

**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE
PROPOSED MATIMBA-WITKOP NO. 2 400 kV
TRANSMISSION LINE, LIMPOPO PROVINCE**

**SPECIALIST STUDY – GENERIC VELD MANAGEMENT
PLAN**

APPENDIX M

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1. PURPOSE OF THE VELD MANAGEMENT PLAN

To facilitate the management of servitudes in a sustainable manner, in keeping with legislation, Eskom policies and sound business purposes to ensure the safe, sustainable and optimal operation of the transmission grid.

Note: This document starts out, as a bush clearing guideline but will culminate as a veld management guideline and included in the Eskom Veld Management Guideline. It concentrates at first on those plant types that pose a particular fire risk.

2. MAIN FACTORS THAT INFLUENCE THE SERVITUDE VELD MANAGEMENT

2.1. Plants

Plants pose a threat to the safe and sustained operation of the grid due to 3 factors:

1. Ingress of the plants into the air gap.
2. Plants provide fuel for fires.
3. Trees that fall on to power lines.

Different plants species pose different threats and require different treatment. For the purpose of this document, plants have been grouped into the following groups and management recommendations are made for each group:

1. Alien invasive plants.
2. Densifiers
3. Reeds
4. Grasses
5. Commercial forests
6. Sugar Cane
7. Fynbos
8. Karroo
9. Indigenous forests

"Abnormal" plant growth is defined as occurrences of plants that have grown outside of the norm for the area or biome, as a result of some man made influence. These can occur in all of the above plant types and the objective of this document will be to restore the plants back to a "normal" state. Bush densification in the Savanna biome, or the existence of Port Jackson in the Fynbos biome are two examples.

The management of plants that pose a fire risk will be referred to as fuel management.

2.2. Soils and Topography

Plant species correlate closely with soils. Whilst plants pose a fire risk, they also stabilize soils and any plant management strategy should consider the effect on soils. Topographical features such as slope does not only add to the erosion risk, but has also been shown to add to the fire risk.

2.3. Atmospheric conditions

Plant growth is clearly influenced by weather. The ignition of fires, fire behaviour and flame lengths are influenced in a major way. Relative humidity, air temperature and wind speed are the main factors and are used to calculate a Fire Danger Index (F.D.I.). Refer to the FDI page at the end of this document. It is not possible to control this aspect of fire risk. Diligent lookout during times of high fire danger is the only way in this aspect of fire management can be addressed.

3. VELD MANAGEMENT PRACTICES

The recommended veld management activities will be carried out, and should fit in within a wide range of practices of landowner or occupiers. On the one end of the scale areas exist that are overgrazed and suffer from extensive erosion. On the other there are areas that are managed as conservation areas. The Government has also committed itself to the eradication of alien invasive plant species.

The use of fires as a veld management tool by landowners and the appropriate skills in this regard, varies across the country. Eskom has in the past, and must in the future, engage landowners in the safe use of fires, especially in proximity to power lines.

4. LAWS AND POLICIES

A number of laws govern Eskom's actions with regards to Veld management practices. This ranges from the imperative of the protection of certain plant species to the removal of alien invasive species.. Issues such as the sustained use of resources, measuring our impact, soil erosion, the use of chemical substances, are all in one way or the other controlled by legislation or policy.

Safety clearances for power lines are stipulated by the OHS Act and these dimensions are considerably less than those required to safeguard against fire threats.

The newly promulgated Veld and Fire act proposes to regulate fire related matter between landowners and will supercede previous fire legislation. Refer to <http://www.dwaf.gov.za/Forestry/Fireawareness/eng.pdf>.

More information on the Veld and Fire act may be obtained from an interpretive document issued by the Department of Water Affairs and Forestry. It can be viewed at <http://intranet.eskom.co.za/enviroweb/>

The use of an EMP for the management of the servitude is prescribed and controlled in terms of legislation, Eskom Policies as well as Eskom's commitment to becoming ISO14000 compliant.

