

FRANSCHHOEK CABLEWAY

CONSTRAINTS ANALYSIS

NOVEMBER 2022



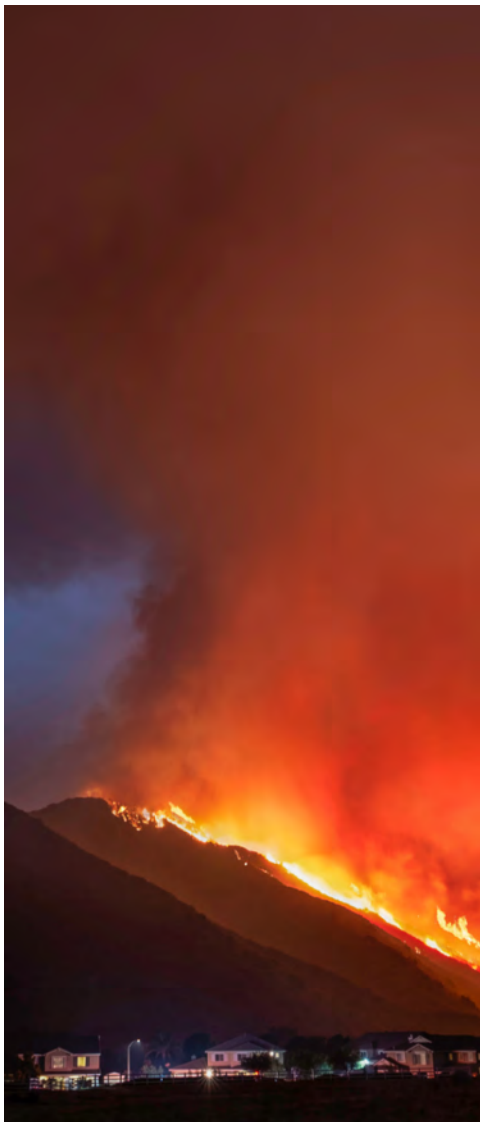
Introduction

Project Description

The project involves the design and statutory approvals of an aerial cableway in Franschhoek. Included but not limited to lower base station; top station; additional facilities and parking as required.

Limitations

No specific information was provided regarding the cableway cars, stations, building materials, parking areas or additional facilities. In addition, no construction plans, or operational plans were provided.



Analysis and Report Process

With a broad project description and the stated limitations, this report will focus on general risk considerations for the upper and lower cable station sites. In order to assess the wildfire risks and understand the local environment Vulcan Wildfire Management took the following steps:

1. Desktop analysis of the general area, as well as the two planned cable station sites. The bottom cable station on Erf 1466 (Haute Cabriere) and the top cable station, located on the mountain on the Remainder of Erf 23, within the Mont Rochelle Nature Reserve (Stellenbosch Municipality).
2. On Thursday 09 June, 10:00, at the Franschhoek Council Chambers, Vulcan Wildfire Management scheduled and held a meeting with key wildfire stakeholders to discuss the planned aerial cableway in Franschhoek.
3. On Thursday 09 June two Vulcan Wildfire Management consultants assessed the planned lower cableway site - 33.913434°, 19.136283° at Haute Cabriere and the planned upper site located on the Middagkransberg mountain, at 33.917124°, 19.146178°. This involved hiking off path to the proposed upper cable station site.
4. Information gathered in steps 1-3 was then compiled into this report.
5. A meeting between stakeholders of the Franschhoek Cable Car Company and Vulcan Wildfire Management was held on 09 November 2022, 11:00, to discuss the report findings and share more current project information. It was agreed to title this report as a Constraints Analysis. A few amendments to content were agreed on and the report finalised.



Report

The report is structured to build knowledge as you progress through sections.



Recommendations

Wherever there is a challenge or risk, recommendations are provided.



Wildfire Risk

Assess
Understand
Act

Contents

Page

Introduction	01
<u>Section A: Wildfire Analysis</u>	03
1. Wildfire Behaviour Analysis. Fuels (vegetation), topography, and weather.	04
1.1 Fuels (Vegetation)	04
1.2 Topography	11
1.3 Weather	22
2. Wildfire Scenarios for Consideration. How wildfires might impact the area.	29
3. General Analysis. Consideration of factors to consider in wildfire preparedness and response.	33
<u>Section B: Risk Analysis and Recommendations</u>	44
4. Wildfire Stakeholder Considerations	45
5. Wildfire Risk Analysis Table	48
6. Construction and Operations Risk to Life & Structures. Recommendations.	51
7. Impact Assessment Tables	61
Conclusion	66
Appendixes	67



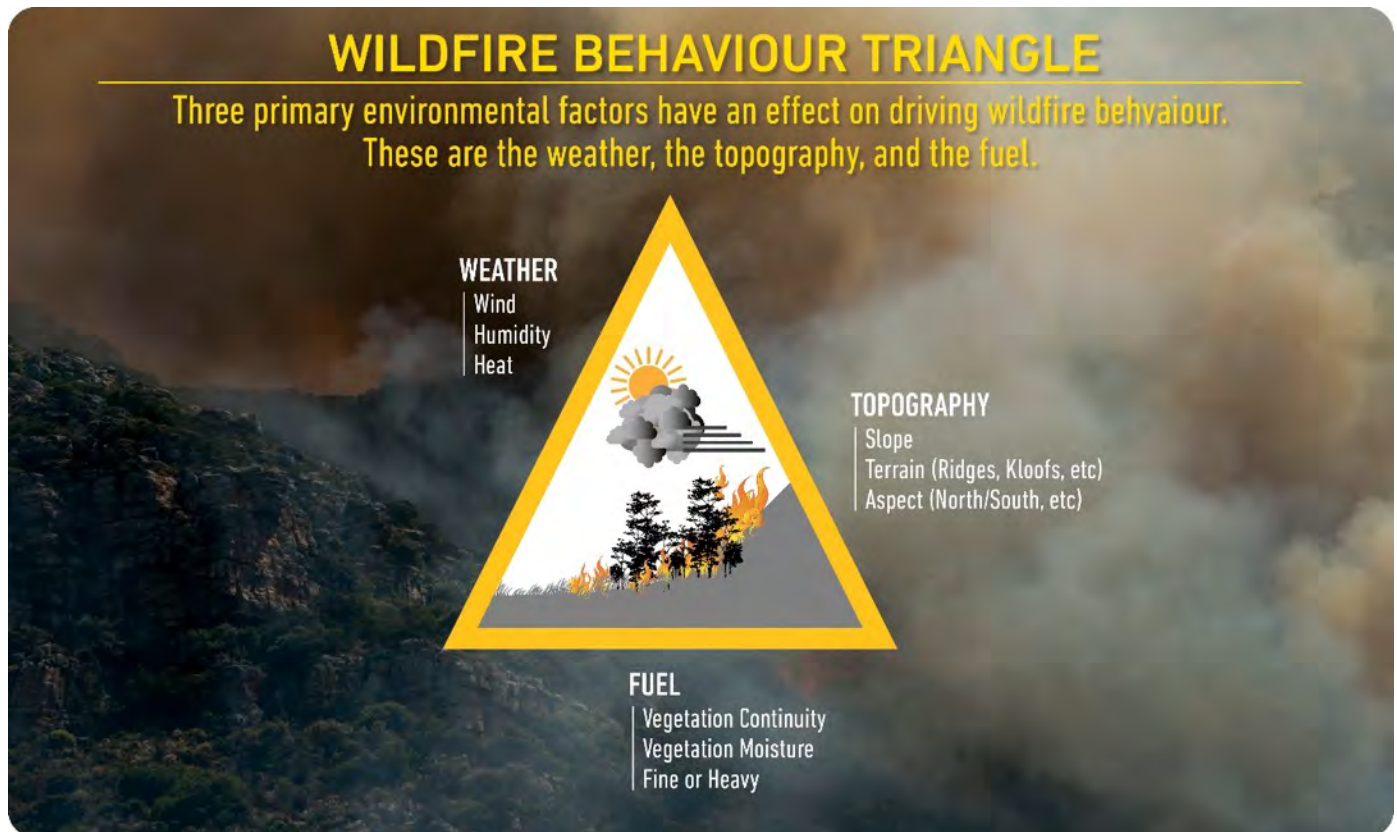
Section A: Wildfire Analysis

To discuss the wildfire environment in which the proposed cableways would be built and operated there are three main factors that need to be considered. These factors have a combined influence on wildfire behaviour, and they include:

1.1 Fuels

1.2 Topography

1.3 Weather



For this analysis, we will cover the key points within each factor and highlight their relevance to wildfire behaviour or risk. Together, all these factors combine to form a wildfire risk profile for the area and influence life safety and threat to property, infrastructure, assets, and business. We therefore spend time going into detail to explain these different factors.

In chapter 2 we will talk about how these factors could play out in likely wildfire scenarios which need to be considered, and then in Section B we relate these factors to profile risk.

Note: We have made use of visuals and graphics to illustrate and describe concepts in this section. Due to the nature of these elements, it is not possible to give exact scenarios or illustrate with 100% accuracy as these elements are extremely dynamic and influenced by so many variables. The concepts however allow for consideration of principles which apply to fuel, weather, topography and how they influence wildfire behaviour.

1. Wildfire Behaviour Analysis. Fuels (vegetation), topography, and weather.



1.1 Fuels (Vegetation)

The following terms will be referenced with regards to fuels (vegetation). After the terms are introduced, they are discussed alongside photographs of the proposed upper and lower cable station areas.

Types of Fuels

Heavy Fuels: A broad category referring to slower burning fuels. Examples include thick logs or tree trunks. They take more energy (heat) to ignite compared to light fuels, but they take more effort to extinguish once they are burning. Heavy fuels may burn slower in comparison to light fuels, but they burn with significantly more intensity (heat). They also retain a lot of heat for long periods of time compared to lighter fuels. This may create conditions which make them very hard to control or extinguish until they have mostly burned themselves out.

Light (or Fine) Fuels: A broad category referring to fast burning fuels. Examples include grasses, twigs, and dry pine needles that will ignite very easily. Light fuels are also referred to as tinder. Light fuels take less effort to extinguish once they are burning compared to heavier fuels. The burned area of light fuels will retain less residual heat compared to heavier fuels because most of the fine fuels are consumed in a fire, leaving only ash behind.

Ground Fuels: Situated under the earth (ground). Examples include deep layers of dead leaves, roots, and rotten buried logs, or peat materials (especially found in pine plantations). Burn with low intensity and may become problematic as they carry fire underneath fire breaks and control lines and may smoulder for months.

Surface Fuels: Situated from ground up to about two metres in height. Examples include grass, forest litter, and brush. The fuels where fires usually start. When they exist underneath trees, they are responsible for allowing fires to spread to aerial fuels.

Ladder Fuels: A continuous layering (ladder) of fuels that allows fires to burn from surface to aerial fuels such as branches of trees and tall bushes. Ladder fuels include surface fuels comprised of grasses, bushes, slash, large shrubs, tree bark, fallen dead branches.

Aerial Fuels: These are situated in the overhead canopy of branches and leaves of trees that are two meters or more above ground. Wildfires in aerial fuels are known as crown fires. Crown fires can move extremely quickly and should be considered to be very dangerous. Once the fire is in the crown it can move faster than a ground and surface fire. This is especially true in strong wind conditions where there is a superior supply of air (and therefore oxygen) at the top of the trees. These are known as independent crown fires.

Embers / Firebrands: Spot fires (new fires started by embers) occur when embers, which are burning bits of vegetation (fuel), are carried by winds or by the convectional heat column out of the area of fire and into unburned fuels. The number of embers that can be lifted out of an area of fire can range from a handful up to tens of thousands or millions, dependant on what fuel is burning and what the wind and atmospheric conditions are like. Spot fires are a major hazard when fires reach the Wildland Urban Interface (WUI) as the embers can cause spot fire ignitions deep into the urban area including homes (which are also considered fuel).

Properties or Characteristics of Fuels

Compact Fuels: Fuels that are compact have very little spacing between fuel particles. Closely packed fuel particles expose less surface area to flames and oxygen which are necessary to support combustion. Fires consuming compact fuels spread more slowly than fires in loosely packed fuels.

Loaded Fuels: An area loaded with fuels will cause more combustion to take place. Loading can be measured as the dry weight of the fuel in a given area.

Arrangement of Fuels: The distribution of fuels affects how the fire will spread. Horizontal continuity refers to the horizontal distribution of the fuel (e.g., continuous, patchy, or loose arrangements). A continuous supply of fuel will enable a fire to spread more easily as each collection or item of fuel provides a link from one to the other. Vertical continuity refers to the distribution of fuels from ground, through surface to aerial fuels.

Size and Shape: The size and shape of fuels will impact the surface-area-to-volume ratio. Fuels with high surface-area-to-volume ratios dry and burn more easily than those with low ratios. The size and shape of firebrands, or embers, are also important considerations in predicting the severity of spotting.

Chemical Content: Flammable chemicals within the fuel will cause it to burn more fiercely (e.g., plant resins that are flammable). Fynbos, Renosterveld, and Eucalyptus are examples of fuels with a high chemical content.

Moisture Content: The amount of moisture present in the fuel plays a major role in determining the ignitability and the rate of spread. As vegetation (fuel) dries out, it becomes more readily ignitable and will burn with greater intensity. Green vegetation, or vegetation having high moisture content is more difficult to ignite and will burn more slowly due to the moisture within the vegetation requiring more heat to evaporate the moisture.

Environmental Factors: These will influence the fuel moisture and these need to be considered as well. The environmental factors are:

Indirect Influences:

- Time of Day,
- Cloud Cover,
- Fuel Canopy,
- Aspect,
- Slope,
- Elevation,
- Shade Cover

Direct Influences:

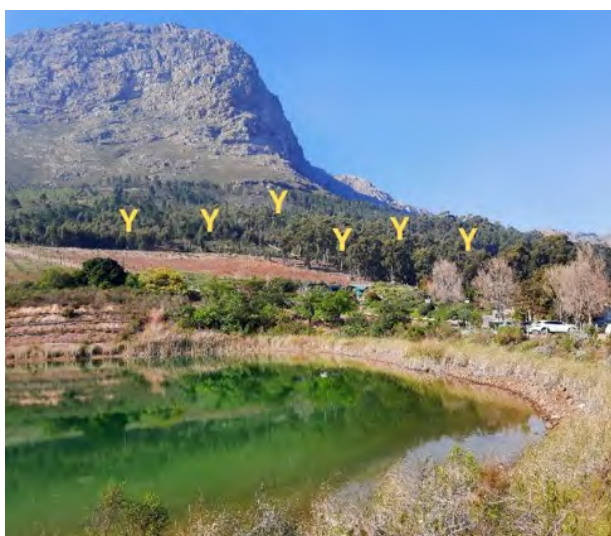
- Wind,
- Temperature,
- Relative Humidity,
- Precipitation

Fuel Analysis for the Proposed Cableway



1.1.1

X and Y in the image show areas of heavy fuel mixed with lighter fuels. This is due to invasive alien species such as pine and eucalyptus. Area Y has greater surface and aerial fuel loading, and continuity of fuels compared to X. The fuel loading of both these areas when compared to the mountain slope above, (which has primarily fynbos, light fuels), will burn with more intensity. These heavier fuels have characteristics which will result in embers with the ability to cause spot fires. This abundance of fuel (vegetation), in close proximity to the proposed lower cable station will be problematic as it will cause large amounts of heat, smoke and be difficult to suppress once it starts burning. The fuel risk profile of the area would be lowered if these heavier, invasive fuels, were removed.



1.1.2

Area Y has large Eucalyptus, Pines, and aerial fuels. There is also a large amount of ground and surface fuel in this area. This provides fuel conditions conducive to extreme fire behaviour on high fire danger days where temperatures, wind speeds and relative humidity can create conditions for high energy wildfires.

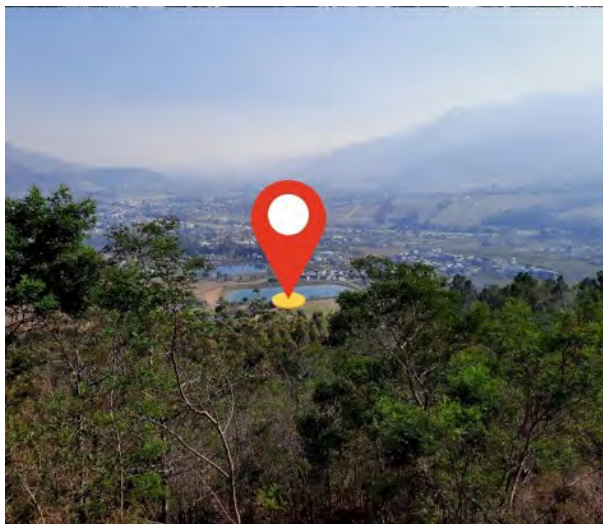
Whilst the vineyards and roads provide somewhat of a defensible space for the Haute Cabriere facilities and potential lower cable station, a wildfire in this area would require the shutdown of cable car operations due to heat and smoke risks.



1.1.3

In 1.1.1 and 1.1.2 we have discussed the continuous fuels and high fuel loading in the immediate area of the proposed lower station, however there are sufficient fuels for a wildfire to burn up the mountain to the proposed upper cable station.

