveld, SANBI & DEAT 2009), Pong Dolomite Mountain Bushveld with endangered Malmani Karstland (SANBI & DEAT 2009), the vulnerable Northern Escarpment Quartzite Sourveld (Mucina & Rutherford (2006), Northern Mistbelt Forest area and the vulnerable Tzaneen Sour Bushveld (SANBI & DEAT 2009). Especially the Great Escarpment area consists of very rugged and high mountains, resulting in a very difficult route with several threatened ecosystems.

Alternative Routes 1 and 2 and later Route 5 were further investigated in more detail by field surveys. The vegetation along these routes is described in detail, including the protected and red data species. Medicinal plants and aliens and weeds are indicated. v

The most difficult part of the route is from the Merensky substation through Ohrigstad Mountain Bushveld which is an extremely mountainous area with sensitive vegetation. This part of the line transects quite sensitive vegetation and it is suggested that a walkthrough in this area is essential.

The most serious limitation on the Lowveld plains where the line transects the Granite Lowveld vegetation type, is the abundance of the protected tree *Sclerocarya birrea*. It is certain that several of these trees will be in the way of the transect.

Locally are also the river and spruit crossings. No river or spruit is very wide, so the lines can easily cross these rivers or spruits systems. Care should be taken to place pylons adequately away from river or spruit banks, avoiding any damage to the banks or water courses. Erosion should be avoided at all times.

Another factor in this area is that large properties are game farms and lodges. These areas are effectively conserved by the owners, and it is realised that the public participation is an important issue. After finalisation of the exact transect, a walkthrough will have to confirm any issues regarding vegetation.

From an ecological perspective, Alternative 5 is the preferred route, which is very similar to Alternative 1, but avoids crossing the Olifants River twice..



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Professional titles:

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 - - 1990 Organising Committee: International Conference: Meeting Rangeland challenges in Southern Africa
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Professional career:

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