5. LIFE CYCLE APPROACH TO VELD MANAGEMENT

It has been demonstrated that adverse (or positive) activities carried out during the construction phase of the life cycle of a servitude leads to maintenance problems (or benefits) during the maintenance cycle of the servitude. Similarly, adverse maintenance activities result in difficulty in obtaining new servitudes and *vice versa*.

The table below shows the life cycle phases of a servitude as well as the activities and duration for each phase.

Phase	Time scale	Activities	Participant in operational activities
Acquisition phase	4 to 8 years	Planning	Planning dept
		EIA	L&R, Consultants
		Survey	ALS
		Design	LES
		Negotiations	L&R
		Registration	L&R
Construction Phase	1 to 2 years	Setting out	Project, contractors, Consultants L&R
		Foundations	
		Erection	
		Stringing	
		Farmer liaison	

Phase	Time scale	Activities	Participant in operational activities
Maintenance phase	25 to 100 years	Maintain Animals	Region, Engineering, specialist consultants
		Maintain plants	
		Maintain soils	
		Maintain gates	Region
		Maintain relationships	Region, Engineering, specialist consultants OFB
		Execute investigations	
Decommissioning phase	1 to 2 years	Remove equipment	Region Projects Contractors L&R
		Restore environment	

6. SUGGESTED SERVITUDE MANAGEMENT ACTIVITIES

All bush clearing activities should be carried out in terms of an EMP as prescribed by section 4.2 of ESKASABG3 (STANDARD FOR BUSH CLEARANCE AND MAINTENANCE WITHIN OVERHEAD POWERLINE SERVITUDES) and ESKPVAAZ1 (ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP) PROCEDURE). These documents may be viewed at <http://intranet.eskom.co.za/enviroweb/>

All protected species shall be treated in terms of applicable legislation. Refer to the above Enviroweb website.

The use of herbicides are prescribed by policies that can be viewed at http://teknowrep.eskom.co.za/EM_Herbicides/MM/main.htm



The following headings may be found there:

[The Need for Herbicide usage in Eskom](#) [Eskom Herbicide Policy and Strategy](#) [Herbicide Use in Eskom](#) [Herbicide Research in Eskom](#) [Eskom Herbicide Guidelines](#) [Safety Considerations and Responsible use of Herbicides](#) [Recommendations on Herbicide Strategy in Eskom](#)

6.1. Clearing for Access, Construction and Stringing

Clear 4-8m for access and stringing as per EMP. During construction of roads, special care should be taken not to create erosion. In areas where erosion exists,

this should be documented thoroughly prior to construction to clear Eskom of liability.

Where the line passes through valleys, methods of stringing should be adjusted to avoid the unnecessary cutting of vegetation, which in turn lead to increased erosion risks. More detail on this aspect can be found in ESKASABG3 (STANDARD FOR BUSH CLEARANCE AND MAINTENANCE WITHIN OVERHEAD POWER LINE SERVITUDES) available at the above Enviroweb website.

Tower positions will be cleared according to the above standard.

6.2. Clearing of Reeds

These plants should be cleared for the total width of the servitude and an appropriate herbicide plan be instituted. (Refer to http://teknowrep.eskom.co.za/EM_Herbicides/MM/main.htm for Reed and Bulrush Management Plan). In areas of high winds such as the Cape, reeds should be cleared for 100 m outside the servitude or as local conditions may indicate. This should be done in full consultation with landowners and with an appropriate EMP as prescribed by ESKPVAAZ1 (ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP) PROCEDURE) and ESKASABG3 (STANDARD FOR BUSH CLEARANCE AND MAINTENANCE WITHIN OVERHEAD POWER LINE SERVITUDES). See the above Enviroweb website.

6.3. Clearing Alien Invasive Vegetation

In terms of the Conservation of agricultural Resources Act, alien invasive vegetation should be cleared and chemically treated for the total width of the servitude. Refer to "Problem Plants in Transmission and Distribution" on the above Enviroweb website. Also refer to ESKASABG3 (STANDARD FOR BUSH CLEARANCE AND MAINTENANCE WITHIN OVERHEAD POWER LINE SERVITUDES).