The mountain slopes above the pass road have light, fynbos fuels. These lighter fuels will readily catch fire from embers. (Noting that the fuels below the road have high potential to produce embers). Despite the rocky appearance and less fuel continuity as you go higher up this slope, there is sufficient fuel for wildfires to burn under the entire cableway.



1.1.4

This image shows the high fuel loading in the foreground, and the graphic of the pin shows the approximate location of the lower cable station. Currently the fuels (vegetation) underneath the proposed cableway lines as well as in the immediate surrounds create a higher risk and complex wildfire environment. Wildfires will burn with high intensity, produce a lot of heat and smoke, and prove difficult for fire services to control the wildfire, especially when weather is not favourable. If this area was returned to a state of indigenous fuels, it would lower the risk considerably. It would not eliminate the wildfire risk as fynbos has a high chemical content and is a fire driven ecosystem, but wildfires would generally become more manageable.



1.1.5

There is an abundance of ground, surface (and ladder fuels) which lead into aerial fuels (in areas where larger trees are present).

This fuel loading, arrangement, position on steep slope, exposure to high amounts of heat (Northwest aspect), chemical content, size and shape, would need to be considered as part of a vegetation management strategy which would look at removing these fuels and allowing only indigenous fynbos to grow.

In addition, fuel buffer zones (areas where fuel is reduced) would need to be considered.



1.1.6

This photograph shows the large pine trees growing along the Franschhoek Pass Road in the general area of the lower cable station.

Pines, (along with Eucalyptus, also found in the area), have a high chemical content (oils) which burn in wildfires with high intensity. If either of these types of trees burn, they can cause a high rate of spread (wildfire spread) because of new spot fires from their embers.

The road, which is mid to lower slope has these fuels dispersed along it. Fire services would struggle to hold a fire burning below the road from jumping over the road.



1.1.7

The arrows indicate examples of areas of the mountain slope where there is fynbos (light fuels) growing. When viewed from the top, it is more evident how much fuel there is compared to the view of the rocky face from below.

Although the fuel is patchy (less continuity than compared to lower slopes), the very steep slope will result in convective and radiant heat rising up the slope and wildfire spreading along with it.

There is therefore the possibility for fire (heat and smoke) to burn underneath and in the general area of the entire cableway.



1.1.8

The accumulative heat from the heavy fuels below (X&Y), and from the light vegetation (as shown by arrows) will result in a concentration of heat and smoke rising up the slope. This heat is carried by the wind, and convective column of a wildfire.

Smoke and heat impacting the upper cable station structure could be mitigated to a small degree only, by having fuel buffer zones and wildfire intelligent design. Of more significant concern would be smoke and heat exposure to all persons located at the upper station and surrounds and anyone in a cable car when close to ground at the lower cable station or approaching the upper station. This would present a risk to life if people were present and evacuation planning would need to consider this.



1.1.9

This Google Earth view shows an overall view of the north-western slope of the mountain and the potential line between the upper and lower station.

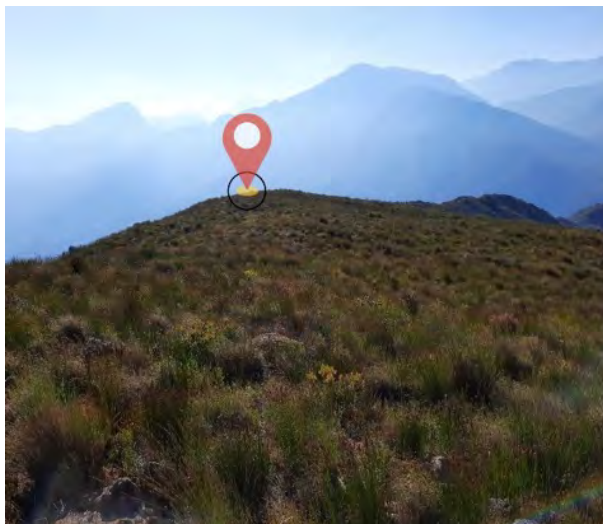
A strategy to lower the risk of fuels (vegetation) around, underneath, and in the general area of the cableway is required.



1.1.10

An overhead view showing the fuel environment surrounding the cableway.

Wildfires can cover large geographic areas in short spaces of time. There is a great risk of this occurring with the mix of fuel types and characteristics that have been mentioned.



1.1.11

The previous images and analysis have focused on the fuels around the proposed lower station, and slope beneath the cable lines. The next series of images look at the upper station and the south-eastern slopes.

The ridge line and south-eastern slopes have indigenous, light fuels. They are currently in a growth stage (approximately 3 years) and will have higher moisture levels and less fuel volume as a surface fuel at this age. As they get older, their fuel loading will increase and with a greater abundance of fuels, fire risk will increase as the fynbos ages and also dries out more.



1.1.12

A – This is an older patch of fynbos in an area below the road within 1.5km of the upper station. You can see a higher fuel loading area, with a mix of light and slightly heavier fuels and this shows the potential for fuel loading of the area in future (when the current fynbos grows to this age).

B – As the region has experienced major wildfires in recent years the greater area has younger fynbos (smaller pioneer plants and grasses). This fynbos, wildfire risk, will rise as the vegetation ages.

C- In the foreground you can see the light fuels with a lot of grass and young plants.



1.1.13

The proposed upper cable station site is located on the western side of ridgeline. The area is rocky, and fuels are patchy. Further fuel reduction around any structure would be advised to protect the building further.

Analysis of fuel pathways would need to be carefully considered once building plans are finalised and if approvals were granted. A detailed fuel management plan around any structure would critical. Building with fire resistant materials would also be essential.



1.1.14

This site location is the most optimal (for structures) in terms of fuel, slope, and protection from wildfires from both the eastern and western side. **Eastern wildfires:** Being on the back side of the ridge, wildfire intensity would have dropped off compared to the eastern slope or ridge. **Western wildfires:** The fuel continuity is less, so there is less direct exposure for the structure.

However, if you analyse this area, fuels (combined with topography and weather to be discussed next), still pose a threat to damage and loss of structures as well as pose more of a risk to human life. This has implications for construction workers, staff and visitors should the project go ahead.



1.1.15

This is a wilderness area and there is no way to eliminate the wildfire risk. The eastern slopes, as can be seen in this image are predominantly indigenous fuels. They typically have a high chemical content, so although they appear green, they ignite and burn easily.

They form part of an ecosystem that relies of wildfire to propagate its seeds and as it ages, it's preparing a fuel pathway which encourages wildfires. Although fynbos is mostly considered light fuels and have less fire intensity potential compared to heavy fuels, their threat to the cableway is more severe when you start to consider how they will burn when weather and topography factors are considered.
(This will be discussed further next).

1.2 Topography

In the wildfire environment topography plays an integral part in determining how a fire will develop and spread across a landscape. Topography can be described as the configuration of the Earth's surface, including its relief (the variations in the elevation of the ground surface) and position of natural and man-made features (such as buildings), arranged across the landscape.

Topography can be broken up into two primary categories: these being topographic features and topographic characteristics.

Topographic Features

Narrow Valleys: These will often appear perpendicular to a ridge line of a hill or mountain. The impact that a narrow valley will have on a wildfire and fire burning into it is directly linked to the way air will move vertically through the valley. Narrow valleys are also susceptible to the spread of fire from one side of the valley to another through spotting or radiant heat raising the temperature of the fuels and bringing them to a pyrolysis and combustion point.

Wide Valleys: The likelihood of spotting (new fires from embers) or radiant heat resulting in fire spread to opposite slopes in a wide valley is lower compared to narrow valleys. The exception to this is in high winds and also dependent on the fuel type. (Wind direction might push the fire from one side to the other). The principles of air flow and therefore fire spread that apply in a narrow valley will still apply, although the impact of many of these effects will be drastically reduced and may even be insignificant. Wide valleys may also be more prone to prevailing winds and the effect the wind has when it swirls over ridge lines into the valley.

Box Valleys: These are determined by their shape and not their size, as a box valley can exist as a relatively small area of landscape or a much larger one. The smaller a box valley is, the more intense the effect of the topography will be on the weather and wind. Box valleys are essentially a steep-sided valley that is enclosed on all or three of the sides. The effect of the 'box' on fire behaviour is that fire moving into a box valley will likely be drawn further along and up as the winds are drawn up and over the ridge lines. A fire burning within a box valley that is enclosed on all sides may burn around the valley in a circular movement, and the hazard of there being only one route out, the exit route, should always be considered.

Chimneys: Sometimes also called a 'Kloof' in South Africa, these are very narrow topographic features that have three walls that form a steep and narrow chimney, chute, or ravine. The effect of fire in this feature is the same as that of a narrow valley but will potentially be more extreme, with a very fast rate of spread when moving up the chimney. The same acceleration of wind happens in a chimney, and therefore the same acceleration of fire spread will occur. Upslope convectional preheating and cross-valley radiant heating that will occur. These are extremely dangerous features to be in or close to when fire is moving through the landscape and are best avoided. If there is fire burning into the base of a chimney anticipate a huge increase in the rate of spread up the chimney.

Dominant Ridge: Forms a prominent skyline feature and may have one or more spur ridges that connect to it.

Spur Ridge: A small ridge which extends finger-like from a main ridge.

Flat Ridge: Has terrain that slopes down gently from one or both sides of the ridgeline

Knife Ridge: Has steep slopes that extend down both sides of the ridgeline.

Ridge Influence on Fire Behaviour: When fires reach a ridgeline, the rate of spread often slows as it encounters an opposing upslope airflow from the other side of the ridge. This effect can slow the fire spread and limit spotting concerns on the opposite slope. However, the effect of erratic winds caused by various winds converging at the ridgetop can change fire behaviour. This is especially likely if the winds on one side of the ridge are stronger than the other.

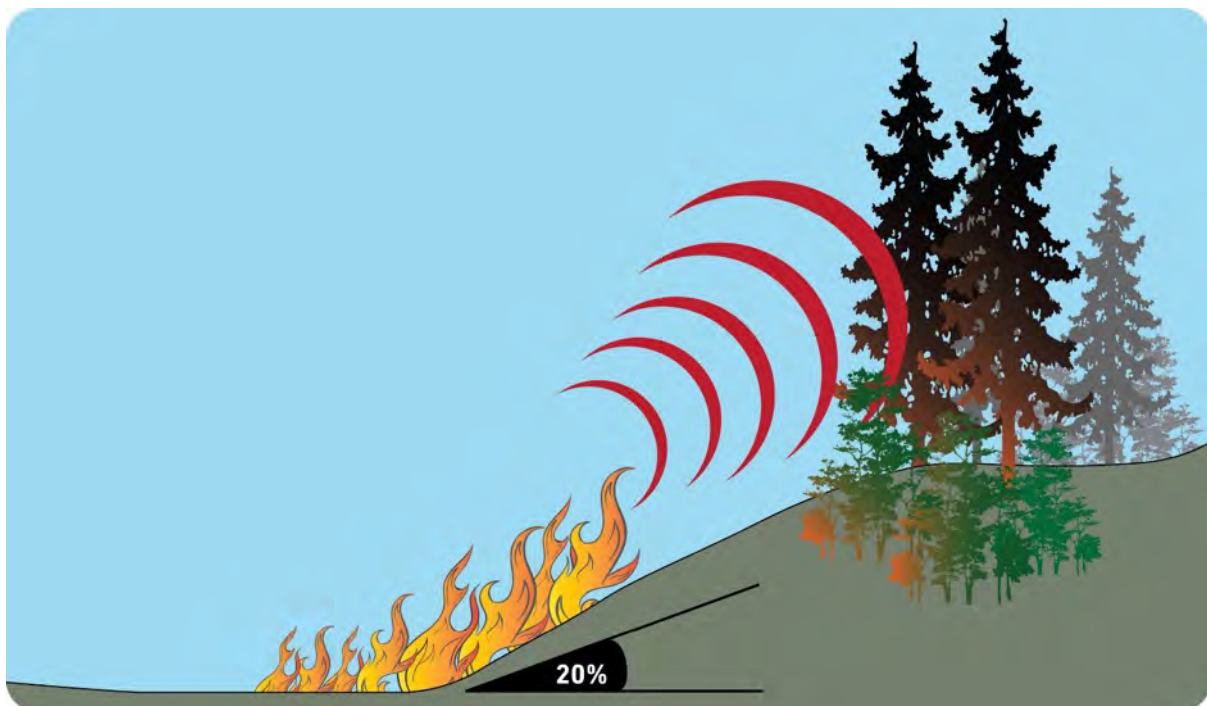
Saddle: Depression or pass in a ridgeline. A saddle has the same effect on air movement through it that of a chimney or narrow valley. The wind will increase in speed and strength as it moves through the constricted area of topography and once through the saddle, which can be a short distance, the wind will spread out and slow down

again on the downwind side. The effect of this feature on fire behaviour will be that of accelerated fire spread and intensity and even a change of direction at times.

Topographic Characteristics

The Slope: The percentage change in the elevation over a certain distance. This percentage describes how steep a slope will be. The steepness can also affect the kind and density of the fuel that exists on the slope and steepness will lead to increased rates of fire spread. Fire spreads uphill the quickest and statistically fires that begin at the base of slopes have become the largest fires. The slope directly affects the preheating rate of the fuels, as the steeper the slope the more the convective heat column is combined with radiant heat spread and the closer this is brought to the upslope fuels. The rate of spread up a slope is exponential, and the following is a guide:

- 0 – 20% results in a determined flame height and a rate of spread.
- 20 – 40% results in an increase of 2 x flame height and 4 x rate of spread.
- 40 – 60% results in 2.5 x flame height and 8 x rate of spread.
- 60 – 80% results in 3 x flame height and 14 x rate of spread.



The **trench effect** is a combination of circumstances that can rush a fire up an inclined surface. It depends on two well-understood but separate ideas: the Coandă effect from fluid dynamics and the flashover concept from fire dynamics.

The **Coandă effect** is the tendency of a fast stream of gases to bend towards, and adhere to, nearby surfaces. The stream's static pressure tends to decrease, which creates a pressure difference between the surface and areas far from it. This bends the stream towards the surface and tends to keep it attached to that surface.

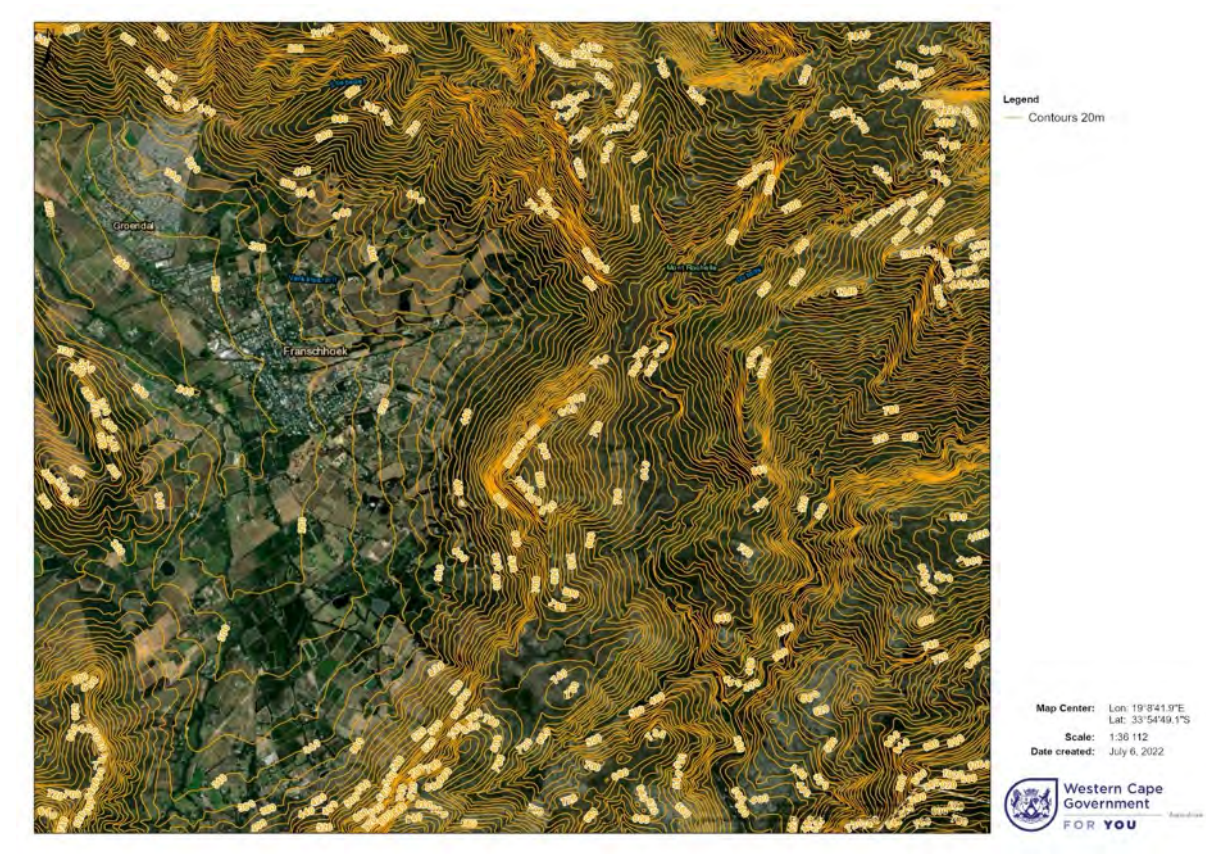
Flashover is a sudden widespread fire, which occurs when most surfaces in a space are heated until they emit flammable gases hot enough to auto-ignite. Before flashover, flammable gases may be emitted but are too cool to ignite.

