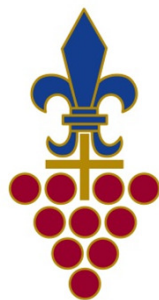


CONSULTATIVE DRAFT

STELLENBOSCH MUNICIPALITY

INTEGRATED FIRE MANAGEMENT PLAN

January 2019



STELLENBOSCH
STELLENBOSCH • PNIEL • FRANSCHHOEK

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1. INTRODUCTION

Stellenbosch Municipality (the Municipality), like the rest of the Western Cape, continue to be threatened by veld fires. The dominant vegetation type within the region is both fire-prone and fire-dependent. This is exacerbated by expansion of urban areas, infestation of alien vegetation and windy, hot and dry summer periods typical of the region.

The Stellenbosch Municipality Integrated Fire Management Plan (from hereon referred to as the Fire Management Plan or SFMP) serves to provide the necessary information for sound veld fire management with an emphasis on Stellenbosch Municipality's legal obligations as landowner.

1.1 CONTEXT

Stellenbosch Municipality forms part of the Cape Winelands District Municipality of the Western Cape Province (refer to Figure 1). The Municipality adjoins the Cape Metropolitan Area to the west and the Breede Valley, Drakenstein and Theewaterskloof Municipalities to the east, south and north respectively.

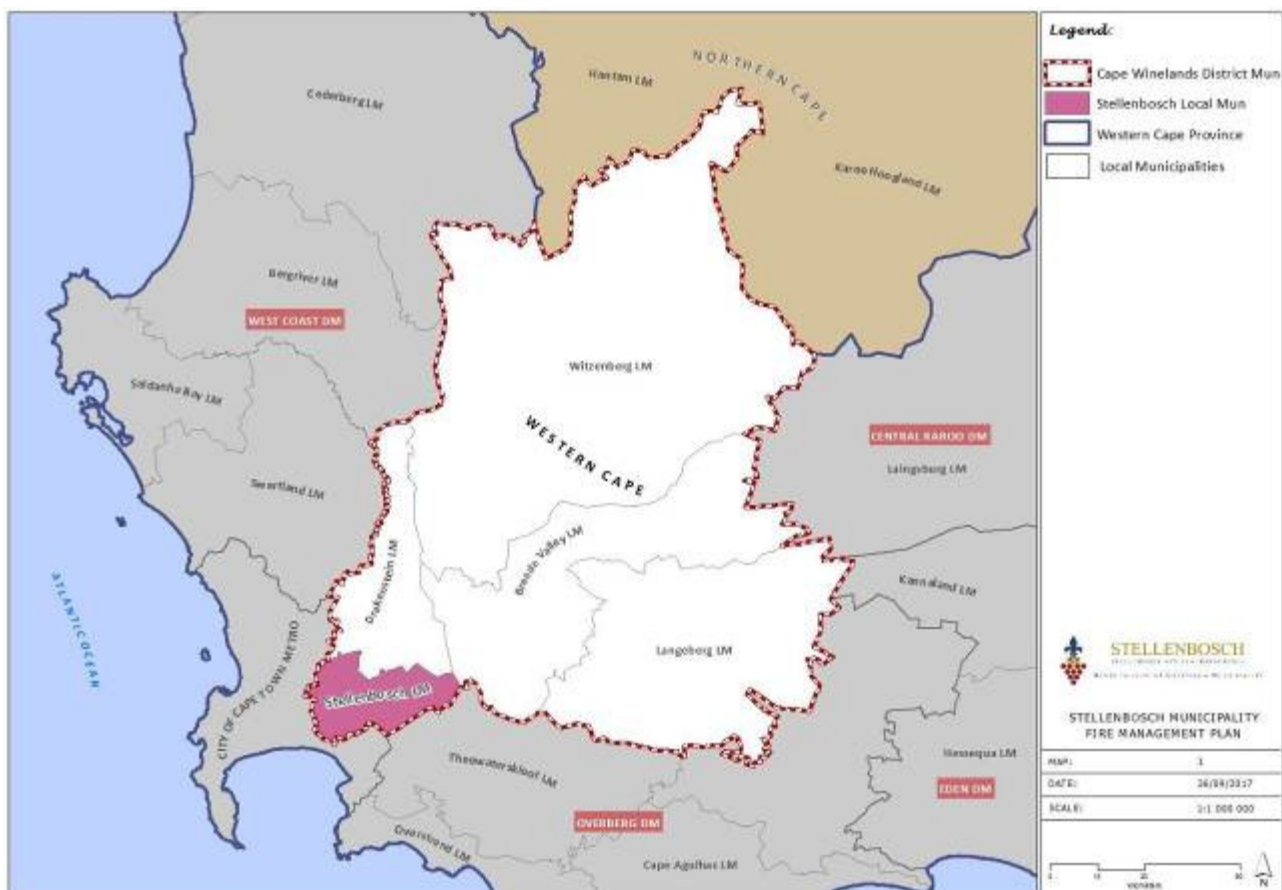


Figure 1: Location and context of Stellenbosch Municipality.

Various biophysical and biological characteristics of the Municipality, specifically related to the regions climate, topographical nature and vegetation, plays a major role in an increase risk of veld fires occurring in the area. These aspects are described in Section 3 below.

1.2 GOALS AND OBJECTIVES

The primary purpose of the SFMP is to ensure that veld fires are able to serve greater good than harm. It aims to eliminate loss of life, human injury, economic and environmental losses as a result of veld fires. Furthermore the overarching fire management goals (italics) and objectives (bulleted) as it pertains to Stellenbosch Municipality are the following:

Protect life and property.

- Minimise fire risks.
- Provide for the safety of residents, visitors, fire-fighters and staff.
- Directly protect real and personal property from the effects of fire.
- Achieve full compliance with the National Veld and Forest Fire Act. 101 of 1998.
- Reduce fuels with prescribed fire and thinning in places where wildfire is a threat to people and property.
- Implement programs to prevent unplanned human-caused ignitions and reduce human-caused wildfires.
- Ensure organized, professional and coordinated response to fires.
- Strive to meet health and safety standards that relate to fire, particularly for air quality and on-the-job safety.

Protect natural and cultural resources from undesirable effects of fire and suppression.

- Reduce fuels with prescribed fire and thinning in places where fire would adversely affect estate resources.
- Avoid negative effects to sensitive areas.
- Employ minimum impact suppression tactics, particularly in ecologically sensitive areas.

Suppress unwanted fire.

- Ensure Stellenbosch Municipality is adequately prepared to suppress unwanted wildfires.
- Suppress human-caused fire.
- Prevent unwanted fire from spreading onto neighbouring land.

Allow fire to assume its natural role in ecosystems.

- Determine fire-related data needs relative to natural resources.
- Attempt to determine range of natural variation related to fire (in time, space and intensity), role of fire and fire effects.
- Promote research relative to data needs.

Manage fire cooperatively with neighboring agencies and private land owners as well as other stakeholders.

- Maintain open lines of communication.
- Collaboratively plan and implement fire operations.
- Improve fire awareness.

The management approach as it relates to risk involved with veld fires is summarized in the table below. These aspects are addressed in the document.

Table 1: List of specific risk management options.

Management options	Descriptors
Avoid the risk	By deciding not to proceed with the activity likely to generate the veld fire risk. For example, prohibiting certain types of actions in areas prone to wildfires.
Reduce the hazard and the likelihood of exposure	Programs to reduce the level of fuel available to burn in a veld fire and improve the degree to which assets are protected. For example, the preparation of firebreaks or manual clearing of fire hazards as well as regular inspections.
Reduce ignitions	Programs to reduce the number of deliberate and accidental ignitions of human origin. For example, education and awareness programmes, fire bans and reduction in activities during high-risk season or periods.
Reduce consequences	This option includes various measures to reduce the consequence of wildfires, such as preparedness and contingency plans, wildfire recovery plans, community education programs for self-protection (lives and property), building restrictions and standards for areas prone to veld fires.

1.3 DOCUMENT STRUCTURE

In order to fulfil the objectives listed above the SFMP makes provision for the following three components in the approach to the occurrence of veld fires (Figure 2):

The structure of the SFMP responds to these components:



Figure 2: Document structure.

a) Awareness

The majority of unwanted fires are caused by human intervention. Proper training and education will promote awareness of risks and the ability to make the right decisions in situations that demand quick and efficient response. It is essential to know where danger areas are, which season present the biggest risks and understand the local conditions which are conducive to fire inception and spread. It is essential for residence to be aware of what is going on around their property and in their immediate vicinity.

b) Prevention and preparedness

Prevention is always better than the cure. After awareness, prevention and control are the secondary steps in wildfire management. The SFMP puts forward measures to achieve the objectives of fire prevention.

Nature is in a constant state of flux and is significantly influenced by fluctuating and variable rainfall cycles. Whilst proper prevention techniques will significantly reduce the likelihood of spreading veld fires it needs to be accepted that, despite any effort made, we will never be able to control natural forces to the extent we may wish to. It is therefore equally necessary to be prepared for the inevitable in this regard.

Stellenbosch Municipality is committed to complying with the provisions of the National Veld and Forest Fire Act, i.e. being sufficiently prepared to react to fire, creating and maintaining adequate fire breaks, clearing the property of excess plant material that might fuel a fire, removing invasive alien plants, etc.

d) Response

All fires start small, thus, detection at the earliest possible stage is critical and is therefore also regarded as being as important a part of preparedness as it is for ensuring an appropriate response.

2 APPLICABLE LEGISLATION

Various pieces of legislation impact on fire management and set out mandates for different stakeholders. This legislation stipulates that various government departments, spheres of government and the private sector are mandated to deal with aspects of fire management responsibilities. The most relevant are listed below.

2.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT 108 OF 1996)

Section 24 of the Constitution provides that *everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA) (ACT 107 OF 1998)

Section 28 of NEMA creates a general duty of care on every person to *take reasonable measures to prevent significant pollution or degradation of the environment from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.*

2.3 DISASTER MANAGEMENT ACT (ACT 57 OF 2002)

The Department of Cooperative Government and Traditional Affairs administers the Disaster Management Act. The Act provides for an integrated and coordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters, and post-disaster recovery amongst others. Fires, including wildfires, are a major hazard to the country and are regarded as

one of the potential disaster areas. The Act requires each sphere of government to prepare a disaster management plan and mandates provinces and districts to respond to such disasters.

Section 42 of the Act states that the district municipality must establish a disaster management strategy. Section 32 states that a disaster management centre must promote an integrated and coordinated approach to disaster management in the municipal area, with special emphasis on prevention and mitigation, and coordinate other spheres of government and role-players. Section 30(1)(b) creates an obligation on the service to adopt proactive mitigation, which would include mitigation of wildfires. The Act gives the executive of the province the overarching control of a provincial disaster, with powers that override those of the Chief Fire Officer of a service within an affected municipality.

The executive of the province, in adopting proactive mitigation steps designed to minimise the likelihood or impact of severe wildfires, therefore may set certain requirements for district and local authorities and other stakeholders. The Disaster Management Act thus provides for the establishment of the framework within which Integrated Fire Management must take place.

2.4 FIRE BRIGADE SERVICES ACT (ACT 99 OF 1987)

The Department of Cooperative Government and Traditional Affairs administers the Fire Brigade Services Act. The Act is the primary piece of legislation regulating fire services and seeks to provide for the establishment, maintenance, employment, coordination, and standardisation of fire brigade services. In terms of the Act, district and local municipalities are required to establish a fire fighting service. The Act also provides for the Minister to designate fire fighting services. Further, it provides for the appointment of a Chief Fire Officer, the introduction of fees for the service, and the conclusion of agreements with other fire services so as to render a more efficient fire service. The Act is currently being reviewed, a process that is likely to result in a shift toward a greater emphasis on fire prevention and, given the pressures and demands resulting from global warming and climate change, more emphasis on the interface between the service and disaster management.

2.5 NATIONAL VELD AND FOREST FIRE ACT (ACT 101 OF 1998)

Veld fires in South Africa are dealt with under the National Veld and Forest Fire Act (Act 101 of 1998). The purpose of the National Veld and Forest Fire Act is *to prevent and combat veld, forest and mountain fires throughout the Republic.*

The Act places the duty on land owners to make provision for the management of veld fires on their own land. Failure to do so may result in penalties being enforced (refer to Section 24 and 25 of the above Act) and claims lodged against a landowner if the above Act's requirements were not met.