In areas of high wind alien vegetation should be cleared to a distance of 100 m outside the servitude or as local conditions may indicate. Adjacent landowner should be included in the remedy of aliens as the C.A.R. Act also binds them. Particular attention should be paid to alien infested rivers.

6.4. Clearing of Densifiers

Bush densification represents abnormal plant growth and poses a major fire threat to power lines in the Savanna biome. This situation resulted from modification to the habitat as a result of grazing-, farming and veld management practices.

The Savanna biome consists in broad terms of three main groups of plants namely the grass-, bush- and tree layers. These groups of plants are inter-linked and activity in the tree and bush layers will have an effect on the grass layer. Fuel management should concentrate mainly on the bush layer.

The clearing of this biome generates a high volume of cut material, which poses a fire risk of its own. The clearing activities should therefore be done in a way that reduces the fire risk in the vicinity of the power line but without creating a new risk. These activities should also be done in a way that will not have a negative effect on the remaining plants and soils. Methods of disposing of this unwanted material will differ from one farm to the other as farming methods and owner preferences differ and while suitable methods exist under certain farming practices, new methods will have to be developed and implemented before the onset of the 2002 fire season.

6.4.1. Fire Critical Zones

Observations done during the 2001 fire seasons of actual burn sites that took place under a variety of atmospheric conditions, indicated that the fire critical zone for flashovers resulting from fires in densifiers happen within 5m from the vertical below the conductor, predominantly in the midspan area.

As a result the area of the servitude within 5m from the outside conductors should be treated as critical for clearing of any densifiers or any other plants that pose a fire risk. The areas closer to the towers carry a lower fire risk than the midspan area. Local conditions have a marked effect on the fire risk and may indicate the removal of fire risk in a curved fashion as indicated in the sketches at the end of the document.

The secondary zone of the servitude refers to the remainder of the servitude. Local conditions will determine the action with regards to determining the fire risk of the plants in this area.

6.4.2. Fuel Management

Not all plants in the servitude pose a fire risk. The excessive removal of plants not only lead to a risk of erosion in certain soils and generate large quantities of unwanted plant material, but will also have an impact on the species of grass that will grow in the servitude in this new modified habitat. It also has an effect on the aesthetics in particular on farms where Eco tourism is practiced.

The disposal of unwanted plant material creates its own challenges.

Atmospheric conditions such as wind speed, relative humidity and air temperature and wind speed will greatly influence fire behaviour and this must be born in mind with the clearing of the servitude. As densifiers do not carry any legal protection and as it signifies an abnormal situation, these may be removed if restricting access or posing further fire risks. Protected species, slow growing plants that, due to their structure, do not pose a fire risk should be identified during the compilation of the management plan and left intact in the interest of preventing soil erosion.

It is proposed that all shrubs, acacias and compound fine leafed trees with a stem diameter of smaller than 100 mm are cut. This should be revised after the first 10 spans have been cut to determine an appropriate standing stem count for the area. The remaining trees should then be assessed individually for their own risk in terms of fires or clearance.

Plants in valleys as depicted on the sketch can also be left without posing any fire risk.

The state of degradation of the land, as well as the existence or otherwise of a veld management plan on the property in question, should be ascertained and integrated with the servitude EMP.

In cases where a rigorous fire management plan exists, this should also be taken into account in the determination of the fire risks. In cases where no control over fires exist, as is sometimes the case with Government owned land, more extensive clearing would be called for than in the case where a strict fire control measures are in force.

Care must, however, be taken with the extensive removal of plant not to destabilize soils. The appropriate EMP with herbicide plan will ensure that this aspect as well as any other consequential reaction of plants (such as the growth of weeds or aliens) will be managed.

The existing land use practices (livestock or game farming) will also have to be taken into account during this process. The landowner should at all times be consulted and be made part of the process.

Where Eco tourism is practised, effective use may be made of plants as a visual screen next to roads and tracts to hide towers and cleared areas. The management plan should identify and use plants with a low fire risk for this purpose.

Protected species shall be treated as prescribed by the law.