Aspect of a Slope: This is the cardinal (compass) direction towards which a slope is facing. The aspect will determine the amount of heat that the slope receives from the sun and that will determine the kind and density of fuel that will exist on it.

In the southern hemisphere, the north and northwest slopes are the most critical in terms of the ease of ignition and initial spread of a wildfire. This is because they are exposed to more direct sunlight and will typically have lighter and more sparse fuels, higher temperatures, lower humidity, and a lower overall fuel moisture.

The south and southeast facing slopes will be critical in the carrying and intensifying of a wildfire, (depending on the weather conditions and fuel kind). As they are more shaded, they will generally have heavier fuels. It's true that it will take more energy to ignite these areas compared to finer fuels, however the fuels situated in these areas are heavier and will burn with higher intensity and take a long time to reduce in intensity.

Topography Analysis for the Proposed Cableway



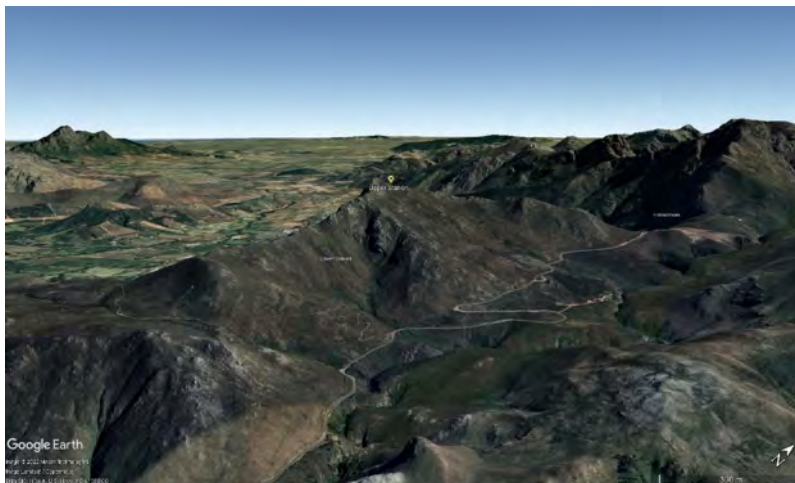
1.2.1
In the centre of the image, you can see the steep slopes of the Middagkransberg. The proposed cableway stations are exposed to wildfires, however their position in this landscape matters. The lower station is at the bottom of a steep slope, it has road access and ways to retreat and be protected from wildfires. The proposed upper station being top of slope was well as more imbedded in a wilderness area, with complex topography, and a fire driven ecosystem poses more of a challenge considering the risk factors.

The map has the 20m contour lines illustrated, which shows you the wide valley of Franschoek as well as the undulating mountains that surround it with ridge lines, narrow valleys, saddles, slopes, and different aspects. When looking at wildfire risk it's important to consider the immediate area of the proposed cableway but also the surrounding landscape.



1.2.2

The cable station has the built-up town as a buffer to wildfires from the west, and north west, although wildfires could still wrap around the mountains and affect the area. The exposure to wildfire from the east, and south east (and north to some extent) is considerable.



1.2.3

If you look at the topography of this area, tied to fuels and weather, the pathways for wildfires to reach the cableway are numerous from the east, and south east and the topographic features and characteristics will cause directional and intensity changes of wildfires burning through the landscape.



1.2.4

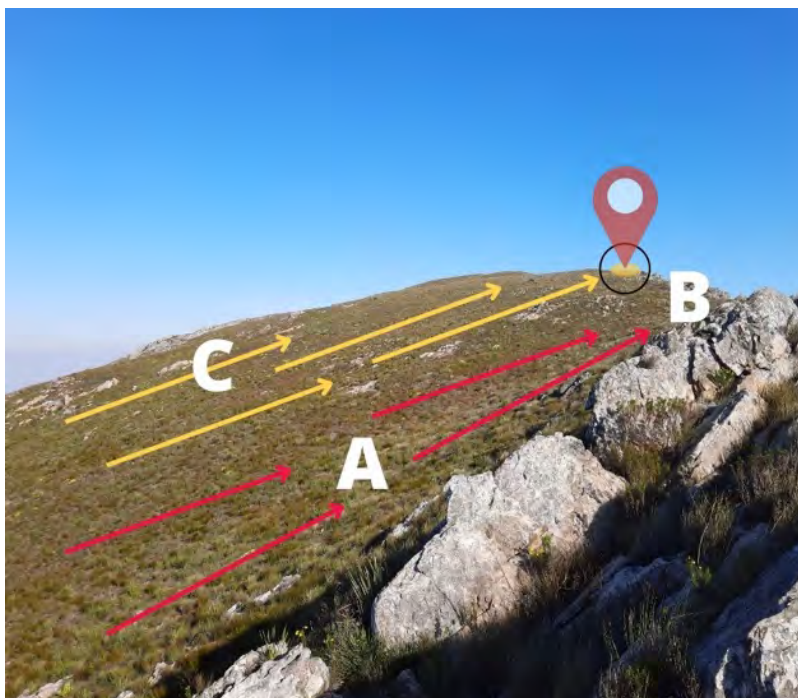
The shape of the land influences air flow and therefore fire spread. Red arrows show narrow valleys, saddles and chutes which will dramatically accelerate fire spread. Orange arrows show narrow chutes, which funnel air, accelerating it through the landscape. Not illustrated but also observed and notable for wildfire behaviour is the box valley and ridges. It is also significant that in summer, the prevailing wind, being a south easterly, will feed directly into these topographic features.



1.2.5

This is approximately mid to upper slope, leading up to the area of the upper cable station. The red arrows indicate a narrowing funnelling of wind that will take place here. The yellow arrows are still pushing upwards due to the slope and flow of air upwards.

These areas of narrowing, funnel the air and fire and accelerate hot air, gasses and fire up the slope. This can create large areas catching fire at once and widening the fire front that moves upslope and through these types of features.

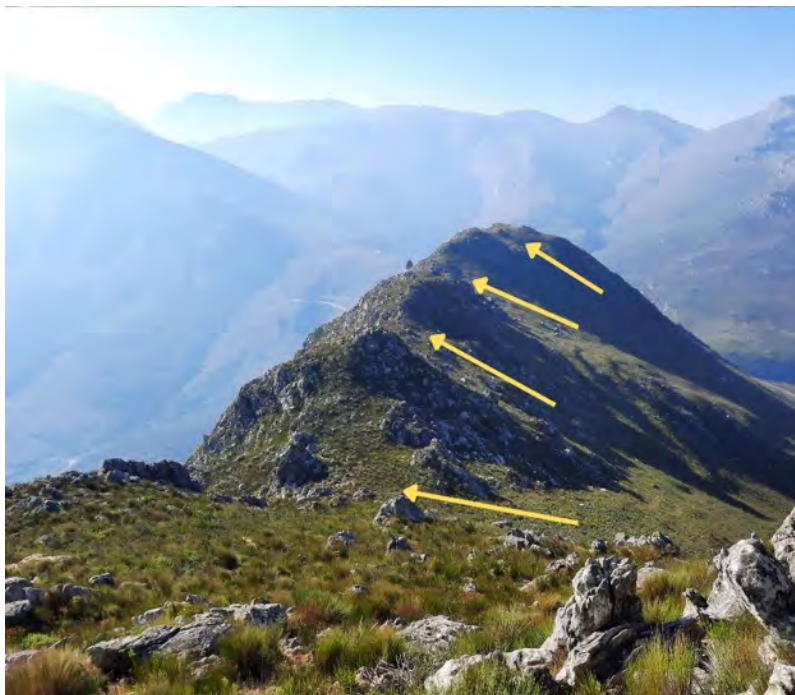


1.2.6

This is another angle on the area shown above in figure 1.2.5.

The concave depression creates a small chute (A), further drawing in air (and fire) upwards and through a saddle at (B). This is where you would expect wildfire already burning fast up this steep slope to accelerate and widen the active burning area as it pinches onto the ridge and saddle.

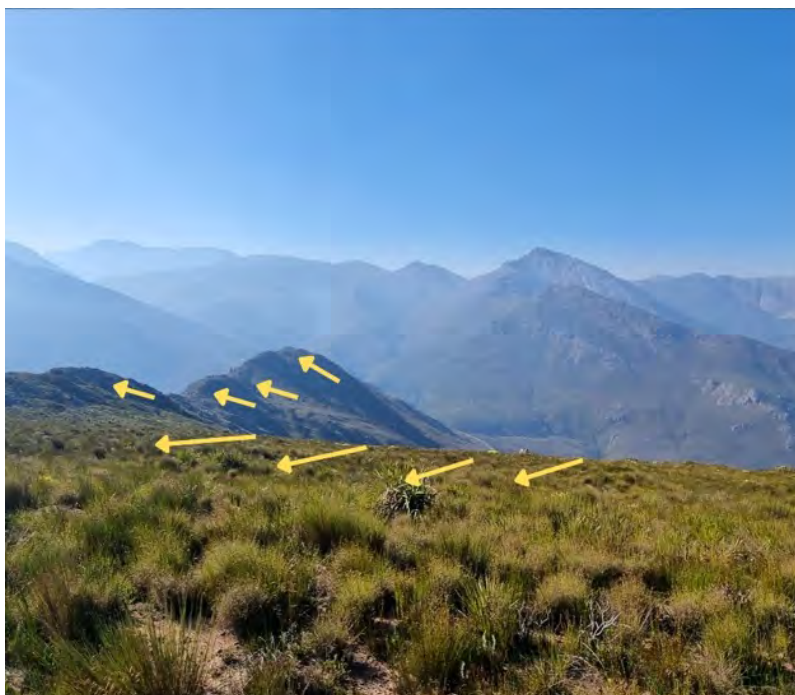
Area (C) also has a steep slope, pushing fire up to the upper cableway and pushing onto the ridge. Direction and strength of wind will have further influence. These factors have a combined effect on wildfire burning up the slope and would affect the cableway in a scenario with fire coming from the bottom of this area.



1.2.7

On the ridge line nearby the upper station (not immediate area), the arrows indicate the saddles which will accelerate air movement (fire).

This is already on a steep gradient so the combined effect, especially with prevailing summer wind from the south-east will cause rapid rate of spread. As the fynbos seen here gets older, the fuel loading will increase and potential for fire intensity will rise with age.



1.2.8

This image pulls back closer to the upper station within +/- 50m range. You can see the saddles from the previous image along the ridge line and also the slope starting to level off, compared to the much steep section dropping off out of picture. In calm conditions, and low fire intensity this levelling will help slow the spread of fire. In conditions likely during the summer months, strong winds, low relative humidity, high temperatures, a wildfire will strike this area with a high intensity and this gradient on the top of the ridge is not large enough an area to have a significant impact in slowing the fire. This is due to wind, heat and smoke being drawn upwards to the ridgeline and the combined force drawing the fire over the top of the ridge.

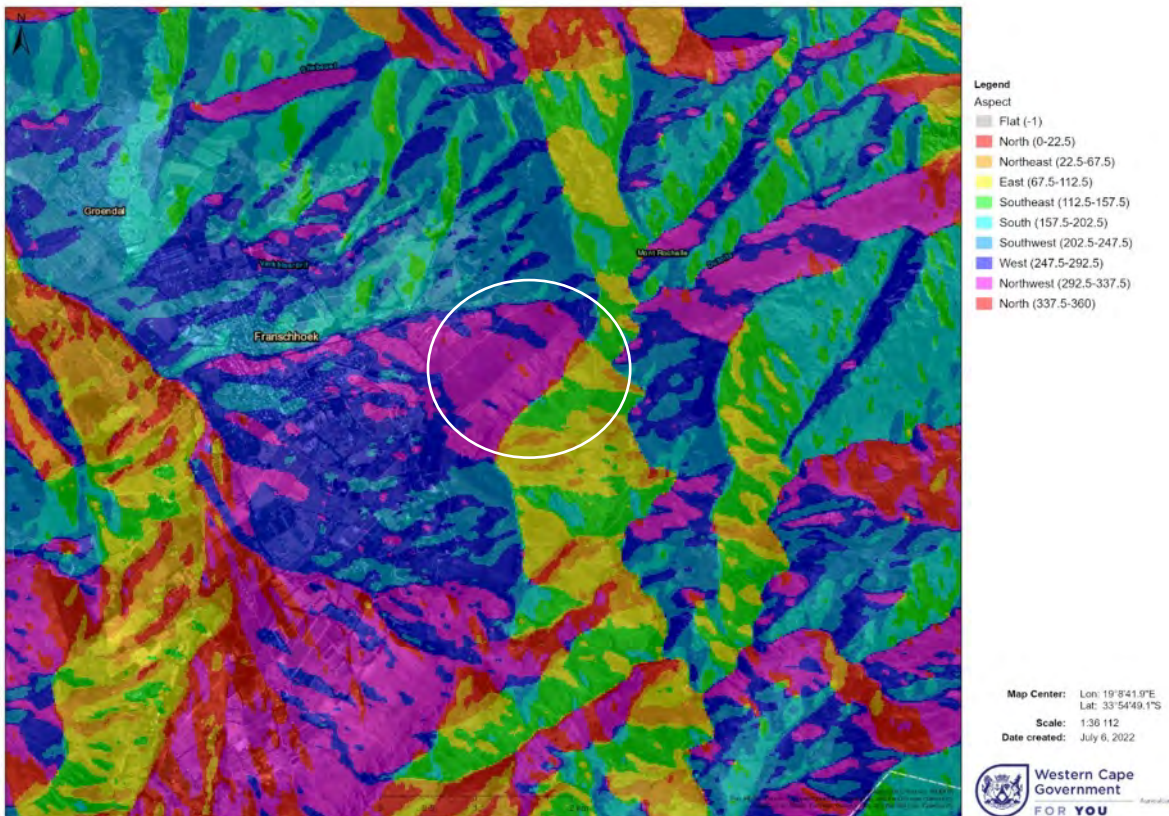


1.2.9

The dotted line stretches from the top to lower point of the planned upper cable station. Being on the western side of the ridge lessens the impact of wildfires coming from the east.

Fire from the west will have heat and smoke impact and there is a degree of protection from less fuel continuity and rocky areas.

Fuel reduction, intelligent design and materials could protect the structure to a limited degree. The significant concern for wildfires for this location is life. Large numbers of people at this location, or in the general area of the upper station would be extremely vulnerable should they be present during a wildfire.



1.2.10

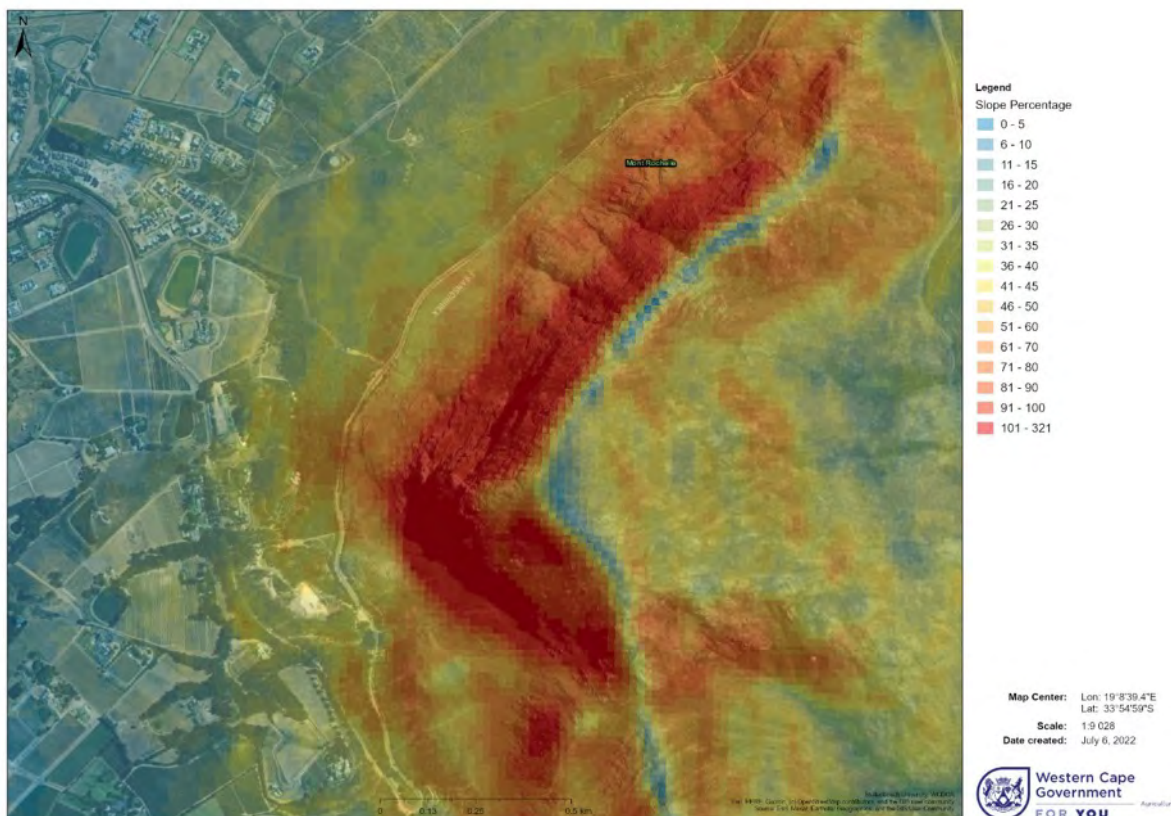
The above map shows the aspect of the area with the key on the right. Aspect influences the state of the fuels, with the significance of the cable station area from lower to upper station being a north-west aspect. This will result in the vegetation (fuels) becoming heated more easily, resulting in the fuel being drier and more susceptible to burning, especially in terms of ignitions and higher rates of spread (ROS). The other side of Middagkransberg has east, north-east, and south-east aspects. The slope in this valley, which historically experiences a significant wildfire every 10 years, will carry and intensify the spread of a wildfire. As these aspects are more shaded; over time the currently young Fynbos will mature and result in a heavy fuel load. (The heavier fuel load situated in these areas will burn with higher intensity and take a longer time to reduce in intensity, this could take anywhere between 30 to 60+ minutes, depending on fuel density and weather conditions.