In terms of the National Veld and Forest Fire Act the following responsibilities apply to landowners:

- The landowner on whose land a fire may start, or from whose land it may spread across boundaries, must prepare and maintain a firebreak on his or her side of the boundary between his or her land and any adjoining land. Owners of adjoining land may agree to position a common firebreak away from the boundary.

- The landowner on whose land a fire may start, or from whose land it may spread across boundaries, must have in place:
 - Such equipment, protective clothing and trained personnel required to extinguishing such fire as may occur as prescribed in the FPA (Fire Protection Association) regulations.
 - If there are no regulations applicable, then as reasonably required in the circumstances.
 - Take all reasonable steps to notify the Fire Protection Officer (FPO) of the local FPA should a fire break out.
 - Do everything in their reasonable power to stop the spread of the fire.
- The Act requires that should the owner be absent, a known and identified other person responsible needs to be present on or near this land to:
 - Extinguish a fire if one breaks out, or assist or instruct others to do so.
 - Take all reasonable steps to alert the neighbours and the FPO.
 - The owner may appoint an agent to act on his or her behalf to perform these duties.

Where a FPA has been registered in an area the municipality or designated service must become a member of the FPA.

SECTION A: AWARENESS**SECTION SYNOPSIS**

This section describes the main characteristics of Stellenbosch Municipality that makes the area susceptible to the occurrence of veld fires and ways to increase awareness about the risk of fire as well as measures to increase general awareness of staff and the public in this regard.

3 STELLENBOSCH MUNICIPALITY AND FIRE**3.1 CLIMATE**

Stellenbosch Municipality has a Mediterranean climate characterised by warm, dry summers and cold, wet winters. Summers are generally hot with temperatures averaging between 25° and 30°C. Heat waves lasting a few days occur reasonably frequently in summer. The *Status Quo report on the climate change in the Western Cape* (June 2005)¹ states that the future climate of the Western Cape is likely to be warmer and drier than at present, according to a number of current model projections. In support of these projections, recent temperatures trends reveal appreciable warming in the Western Cape over the past three decades. Rainfall trends are not as clearly identifiable. A future that is warmer, and possibly drier, will encompass increase an already high risk of wildfires occurring within the region.

Stellenbosch Municipality is located within the winter rainfall area. The Municipality receives approximately 80% of its annual rainfall in the winter months typically as cyclonic rain from cold fronts, and 20% during its summer months (Elsenburg, 1990). Most areas of the Municipality have moderate to low rainfall, except for the mountain areas, which have been known to receive some of the highest rainfalls in the country. These high rainfall areas, however, constitute only a very small part of the Municipality. Rainfall across the Municipality thus varies from 200 mm to 3 000 mm per year, in the higher peaks of the Groot Drakenstein mountain range, decreasing to the west away from the influence of the mountains.

3.2 TOPOGRAPHY

Stellenbosch Municipality² is characterised by a diversity of topographical features from gently rolling hills to wide open plains, high impressive mountains and secluded valleys (see Figure 3). As stated above, the most defining feature of the Municipality is its mountain ranges, which give shape and a magnificent backdrop to its fertile agricultural valleys. The central part of the Municipality is characterised by steep valleys and high peaks, i.e. Simonsberg, Jonkershoek Mountains and Groot Drakenstein Mountains. The topography of the area makes access and the management of a large part of the region challenging.

¹ Department of Environmental Affairs and Development Planning (DEA&DP) 2005: *A Status Quo, vulnerability and adaptation assessment of the physical and socio-economic effects of climate change in the Western Cape*. CSIR Environmentek: Stellenbosch. Report No. ENV-S-C 2005-073

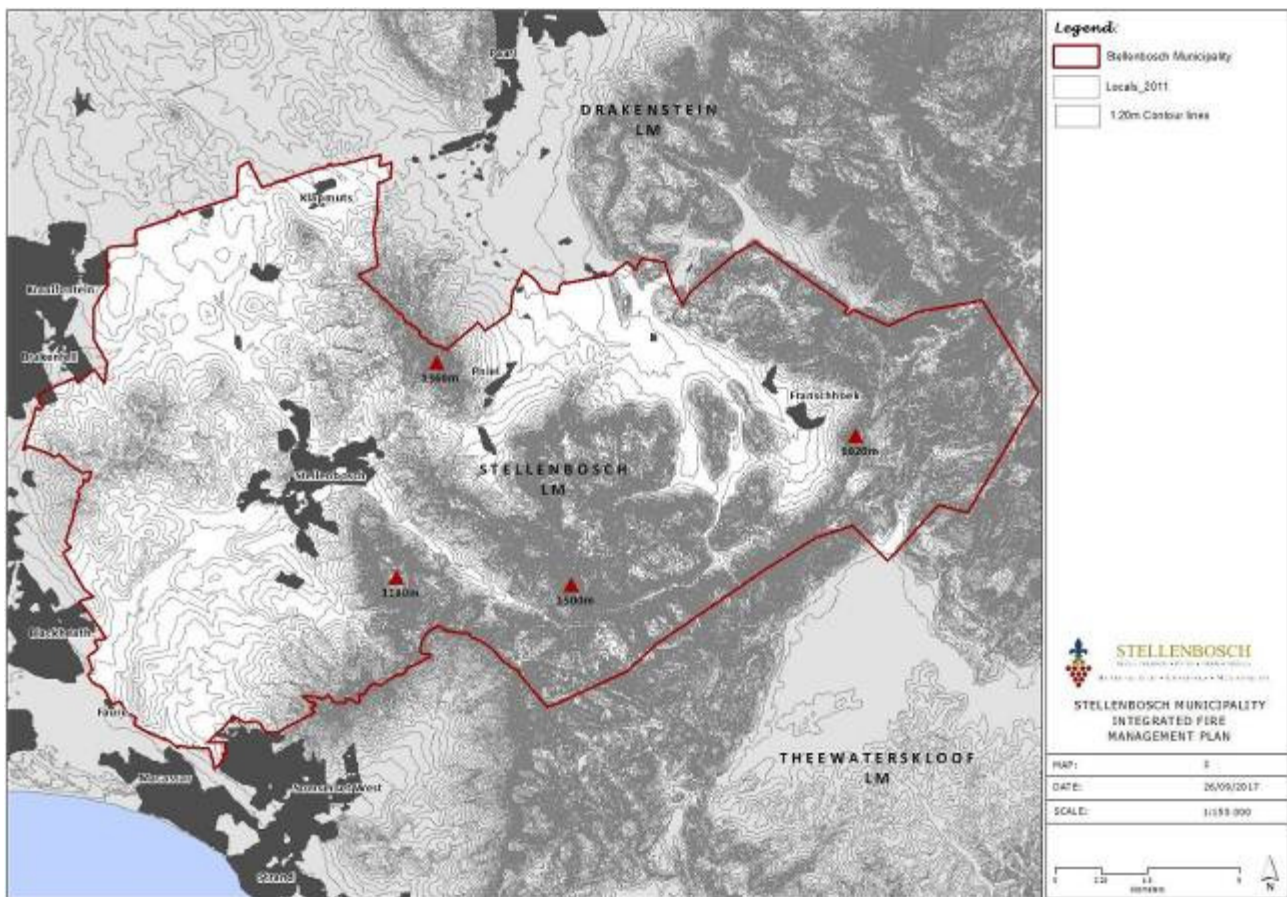


Figure 3: Topography of Stellenbosch Municipality.

3.3 ECOLOGY

Stellenbosch Municipality are wholly located within the fynbos biome (see Figure 4). When planning for fire management within the fynbos biome it is important to understand the relationship between fire and fynbos.

Fynbos is fire-adapted vegetation that requires regular burning for its persistence. In the absence of fire, fynbos is gradually replaced by thicket species. It thrives on infertile soils and fire is the mechanism that recycles precious nutrients from old moribund growth into the soil. Fire in fynbos is far from a disaster, but rather a crucial trigger that resets the fynbos 'successional clock'. It provides the stimulus for dormant seeds to germinate and the opportunity for many annuals, short-lived perennials and bulbs to grow, flower and seed during times of abundant nutrients and sunlight. They complete their short life cycles, returning to the soil as the larger shrubs overwhelm them, and remain dormant until the next fire. The optimal fire cycle for fynbos is between 10-14 years. Shorter fire cycles can wipe out slow maturing species, while species start dying when intervals become too long³.

Fire season is predominately during the months of November to April when the fire risk is at its highest.

³ <http://www.fynboshub.co.za/fynbos-and-fire/>

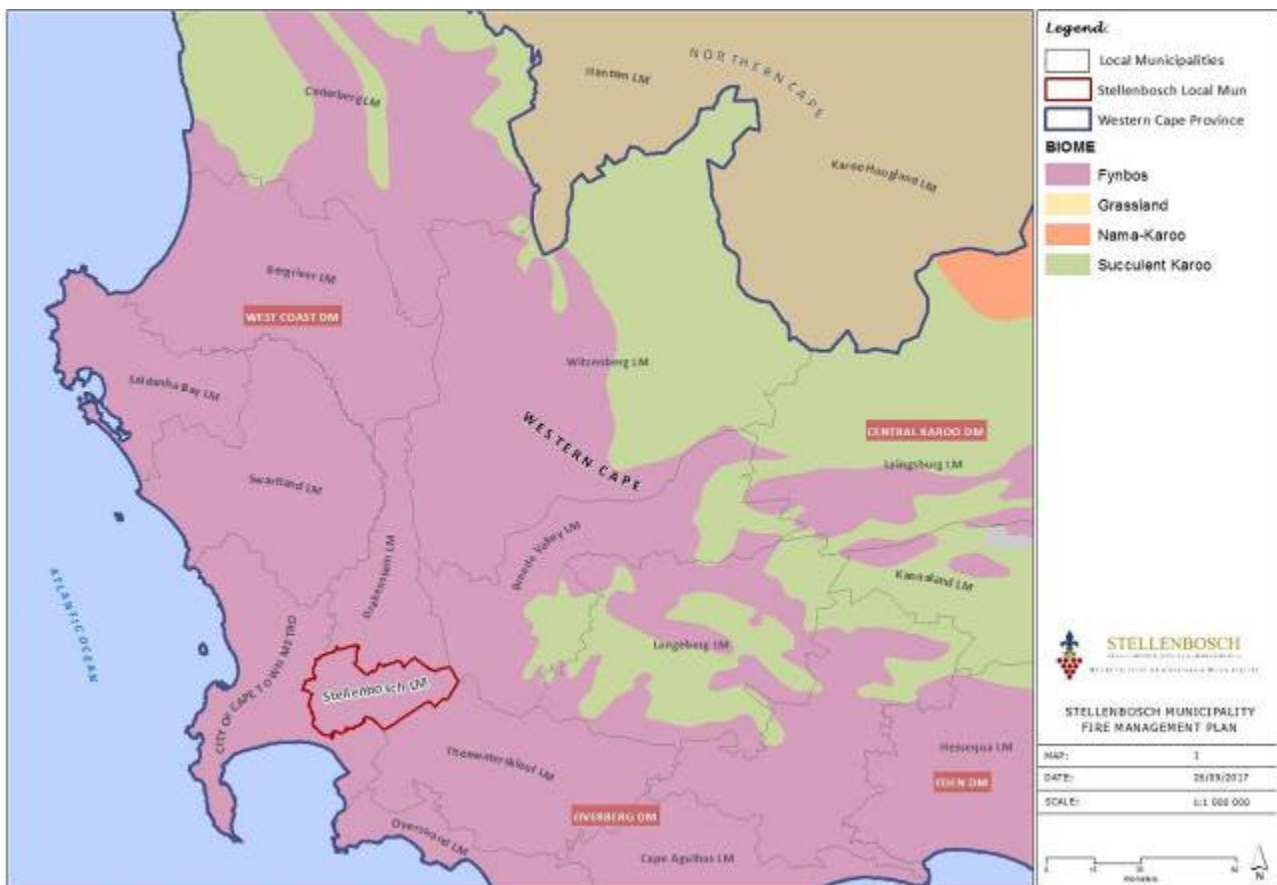


Figure 4: The Fynbos Biome.

3.4 VELD FIRE HISTORY

Figure 5 depicts veld fires that occurred in and around Stellenbosch Municipality since 1970 until 2015. During this period there were ±275 fire recorded (BGIS). From the information provided in Figure 5 it is important to note that the major fires that occurred in an around Stellenbosch Municipality in recent history are closely associated with the natural areas. Awareness, prevention and preparedness strategies should therefore be focussed and geared to manage fire in and from these areas.