The chemical or biological follow-up treatment should be discussed with the landowner and should follow the guidelines of ESKASABG3 (STANDARD FOR BUSH CLEARANCE AND MAINTENANCE WITHIN OVERHEAD POWER LINE SERVITUDES).

6.4.3. Disposing of Cut Material

The disposing of large quantities of cut material generates its own problems. The stacking of cut material in windrows at the edge of the servitude poses a further fire threat to the line. It also has the potential of sterilising the seedbed under hot burning conditions. Farmers also complain about the effect that these windrows have on the free movement of game and stock animals.

As a result the above selective cutting procedure is proposed. This should adequately reduce fire risk without generating an unnecessary large quantity of cut material that has to be disposed of.

Local farming practices will indicate which disposal method is to be followed. The following methods are available:

- Cut material can be spread equally inside the servitude to protect new grasses from grazing pressure. The fire risk of this methods needs to be asses for each case and cognisance should be taken of the fire critical zones, as well as local farming and burning practices. In particular cases stock farmers do not prefer this method as they claim that it prohibits their cattle from grazing here. Under these conditions a high risk of over grazing exists and these servitudes need to be monitored closely.
- Excessive plant material may in certain cases also be removed by mulching, provided that the mulched material is spread in such a way that it does not sterilise the soil. This method has to date not proved very successful as the densifiers consist of high-density woods and equipment failure have been experienced.
- In certain areas the cut wood may be utilised as firewood by the landowner or by third parties. Local conditions and landowner preference will indicate the appropriate course of action.
- A proposal worth exploring will be the viability of establishing a BEE/SMME contractor to chip and process the removed shrubs for the manufacture of compost or game pellets.
- In cases where the removal of plant material is not feasible, prescribed burning of the servitude may take the place of vegetation removal. Prescribed burns can take place with the line switched out and can be executed during day or night-time. In cases of high phytomass, night burns are preferable. Certain plant types such as khakibos, Blackjacks and cosmos have been reported to be implicated as high risk plants with regards to fire

flashovers. These plants result where disturbance of the soil resulted from agricultural or other activities and need special attention during fire prevention planning.

- The FDI must be obtained and burns must be executed with people with the correct training and equipment appropriate for this task. Cognisance should be taken of the possibility of soil sterilisation during these burns. As a general rule, landowners must report all burns to Eskom in order that the necessary arrangements be made to safeguard the lines.

6.4.4. Further Management of the Veld

The further management of the veld after the removal of plants should be established and contained in an EMP. The aim should be to establish a stable and low maintenance situation with a minimum fire risk. The use of fire should play an important role here. The involvement of landowners in this process is extremely important.

7. COMMERCIAL FORESTS

Refer to ESKASABG3 (STANDARD FOR BUSH CLEARANCE AND MAINTENANCE WITHIN OVERHEAD POWER LINE SERVITUDES) and the Commercial Timber growers Guideline for Maintenance and Maintenance Agreement in Forest plantation areas and servitude areas, referred to in that document.

8. SUGAR CANE

Sugar cane is harvested by means of the burning of excess material. Where this process takes place in the proximity or underneath power lines, flashover occurs.

Cane free servitudes have been used as a remedy but this reduces the landowners' production capability.

Other methods such as green harvest or thrashing is used. Innovative work on alternative harvesting of cane in the vicinity of power lines have already been done. More comprehensive guidelines to be developed.

9. KARROO BIOME

This biome is not known for fire risk. It is, however, vulnerable to erosion and further veld management guidelines must be developed.

10. FYNBOS

This is a highly prized animal kingdom that also poses a high fire risk that is further compounded by the atmospheric conditions prevalent in the Western Cape. The management of this biome is highly specialised and has very specific burning regimes. Further veld management guidelines need to be developed for this biome.

11. INDIGENOUS FORESTS

Indigenous forests normally do not pose a fire risk. The plants are, however, worthy of conservation and specific guidelines need to be developed.