1.2.11

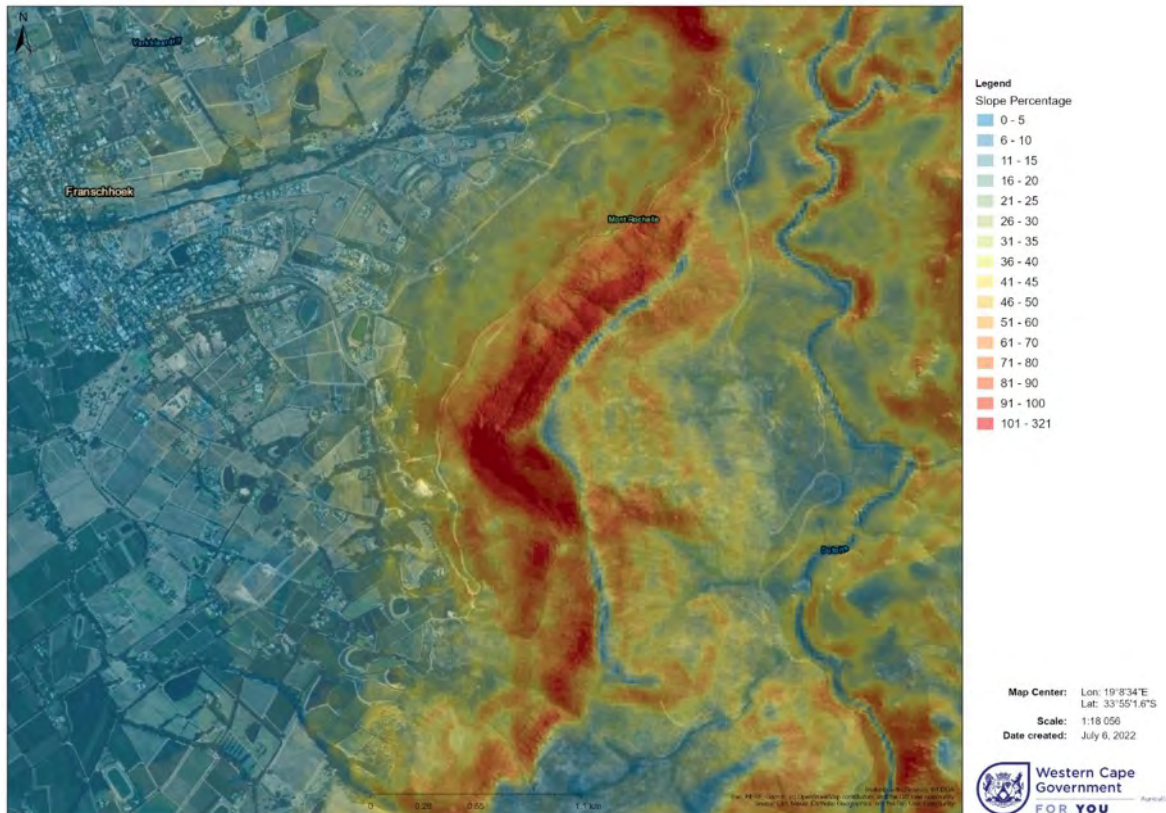
Based on recent fire history, the Google Earth image of 2022 shown here, doesn't show the contrast between the fuels on the different aspects at this stage.

What is noticeable, is the heavy fuels below the pass road on the north-west aspect, which is a high risk for wildfires.



1.2.12

The above map shows the slope percentage of Middelkransberg. The dominant ridge line is evident through the middle of the image with very steep cliffs on the western side and steep terrain on the eastern slide. With such steep sides, wildfire will arrive at the top ridge line, (especially with the high continuity of fuels on the eastern side), like a heavy train. Even though the slope momentarily levels out at the top, the momentum and energy of a wildfire will keep pushing over the ridge. Like a heavy train that stops accelerating, the forward energy of the train takes time to dissipate and slow down.



1.2.13

This map still shows the slope percentage of the area; however, we have zoomed out to show the slope profile within the general area. Slope is a big driver of fire rate of spread and intensity. The complexity of wildfire behaviour is a consideration for all the driving factors; however, you can see by the varying slopes within this range how wildfire will spread at different intensities and be subject to directional changes from a factor such as slope.



1.2.14

This photograph shows the slope leading up towards the upper cable station.

The lower slope starts around 6-15%, with sections of 30-40% and even some 60-90% sections.

The rate of spread up a slope is exponential, and the following is a guide:

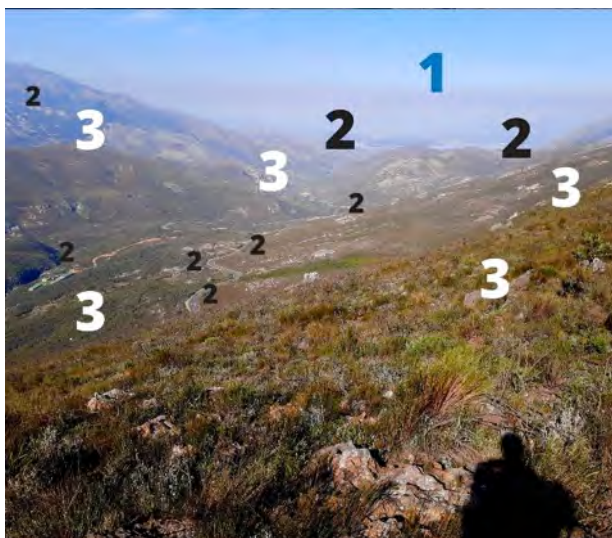
- 0 – 20% results in a determined flame height and a rate of spread.
- 20 – 40% results in an increase of 2 x flame height and 4 x rate of spread.
- 40 – 60% results in 2.5 x flame height and 8 x rate of spread.
- 60 – 80% results in 3 x flame height and 14 x rate of spread.



1.2.15

This is a visual of a slope a little further away from the proposed upper cable station, but along the same ridge line. If you imagine a wildfire starting at the base of this hill, it is easy to see why a wildfire will move rapidly up a slope of this degree.

Combine the force of wind behind a fire, feeding in oxygen but also hitting the slope and forcing air upwards, and then add in hot, and dry weather and you have the potential for wildfire to move incredibly fast.



1.2.16

1- Prevailing south and easterly winds push up through the wider valley and into this mountainous topography.

2- Ignitions often occur at the entrance to the valley where farming and recreational activities occur. Ignitions along roads through wilderness area are also a factor.

3. With continuous fuels, narrow valleys, steep slopes, ridges, saddles and chutes it's easy to imagine how hard it is to control the spread of wildfires in this area. The topography not only makes for extreme fire conditions, but it also makes access to fires and suppression thereof difficult.



1.2.17

The R45, Lambrechts Road, passing through the Franschhoek Pass area accommodates truck and vehicle traffic. While the road provides access to firefighting vehicles, it is only under optimal weather and fire suppression conditions that the road could be used to hold the spread of fire. The users of the road, increase the risk of ignitions in the area. Accidents or breakdowns can result in fires, and people stopping on the pass can sometimes make fires. The road across the base of the eastern slope which leads up to the upper cable station. A wildfire starting on the road and fanned by medium to strong winds could easily reach the upper cableway within a minimum of 8-15 minutes, or up to 30-45 minutes, depending on the area of ignition, control efforts, fire weather and fire landscape conditions.

The following calculations were used:

Rate of Spread (ROS) at 10% of 10-m wind speed.*

Slope factor of x2 per 10% increase – slope increase from 11% to 33%.

Example: Wind of 20km/h = 2km/h ROS on flat terrain.

20km/h wind with 20% slope increase = 8km/h ROS.

8km/h = 8000 metres divided by 60 minutes = 133 m/min ROS.

Distance from Lambrechts Road to upper cable station site is 800m (approximately).

*(Cruz. M., Alexander. M., (2019, April 25) The 10% wind speed rule of thumb for estimating a wildfire's forward rate of spread in forests and shrublands. *Annals of Forest Science*. Retrieved from

<https://annforsci.biomedcentral.com/articles/10.1007/s13595-019-0829-8>)



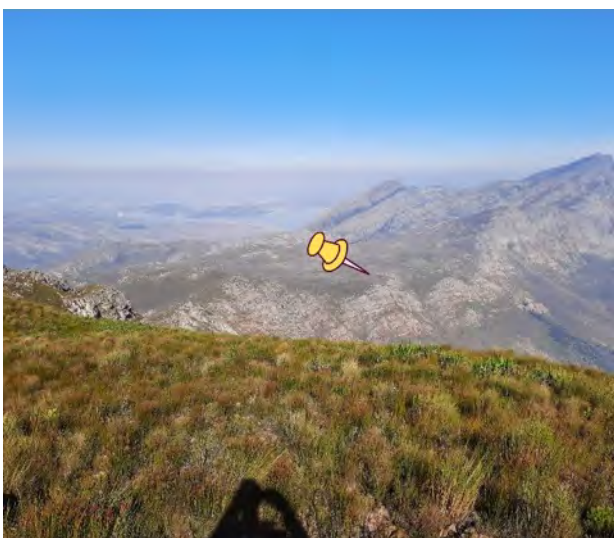
1.2.18

From the proposed upper cable station, the walk down the ridgeline to the mountain pass road (shown by the pin) is approximately 1.5km-2km. There is no path and the hike will take fit individuals about 50-60 minutes. The steepness and footing are difficult without a path.



1.2.19

The closest road to the upper cable station is the R45 Lambrechts Road. The terrain in between is steep and difficult to walk. The straightest line distance is approximately 1km however to safely hike down from the top the preferable route will most likely be the ridge line shown in the previous image 1.2.18.



1.2.20

There is another jeep track path in the area which runs up from the R45 Lambrechts Road. (This can be seen better in image 1.2.21 below). This road is approximately 2-2.5km hike down steep terrain. It presents another hiking option down from the top, in another direction. This would only be suitable for fit individuals familiar with mountainous terrain, as per the other hiking route option.



1.2.21

A jeep track road can be seen leading off the R45 Lambrechts Road, with its switch backs and then around the base of the spur ridge. This is a 4x4 jeep track and does not provide an access route to the upper cable station.

1.3 Weather

The weather is the main influencer on wildfire and is often the key component of why problematic fire behaviour will occur. The other factors of fuel and topography will of course have a role to play and impact the fire behaviour and rate of spread (ROS), but it is the weather that is the primary driver of fire behaviour.

Weather on the day affects fire behaviour, but the weather leading up to the day also factors into how the fire will burn. In the context of wildfire management, the weather that has an impact on the fire behaviour and is conducive to the ignition and spread of wildfire is termed 'fire weather'. There are several elements of weather that must be considered, and they are:

- Temperature
- Wind
- The Stability of the Atmosphere
- Relative Humidity
- Precipitation
- Cloud development
- In addition, drought, which is the result of certain weather conditions must also be considered (when it is taking place).

It is important to recognise that weather conditions will have an impact on the environment surrounding the fire and on the fire behaviour. High temperatures, low humidity and strong or shifting winds are a recipe for more extreme fire behaviour. These environmental changes can occur over relatively short periods of time. For example, cool temperatures, high humidity a stable atmosphere and light winds may be present in the morning but by mid-afternoon an approaching front may push higher temperatures, lower humidity an unstable atmosphere and strong shifting winds ahead of it.

Temperature: The air temperature has a direct influence on fire behaviour because of the heat requirements for ignition to take place and for a continuing combustion process. Air temperature is directly linked to the amount of radiant heat from the sun that warms up the surface of the earth and all that is on it. The vegetation in the landscape is heated by the radiant heat of the sun having an effect on fuel moisture and temperature.

Relative Humidity (RH) is the term used to express the amount of moisture in the atmosphere. The lower the RH, the easier it is for a fire to ignite and burn and for the intensity to increase. When the RH is low, the moisture in the vegetation (fuel) evaporates as it rises to the surface of the vegetation, drying it (the fuel) out. When the RH is high, it is harder for the moisture to evaporate as moisture won't rise to the surface of the vegetation as easily.

Wind: This movement of air is termed 'wind'. Wind occurs over a range of scales, from large-scale systems influenced by the transfer of heat from the equator to the poles, to small eddies or whirls that can occur around obstacles.

Wind is the horizontal movement of air relative to the surface of the Earth and is often cited as the most influential factor affecting wildfires. Wind increases the supply of oxygen to a fire, resulting in the fire burning more intensely.

The wind will also dry out the surface fuel moisture meaning that it is more combustible, and the development of air pressure differences will lift flames and embers into areas of unburned fuel. Wind will also push flames closer to the ground which combines the radiant and convectional heat leading to an increased preheating of the fuel and the air surrounding vegetation (fuel), which in turn accelerates the release of moisture from the vegetation allowing it to reach its ignition temperature at an accelerated rate.

Prevailing winds: A pattern of seasonal winds which may or may not be present during the fire. Often the general wind is the same as the prevailing wind.

General winds: Winds that are reported by weather forecasts that often affect large geographic areas for the forecasted period.

Local winds: Produced because of the natural features (topography) of the area. This includes valleys, hills, and mountains that cause the air to move in specific directions. These features, together with solar heating, cause valley and slope winds to build up as the temperatures rise or fall.

Surface winds: Are measured 6 – 10m above the ground (winds that are near the surface of the earth).

Mid-flame winds: Winds that occur halfway up the flames in a fire and have the greatest effect on the direction in which a fire will burn.

Cold fronts: Cold fronts (with or without precipitation) cause winds to speed up and gust as the front passes by. They may also cause changes in wind direction. Direction changes are often at 90° to 180° angles. Cold fronts will also often bring rain but before the rain falls, strong gusts of wind can cause extreme fire behaviour. If no rain comes, or only limited showers, wildfires might continue burning.

Anabatic and Katabatic winds: Anabatic Winds are upslope winds driven by warmer surface temperatures on a mountain slope than the surrounding air column. Katabatic winds are downslope winds created when the mountain surface is colder than the surrounding air and creates a down slope wind.

Lee Rotor Winds are a particularly hazardous wind to wildfire management. The Lee Rotor effect on wind occurs when an airflow moves across a landscape and over a ridge and separates from the lee slope. In other words, instead of flowing along with, or adhering to, the shape of the topography the wind shears off and rolls becoming turbulent. This turbulence causes a rotor or spinning effect and will draw wind laterally across a slope. If there is fire on this slope, the fire will be intensified by the rotor effect and be drawn horizontally across the slope. This movement can be in a completely different direction to the main fire spread.

An Inversion Layer is a sign of a stable atmosphere but is still a weather hazard. This is because the state of the atmosphere is always one of continual fluctuation and change. A stable atmosphere will become an unstable atmosphere as conditions change, and when this occurs fire intensity can increase and become problematic very quickly. Inversions are layers in the atmosphere where the temperature increases with altitude instead of decreasing. Made up of warmer and less dense air, it essentially acts like a lid on any vertical movement or updraft.

The Fire Danger Index (FDI) system was created to alert fire suppression organisations and landowners to the daily fire weather and the impact this will have on a wildfire should it occur. The system uses a colour code that aligns to a level of risk, with Blue being the lowest and Red the highest. This colour coding is linked to a numerical rating system that indicates the level of risk. This level of risk is worked out from a formula that takes the temperature, the wind speed, the relative humidity, and the amount of rainfall and how recently this occurred into account. The colour coding system is an easy way for this numerical value to be communicated to the landowners and public so that they know what fire behaviour to expect and what actions they should/should not be taking.

The FDI is not just an indicator of what you can expect from the fire behaviour, but it also offers guidance on the level of preparedness that fire suppression organisations, landowners and even the public should be aware of. This can guide a landowner on making sure that their response to a fire occurring will be appropriate for the fire weather

conditions, or whether a member of the public can understand the risk they may face when deciding to burn some garden refuse or have a braai on a high fire danger day.