3.5 RISK ASSESSMENT FOR STELLENBOSCH MUNICIPALITY

Veld fires are listed as a risk or hazard in the Disaster Hazard, Vulnerability and Risk Assessment for Stellenbosch Municipality. The areas identified as being High Risk areas (Figure 6) coincides with the information provided in paragraph 3.4 above and depicted in Figure 5, i.e. natural, high lying areas. Other areas listed a risk areas include those associated with:

- transport routes,
- powerlines and
- informal settlements.

In terms of the above assessment all settlements within the Municipality are at medium risk with regards to fire. The northern section of Franschhoek town is within 100 meter of a high fire hazard area.

Further areas of risk to the Municipality include:

- Sufficient funding to administer effective alien clearing and prepare firebreaks on all municipal owned land.
- Council liability in terms of the National Veld and Forest Fire Act for the potential origin or spread of fire from municipal land under lease agreement.
- Coordination between other agencies for the implementation and maintenance of fire prevention measures on land not owned by the Municipality but identified in the Disaster Hazard, Vulnerability and Risk Assessment. These areas include vacant (municipal owned) areas, areas along transport routes, powerlines, the urban fringe, open (recreational) areas and informal settlements.
- Old forestry areas with limited access control used for recreational purposes.
- Having in place the required insurance should the Municipality be found to be liable in terms of its responsibilities as prescribed by the National Veld and Forest Fire Act or any other legislation guiding the prevention and suppression of veld fires.

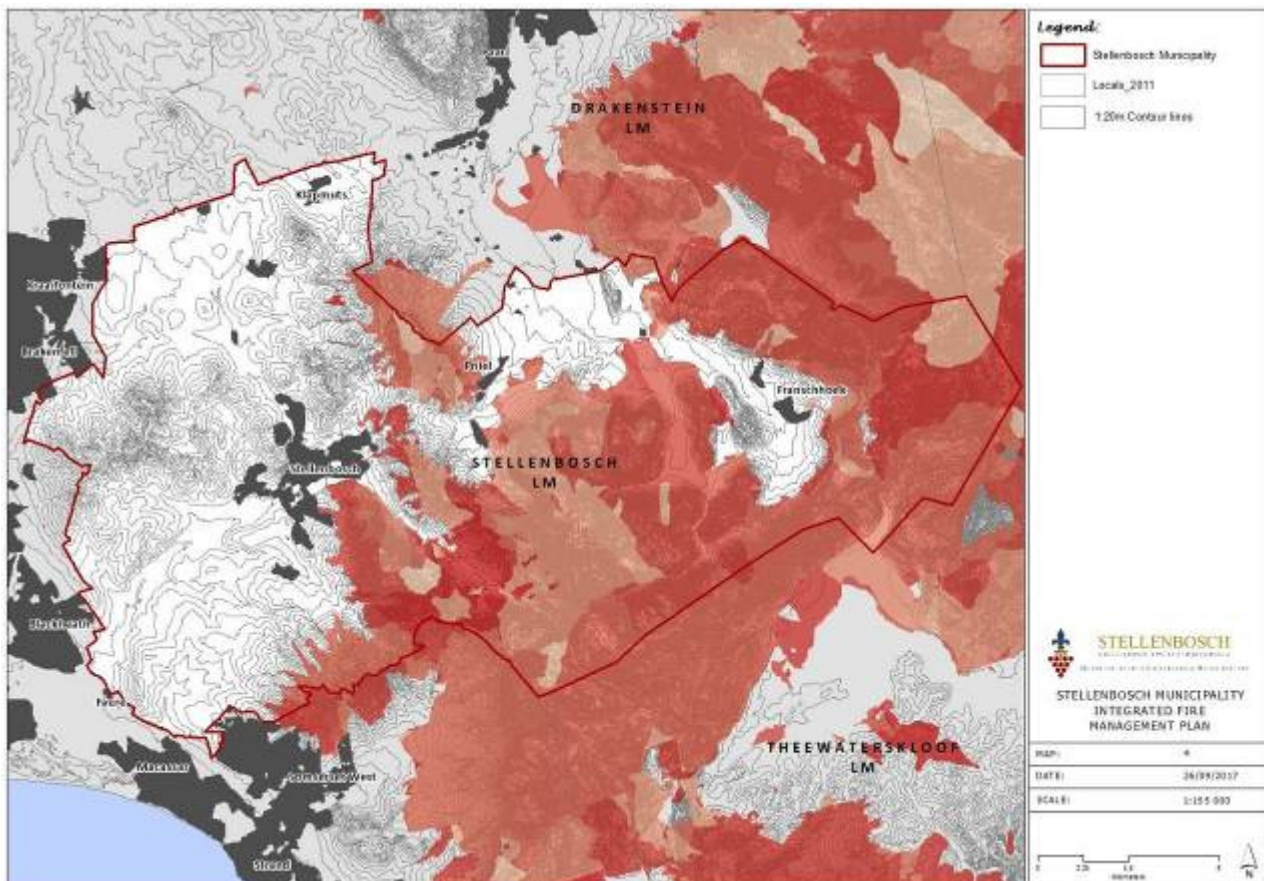


Figure 5: Veld Fire History.

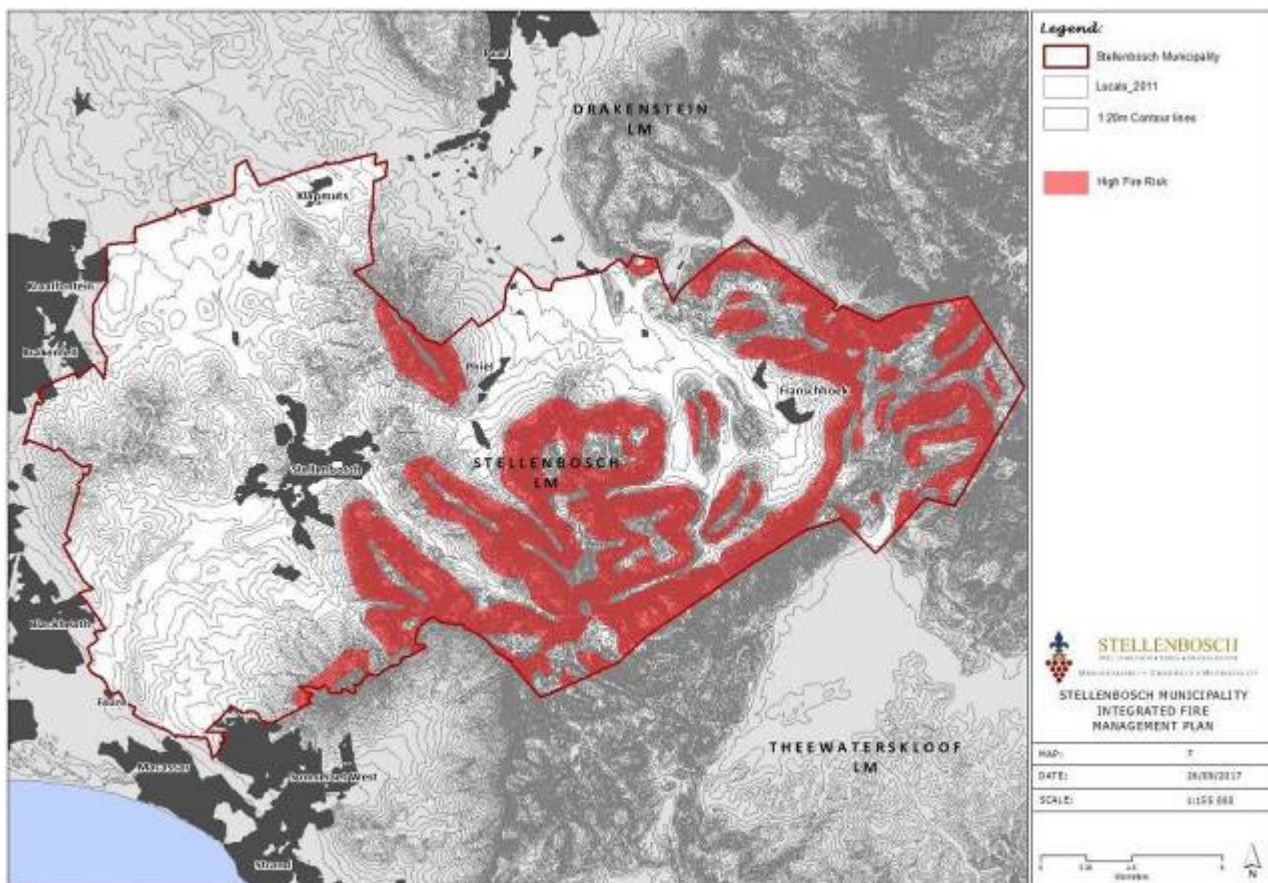


Figure 6: High Risk Areas for veld fires.

4 LANDOWNERS AND FIRE

The National Veld and Forest Fire Act impose a number of duties on individual landowners that are intended to reduce the harm from wildfires. These are:

- You may not start a wildfire (Section 18(1)).
- You may only start a fire, including a cooking or braai fire, in a designated area.
- You must have equipment available to fight wildfires (Section 17(1)).
- You must have trained personnel available to fight wildfires (Section 17(1)).
- You must have a person on the property who keeps a lookout for fires (Section 17(2)).
- You must establish a system of firebreaks (Section 12).
- You may not burn firebreaks or carry out controlled burns when the Fire Danger Index is high or the FPA has objected to such burning taking place.
- You must manage the fuel load on land under your control. This means that you must remove invasive alien vegetation from the land, as well as other vegetation that creates unwanted fuel loads.

Section 34 of the National Veld and Forest Fire Act creates a presumption of negligence in relation to wildfires. If a person bringing a civil claim against a landowner proves that he or she suffered loss, the loss was caused by a wildfire and the wildfire started on or spread from land owned by the landowner. The landowner against whom the claim is made is presumed to have acted negligently in relation to the wildfire unless the landowner proves that he or she was not negligent or the landowner is a member of an FPA in the area where the fire occurred, in which case the person bringing the claim must prove that he or she was negligent.

5 AWARENESS PROGRAMS

Communication and awareness must be focussed to be effective, and so, to be effective we need to know *WHO* we want to raise awareness with and *HOW* does one do this.

Target audiences (who) would include groups such as:

- Staff
- Neighbouring landowners
- Community
- Schools

Different types of media (how) have different needs. The most suitable types of media include:

- Print
- Television
- Radio
- Website
- Posters and notice boards
- Public Relations Consultants

The principles of a communication strategy are who is the target audience, what message will they be given and when will the message be given? There are four steps to implementing this strategy:

- Step 1:** Understand your audiences and the wildfire prevention problems that have to be addressed. Focus on the problem issues.
- Step 2:** Determine the people who can help solve the problem, as this is the target audience. Then decide what they need to know about veldfire – that’s your message.
- Step 3:** Establish what newspapers or magazines your target audience read, what radio stations they listen to and what TV channels they watch – the media you need to work with.
- Step 4:** Determine the best time to deliver your message to the target audiences. And remember that wildfire messages can be linked to a number of other events such as Heritage Day (24th September). Heritage Day also coincides roughly with the beginning of the fire season on the Cape Peninsula.

A further means to communicate the risk of fire is through a Fire Danger Index. The Minister prepares and maintains a fire danger rating system for the entire country in consultation with the South African Weather Bureau and the FPAs. The Minister must communicate the rating to the fire protection associations in the region and must publish warnings when the fire danger rating is high in any region. This must be published in newspapers and television channels. When the minister has published a warning, no person may light, use or maintain a fire in the open air in the region where the fire danger is high.

The Fire Department may collate a fire danger index daily rating and to communicate such to staff and the public. A simple but effective fire danger rating can be applied within the Municipality (refer to Table 2). Fire danger ratings must be assessed weekly during the fire season. The fire danger rating system must take into account the following factors:

- (i) topography,
- (ii) type of vegetation in the area,
- (iii) seasonal climatic cycle,
- (iv) typical weather conditions,
- (v) recent weather conditions,
- (vi) current weather conditions,
- (vii) forecasted weather conditions, and
- (viii) any other relevant matter.

The fire danger rating system must show the rating in a clear format identifying what activities are dangerous and what precautions should be taken for each rating.

Table 2: Fire Danger Index.