12. FIRE PROTECTION ASSOCIATIONS

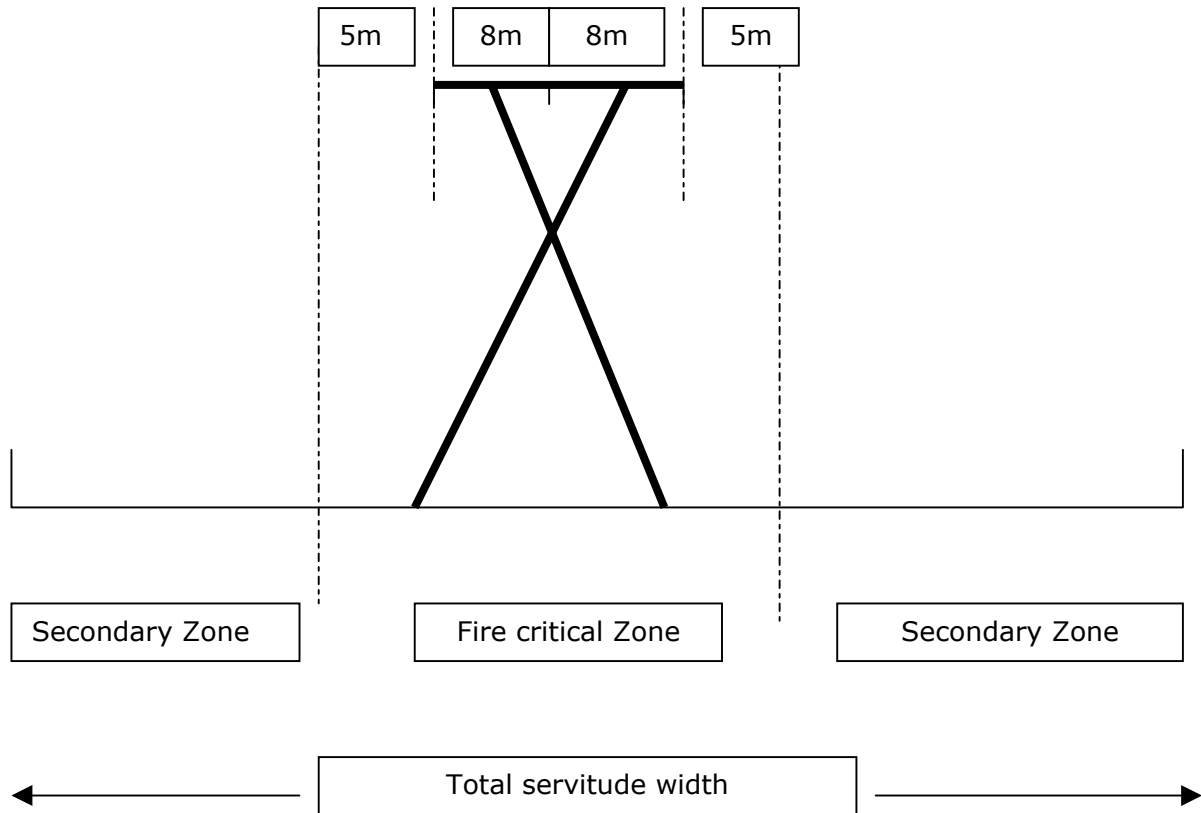
These associations will benefit Eskom once implemented, as it will result in a more controlled situation with regards to fires. For more information refer to <http://www.dwaf.gov.za/Forestry/Fireawareness/eng.pdf>