The FDI is part of a greater model that has the following goals:

- To aid the prevention of wildfires through advice on precautionary measures.
- To provide guidelines on how planned fires are to be managed, and whether or not they are to go ahead.
- To provide guidelines on resource readiness plans.
- To provide guidelines on fire suppression tactics that will be required given the expected fire conditions.
- To serve as an alert or warning system to the public, of the fire danger on any given day in attempts to heighten readiness and promote good practice in preventing wildfires from occurring.

The Fire Danger Index (FDI) colour coded rating system is as follows.

CODE	RATING	FIRE BEHAVIOUR	FLAME LENGTH	RATE OF SPREAD
BLUE	Safe	Ignitions unlikely, fire low intensity.	± 0.5m or less.	Up to 2m per minute.
GREEN	Moderate	Ignitions can occur, fire moderate intensity, control possible.	± 0.5m to 1m	Up to 5m per minute.
YELLOW	Dangerous	Ignitions occur easily, fire intensity severe at times, control possible but difficult.	± 1m to 2m	Up to 25m per minute.
ORANGE	Very Dangerous	Ignitions occur easily, fire intensity severe, spotting and crowning possible, control dangerous and maybe not possible.	± 2m to 5m	Up to 35m per minute.
RED	Extremely Dangerous	Ignitions occur easily, fire intensity severe, spotting and crowning occurring, control very dangerous and likely not possible.	± 5m or more.	Up to 60m per minute.

CODE	STAGE OF PREPAREDNESS	LEVEL OF DIFFICULTY OF FIRE SUPPRESSION ACTIONS
BLUE	Burn with a permit only, open air fires allowed in designated areas.	Fire suppression (Direct Attack) easy and may not be required.
GREEN	Burn with a permit only, open air fires allowed in designated areas.	Fire suppression (Direct Attack) feasible with appropriate resources and tactics.
YELLOW	Burn with a permit only, open air fires allowed in designated areas, extreme caution required.	Fire suppression (Direct Attack) constrained, aircraft called at early stages.
ORANGE	No burning, no open air fires allowed, no activity that can lead to ignition allowed.	Fire suppression (Direct Attack) not feasible, aircraft called immediately at early stages, evacuations may be needed.
RED	No burning, no open air fires allowed, no activity that can lead to ignition allowed.	Fire suppression (Direct Attack) not feasible, resources on standby, immediate response required, aircraft called immediately at early stages, evacuations very likely.

Weather Analysis for the Proposed Cableway



1.3.1

It is likely that during the south easterly winds (A), the Lee Rotor Winds could come into effect and cause turbulence and possibly a lateral spread of wind (B), or wildfire if one is burning.



1.3.2

Continuing on from, 1.3.1, Lee Rotor Winds from a south easter or easterly (A) could have the same effect with lateral spread (B).

Note the different lateral spread directions in 1.3.1 & 1.3.2. In either scenario the wind could break in either direction over a period of time or switch directions over the same period. This type of turbulence can make wildfire control very difficult and spread fire embers in different directions to the prevailing or general winds.



1.3.3

Wind from the easterly, north easterly will travel and accelerate through the saddle. This could cause any wildfire burning to accelerate through this direction, with spot fires from embers quite likely in strong winds.

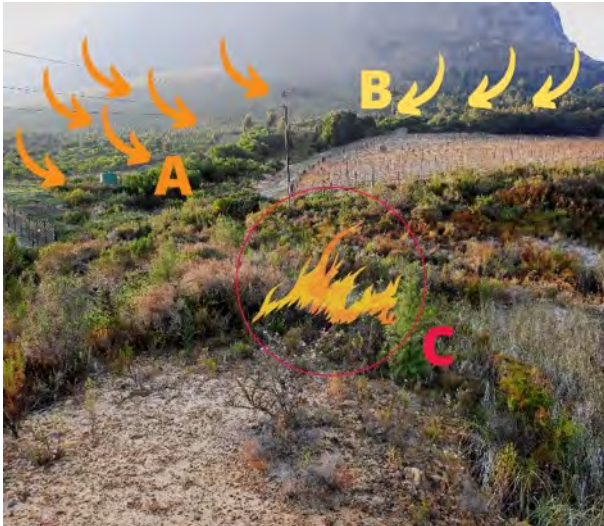
The same will apply to air flow in the other direction.



1.3.4

Wind from a more southerly direction will accelerate and wrap around this small spur ridge in the direction as indicated.

With the abundance of surface and aerial fuels, eucalyptus in particular, spot fires and difficult fire behaviour in strong winds will be likely.



1.3.5

With the possibility of wildfire spread during different conditions, and originating from directions (A or B), Haute Cabriere property may experience spot fires in the patches of vegetation (C) on the property.

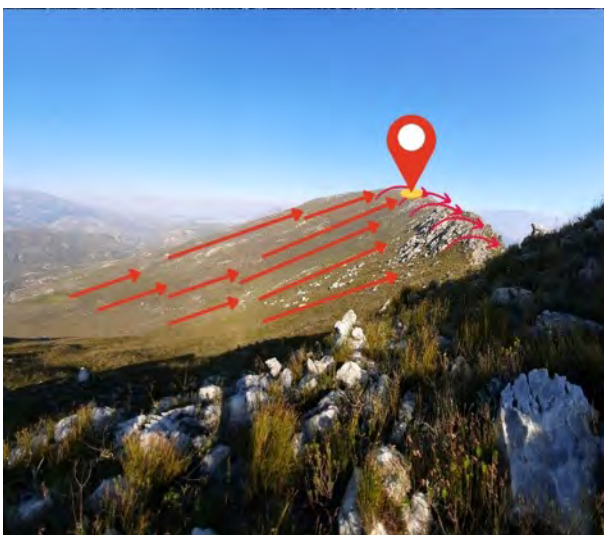
Firebreaks around the property and fuel reduction and zone preparedness around structures would be vital.



1.3.6

This is an illustration of how a prevailing North Westerly might funnel through this wide valley, with wide valleys being more prone to prevailing winds and the effect the wind has on the topography.

The wind will accelerate and being subject to directional changes as indicated by the orange and red arrows. Notable is how the wind will push and deflect through the saddle at the pass as well as around the Middagkransberg.

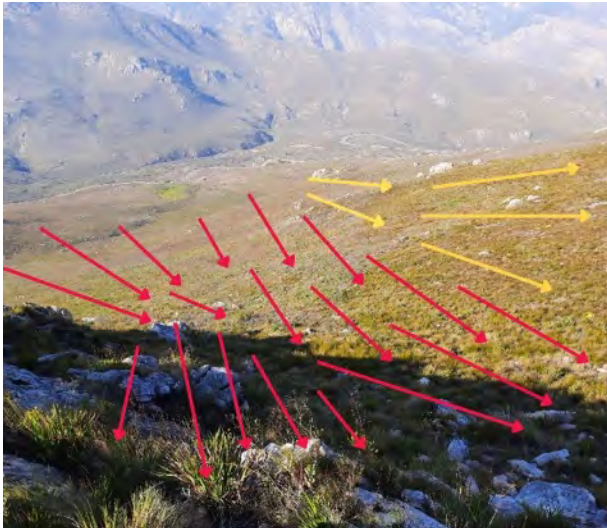


1.3.7

Pin Graphic: Proposed upper station site.

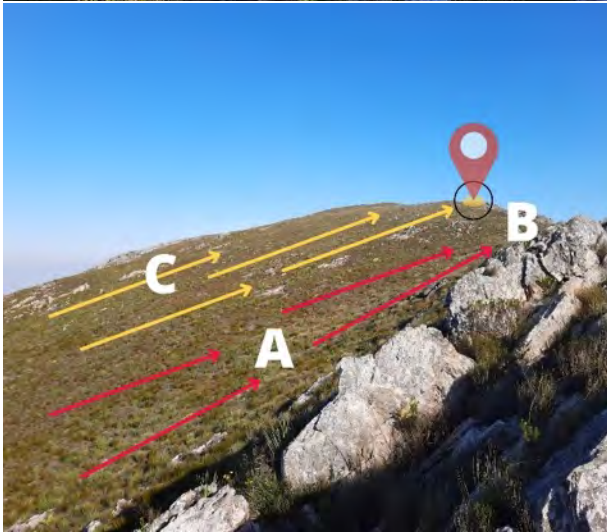
Arrows: Indicate flow of wind (or fire).

The flow of wind up this slope would accelerate fire spread. Easterly and south easterly winds would be the main driver of wind up the slope. Any wildfire will be subject to these forces. A possible situation to expect would be the wildfire and wind racing up the slope and only slowing down on the back side of the ridge. The fuels burning would have the tendency of a fast stream of gases to bend towards and adhere to the surfaces. On the lee side of the ridge the Lee Rotor effect could cause turbulence and swirling of winds and fire laterally as well and back up the lee side. Embers and spot fires would be a concern in older vegetation.



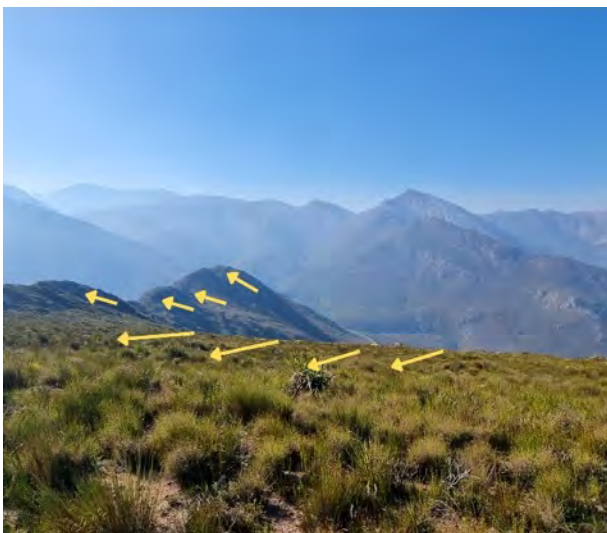
1.3.8

Wind would funnel or be channelled along topographic features with varying degrees of speed and directional changes. In this image subtle but notable effects are illustrated.



1.3.9

Wind travels upwards (A) and is accelerated towards ridge and saddle at (B). Wind (C) also moves up the steep slope towards the ridge.



1.3.10

The flow of air (wind) will be influenced by topography. Saddles, slope, ridge lines, valleys, collectively impacting movement of air (wind) as a result fire.



1.3.11

A graphic, not even a detailed analysis, showing how wind channels and moves in different directions. If you had to analyse this in more detail there would be many localised effects of turbulence, accelerations, and deviations.

This is purely just to highlight the complexity of wind in such an environment, let alone all the other factors that drive wildfire behaviour.

2. Wildfire Scenarios for Consideration. How wildfires might impact the area.



This next section is designed to paint a possible picture and discuss scenarios of what might occur during wildfires. As has been discussed, fuels, weather, and topography interact to create wildfire burning conditions, with even the wildfire itself having the ability to influence air flow and atmospheric stability. As such wildfires are incredibly dynamic, hard to model, and difficult to predict with certainty. You can however apply principles and consider likely scenarios.

We have made use of visuals and graphics to illustrate and describe concepts. As with the fire behaviour factors, these next illustrations are conceptual in nature and graphics are not to exact scale.

The main purpose of discussing possible scenarios in this way is to help create awareness of the risks and likelihood of what might happen and use this understanding and knowledge to guide preparedness.



2.1

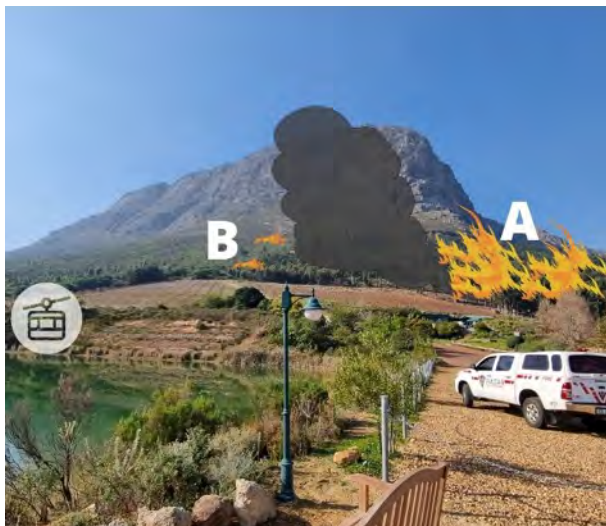
A wildfire in the lower cable station area will result in smoke, heat and if anywhere near the lines of the cableway it would be important to shut down operations as heat and smoke exposure to visitors would be a concern.

As has been discussed the fuels in the pathway and in the surrounds (X&Y) will create a longer lasting and more intense wildfire. A wildfire in fynbos would still have intensity, and control challenges, but in comparison to the existing heavier fuels, the fire would not impact the area in the same way.



2.2

Heat and smoke will still be a factor for shutdown even with a wildfire not underneath the cableway. a) Wildfires spread rapidly, and safety needs to look at current and forecast fire conditions. b) Smoke in can negatively impact on visitors. c) If the area needs to be evacuated, early movement of people and vehicles is advisable because if you wait for the wildfire to impact the area, it will be too late to coordinate an orderly evacuation. Firefighting resources will also need good access to the area, and it would be important not to block their pathway, and have people in harm's way that they need to divert their attention to.



2.3

With the abundance of surface and aerial fuels, eucalyptus in particular (A), spot fires (B) and difficult fire behaviour in strong winds will be likely.

Spot fires rapidly increase rate of spread ROS and should be factored into risk considerations, shutdown of operations and evacuation from the area.

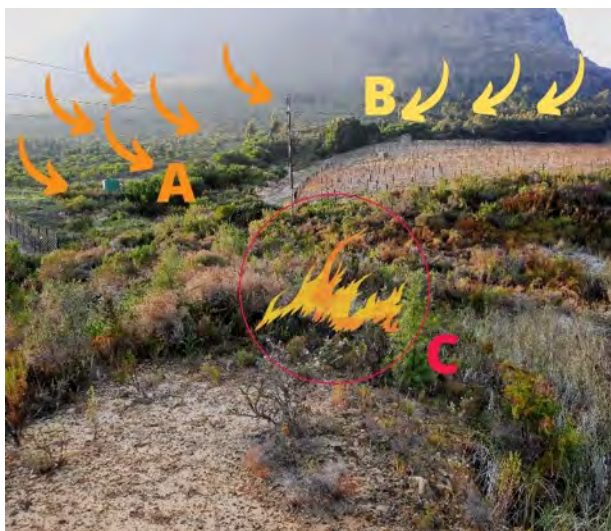
Wildfire in general area could start with low intensity but any influence from fuels, weather or topography could change the situation rapidly. It would be vital to take all wildfires in the area very seriously and take decisive actions.



2.4

Slope, wind, fuels could result in wildfires spreading underneath the cableway and towards the upper station area.

If there is a northerly wind, this would result in even more accelerated upward fire spread. Fynbos, on this northern aspect, being dry, light fuels would ignite readily from any embers and would spread fire quickly. With heavy fuels below the pass road, spotting is likely, as well as high radiant and convective heat. This would mean that it is highly unlikely the pass road would prevent a wildfire from spreading into the mountains.

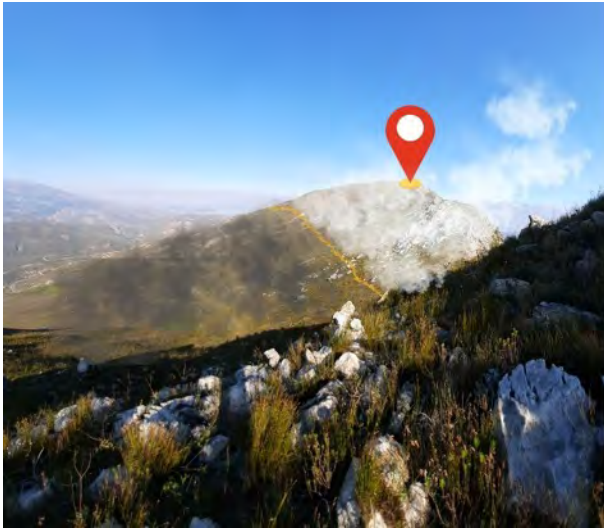


2.5

Haute Cabriere should have firebreaks, fuel buffer zones and resources to deal with fires on the property.

Wildfires from any directions (A&B) could still “jump” over these defensive barriers and spot fires could start in vegetation all around the property, for e.g., in the fynbos (C) around the dam and in the vicinity of the lower cable station.

As an operation, the cableway should reinforce these plans and resources to help protect and defend the property from wildfires.