Fire Danger Index	Fire Conditions	Fire management preparation
Safe	Safe	<ul style="list-style-type: none"> • Basic minimum fire fighting preparedness apply
Moderate to safe	Moderate to safe	<ul style="list-style-type: none"> • Standby operational on a roster basis • Proactive fire management measures undertaken as planned
Moderate to high	Moderate to high	<ul style="list-style-type: none"> • Standby operational on a roster basis • Limited/no proactive burning interventions • Open fires only permitted in authorised fireplaces
High	High	<ul style="list-style-type: none"> • Standby operational on a roster basis • Open fires only permitted in authorised fireplaces • Designated management staff available for wildfire response
Very high to extreme	Very high to extreme	<ul style="list-style-type: none"> • Standby fully operational • No open fires • Fire response team (proto-team) working close to fire-fighting equipment • Test fire-fighting equipment • Deploy field staff in safe areas only

6 DIFFERENT TYPES OF FIRES

Specific terminology describes the types of fires and burning conditions. Some of these are listed below.

Table 3: Terminology to describe the types of fires and burning conditions.

Term	Description
Arson fire	An uncontrolled fire wilfully ignited by anyone to burn or spread to vegetation or property without consent of the owner or his/her agent.
Block burn	A prescribed burn in a pre-determined and specified land area.
Brush fire	A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.
Catastrophic fire	A fire that causes unrecoverable damage to property, loss of life and limb. In plantations, the area is more than 100 ha (250 acres).
Controlled fire	A fire that is subject to a line of control around a fire, any spot fire from it, and any interior island to be saved, effectively preventing any unplanned spread.
Crown fire	A fire that burns in and advances through the top leaves or the crown of trees or shrubs.
Debris burning fire	A fire spreading from any fire originally ignited to clear land or burn rubbish, garbage, crop stubble, or meadows (excluding incendiary fires).
Ecological burn	A form of prescribed burning involving the treatment of vegetation by burning it in predetermined areas to achieve specified ecological objectives.
Forest fire	A fire burning mainly in a forest and/or woodland.
Fuel reduction burn	The planned application of fire to reduce hazardous fuel quantities, and undertaken in prescribed environmental conditions within defined boundaries.
Ground fire	A fire that is burning below the surface of the ground in roots, peat, coal, decaying plant material, etc.
Human-caused fire	Any fire caused directly or indirectly by a person.
Mega fire	A wildfire or concurrent series of wildfires that is in the upper percentile of the fire regime.
Open burn	Burning of wastes in the open or in an open dump.
Out-of-control fire	A fire that has reached the intensity where no attempt is or can be made to stop the head of the fire using a direct attack. Only the flanks can be attacked.
Prescribed burn	The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives. It is undertaken in specified environmental conditions. Generally, it requires the specific authorisation of the fire management authority.
Prescribed fire	Any fire ignited by management actions to meet specific objectives. A written, approved burn plan must exist, and approving agency requirements (where applicable) must be met, prior to ignition.
Spot fire	Isolated fire started ahead of the main fire by sparks, embers or other ignited material, sometimes to a distance of several kilometres.
Structural fire	A fire originating in or burning any part or all of a building or shelter.
Surface fire	Fire that moves through combustible material located on the ground.
Uncontrolled fire	Any fire that threatens to destroy life, property, or natural resources, and (a) is not burning within the confines of firebreaks, or (b) is burning with such intensity that it could not be readily extinguished with ordinary, commonly available tools.
Veldfire	Described in the NVFFA as "a veld, forest, or mountain fire". A vegetation fire outside the urban-rural interface; a general term to describe fire in vegetation. In

	this context these forms of fire are collectively referred to as “wildfires”.
Wildfire	A vegetation fire accidentally or deliberately ignited but burning out of control, including veld and forest fires.
Wildfires	A fire burning outside the urban areas, either as a prescribed burn or as a wildfire.

7 MANAGEMENT ACTIONS

Table 4: Awareness – Management Actions.

Action	Responsible Department	Timeframe
Educate staff on the characteristics that makes the municipal area conducive to veld fires.	Fire Department Nature Conservation	Immediate & ongoing
Communicate to management the legal requirements as per the National Veld and Forest Fire Act applicable to the Municipality.	Community Services Env. Management	Immediate
Communicate to lessees renting farm- and other land from the Municipality as to their legal requirements as per the National Veld and Forest Fire Act.	Property Management	Immediate
Include fire awareness in the existing educational and awareness programs presented.	Fire Department Nature Conservation	Immediate & ongoing
Develop a fire danger rating system.	Fire Department	Immediate & ongoing
Communicate fire danger rating to the public.	Fire Department	Immediate & ongoing

SECTION B: PREVENTION AND PREPAREDNESS

SECTION SYNOPSIS

This section describes activities to reduce or mitigate the risk or effect of veld fires. These include:

- a) Alien clearing;
- b) Firebreaks; and
- c) Preparedness.

8 STELLENBOSCH MUNICIPALITY FIRE FIGHTING CAPACTIY

Stellenbosch Municipality's fire fighting capability and responsibility vests with the Fire Department.

8.1 FACILITIES

Veld and Forest Fire Act, 101 of 1998

In terms of section 17.(1)(a) every owner on whose land a veldfire may start or burn, or from whose land it may spread must have equipment, protective clothing and trained personnel for extinguishing fires.

Occupational Health & Safety Act, 85 of 1993

This Act specifies that employees need to provide and maintain a safe working environment for their staff. In terms of section 8: 1 & 2 (a-j) every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of its employees without derogating from the generality of an employer's duties under subsection (1), the matters to which those duties refer include in particular – the provision and maintenance of systems of work, plant and machinery that, as far as is reasonably practicable, are safe and without risks to health.

Stellenbosch Municipality has three fire stations. One is located in Stellenbosch, one in La Motte (near Franschhoek) and the third in Klapmuts (Figure 7). Cape Winelands District Municipality has a fire station located in Stellenbosch. Nature Conservation, a section operating under the Directorate: Community and Protection Services, has limited fire-fighting capability with facilities situated in Stellenbosch and Franschhoek.

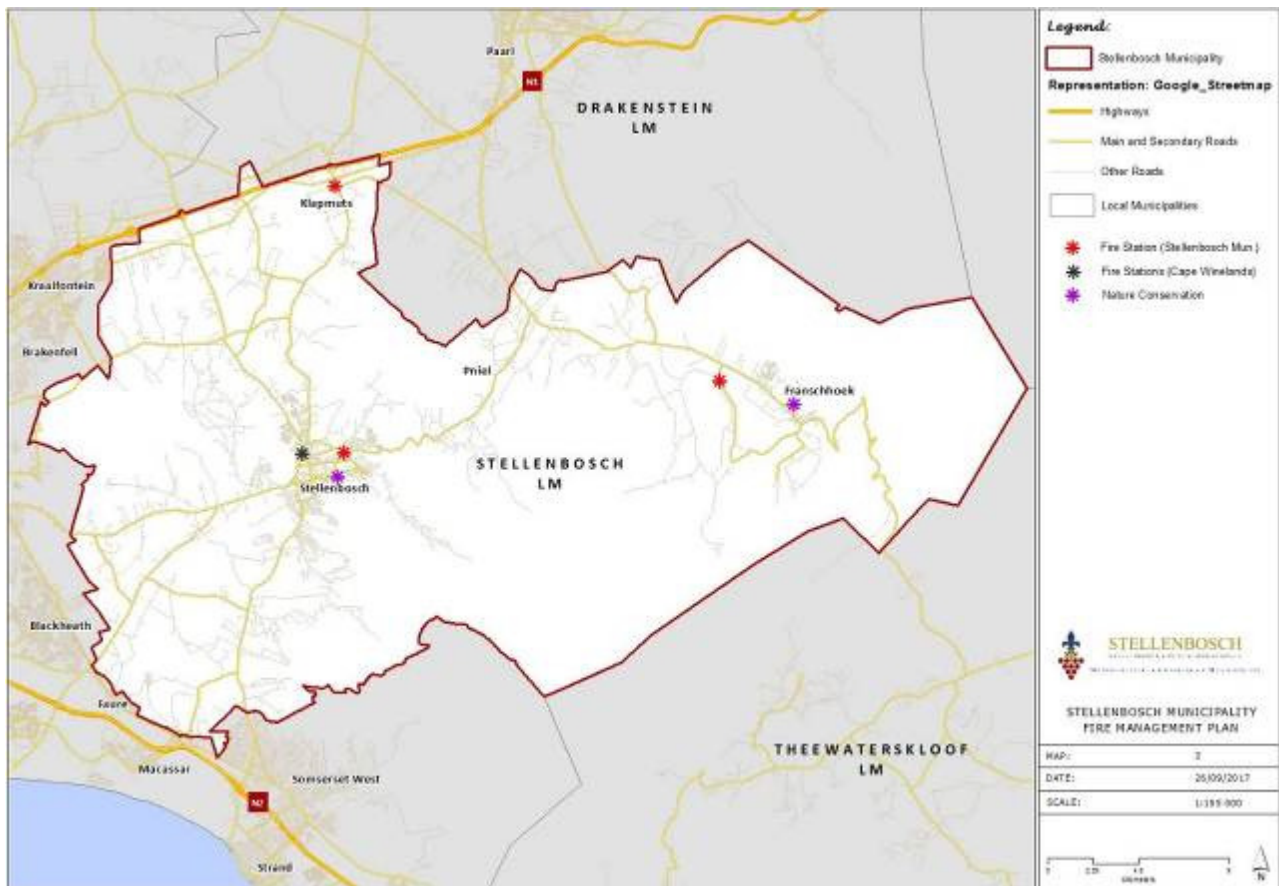


Figure 7: Stellenbosch Municipality Fire Stations and fire suppression facilities.

8.2 EQUIPMENT

The following fire fighting equipment is available to the respective departments directly involved in fire prevention and response:

8.2.1 Fire Department

Vehicles

The Fire Department has the following equipment:

- 3 x Land Cruiser rapid response units (500l tanks)
- 3 x Medium-pumpers (2500l tanks)
- 1 x Water tanker (4500l tank)
- 3 x Major-pumpers (3000l tanks)

Two (2) of the medium pumpers are located at the La Motte station, one (1) major pumper in Klapmuts whilst the rest are located in Stellenbosch.

8.2.2 Nature Conservation

Vehicles

Nature Conservation has the following equipment:

- 2 x Rapid response units (500l tanks)

Both units are located in Stellenbosch.

Tools

Nature Conservation has the following tools:

- 15 x *Brandplakke*
- 2 x Drip-torches
- 5 x Rake-hoes

8.3 STAFF

8.3.1 Fire Department

The Fire Department has a total of 20 staff members available on a 24/7 basis. 12 Of these staff members are located in the Stellenbosch station, 4 in La Motte and 4 in Klappmuts.

8.3.2 Nature Conservation

Nature Conservation has in the order of 15 staff members that work on alien clearing and firebreak preparation. These personnel can react to fire. They are on duty during office hours (8:00 – 16:30).

Table 5: Stellenbosch Municipality fire fighting capacity.

	Staff (basis)	Vehicles	Tools
Fire Department (Stellenb)	12 (24/7)	3 x Rapid response units (500l)	
		1 x Med-pumpers (2500l)	
		1 x Water tanker (4500l)	
		2 x Major-pumpers (3000l)	
Fire Department (La Motte)	4 (24/7)	2 x Medium-pumpers (2500l)	
Fire Department (Klappmuts)	4 (24/7)	1 x Major-pumpers (3000l)	
Nature Conservation (Stellenb)	15 (8:00-16:30)	2 x Rapid response units (500l)	15 x <i>Brandplakke</i>
			2 x Drip-torches
			5 x Rake-hoes
Nature Conservation (La Motte)			

Importantly, Nature Conservation staff will be under the supervision and command of the Fire Department in the event that they are required and called out to assist with the control of a fire.

The Fire Department strive to manage and maintain its equipment according to SANS 10090 standards.

8.4 PREPAREDNESS

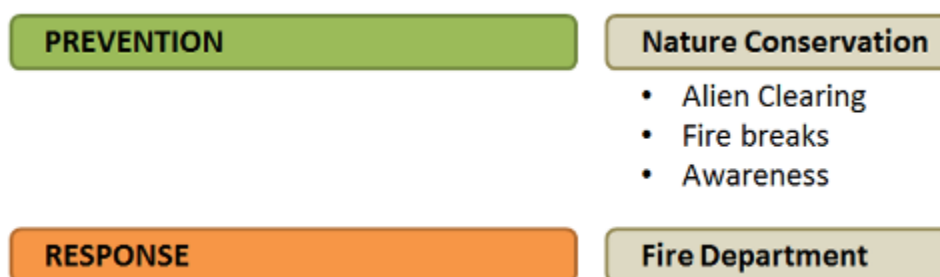
The level of preparedness during the fire season should be based on the Fire Danger Rating. However, basic preparedness levels that should be maintained throughout the fire season in the following way:

- Vehicles to be used for fire fighting to be equipped with basic veldfire response tools.