13. ACKNOWLEDGEMENT

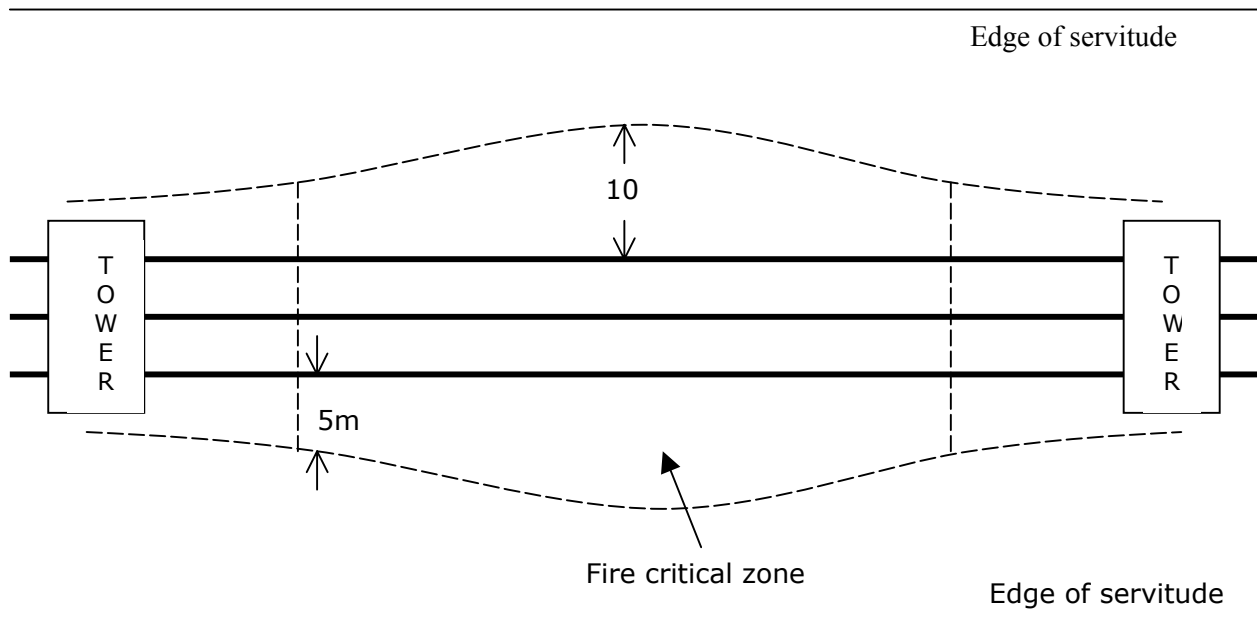
The author wishes to thank the lines and Servitude managers for their input and support. In particular the following people are acknowledged for their help:

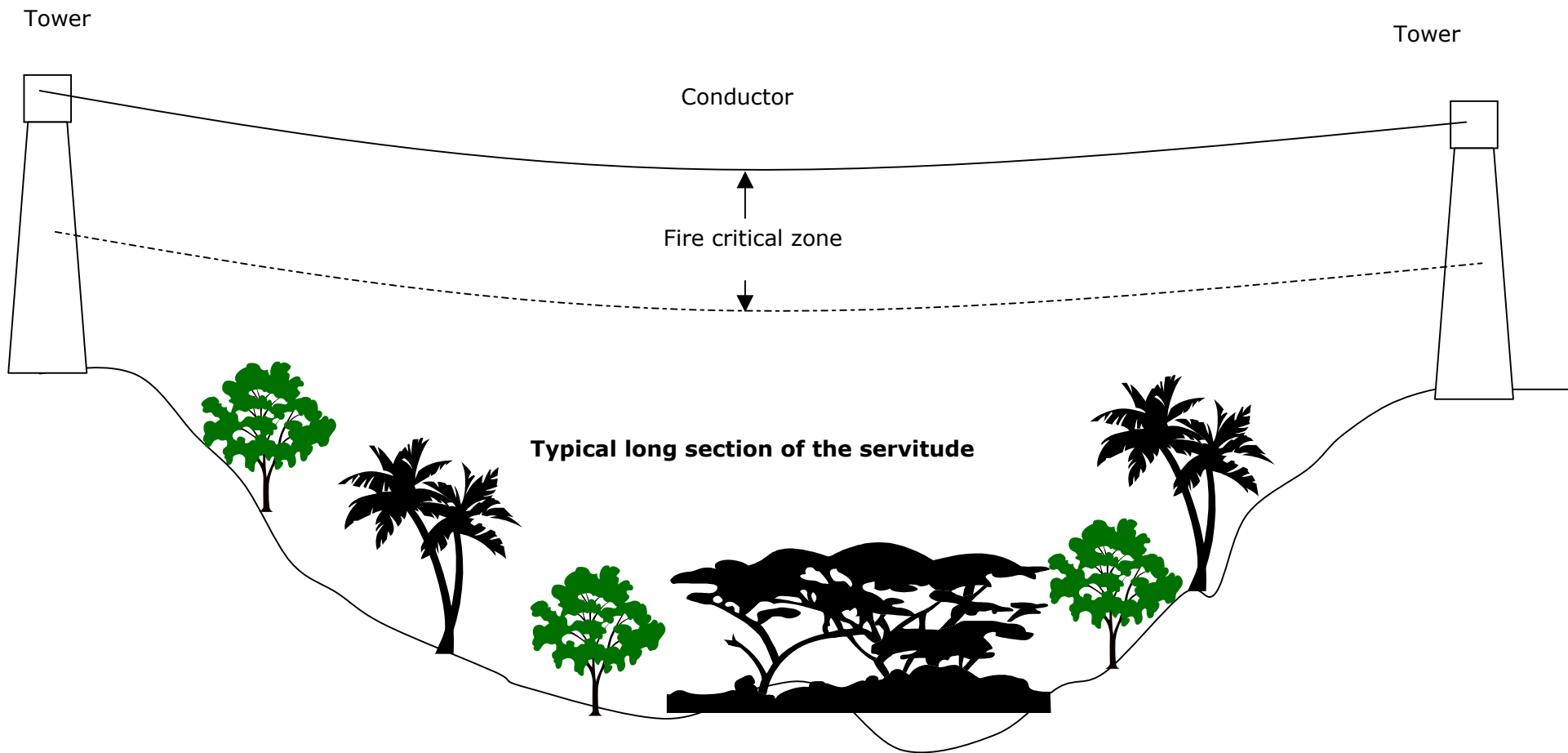
Connie Pelser
Edward Cronje
Manie Farinha
Pottie Potgieter
Butch Rossouw

Typical cross section of power line



Typical plan view of power line





FIRE DANGER RATING SYSTEM

FIRE ALERT STAGES	BLUE	GREEN	YELLOW	ORANGE	RED
FIRE DANGER INDEX	0 - 20	21 - 45	46 - 60	61 - 75	76 - 100
FIRE BEHAVIOUR	SAFE	MODERATE	DANGEROUS	VERY DANGEROUS	EXTREMELY DANGEROUS
FLAME LENGTHS (METRES)	0 - 1	1 - 1,2	1,2 - 1,8	1,8 - 2,4	2,4 +
FIRE CONTROL GUIDE	<p>Fires are not likely to start. If started they spread very slowly or may go out without aid from suppression forces. There is little flaming combustion and intensity is low under all conditions. Control is readily achieved and little or no mopping up is required.</p>	<p>Ignition may take place near prolonged heat sources (camp-fires, etc.) spread is slow in forests, moderate in open areas. These are light surface fires, with low flames. Control is readily achieved by direct manual attack methods and with minimum forces, difficulty may be experienced on exposed, dry slopes and some light mopping up will be necessary.</p>	<p>Extreme caution should be taken when controlled burning is carried out.</p> <p>Aircraft should be called in at the early stages of a fire.</p>	<p>Ignition can occur readily, spread may be fast in the forests though not for sustained periods. Grass fires could outstrip forces with a spread of approximately 7km/hour. Fires may be very hot with local crowning and "short to medium range" spotting. Control will be very difficult requiring indirect attack methods with major assistance necessary. Mopping up may require an extended effort.</p>	<p>Ignition can occur from sparks. Rate of spread will be extremely fast for extended periods. Fires will be extremely hot with a dangerous heat effect on people within 10m of fire and there may be extensive crowning, fire whirls and "long range" spotting. Control may not be possible by frontal attack during the day and fire fighters should limit their efforts to containing lateral spread - until weather changes. Damage potential total and mopping up operations may be very extensive and difficult. Full assistance necessary throughout.</p>