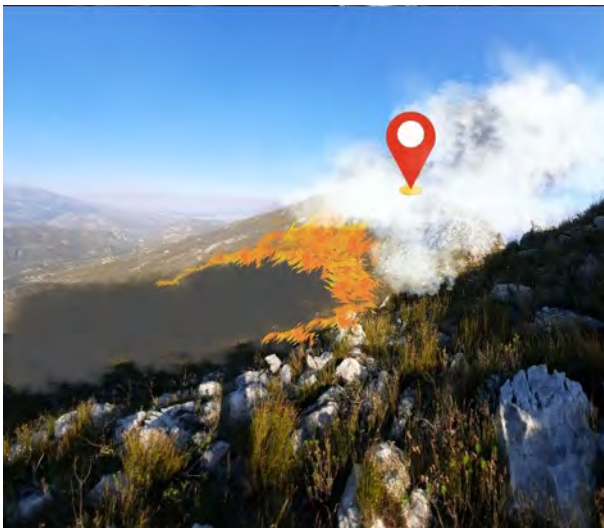
2.6

Under cooler conditions, young vegetation, high fuel moisture, low wind speeds a wildfire burning up this eastern slope could burn slowly, with small flames and a low intensity. It might result in a patchy burn which means not all fuels are consumed in the fire. There would likely be a low threat to the upper cable station as the wildfire will slow on the upper ridge line. In addition, firefighting efforts would have a high probability of success. Smoke from this wildfire would still be of concern to any person in this area but it would be less of a concern compared to other fire scenarios that could play out on this slope.



2.7

In this scenario a wildfire from the south, south east could race up the box valley on the other side of the slope, out of view in this image, and then run over onto the slope where you see fire. Well before the fire starts to move across and up the slope, heavy smoke will likely be affecting the upper cable station area. The wind will keep driving the flames across the area however the slope will come into play drawing the fire and wind upslope towards the ridgeline. This fire will impact the upper cable station and by this stage all people must be evacuated from this area for life safety.



2.8

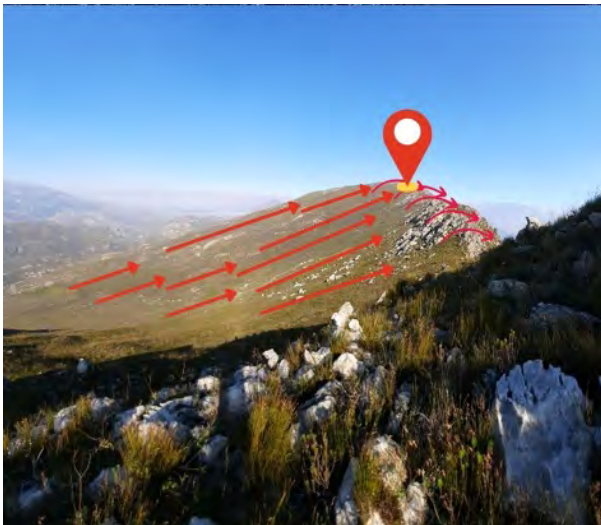
On high FDI days and days where fuel, weather and topography align to produce more extreme fire behaviour, it is possible for a wide fire front to move rapidly upslope. This would not be a single line of fire but rather a wide area catching on fire at the same time, moving rapidly upslope and increasing in intensity as it builds upslope. This scenario would likely play out from a wildfire that comes from the base of the slope, driven by strong wind. This scenario would threaten life and possibly result in heat and fire damage to upper cableway facilities. Structural damage would be dependent on preparedness measures undertaken.



2.9

Following on from 2.8, the fire front will continue over the top of the ridge and only slow in intensity on the back side of the ridge. When a wildfire has so much momentum, it takes a while to drop and slow in intensity.

This means even the flatter ridge top and the back side of the ridge will face intense fire conditions.



2.10

If we remove the smoke and fire graphics from images 2.8 and 2.9, the arrows indicate the movement of fire and air. The fire, consuming oxygen and drawing in air, will likely have a tendency to adhere to nearby surfaces (Coandă effect). After it dissipates some energy and fuels are less likely to be preheated on the back side of the ridge the Lee Rotor Winds will start to have an effect, possibly resulting in spot fires and turbulent air and fire movement on the back side of the ridge.

2.8-10 present one of the worst-case scenarios in risk planning and preparedness, especially where life safety is a concern, this scenario must be taken seriously.

While any structure, activity or business situated within a wilderness area in the Western Cape will be subject to wildfire risk, it is the location specific risks that will create the risk profile. Included in this analysis we have highlighted a relationship between fuels, weather and topography which create scenarios for problematic fire conditions.

3. General Analysis. Consideration of factors to consider in wildfire preparedness and response



3.1 Fire History



Jonkershoek Area, February 26, 2021. Image by Wictoryza

This image, from the Jonkershoek Area in 2021, shows a wildfire is racing up a steep slope towards the mountain ridge line. You can see a similar composition of fuels (light fynbos) in the foreground as to what is present on Middagkransberg.

This photo has been included to show how fuels, topography and weather can combine to produce a wide fire front with lots of heat even in light fynbos fuels.

In this image the wind seems to be holding the smoke back at the top of the ridge, meaning the wildfire could have been even more intense if there was a stronger wind behind the fire, pushing it over the ridge.

Franschhoek Wildfires



2016 La-Montagne area of the Franschhoek Valley, ©Patrick Ryan

Above, a wildfire from 2016 in the La-Montagne area of the Franschhoek Valley, on a south west aspect slope. There is a mixture of fuels located here, similar to the lower cable station area.

The wildfire started at the base of the mountain and was at the top within about 2 hours. There was a very little wind, making the fire primarily slope driven. Even with a rapid response the wildfire was not able to be contained until 48 hours later when cooler weather settled into the area and the wildfire was backing down a slope on the other side of the mountain.

These images have been included to show how much smoke is produced from wildfires, and from wildfire far away, it would definitely impact cableway operations. In addition, this wildfire was situated on a cooler aspect slope, with calm winds, and was difficult to contain. It also represents how slope drives wildfires up the mountains.

Other General Images of Franschhoek Area Wildfires



Images shared by Franschhoek Fire Management Unit: Ashley Bauer

Franschhoek Fire Trends

At the wildfire stakeholders meeting in Franschhoek, the discussion around wildfires in the area highlighted the frequency and severity of wildfires in the Franschhoek region. There is, on average, a major wildfire that affects the Middagkransberg and Franschhoek Pass area every 10 years. There are regular wildfires, every year, mainly in the summer months that impact some part of the valley in some way.

Large wildfires often originate in the Theewaterskloof area and are funnelled through the valleys and steep mountainous terrain by the prevailing South Easter wind. These wildfires tend to burn large areas with the most recent wildfire burning from Theewaterskloof area, all the way into the Jonkershoek valley in 2021.

In the Western Cape, the trend over the last 5-10 years has seen the North Westerly wind driven wildfires resulting in the most devastation and loss to life, farms, homes, infrastructure, and firefighting assets. These fronts come with strong gusting winds, and in the Autumn when the fuels are still dry from summer, they are often preceded by berg winds (hot dry winds), with little or no precipitation forecast. They can be the perfect mix for extreme fire conditions. As a result, planning for extreme wildfires should incorporate all, high hazard, fire conditions, not just the most common conditions.

3.2 Response to Wildfires

The Cape Winelands District Municipality is the responsible authority for wildfires in the area of the cableway. It must be noted that there is a Municipal boundary in the general area. It may be that a wildfire originates in the Theewaterskloof area, in which case the wildfire might initially be under the authority of the Overberg District Municipality. CapeNature are also a major stakeholder and role-player in wildfire management and control in the area with their reserves in the region.

There are a number of acts governing fire suppression, however the one to highlight in terms of authority over wildfire suppression is the **Local Government: Municipal Structures Act 117 Of 1998 - An extract from the Act:**

84 Division of functions and powers between district and local municipalities

(1) A district municipality has the following functions and powers:

Fire fighting services serving the area of the district municipality as a whole, which includes-

- *planning, co-ordination and regulation of fire services;*
- *specialised fire fighting services such as mountain, veld and chemical fire services;*
- *co-ordination of the standardisation of infrastructure, vehicles, equipment and procedures;*
- *training of fire officers.*

The Cape Winelands District Municipality is the primary authority for wildfires in the region of the proposed cableway. The Stellenbosch Municipal Fire Services may also be involved; however, their function is more closely associated to structural firefighting services.

There is normally a unified effort in tackling wildfires, especially larger fires. The cableway company through the landowners (on which the cableway is situated) should be involved with the Fire Protection Association (FPA). As a land user they need to focus on preparedness, as well as actions around reporting fires, providing access, and fire response procedures. (We cover landowners and FPA responsibilities in the next chapter).

There are many stakeholders and role-players involved in wildfire preparedness, response, and recovery in the area.

- District and Local Municipalities
- CapeNature
- Landowners (Large and Small)
- Private Contractors
- Working on Fire
- Volunteer Organisations
- Others (Such as programs involved in alien invasive clearing for example).

3.3 Landowner Wildfire Responsibilities

The proposed lower cable station will be situated on Erf 1466 (Haute Cabriere) and the upper cable station, located on the mountain on the Remainder of Erf 23, within the Mont Rochelle Nature Reserve (Stellenbosch Municipality).

Both landowners, and any lessee of the land, need to comply with the **National Veld and Forest Fire Act No.101 of 1998**. Here are some key extracts from the act, however we recommend the cableway company make themselves aware of everything contained in the act. This can be downloaded here:

https://www.dffe.gov.za/sites/default/files/legislations/nationalveldandforestfireact_no101of1998_g19515vol401.pdf

Purpose of the Act

1. (1) *The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic.*
- (2) *The Act provides for a variety of institutions, methods and practices for achieving the purpose.*

Chapter 4 places a duty on owners to prepare and maintain firebreaks.

Duty to prepare and maintain firebreaks

12. (1) *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 side of the boundary between his or her land and any adjoining land.*
- (7) *Owners of adjoining land may agree to position a common firebreak away from the boundary.*

Requirements for firebreaks

13. *An owner who is obliged to prepare and maintain a firebreak must ensure that, with due regard to the weather, climate, terrain, and vegetation of the area—*
 - (a) *it is wide enough and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land;*
 - (b) *it does not cause soil erosion; and*
 - (c) *it is reasonably free of inflammable material capable of carrying a veldfire across it.*

Chapter 5 places a duty on all owners to acquire equipment and have available personnel to fight fires. Certain persons and officials are given the power to enter land and fight fires in an emergency. It provides for agreements to be entered into between the Minister and fire protection associations, or between such associations, to assist each other in the case of a fire.

Readiness for firefighting

17. (1) *Every owner on whose land a veldfire may start or burn or from whose land it may spread must—*
 - (a) *have such equipment, protective clothing and trained personnel for extinguishing fires as are—*
 - (i) *prescribed; or*
 - (ii) *in the absence of prescribed requirements, reasonably required in the circumstances;*
 - (b) *ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will—*
 - (i) *extinguish the fire or assist in doing so; and*
 - (ii) *take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.*
- (2) *An owner may appoint an agent to do all that he or she is required to do in terms of this section.*

Actions to fight fires

18. (1) *Any owner who has reason to believe that a fire on his or her land or the land of an adjoining owner may endanger life, property or the environment, must immediately—*
 - (a) *take all reasonable steps to notify—*
 - (i) *the fire protection officer or, failing him or her, any member of the executive committee of the fire protection association, if one exists for the area; and*
 - (ii) *the owners of adjoining land; and*

(b) do everything in his or her power to stop the spread of the fire.

(2) Any person who has reason to believe that a fire on any land may endanger life, property or the environment, may, together with any other person under his or her control, enter that land or land to which the fire can spread in order to prevent that fire from spreading or to extinguish it.

Chapter 7 sets out the relevant offences in terms of the Act and the penalties applicable.

Offences

25.

(3) Any person who—

(a) fails to prepare a firebreak when obliged to do so in terms of section 12(1) or 14;

(4) Any person who—

(a) fails to meet the standards of readiness for firefighting referred to in section 17(1);

(b) fails to notify the persons referred to in section 18(1)(a);

(c) refuses to assist a fire protection officer or a forest officer in terms of section 18(3)(b) or 18(4)(b); or

(d) hinders or obstructs any person referred to in section 18(2) or any fire protection officer referred to in section 18(3) or any forest officer referred to in section 18(4), is guilty of a second category offence.

(5) Any owner, occupier or person in control of land on which a fire occurs who fails to take reasonable steps to extinguish the fire or to confine it to that land or to prevent it from causing damage to property on adjoining land, is guilty of a first category offence.

(7) Negligence amounts to fault for the purposes of an offence in terms of this section.

Relationship between the National Veld and Forest Fire Act and other statutes.

(Extract from Guide to interpreting and implementing the National Veld and Forest Fire Act No. 101 of 1998)

- The Constitution of the Republic of South Africa
- Forest Act No. 122 of 1984
- Fire Brigade Services Act No. 99 of 1987
- The Fire Brigade Services Act provides for the establishment, co-ordination and standardisation of fire brigade services.
- The Disaster Management Act, No. 57 of 2002
- The Conservation of Agricultural Resources Act No. 43 of 1983 (CARA)
- The Mountain Catchment Areas Act No. 63 of 1970
- The Atmospheric Pollution Prevention Act No. 45 of 1965
- The National Environmental Management Act No. 107 of 1998
- Compensation for Occupational Injuries and Diseases Act No. 130 of 1993
- Occupational Health and Safety Act No. 85 of 1993
- Criminal Procedure Act No. 51 of 1977
- Local authority legislation

The cableway company should make themselves aware of the act as well as ensure that full compliance, (by the landowners on which the cableway is situated), is in place if they are going to the making use of the land.

All landowners have a responsibility for wildfires in terms of **NO. 101 OF 1998: NATIONAL VELD AND FOREST FIRE ACT, 1998**. 'Owner' means any landowner with title deed, as well as a lessee, or other person legally controlling land, the executive body of a community, the manager of State land, and the chief executive officer of any local authority, or their duly appointed agents in the cases of State land (including South African National Defence Force land).

All owners on whose land a veldfire (wildfire) may start or burn or from whose land it may spread must:

- Prepare firebreaks on their side of the boundary if there is a reasonable risk of veldfire.
- Have such equipment, protective clothing, and trained personnel for extinguishing fires as prescribed (in the regulations)
- If there are no regulations, reasonably required in the circumstances.

- Take all reasonable steps to notify the Fire Protection Officer (FPO) of the local Fire Protection Association FPA (if there is one) when a fire breaks out. (In addition, the District Municipality Fire Services should be notified, preferably immediately so that a response can be activated).
- Do everything in their power to stop the spread of the fire.

The Act also requires that if the owner is absent, they must have a responsible person present on or nearby their land to:

- Extinguish a fire if one broke out or assist others to do so.
- Take all reasonable steps to alert the neighbours and the FPA (if there is one).
- The owner may appoint an agent to act on his or her behalf to perform these duties.

It is not compulsory for most owners to join a Fire Protection Association (FPA) if one is registered in the area where they live. This is because the right to freedom of association in the Constitution must be upheld, but also because landowners themselves need to make a firm commitment, voluntarily, to co-operate through FPAs. But certain owners must join an FPA when it has registered:

- The owners of State land, whether it is held by the national or provincial government
- The owners of land held in trust for communities by the Minister of Land Affairs or the Ingonyama Trust, which usually means the executive body of community exercising control over that land, because they are in control of land held in trust for them by the State.
- A municipality within the area of the FPA, if it has a fire service.

Wildfire safety and property protection is optimised when all landowners work together to prepare for wildfires, introduce vegetation management strategies and have clear plans in place to attempt to limit the spread of fire on their properties.

Winelands Fire Protection Association

Office Landline No.: +27 (021) 888 5821

Duty Phone No.: 076 134 5265

Cnr Bird- & Langenhoven Street, Stellenbosch, 7599

Manager: Dale Nortje manager@winelandsfpa.co.za

Administration: Tania Cloete info@winelandsfpa.co.za

Burn permits & GQIS: Esme Jordaan projects@winelandsfpa.co.za

3.4 Principles of Wildfire Spread and Structure Vulnerability to Wildfires

Wildfires will spread due to one, but most likely a combination, of these primary factors. Wildfire preparedness, response, and recovery should consider these factors to limit the threat to life and damage to property, structures, and infrastructure.

1. Direct Flame / Heat Contact
2. Embers (Firebrands)
3. Structure to Structure Ignitions

Direct Flame / Heat Contact

A wildfire can burn at incredibly high temperatures, 800°C to 1200°C at its hottest levels and generate enough radiant and convective heat that any flammable material ahead of the flaming front becomes preheated and ignition occurs unless there is some intervention or fuels run out. Finer fuels are easily combustible materials such as grasses, fynbos, dry sticks, curtains in a home, pine needles in gutter etc. and can easily ignite from radiant heat alone and carry fire to the heavier fuels or materials such as bushes, trees, balconies, roofs, carpets, gutters etc. Slope directly affects the preheating rate of the fuels, as the steeper the slope the more the convective heat column is combined with radiant heat spread and the closer this is brought to the upslope fuels. Strong winds can have a similar effect. If conditions are favourable, ALL flammable fuels, including homes in their path can burn.

Ignitions from direct flame / heat contact can occur when a flaming front passes through an area, especially an area with enough continuity of vegetation or other flammable material to carry a fire. In a building, all it takes is one small ignition in the wrong place for the entire structure to be lost.



See the image above. The flaming front doesn't necessarily have to make contact with the fuel in its pathway for it to ignite. Radiant heat (or convective heat if on a slope), can heat the fuels (garden and parts of the structure) to ignition point.