- Tools to be checked once a week and checklist to be signed.
- Motorised, electrical or mechanical equipment should be checked daily.
- Any defects or damages to vehicles or equipment must be reported.
- Standby crews must at all times be ready to depart immediately in event of a veldfire reported.
- On the alarm being given all crew must immediately proceed to the point of assembly with their respective equipment.
- Where there are radio blind spots measures must be taken to ensure that fire crews are in contact with the Control Room.
- A standby crew should be maintained after hours throughout the fire season. When fire danger is exceptionally high crews of volunteers may also be kept on standby.

8.5 STRUCTURE, ROLES AND RESPONSIBILITIES

As stated above Stellenbosch Municipality's fire fighting capability and responsibility vests with the Fire Department with limited fire-fighting capability and support from Nature Conservation. Whilst the Fire Department primary purpose is to respond to incidents Nature Conservation's role is related to fuel load reduction and the prevention of fires.



9 FUEL LOAD REDUCTION

It is important to understand the basics of fire before preparation can be made for efficient control thereof. It is essential to note that three environmental components are required for a fire to occur. These are oxygen, heat and fuel (refer to Figure 8). Whilst the atmosphere contains 21% oxygen, only 16% oxygen needs to be in the air for a fire to start. Fuel is any living or dead material that will burn. If ignition occurs in the situation or environment where all three elements are present combustion will result and a fire will continue to burn until one of the three elements are removed.

It is difficult to exclude oxygen from fires. Heat is considered a constant. However, a reduction in fuel will reduce the total energy output (refer to Figure 9). Fuel or more specifically the amount of fuel is the aspect that can be influenced most. It therefore becomes the most critical factor in the prevention and control of fire.

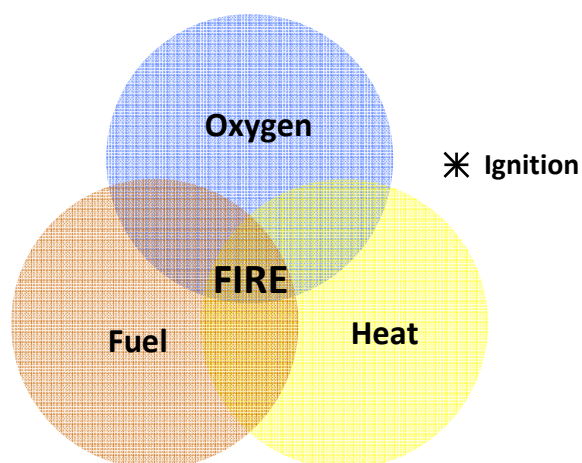


Figure 8: Basic elements of fire.

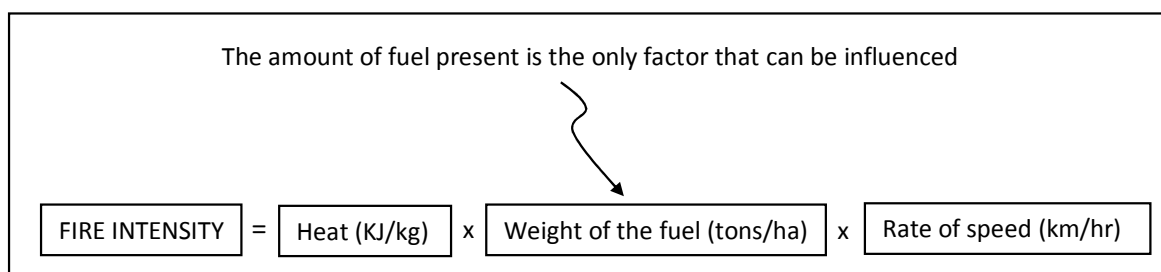


Figure 9: The factors determining the intensity of fire.

Two ways of reducing the fuel load are alien vegetation clearing or control and the establishment and maintenance of firebreaks.

9.1 ALIEN CLEARING

Invasive alien plants are plant species that have been introduced, either intentionally or unintentionally, to South Africa. They can reproduce rapidly in their new environments and tend to out-compete indigenous plants. The result usually includes a variety of negative ecological, social, and economic impacts. Invasive alien species pose the biggest threat to biodiversity after direct habitat destruction.

Approximately 8 750 alien species have been introduced into South Africa, 161 of which are seriously invasive species, and is estimated to cover over 10 million hectares (almost 8%) of South Africa's land surface. Expectations are that the impact will double every fifteen years if they are left un-managed⁴. Known for its renowned fynbos biome, the Western Cape is the most severely invaded province, with the wetter catchments of the coastal mountain ranges and the broad coastal lowlands being the most effected regions. The invasion of AIPs within the fynbos biome has called for elevated levels alarm since the early decades of this century⁵. Invasive plant species such as the *Acacia saligna* (Port Jackson), *Acacia mearnsii* (Blackwattle) and *Pinus pinaster* (Cluster Pines) are found in the fynbos introduced to enhance the value of the Cape's resources, pines originated from Europe while the *Acacias* are originally from Australia. Although many of these

⁴ Schonegeval 2001; Versfeld, Maitre and Chapman, 1998.

⁵ Macdonals *et al.* 1985.

species still support several industries, their negative impact are becoming more prominent, leading to a urgent need to protect our natural resources.

IAPs are characterised by being able to reproduce rapidly in their new environments, and this is usually due to a combination of factors, including:

- A lack of natural enemies in the new environment
- Resistance to local diseases and other plant pathogens
- Highly competitive growth and colonising strategies that provide them with a competitive edge, and an ability to out-grow local indigenous plants

IAPs can significantly alter the composition, structure and functionality of ecosystems. As a result, they degrade the productive potential of the land, intensify the damage caused by veld fires and flooding, increase soil erosion, and impact on the health of rivers and estuaries. Indigenous species may be reduced in numbers/coverage, or may be lost as a result of IAP infestations, posing a threat to South Africa's natural heritage in sensitive locations.

The National Environmental Management Biodiversity Act, 10 of 2004 (NEMBA), Section 76, states that all organs of state are required to draw up an invasive and alien monitoring, control and eradication plan for the land under their control.

In terms of Section 4(2)(a) of the NEMBA all municipalities are required to manage and conserve biological diversity. This includes taking steps to control and eradicate Invasive Alien Plants (IAP) in areas that they own or manage.

Conservation of Agricultural Resources Act, 43 of 1983

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 43 of 1983 (CARA), all declared aliens must be controlled. Landowners are legally responsible for the control of invasive alien plants on their property. In terms of the above act alien invasive plants are described to one of the following categories:

- Category 1: Prohibited and must be controlled.
- Category 2: May be grown in demarcated areas provided that there is a permit in place and steps taken to prevent spread.
- Category 3: May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent spread, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act, 10 of 2004

National Environmental Management: Biodiversity Act, 10 of 2004 (NEMBA), regulates all invasive organisms in South Africa. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this act and the regulations any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Categories listed are:

- Category 1a: Invasive species requiring compulsory control. Any specimen of a Category 1a listed species must, by law, be eradicated.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control program. These species must be removed and destroyed.

- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as gift ant plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as gift. No permits will be issued for Category 3 plants to exist in riparian zones.

Aliens that are regulated in terms of CARA as weeds and invader plants are exempted from NEMBA. This implies that the provisions of the CARA in respect of listed weeds and invader plants supersede those of the NEMBA.

Stellenbosch Municipality has prepared and adopted the Stellenbosch Municipality Invasive Alien Management Plan (April, 2017). The purpose of this document is to respond to this obligation and to coordinate Stellenbosch Municipality’s approach in this regard in order to reduce future IAP control costs and improve the integrity of the natural areas and ecosystems in Stellenbosch Municipality. This plan addresses invasive alien control in the nature areas owned and maintained by the municipality itself. These properties include:

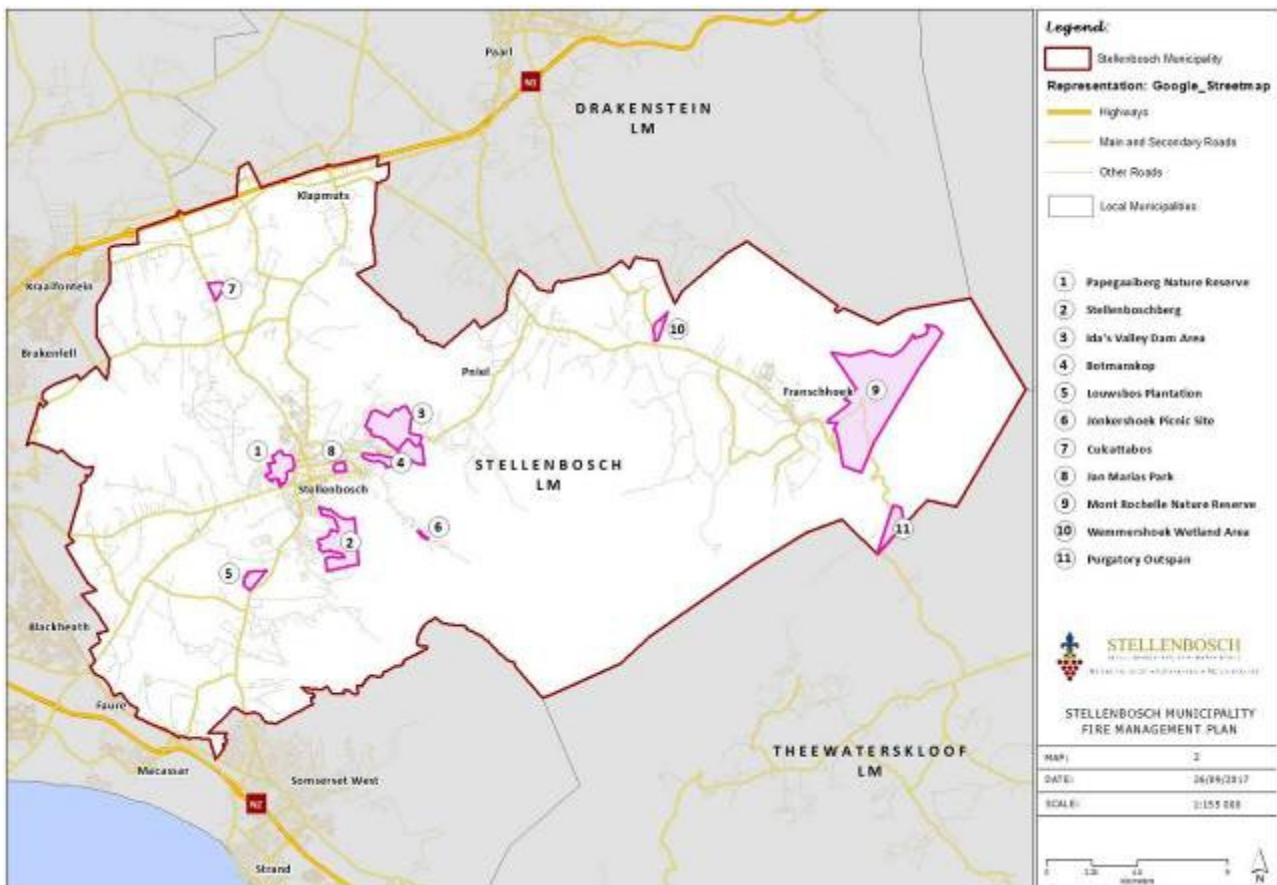


Figure 10: Stellenbosch Municipality properties that are the subject of the Stellenbosch Municipality Invasive Alien Plant Management Plan (April 2017).

- Papegaaiberg Nature Reserve
- Paradyskloof, including the areas of Stellenboschberg and Brandwacht
- Ida’s Valley Dam Area
- Botmaskop
- Louwsbos Plantation

- Jonkershoek Picnic Site
- Culcattabos
- Jan Marais Park
- Mont Rochelle Nature Reserve
- Wemmershoek Wetland Area
- Purgatory Outspan

In terms of planning, the Stellenbosch Municipality Invasive Alien Management Plan states the following:

Species and areas has to be prioritized and cleared according to their impact on natural resources and their potential for spreading to non-invaded areas⁶. Considerations in this regard include IAPs that pose a fire risk to houses or infrastructure should be targeted as a priority. Creating an effective fire break is important where woody/fire prone IAPs are located in dense stands near settlements, power lines etc.

9.2 FIREBREAKS

Fire breaks are cleared paths which will prevent the spread of fire by removing the fuel from the fire path. Section 12 of the National Veld and Forest Fire Act *stipulates that every owner on whose land a veldfire may start or burn or from whose land it may spread must prepare and maintain a firebreak on his or her boundary between his or her land and any adjoining land.*

In terms of Section 13 of the Act *above a landowner is obliged to prepare and maintain a firebreak, with due regard to the weather, climate, terrain and vegetation.* The firebreak must:

1. *be wide enough and long enough to have a reasonable chance of preventing a veldfire from spreading to or from the neighbouring land,*
2. *not cause soil erosion, and must*
3. *be reasonably free of inflammable material capable of carrying a veldfire across it.*

In terms of Section 16 of the National Veld and Forest Fire Act the right or duty to prepare and maintain a firebreak prevails over any other prohibition in any other law on the cutting, disturbance, damage, destruction or removal of any plant or tree, except the owner must:

1. *where possible, transplant any plant which is protected in terms of any law; or*
2. *where it is safe and feasible, position the firebreak so as to avoid such plant or tree.*

A fire break is a means of access for personnel and equipment, to serve as a control line and to serve as a line from where a fire can be attacked from, for example by setting a backburn. The firebreaks are to be linked to access roads, thereby reducing the areas requiring preparation and increasing accessibility to the various sites.

9.2.1 Location

The provisions of the National Veld and Forest Fire Act that specify in Section 12(1) that a firebreak must be prepared on the boundary of the property. Preparation of firebreaks must be done annually between September and November. Firebreaks need to be well positioned and regularly

⁶ Schonegevel, 2001.

maintained to be effective. Specific considerations with respect to firebreak preparation and maintenance are:

Ecological considerations:

- Avoid known populations of rare and endangered plants.
- Align firebreaks to avoid sensitive habitats such as wetlands.
- Firebreaks should not be aligned along ridges which are favourable habitats of rare and endangered plants.
- The firebreak must not cause erosion.
- Extensive use of brush-cut breaks because the preparation of breaks by burning is a hazardous operation that has often been the source of wildfire.

Planning considerations:

- A decision as to what firebreaks to maintain in any particular year should be taken in the early autumn of each year.
- Information on the spatial distribution of fire hazard should be used in prioritising the preparation and maintenance of firebreaks.
- Maintain costs at a reasonable level without jeopardizing good veldfire management and protection.
- Placement of firebreaks on a slope must be determined by access to the break and by topography.

Design considerations:

- Advantage of preparing brush cut breaks is that unlike rotation of firebreaks of the past, a single break, typically 15 m wide, will be maintained in a permanent position.
- 15 m width for firebreaks should be used as a guide and in circumstances of high risk consideration should be given to creating wider firebreaks.
- Breaks should have significantly reduced fuel loads, and the height of vegetation within the break must be kept as low as possible.
- Waste material from firebreak preparation must be disposed of into the veld on the municipality's side of the firebreak.
- Use existing features of the landscape where possible, such as cliffs, sand dunes, tracks and roads as control lines.

9.2.2 Preparation and Maintenance

Locations where firebreaks are required vary. Individual circumstances will determine what type, width and length will be applicable. When constructing firebreaks it is important that all vegetation cover is removed and that only rocks and soil (minerals) are exposed. A fire can travel very slowly through the grass roots or decayed vegetation and great care must be taken to ensure that mineral earth is exposed throughout the length and width of the break.

The following factors must be taken into account with the construction of firebreaks.

- Access: The placement of firebreaks on a slope must be determined by access to the break.
- Slope: Slope is the steepness of the land and has the greatest influence on fire behaviour. The steepness of the slope affects both the rate and direction of the fire spread. Fires usually move faster uphill than downhill and the steeper the slope, the faster the fire will move. This is because:

- on the uphill side, the flames are closer to the fuel;
- the fuels become drier and ignite more quickly than if on the level ground;
- wind currents are normally uphill and this tends to push heat flames into new fuels;
- convected heat rises along the slope causes a draft which further increases the rate of spread; and
- burning embers and chunks of fuel may roll downhill into unburned fuels, increasing spread and starting new fires.
- **Aspect:** Aspect is the direction the land faces - north, south, east or west. The aspect of a slope influences a fire's behaviour in several ways:
 - southern aspects receive more direct heat from the sun, drying both the soil and the vegetation;
 - fuels are usually drier and less dense on southern slopes than fuels on northern slopes;
 - heating by the sun also causes earlier and stronger slope winds; and
 - on south-facing slopes, there will normally be higher temperatures, stronger winds, lower humidities, and lower fuel moistures.

These are all the conditions needed for quick starts and a rapid rate of fire spread.

- **Terrain:** *Terrain* or special land features may control wind flow in a relatively large area. Wind flows like water in a stream and will try to follow the path of least resistance. Ridges, trees, and rocks may alter wind flow and cause turbulence or eddies to form on the windward side of obstructions. Also, when wind flows through a restriction, such as a narrow canyon, it increases in strength. Wind movement can be critical in chutes or steep v-drainages. These terrain features create a chimney effect, causing a forced draft, as in a stove chimney. Fires in these chutes or drainages spread quickly and are dangerous.
- Elevation.
- Vegetation type.
- Moisture content.
- Size and shape of material.
- Volume and area covered.
- Fuel content (breaks alignment should avoid heavy fuel concentrations and be situated in areas with the lightest fuels possible).
- Wind direction (internal belts should as far as possible run parallel with the prevailing winds).
- Spotting distance.
- Firebreaks should be anchored, either to a natural barrier, road or another firebreak.
- Natural or existing barriers like roads, paths, streams, lakes, vleis, rivers, rock outcrops, or any other break in fuel should be utilise as far as possible.

There are four methods of preparing a firebreak and proper consideration should be given to each before commencing the preparation of a firebreak.

1. **Manual:** Preparing a firebreak manually involves the utilisation of a team of workers working in a planned manner using manual tools.
2. **Burning:** After deciding where the belt is to go, an adequate tracer is cut around the entire belt, and then the belt itself is burnt. This is the most common form of preparing a firebreak.

3. Ploughing/brushcutting: Ploughing/brushcutting with a tractor is a common method of constructing breaks where the vegetation is low or has been previously removed. The positive thing with brushcutting is that the roots are not destroyed and this will assist in reducing erosion on these breaks. Bushcut material should be removed two months after cutting, and mulched at a organic dump.
4. Application of herbicide: With this method herbicide is used to kill off all the plant growth in the firebreak. The indiscriminate use of herbicides can cause long-term environmental damage.

9.2.3 Stellenbosch Municipality Firebreaks

Stellenbosch Municipality maintain a system of firebreaks in accordance with the provisions of the Veld and Forest Fire Act. The current positions of the firebreak network in and around municipal property are depicted in the figures below. These firebreaks are maintained as of October 2017.

Properties at risk are Culcattabos, Wemmershoek and Purgatory that has no firebreaks currently in place.

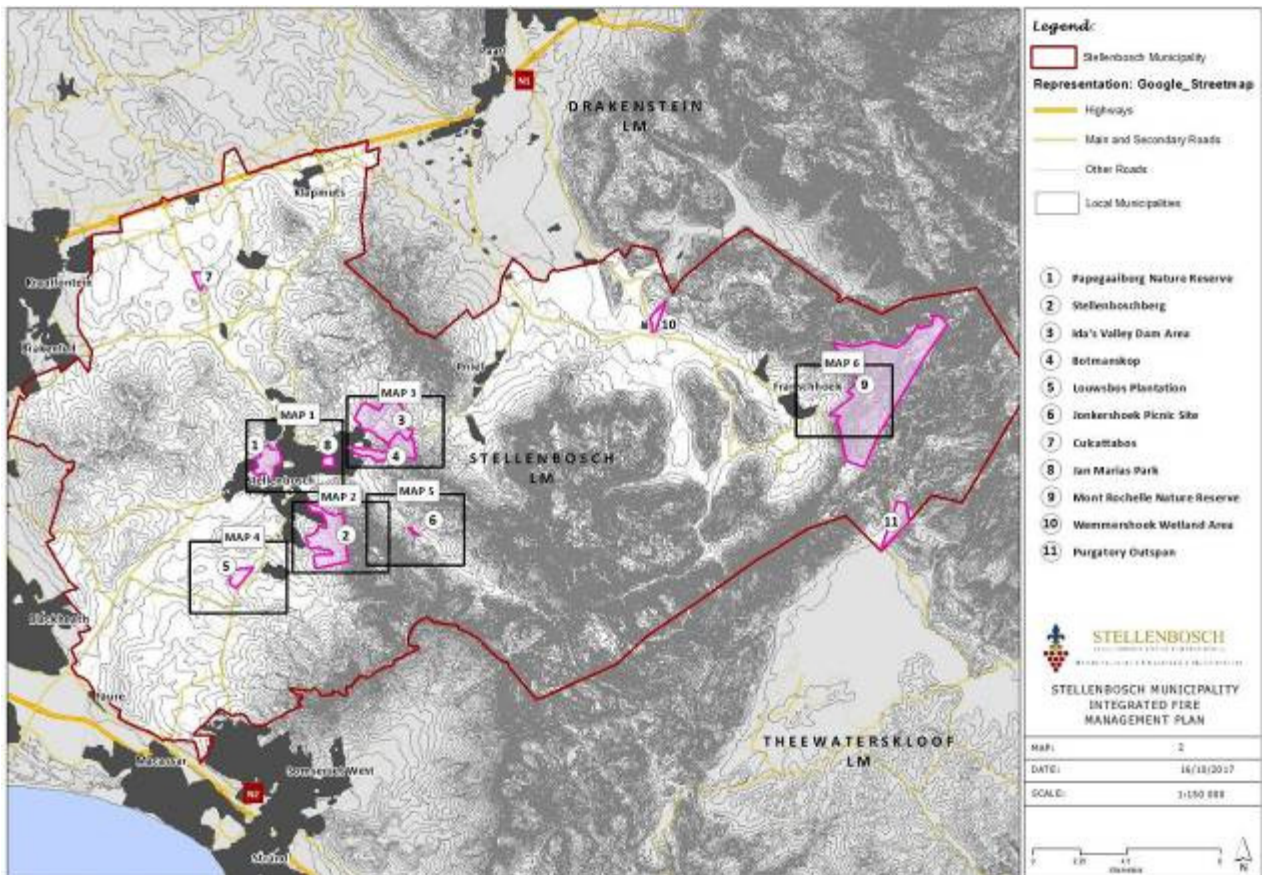


Figure 11: Firebreaks in and around Stellenbosch Municipal property.



Figure 12: Firebreaks – Jan Marais Park / Papegaaiberg.



Figure 13: Firebreaks – Paradyskloof / Brandwag.

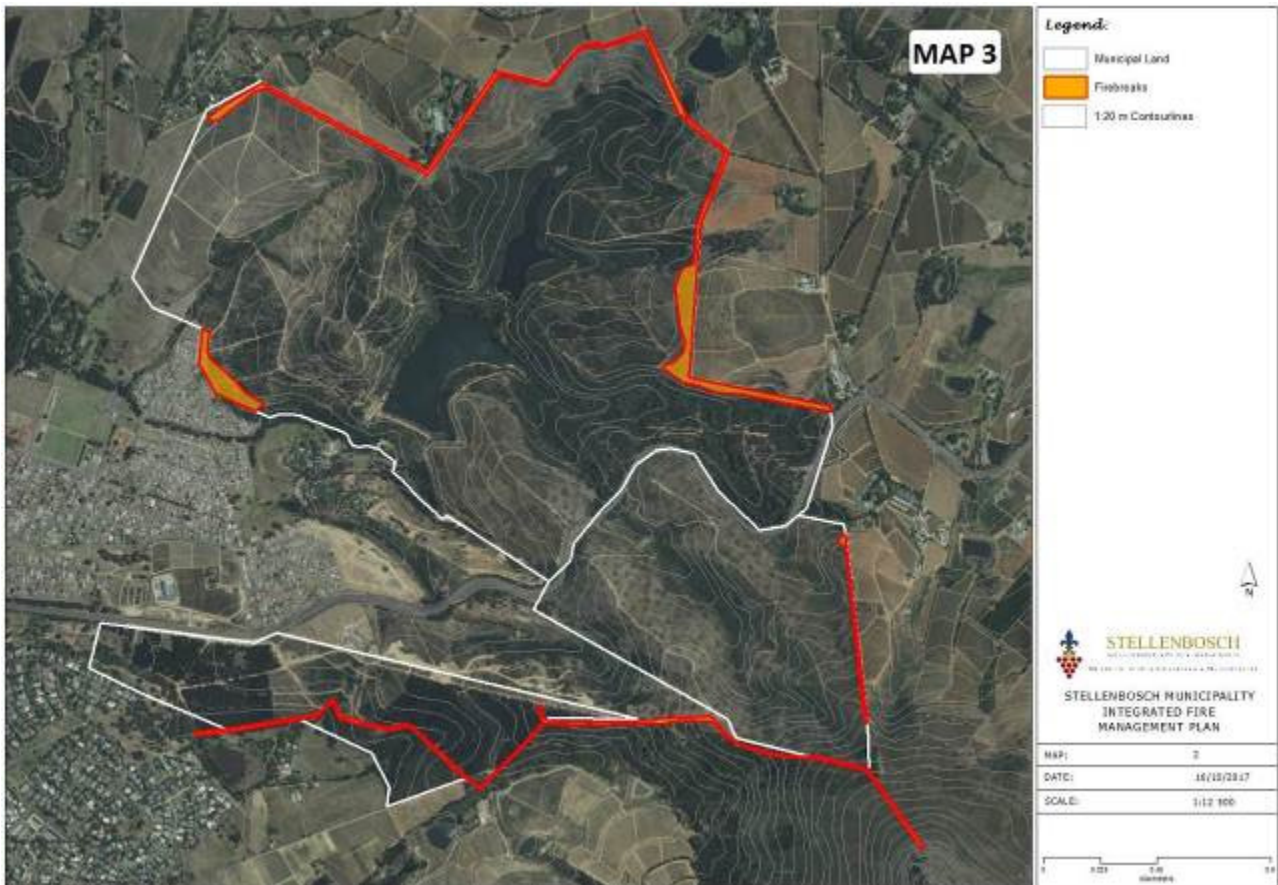


Figure 14: Firebreaks – Idas Valley Dam / Botmaskop.