Embers

A significant threat of damage or loss comes from embers. These are burning pieces of organic material such as bark and twigs that are lifted into the air by the convectional updraft of the fire and travel in the wind from the area of fire settling in areas of combustible vegetation (fuel) or on structures (such as in gutters, eaves, decks). During a wildfire, embers can occur before, during and after a flaming front. Before a flaming front reaches you, as well as during, the intensity of embers will typically be at the highest, however do not discount ember threat for the extended period after the main wildfire has passed your area. If there is burning fuel anywhere in the general area combined with wind to carry embers, there is a threat.

Embers pose a threat because they ignite vegetation, fences, door mats, garden furniture, etc., close to structures which then carry the fire into the structure. Of equal concern is the embers that also set fire directly to structures in various ways where they find dry timber, organic material in gutters, roof vents, eaves etc. Embers force their way into vulnerable areas, collecting in 'weak points' around a structure and they have a potential to start a fire that can quickly spread throughout. Several scientific studies have been conducted in the USA and Australia, the results of which point to the highest percentage of damage and loss of structures coming from embers. This percentage is far higher than any other ignition sources, (such as direct heat exposure).



The illustration on the left depicts burning material, (embers), being carried from a fire over some distance towards a structure. Each one of these embers flying through the air has the potential to enter vulnerable areas of a structure (or home) also known as the Home Ignition Zone (HIZ) and cause an ignition. Minimising gaps and areas where dry fuels can accumulate, will significantly increase the structures resistance to ember attack. Paying attention to these vulnerable points around a structure can alert you to an ignition while it is still small, and you can deal with it before it takes hold.



Image credit: Justin Sullivan c/o Sullivan Photography.

Left: The photograph clearly shows the reality of how many embers are thrown into the air and carried by the wind when vegetation is burning. Embers can originate from fynbos, trees, bushes, burning homes in the form of bark, twigs, wood chips, pinecones, etc. These can burn for long periods of time and are easily carried by the wind, making them ideal carriers of fire.

***"In Wildfires, Big Flames Attract Attention
But Watch Out for The Embers"***

Dr. Jack Cohen, pre-eminent fire scientist

The **Home Ignition Zone** is the area that immediately surrounds a home (or structure) and extends up to 30m out and away from that structure. Ignitions that occur within this zone pose a significant threat and have a high probability of leading to other homes and structures being lost. Once a home ignites a chain reaction can occur as depicted in the illustration to the right. Radiant heat (+ embers) can result in ignitions, even without any direct flame contact.



Structure to Structure Ignitions

The other threat to many structures within a community could come from another adjacent structure (home, shed, office) which catches alight. Once a structure has ignited the radiant heat given off is enough to cause the preheating of fuels (other homes, fences, gardens) close by. A burning structure will also produce significant embers adding to the threat downwind. When one or more structure catch fire, they can cause a chain reaction destroying an entire block or suburb.

This has been experienced on many wildfires around South Africa (and the world). In recent times, examples communicated in the press include entire suburbs (bricks and mortar homes) impacted in the 2017 Knysna Fires, as well as the thatch homes of St Francis Bay. The reality is that structure to structure ignitions are a fairly common occurrence on wildland urban interface incidents throughout the Western Cape and South Africa every fire season.



Image Left (A&B Structures)

Analysis from the Knysna Fires of 2017 gives us an example of a likely structure-to-structure ignition.

Home A was determined to catch fire first due to embers landing in vulnerable areas.

Due to the proximity of Home B and prevailing wind direction, **Home B** likely caught fire and burned down due to a structure-to-structure ignition.



Image Left (B Structure)

With reference to the image above, **Home B** shows the results of exposure to extreme heat from **Home A**.

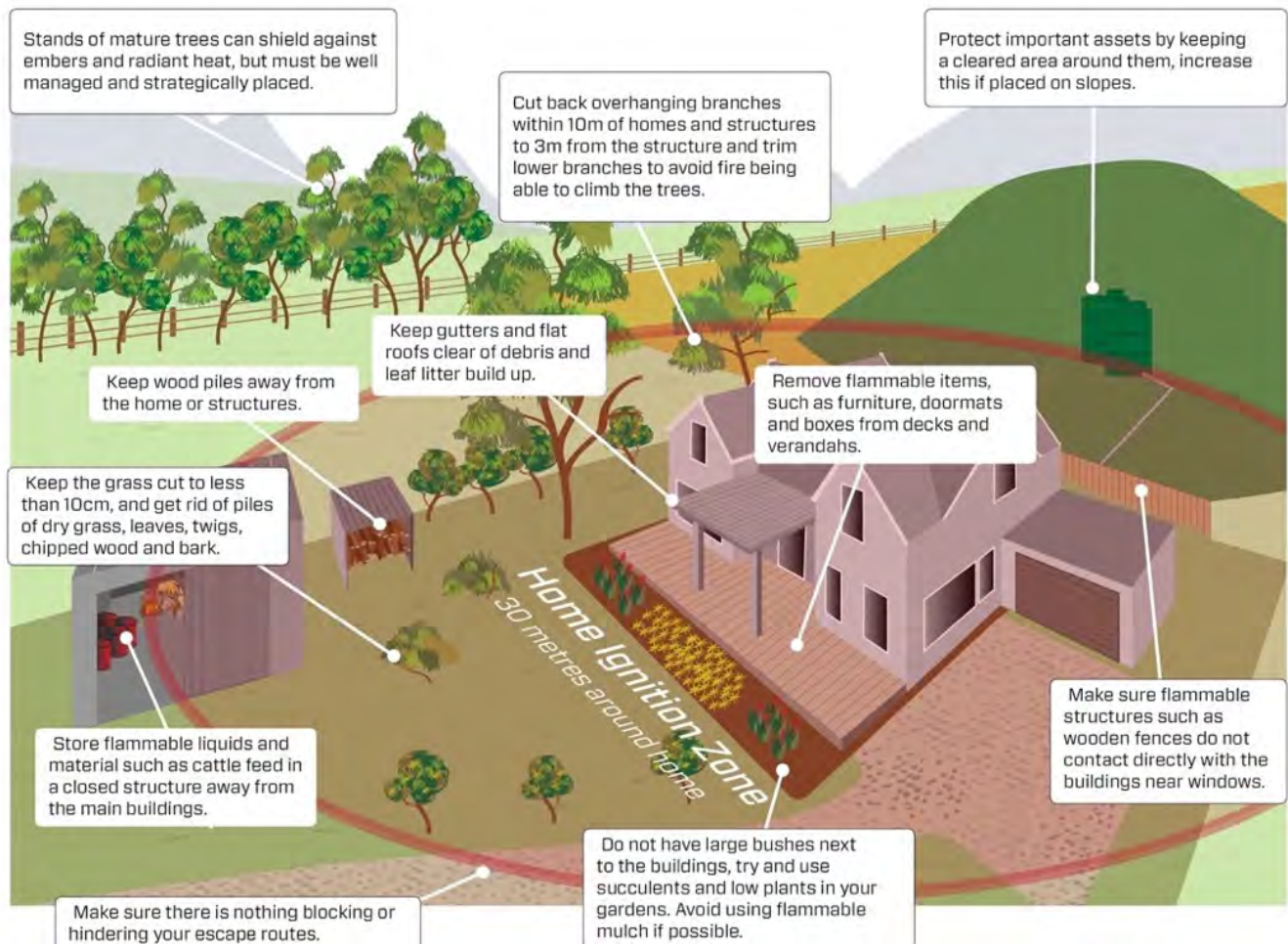
Despite being made of bricks and mortar, the home was too close to the intense heat of burning structure A. With a distance of less than 30m separating them, it is most likely **Home B** was lost due to a structure-to-structure ignition.

If a home ignites there is often intense focus (tunnel vision) on the burning structure. It is therefore important to understand the potential for even greater loss and to have plans and processes in place of what will be done if this were to occur during an incident. Homeowners, business owners, community members are not firefighters and the greatest action for them comes in form of defence i.e., preparedness.

Taking action to prepare structures from igniting in the first place must be a top priority. Being Wildfire Ready as a owner is further enhanced by the wider community also becoming Wildfire Ready. Community wide preparedness puts everyone in a better position to withstand wildfires.

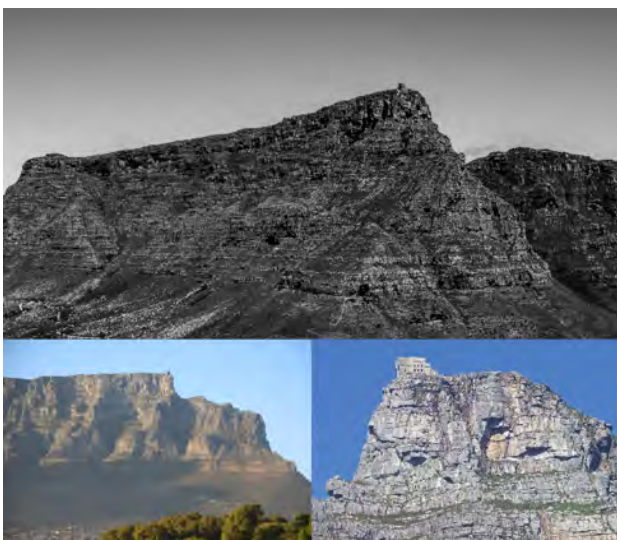
Co-existing with wildfire means taking active measures to reduce wildfire risks.

The image below gives an indication of the fine eye for detail that you need to have when you are assessing the wildfire risks around a home or structure. Pay particular attention to the area within the Home Ignition Zone (HIZ), starting there first to reduce the risks. This doesn't mean you can ignore the area beyond 30m but you can prioritise your HIZ first and then work further outwards, continuing to break fuel paths and reduce ignition potential from embers and heat.





Section B: Risk Analysis and Recommendations



There are several key factors which create a high to extreme wildfire risk level and therefore must be considered when looking at threat to life safety and structure vulnerability given the location of proposed upper cableway site, and lower site.

- The proposed cableway area has a high historical record of major wildfires impacting the area with an approximate interval of 10 years.
- Vegetation prone to burning (fire driven ecosystem) is present on both sides of mountain. The fire fuels are made up of invasive alien vegetation & fynbos on western side and fynbos on eastern side.
- The topography, weather and fuels combine to create conditions for potential extreme fire behaviour, particularly on the eastern slopes. The photo with arrows (top image) indicates the steep slope, with continuous fuels (vegetation) which lead to the proposed upper cable station. The prevailing South Easterly wind in summer has historically driven wildfires up the steep slope in fynbos that burns with high rate of speed and intensity. Currently the fynbos is young (+/- 3 years) but as it ages it will add to the fuel load and therefore fire intensity (risk).
- Upper station - there are currently no roads or paths that exist for evacuating people off this remote wilderness area. The option to build a road to the upper station was considered, but due to the aquatic and terrestrial biodiversity constraints, the road was considered a fatal flaw from an environmental risk perspective.
- Upper station - a wildfire has the potential to impact this area within 30-45min under extreme conditions, and if an ignition occurred on the pass road for example.

In comparison to Table Mountain Cableway, for example:

- This cableway area has a flat top, with sparse fuels, and paved areas. The risk to life and structures is low (at the cable station general area).
- Low fuel (vegetation) continuity in the general area and protection from high cliffs around the flat top area further enhance the safety of this spot from wildfires. The comparison to fuel pathways in the Franschhoek area very noticeable.
- There are no major wildfires in recent or extended history for this section (cableway area) of mountain on record (for over 100 years). There have been some smaller wildfires in the general area, which have not threatened life or structures around the cableway.
- Multiple escape route paths, in different directions exist with some that take people to dams which has road access down the mountain.

4. Wildfire Stakeholder Considerations



Vulcan Wildfire Management organised a meeting with key, local wildfire stakeholders who would analyse the project with their experience of wildfires, general wildfire understanding, as well as their organisational responsibility or authority in mind.

This meeting took place Thursday 09 June, 10:00, at the Franschhoek Council Chambers

Attendance

- Chief Fire Officer: Cape Winelands District Municipality: Wayne Josias
- Ward Councillor: Reginald Pheiffer
- Franschhoek Fire Management Unit: Ashley Bauer
- Vulcan Wildfire Management: Ryan Heydenrych
- Vulcan Wildfire Management: Rouvanne van den Berg

Apologies

- Winelands Fire Protection Association: Dale Nortje

(Emailed Comments)

Invited (Not in Attendance)

- Stellenbosch Municipality Environmental Dept. Schalk VD Merwe
- Stellenbosch Municipality Environmental Dept. Tammy Leibrandt
- Chief Fire Officer: Stellenbosch Fire and Rescue Services Wayne Smith
- CapeNature: Jo Alberts

(Included in all communications, no comments received)

Vulcan Wildfire Management welcomed and thanked all in attendance as well as gave a project overview of the Franschhoek Cableway Project which included rough graphics of the cableway locations as well as conceptual designs. Discussion was then grouped into risks faced by the project at the upper and lower cable stations. The following are points which summarised the meeting comments and discussion.

Note: Meeting notes were circulated, and corrections or further comments were invited. No further comments or additions were received apart from Winelands Fire Protection Association: Dale Nortje who was unable to make the meeting due to being required at a wildfire operation. Mr. Nortje provided some comments via email which were aligned with the meeting.

Upper Cable Station Considerations

- At an approximate interval of 10 years there is a major wildfire incident that impacts the slopes of the proposed upper cable station.
- The primary risk to consider is life safety. The impact to structures, business continuity, assets is secondary. Wildfires have historically, and are expected to move fast, causing extreme fire behaviour conditions and could result in fatalities, serious injury and be very threatening in many circumstances if there are not appropriate safety measures in place.
- The risk profile of the upper station and its operations must be assessed on an ongoing basis – annually is recommended.
- On high FDI days, in particular red days, the cableway must suspend all operations due to unacceptable wildfire risk. This includes suspending work during the construction phase. Additional hot work considerations and procedures must be in place to reduce any potential source which can cause ignition to surrounding vegetation. (Red days in 2020 – almost weekly, 2021 – 3 or 4 days)

- The wildfire risk of this activity impacts surrounding land and visa-versa. In this context this operation should have a larger area plan to lower and maintain a lower wildfire risk profile. This means contributing to integrated wildfire management of the general area (on their own {Cableway footprint} and neighbouring land) including activities such as:
 - Invasive alien fuel clearing and maintenance programs.
 - The vegetation below the entire cableway and around the upper and lower stations must be well maintained to reduce risk in case of wildfire.
 - Fuel reduction: clearing, burning operations must take place.
 - Burning for biodiversity and maintaining vegetation of different ages to prevent build-up of older vegetation across a large area.
 - Contributing to area strategic firebreaks and fuel buffer zones.
 - Early warning detection: Given the vantage point of the upper station, having camera detection systems to detect ignitions (smoke) as well as an early warning reporting mechanism linked to a watch room is essential. This must identify ignitions in a 360-degree area, at the greatest distance possible for detection systems.
- There needs to be a detailed emergency and evacuation plan appropriate for the expected numbers at the upper cable station area. Given expected numbers the cableway might not be able to return everyone to the lower station before a wildfire impacts the area. Persons on the mountain could include elderly, children, disabled, and those not dressed for, or familiar with, mountain conditions. Therefore, the following needs to be in place.
 - Detailed emergency and evacuation plan. (Wildfire heat and smoke could potentially impact the upper station within a minimum of 8 minutes and up to 30-45 minutes of a fire starting near the R45 under fire weather conditions).
 - There must be a constructed helipad for emergency operations.
 - It should be required that there is road access, preferably 2 different routes off the mountain for vehicles to extract visitors off the mountain. This road should have a fuel buffer zone, maintained to 50m either side of this evacuation route. This road is not to be used for visitor access, it must be purely used for utility access and emergency situations. The road must be constructed in a manner that a fire truck and emergency response vehicles can access the upper station. In addition, a standard multi-person carrier, at least being able to carry 12-20 persons must be able to drive safely on this road. It must have dual carriage way (passing spots) built into it as well as turning points built into it at regular intervals.
 - There must also be a designated safety zone constructed which limits exposure to smoke and heat and can accommodate a large number of people in a last resort survival situation.
 - An early warning wildfire detection system must also include a siren and public address system to alert all on the mountain.
- The upper cable station should be equipped with water tanks (independent water source for at least one hour) for the purpose of firefighting efforts.
- Wildfire suppression insurance for the landowner and cable station operator is vital. This must include aerial resource, firefighting vehicles, and firefighting crews for response, mop up, monitoring and recovery from wildfires.
- The buildings, walkways and facilities should be constructed with fire resistant materials.
- It is recommended that cableway staff undergo basic wildfire, incident management, building fire safety and relevant OHSA training.
- It is recommended that construction staff undergo wildfire awareness and safety training prior to working in the remote location of the upper cableway station.

- The upper cable station should provide a smoking area and prevent smoking in all other areas.
- There must be an alternate power supply for the cableway so that it can operate in case of load shedding.

Lower Cable Station Considerations

- The lower station area experiences regular wildfires (also around a 10-year interval), although the impact, severity and risk is different compared to the upper station as the access/egress provides for better response and evacuation of this lower station area.
- There must be consideration for a no-fly zone around the cableway lines from the bottom to the top. There might also be an impact to helicopter access to water in the Haute Cabriere dam which must be looked into.
- The lower cable station should have wildfire awareness information clearly displayed, such as an FDI board which indicates the current FDI and what this means to visitors. There should also be a safety briefing or announcement of some kind which draws visitor attention to the fact they are entering a wilderness area where wildfires are possible, and they must be informed on what steps to take if a wildfire is detected. It was noted that awareness information must not scare people, it must serve to inform.