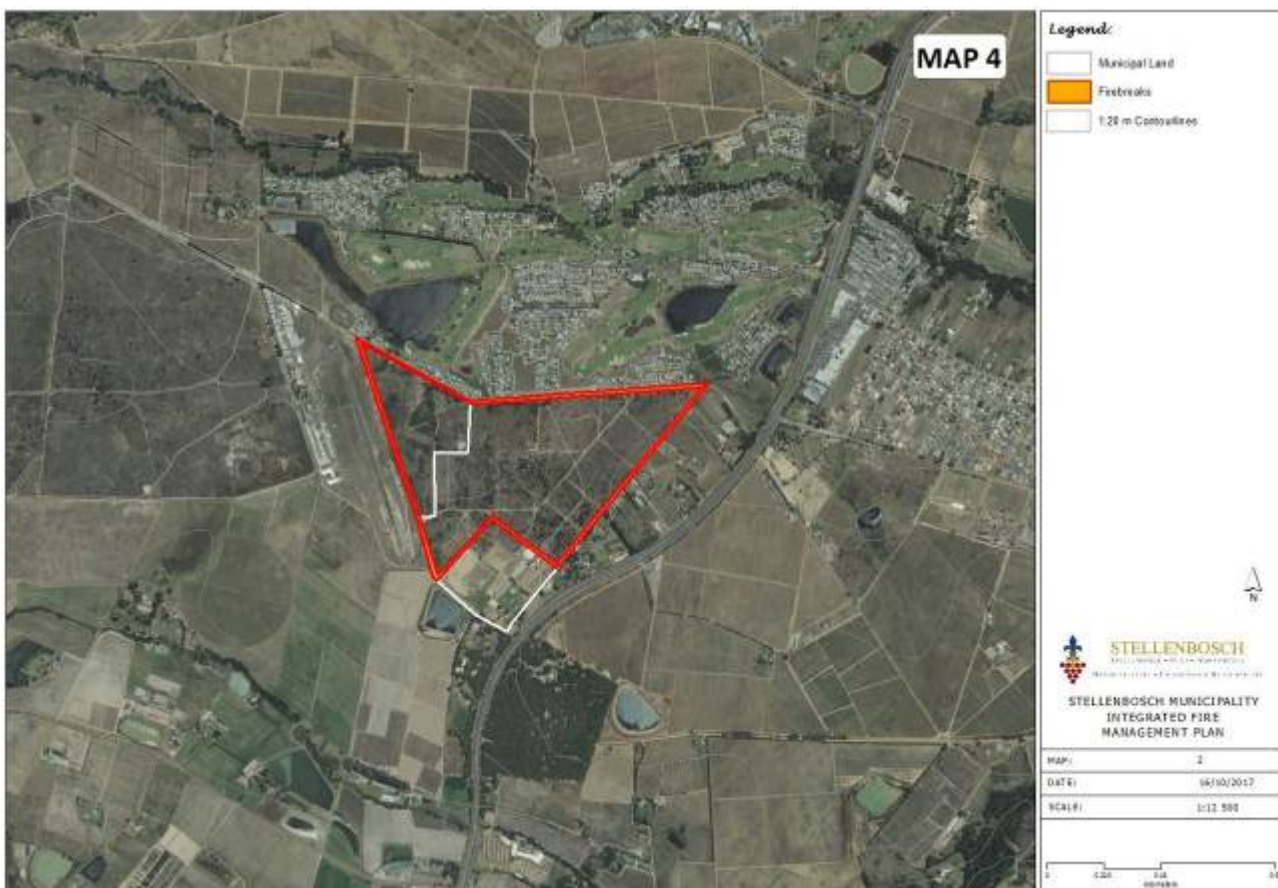


Figure 15: Firebreaks – Louw's Bos.

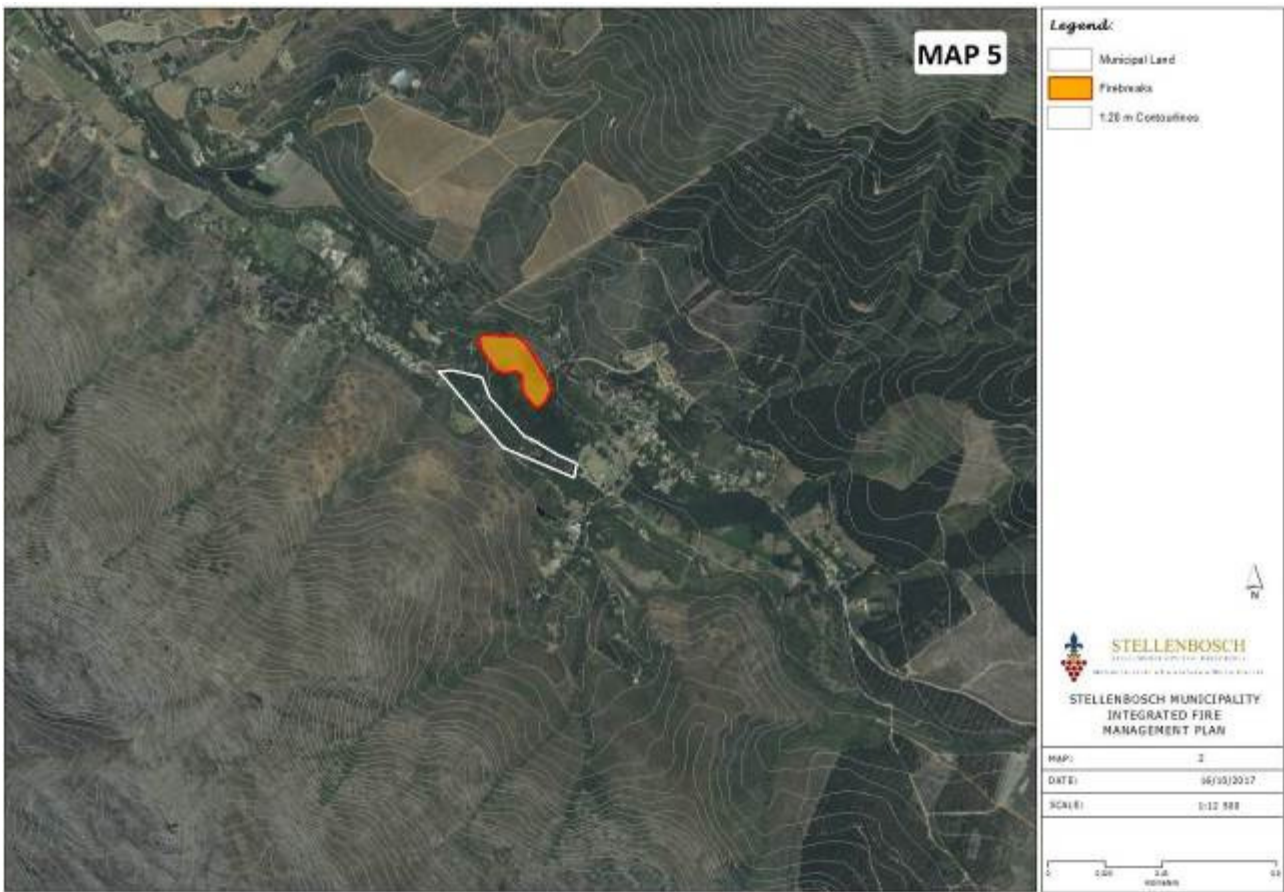


Figure 16: Firebreaks – Jonkershoek Picnic Area.

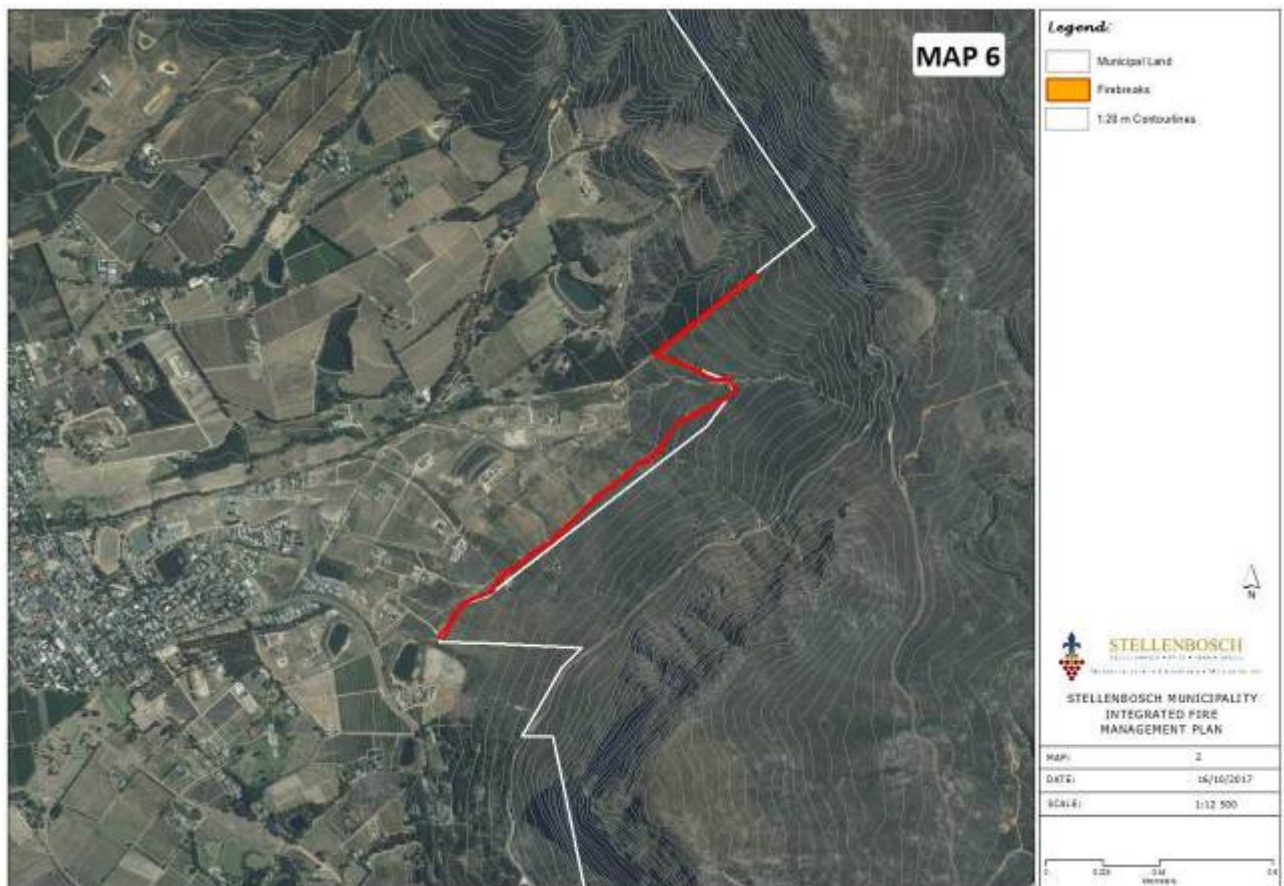


Figure 17: Firebreaks – Mont Rochelle.

10 ACCESS MAINTENANCE

Roads must be inspected regularly to:

- Remove obstacles such as fallen trees.
- Make sure roads can accommodate fire tenders.
- Key locks on access gates alike and ensure that vehicles carry tools (e.g. bolt cutters and saws).

11 MANAGEMENT ACTIONS

Table 6: Prevention & Preparedness – Management Actions.

Action	Responsible Department	Timeframe
Renew the Municipality's membership to the FPA	Nature Conservation	Annually
Maintain fire fighting equipment in good working condition and in accordance with SANS 10090 standards.	Fire Department Nature Conservation	Immediate & ongoing
Control and remove invasive alien vegetation from municipal land.	Nature Conservation	Immediate
Maintain firebreaks around municipal land.	Nature Conservation	Sep-Nov annually
Maintain firebreaks around areas of high risk as identified in the Disaster Management Plan.	Nature Conservation	Sep-Nov annually
Maintain access roads to nature areas / municipal land.	Nature Conservation	Immediate & ongoing
Manage and maintain fire fighting equipment according to SANS 10090 standards.	Fire Department Nature Conservation	Immediate & ongoing
Training to be provided for all personnel required to respond to fire.	Fire Department Nature Conservation	Annually

SECTION C: RESPONSE**SECTION SYNOPSIS**

This section describes the response to fires within Stellenbosch Municipality as well as the actions following such an incident.

All fires start small, thus, detection at the earliest possible stage is critical and is therefore also regarded as being as important a part of preparedness as it is for ensuring an appropriate response.

12 FIRE DETECTION

The Fire Department will have to rely on its staff members and the public for fire detection. Emergency telephone numbers must be boldly displayed in strategic positions across the Municipality.

13 FIRE SUPPRESSION**13.1 FIRE FIGHTING SAFETY RULES**

Along with fire prevention the safety of all personnel during fire fighting operations is the most important component of fire management. The most important rules in this regard are the following:

- Keep informed of fire weather conditions and forecasts
- Know what your veldfire is doing at all times
- Base all actions on the current and expected veldfire behaviour
- Plan and make known escape routes for everyone on the ground and in the air
- Post a lookout for danger and safety aspects
- Be alert, keep calm, think clearly, make clear decisions and act decisively
- Maintain prompt communications with the Fire Boss, Sector Bosses, crew leaders and fire fighters under your control
- Give clear instructions and have them repeated to ensure that they are understood
- Maintain control of your men and fire fighting operations
- Fight fires aggressively but put the safety of fire fighters first

13.2 COMMAND STRUCTURE

Regardless of the size of the veldfire, certain basic management actions are required to establish rapid and efficient control, and minimise risk, damage and costs. To meet this requirement, it is essential to set up positive and clear lines of authority quickly, and launch a dependable and rapid response to instructions.

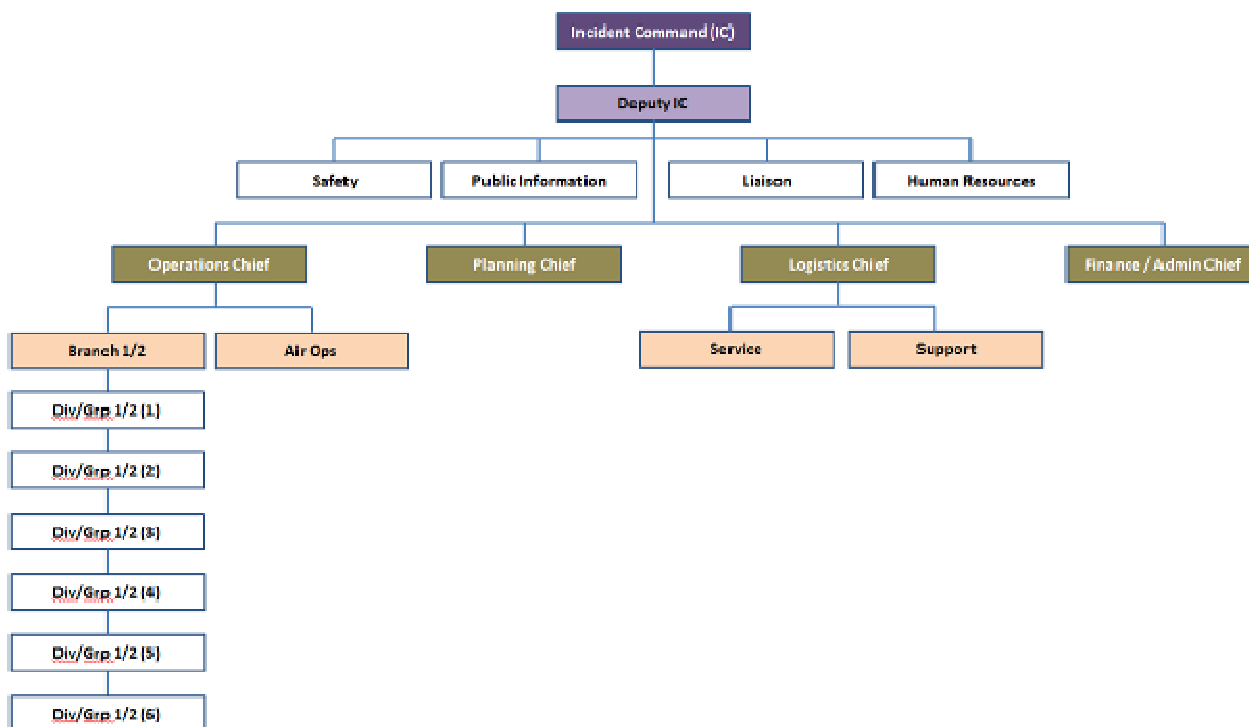


Figure 18: Basic command structure for fire suppression.

Table 7: Roles and responsibilities of the various personnel in the command structure

Position	Responsibility
Incident Commander	Assumes overall control of a fire
Fire Boss	In control of fire fighters equipment within a specific sector or flank of a veldfire. In the case of small veldfires it could be the Crew Leader at initial response, but who would be replaced if a veldfire increased in size or severity.
Crew Leader	In control of a fire control crew that could consist of a team of beaters, a tanker crew or a mopping-up crew. The Crew Leader serves as supervisor on the actual fire line, and is responsible for suppression of the veldfire on a particular line.
Logistics Section Chief	Generally positioned on larger veldfires, the Logistics Officer is Responsible for ensuring that the supply of equipment and other resources (including rations) arrive on site, on time.
Planning Section Chief	Uses weather, terrain, veld age and other parameters to develop plans of attack; propose future control lines, and estimate potential veldfire size.
Operations Section Chief	Responsible for all suppression activities at a large fire and reports to the Incident Commander.
Air Attack Boss	Responsible for the tactical operations of all aircraft assigned to a veldfire including their logistical support.

13.3 PROCEDURES TO BE UNDERTAKEN IN THE EVENT OF A FIRE

The following procedures has to be undertaken in the event of a fire:

- a. The person who has discovered the fire must immediately report the fire to the Fire Department.
- b. The following information must be transferred to the relevant authority.
 - Name of the caller

- Location of the fire
 - Type of fire
 - Seriousness of fire
 - Injuries or casualties
- c. Raise the fire alarm by activating the fire alarm siren. If the fire is during the day, the telephone operator must notify key personnel.
- d. Rapid deployment of fire fighting resources within the structure of pre-planned Emergency Procedures.
- e. Shut off all air and power (fuel supplies).
- f. Depending on where the fire is, evacuate building or premise immediately.
- g. Emergency medical resources should be placed on standby.

14 VELDFIRE BEHAVIOUR

Personnel must exercise extreme caution when:

- working downwind of a veldfire
- working up-slope of a veldfire
- fighting a veldfire on a slope
- working near heavy fuels, or where there is un-burnt fuel between you and the veldfire
- terrain or vegetation impedes travel

The behaviour of a veldfire is governed by fuel, topography and weather. Small variations in any of these factors can lead to significant changes in veldfire behaviour.

14.1 FUELS

Knowledge of fuels is fundamental to understanding veldfire behaviour. The important elements are:

- Fuel type (e.g. grasslands, fynbos, plantations)
- Fuel quantity – Increases in the amount of fuel influences:
 - Rate of spread
 - Rate of energy release
 - Flame lengths
- Fuel moisture content – The moisture content of fuels affects:
 - Ease of combustion
 - Combustion rates
 - Rate of spread
 - Radiation efficiency of flames
 - Probability of spotting

14.2 WEATHER

Weather factors that have a major influence on veldfire behaviour include temperature, relative humidity, wind speed and wind direction. Weather and veldfire behaviour in general:

- Strong and gusty, hot, dry winds generally precede a cold front. Such conditions favour the spread of veldfires.
- Under unstable atmospheric conditions:
 - Veldfires will develop strong convection columns

- Longer spotting distances may occur
- Winds tend to be gusty which make veldfire behaviour erratic
- Thunderstorms may develop and the resultant lightning could start more veldfires

14.3 PREDICTION

The ability to predict veldfire behaviour is vital in the planning of wildfire suppression, and the application of prescribed burning.

Veldfire behaviour (in general):

- Spread faster uphill than downhill
- Spread with the wind rather than against it
- Spread faster where the vegetation contains quantities of dead plant material
- Spread faster in fine fuels
- Spread faster where the vegetation canopy is intertwined
- Doubling the fuel load will double the rate of spread, resulting in the intensity of the veldfire increasing fourfold.
- Halving the fuel load will decrease the rate of spread fourfold.

15 POST FIRE RECOVERY

15.1 CHECKLIST FOR ACTIONS TO BE TAKEN IMMEDIATELY AFTER VELD FIRES

There are a number of procedures that need to be adhered to after a prescribed or wildfire has been extinguished. The following procedures should take place as quickly as possible after the end of a fire:

- After a fire has been brought under control, patrolling and inspections should continue until the Fire Boss is satisfied that the fire has been extinguished. Veldfires are only really considered to be “under control” once they are extinguished.
- The extent of a veldfire should be mapped and a Fire Report completed.
- During the patrolling phase, hazardous situations where a fire could most likely reignite should be identified.
- The frequency of patrolling the perimeter should be decided by the Fire Boss, and could decrease over time. Weather forecasts should be obtained and carefully studied.
- Once a fire has been extinguished, all equipment should be returned to the correct storage facilities and inspected.
- All infrastructure within the perimeter of the fire should be inspected for damage and reported/repaired if necessary.
- Restrict public access to the recently burnt areas if dangerous or ecologically sensitive.

15.2 CHECKLIST FOR ACTIONS THREE MONTHS AFTER VELDFIRES

- The secondary effects of removal of vegetation by intense fires can pose a danger to people, infrastructure and vegetation situated down slope, and include:
 - increased danger of rock and mudslides
 - blocked storm water drains
 - loose sand on roads, and
 - increased erosion

- The burnt area should be inspected and assessed in terms of these effects and contingency plans made to deal with these issues, if necessary.
- After all major fires a formal debriefing should be held involving all relevant agencies. At this debriefing, the cause of the fire should be identified and the discussion should focus on the cooperation of all relevant agencies in the extinguishing of the fire.
- Post-fire issues need to be addressed through checking and corrective action, and through a management review. This regular review will ensure that the management plan remains relevant and appropriate to changing conditions and experience.

Wildfires are often a source of opportunity, the fire managers need to be aware of the following:

- The occurrence of a wildfire often stimulates the flowering of geophytes and represents a significant opportunity to raise awareness amongst the public of the role and importance of fire in the ecology of the area.
- Wildfires could result in the removal of large stands of dense alien plants, but equally this could stimulate mass germination of a large number of seedlings.
- Many plant species flower only within the first year or two after a veldfire. These post-fire blooms represent rare opportunities to expand knowledge on the occurrence and distribution of such plant species.
- The occurrence of veldfires also offers the opportunity for initiating research investigations to increase the understanding of the role of veldfires in the dynamics and conservation of the area's ecosystem.

15.3 VELDFIRE REPORTING

It is essential that during any fire, an accurate chronological record of the fire, weather and actions be maintained. This will ensure that the Municipality has a record of the deployment of the resources, it facilitates debriefing and can be of major importance in the event of legal action after a fire.

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