General Recommendations

- The cableway operations should link into the Stellenbosch Safety Partnership in some way with direct communication lines to the control room. (Which can be done via radio).
- The vegetation directly below the proposed cableway path is noted as having invasive alien vegetation particularly on the lower slopes and this needs to be cut and removed within agreed upon parameters to reduce risk, prior to any operations. In addition it is recommended the cable way company support vegetation management strategy operations by joining the Fire Protection Association and contributing to the vegetation management budget of the Fire Protection Association with a focus on vegetation management operations located within a 2.5km radius of both the lower and upper cable way stations.
- The landowners where the cableway is situated must be compliant FPA members and maintain this status for operations to continue.

5. Wildfire Risk Analysis Tables



Risk Categories

To quantify and compare risk levels to the different cableway structures and potential impact on life and other infrastructure Vulcan Wildfire Management used a tool to rank factors which influence risk into Risk Categories which consider the (LIS) Level, which stands for Likelihood. Intensity. Susceptibility.

There are five different categories of risk which are rated as follows.

Extremely High Risk LIS 5
High Risk LIS 4
Medium Risk LIS 3
Low Risk LIS 2
Insignificant Risk LIS 1

Based on the detailed analysis, as provided in the report, Vulcan Wildfire Management complete the risk categories with all this information in mind. It must be noted that some risk levels can be reduced, while others will always remain the same. We have noted in our risk table where this is applicable.

Vulcan Wildfire Management developed this tool to assess risk. This tool can be used to ascertain why certain structures or areas are placed at a specific risk level. This is to be used as a guide to enhance your own understanding of what influences risk with regards to wildfires, as well as what can be done to possibly reduce risk.

The factors assessed are those which influence the risk level to life, homes, assets, infrastructure. They are as follows:

A: Fuels

B: Fuel Proximity to Structures

C: Embers

D: Wildfire Behaviour

E: Structure to Structure

F: Structure Ignition Zone

G: Threat to Life

H: Threat Animals (Domestic/Livestock)

I: Defensive Actions

J: Fire Services

Wildfire Risk Impact Analysis (Page 1 of 2)								
Factors Influencing the Risk Level to Life, Homes, Assets, Infrastructure	Risk Category (LIS) Level Likelihood. Intensity. Susceptibility.					Lower Station	Under Cable	Upper Station
	Extremely High Risk LIS 5	High Risk LIS 4	Medium Risk LIS 3	Low Risk LIS 2	Insignificant Risk LIS 1			
<p><u>A: Fuels</u></p> <p>Fuel Condition: age, moisture content, oil content, continuity</p> <p>Types of Fuels: light (grasses), medium (bushes and shrubs) heavy (trees).</p> <p>Fuel Risk Factors: Prone to produce embers (blue gum bark, pine cones, palms).</p>	Significantly large wilderness or natural fuel belts in the general area. In the immediate area there is a large build up of dead and dry fuels with high continuity as well as a mixture of light, medium and heavy fuels. Problematic fuels are also abundant.	Large wilderness or natural fuel belts in the general area. In the immediate area there is a notable build up of dead and dry fuels with medium to high continuity as well as a mixture of light, medium and heavy fuels. Problematic fuels are widespread but not all over. Or , continuous, high chemical content, 7+ years old indigenous fuels such as fynbos, renosterveld, or similar fuels.	Approximately half the immediate area has build up of dead and dry fuels. Horizontal fuel continuity is high but only a small percentage of area has vertical continuity. There's a mixture of light, medium, and limited heavy fuels. Problematic fuels such as Eucalyptus are sporadic. Or, continuous, high chemical content, 3-7 years old, indigenous fuels such as fynbos, renosterveld, or similar fuels.	All fuels are in a young, state. Light, medium and heavy fuels exist but not in abundance and they are separated from one another i.e. minimal continuity. Minimal problematic fuels. Or, continuous, high chemical content, 1-3 year old, indigenous fuels such as fynbos, renosterveld, or similar fuels.	Fuels are in a young, high moisture state, with very low continuity, low chemical content. Minimal to no, medium or heavy fuels. Zero problematic fuels in area.	LIS 4 High Risk	LIS 3 Medium Risk (Fuels under cable rated for wildfire spread risk potential, as well as risk to cable car if operating)	LIS 2 Low Risk (Current) LIS 3, 4 (Potential, as fynbos ages)
<p><u>B: Fuel Proximity to Structures</u></p> <p>Proximity of Fuels & Heat Exposure Potential. The vertical and horizontal arrangement of fuels around homes, assets, infrastructure will indicate the potential threat posed by heat. Barriers = Man made or natural breaks in fuel considered HIZ = Home (Structure) Ignition Zone, 30m considered</p>	Structures, assets, infrastructure completely surrounded, no clear barriers, high fuel continuity from wilderness areas as well as immediate area.	Structures, assets, infrastructure mostly surrounded, very few barriers, high fuel continuity from wilderness areas as well as immediate area.	Structures, assets, infrastructure mostly clear of immediate fuel threats. Strategic barriers are in place and well positioned. Beyond the 30m HIZ there exists potential for wildfires to generate heat which will pose limited threat levels.	Structures, assets, infrastructure predominantly clear of fuel threats with only a small percentage of light to medium fuels posing a low level of risk. Strategic barriers are in place and well positioned. The 30m HIZ has been well thought out with low ignition potential.	Structures, assets, infrastructure are well away from any fuel threats. The general and immediate area poses no heat threats from wildfires.	LIS 3 Medium Risk	LIS 4 High Risk (Fuels under cable rated for wildfire spread risk potential, as well as risk to cable car if operating)	LIS 4 High Risk
<p><u>C: Embers</u></p> <p>Ember Attack Potential: Burning firebrands with potential to start new fires. The type of vegetation, fire intensity and weather conditions will influence the amount, intensity and area affected by embers.</p>	Given proximity and type of fuels ember storms covering the area extremely likely.	High intensity of embers to be expected over area with high threat level.	Medium intensity of embers to be expected over area with moderate threat level.	Under extreme conditions, long range embers may travel into area and pose limited, medium risk.	Under extreme conditions, long range embers may travel into area and pose low risk.	LIS 4 High Risk	LIS 4 High Risk (Fuels under cable rated for wildfire spread risk potential from embers not the ember threat to cable car),	LIS 3 Medium Risk
<p><u>D: Wildfire Behaviour</u></p> <p>Expected Fire Behaviour: The three most significant factors affecting fire behaviour are Fuels, Weather & Topography.</p>	Extreme fire behaviour with prolonged extreme intensity highly likely.	Extreme fire behaviour with periods of high to extreme intensity likely.	Moderate to high intensity fire, with limited, or waves, of extreme fire behaviour periods expected.	Moderate to low intensity fire and fire behaviour expected.	Low intensity fire expected.	LIS 3 Medium Risk	LIS 3 Medium Risk (Wildfire behaviour spread risk potential, as well as risk to cable car if operating)	LIS 3 Medium Risk
<p><u>E: Structure to Structure</u></p> <p>Structure to Structure Ignition Potential: The closer structures are located to one another the greater the threat of a burning structure resulting in a chain reaction, causing another or multiple homes to catch fire from increased heat and ember exposure.</p>	Extremely high likelihood	If one structure ignited, high chance of multiple structures catching fire in a chain reaction due to heat exposure of close proximity structures.	A moderate threat exists, and some preparedness and defensive measures have been put in place by owners.	Structures are mostly build from fire resistant materials It's possible that a structure could ignite from an ember going unnoticed and indirectly affecting other structures in the area with further embers if it did catch fire.	Plausible under extraordinary conditions however threat level very low.	LIS 3 Medium Risk (Based on lower station and existing structures on farm)	n/a	It is unknown what structures will be built at the upper cable way site.
<p><u>F: Structure Ignition Zone</u></p> <p>Accumulated percentage of vulnerabilities to structures. Looking at all likely risk factor variables in the HIZ (30m radius around the home (structures)), what is the percentage survival rate of the homes, assets, infrastructure due to accumulation of vulnerabilities present. (100% Max Loss - 0% No Loss)</p>	90-100%	50-90%	30-50%	20-30%	5-20%	LIS 3 Medium Risk	LIS 2 Low Risk (Risk to cable car if operating)	LIS 3 Medium Risk

Wildfire Risk Impact Analysis (Page 2 of 2)

Factors Influencing the Risk Level to Life, Homes, Assets, Infrastructure	Risk Category (LIS) Level Likelihood. Intensity. Susceptibility.					Lower Station	Under Cable	Upper Station
	Extremely High Risk LIS 5	High Risk LIS 4	Medium Risk LIS 3	Low Risk LIS 2	Insignificant Risk LIS 1			
<p><u>G:Threat to Life</u></p> <p>We evaluate the risk to human life should a person or multiple people remain in the assessed area (or structure) during a wildfire.</p> <p>For this variable, we consider a high intensity wildfire relecant to the area fuels, weather and topography</p>	Loss of life Highly Likely. Risks in the highly likely category are almost certain to occur.	Loss of life Likely. A likely risk has a 60-80% percent chance of occurring.	Loss of life Possible	Loss of life Unlikely	Loss of life Highly Unlikely	LIS 2 Low Risk	LIS 3 Medium Risk (Based on a cable car travelling with people during a wildfire incident under/near the cable)	LIS 4 High Risk (Based on only a cable station being located here with no other mitigation measures considered)
<p><u>H:Threat Animals (Domestic/Livestock)</u></p> <p>We evaluate the risk to human life should any person be present in the area during a wildfire.</p>	Loss of life Highly Likely. Risks in the highly likely category are almost certain to occur.	Loss of life Likely. A likely risk has a 60-80% percent chance of occurring.	Loss of life Possible	Loss of life Unlikely	Loss of life Highly Unlikely	n/a	n/a	n/a
<p><u>I: Defensive Actions</u></p> <p>Chance to prevent damage or loss if defensive actions are taken after wildfire breaks out: Chance of success by <u>owner, occupant, staff</u> (of home, property, business).</p>	Zero chance. Early evacuation critical to preserve life.	Very low chance. Early evacuation of area advised.	Structure defensive measures only advisable if extensive preparation efforts and safety measures in place. Evacuate if extreme fire conditions.	No direct heat threat. Structure defensive measures from ember attack advisable. Moderate smoke exposure expected.	No direct heat threat. Defensive measures from ember attack advisable. Limited smoke exposure expected.	LIS 3 Medium Risk	LIS 1 Insignificant Risk (If operations suspended)	LIS 5 Extremely High Risk
<p><u>J: Fire Services</u></p> <p>Chance to prevent damage or loss if defensive actions are taken after wildfire breaks out: Chance of success by <u>Fire Services</u>.</p>	Not practical to send crews for structure protection measures. No chance to defend structures during an incident. Emergency services would be in extreme danger immediately before, during and in early stages after wildfire affecting the area. Helicopter water drops would be ineffective or not possible.	Plausible that loss might be reduced but tactical success rate very low. Advisable to only move into area after wildfire to prevent or limit total loss. Emergency services would be in extreme danger during an incident. Helicopter water drops, if possible have small chance of success.	Some rapid improvements to the area will assist. Structures, assets, infrastructure defensive efforts will be effective. A medium risk area in which to operate in. Helicopter water drops possible, with some effectiveness.	Structures, assets, infrastructure defensive efforts will be effective. A low risk area in which to operate in. Helicopter water drops effective.	Structures, assets, infrastructure defensive efforts will not be required and advisable to be tasked to homeowners who are capable. Concentrate resources elsewhere. Helicopter water drops not required.	LIS 3 Medium Risk	n/a (Assuming operations suspended)	LIS 4 High Risk



6.1 Risk to Life

The analysis in this report has highlighted the wildfire risks for the different cableway sites as well as the operational risks of transporting large numbers of people into a wilderness area.

The risk to life has to consider multiple scenarios, and part of this is the worst-case scenario for wildfires. The sentiment of the wildfire stakeholders that a road, to use as both an evacuation route for visitors but also an access route for emergency services and fire services was a “must have”. This is due to their, as well as Vulcan Wildfire Managements assessment that there is potential risk to life after considering all the risk factors.

After the wildfire stakeholders meeting, it was communicated to Vulcan Wildfire Management that the option to build a road to the upper cable station was considered, but due to the aquatic and terrestrial biodiversity constraints, the road was considered a fatal flaw from an environmental risk perspective.

This raises a very important question. Is it possible to undertake risk reduction and preparedness measures that would satisfy the wildfire stakeholders that life safety risks could be reduced sufficiently for the project to go ahead?

Before this can be answered, the cable car company needs to develop a comprehensive plan which demonstrates that life safety can be sufficiently addressed. (Especially given that an evacuation road is not possible).

To assist with this, this report contains recommendations that the cable car company and project development team need to undertake and present to the key wildfire stakeholders for consideration. Vulcan Wildfire Management stress that all of these recommendations need to be implemented with a high degree of expertise and quality in terms of implementation effectiveness. And even if they are, it does that guarantee that they will be accepted by the wildfire stakeholders.

In order to be acceptable, some of the recommendations will need to be developed further by professionals in wildfire detection systems, insurance, shelter construction etc. We recommend a detailed development proposal that addresses life safety concerns is presented by the project team and client to the key wildfire stakeholders before any further steps are taken on the project. The client and project team may conclude, when trying to reduce all the wildfire risks that the site location and associated risks pose too much of a challenge to overcome. This is a possible outcome when all risks are considered.

6.2 Risk to Structures

It was noted at the beginning of this report that no specific information was provided regarding the cableway cars, stations, building materials, parking areas or additional facilities. In addition, no construction plans, or operational plans were provided. We will therefore provide some general principles to consider.

It is important to recognise and bear in mind that the entire building or structures built will only be as resistant or ‘hardened’ as their weakest point. Therefore, the smallest details matter, especially with regards to areas where embers can gain entry to or become lodged within a structure. For example, vents or ventilation bricks without an appropriate mesh screen, decking that is not fire-resistant and attached to the building or vulnerabilities and gaps within eaves and roofing material and systems.

While wildfire risk can be mitigated, it can never be eliminated. Even if all mitigation measures are actioned, ignitions of structures can still occur, especially in the cases of extreme fire behaviour. However, if risk reducing measures are implemented and maintained, damage can be limited or avoided.

Just as certain construction materials have different fire resistance ratings so to do different architectural features of a structure. While no structure can withstand prolonged direct flame contact, the correctly designed structure can withstand limited attack from radiant heat and burning embers. The most vulnerable areas of the structure are the roof (and all elements attached to and making up the roofing system), decking or balconies, vents and weep holes, and windows and doors.

Construction Oversight

Oversight during construction as well as an ongoing maintenance plans for ensuring wildfire risk is maintained to an appropriate level is an important aspect to consider. One vulnerability in a structure resulting in an ignition will increase the risk of ignition to other structures that are in close proximity or down wind of a burning structure.

The importance of correct site placement of a structure and the risk reduction measures created around that structure are therefore vital and the following should be considered:

- Avoid selecting a construction site along the edge of a slope, midway up a slope or in a narrow kloof.
- Avoid selecting a construction site in or adjacent to a saddle or a narrow mountain pass.
- Site placement at the immediate top and midway of a slope increase the intensity of the heat energy that will spread from a wildfire and therefore increase the level of risk for construction on that site.

The **upper cable station** site suitability is therefore less than optimal considering these factors and will require a host of risk reduction measures to be in place, and it will still face a high level of risk to damage and destruction despite risk reduction measures, primarily due to its location.

The **lower cable station site** is better suited in this regard and its exposure will be less. Risk reduction measures are still important due to the surrounding area risks; however, risk reduction measures will stand a better chance of succeeding.

General Construction Considerations:

- Balconies, decks, and extended roofs that stand out from the main construction can become heat traps allowing for heat accumulation and increasing the risk of ignition.
- Ensure decks and balconies are constructed to reduce their flammability by use of fire-resistant materials or treatments.
- Construct roofs to reduce their ignition vulnerability.
- If possible, within site planning, orient the narrowest wall of the building toward the likely path of a wildfire, based on wind direction, the effect of slope and vegetation density. This is to allow the burning debris and embers to pass the majority of the building and avoid accumulating next to walls, especially in corners and off-set walls.
- Minimise the number and size of windows on the side of the building facing the likely path of a wildfire to reduce the risk of radiant heat or flying burning debris to break the windows, allowing fire to enter the building. Quality thick glass with double or triple glazing is advised.
- Consider the vegetation characteristics on and adjacent to the construction site, with regards to density, continuity and type.
- Ensure an adequate width Fuel Break is established and maintained.
- Avoid steep driveways or narrow roads to the building as this can limit the ability for fire services vehicles to access the property, as well as lead to congested routes during evacuations.

General Considerations for Decking

- It should be noted that recent research studies in Australia have shown that gaps at 5mm spacing afford an opportunity for embers to become lodged between timbers, which may contribute to an ignition. Larger gap spacings of 10mm may preclude this from happening but such a spacing regime may not be practical for a timber deck. Standards Australia, AS 3959 - 2009, s. 9.
- Wooden decking is not advised for any structures in either location due to the risks.

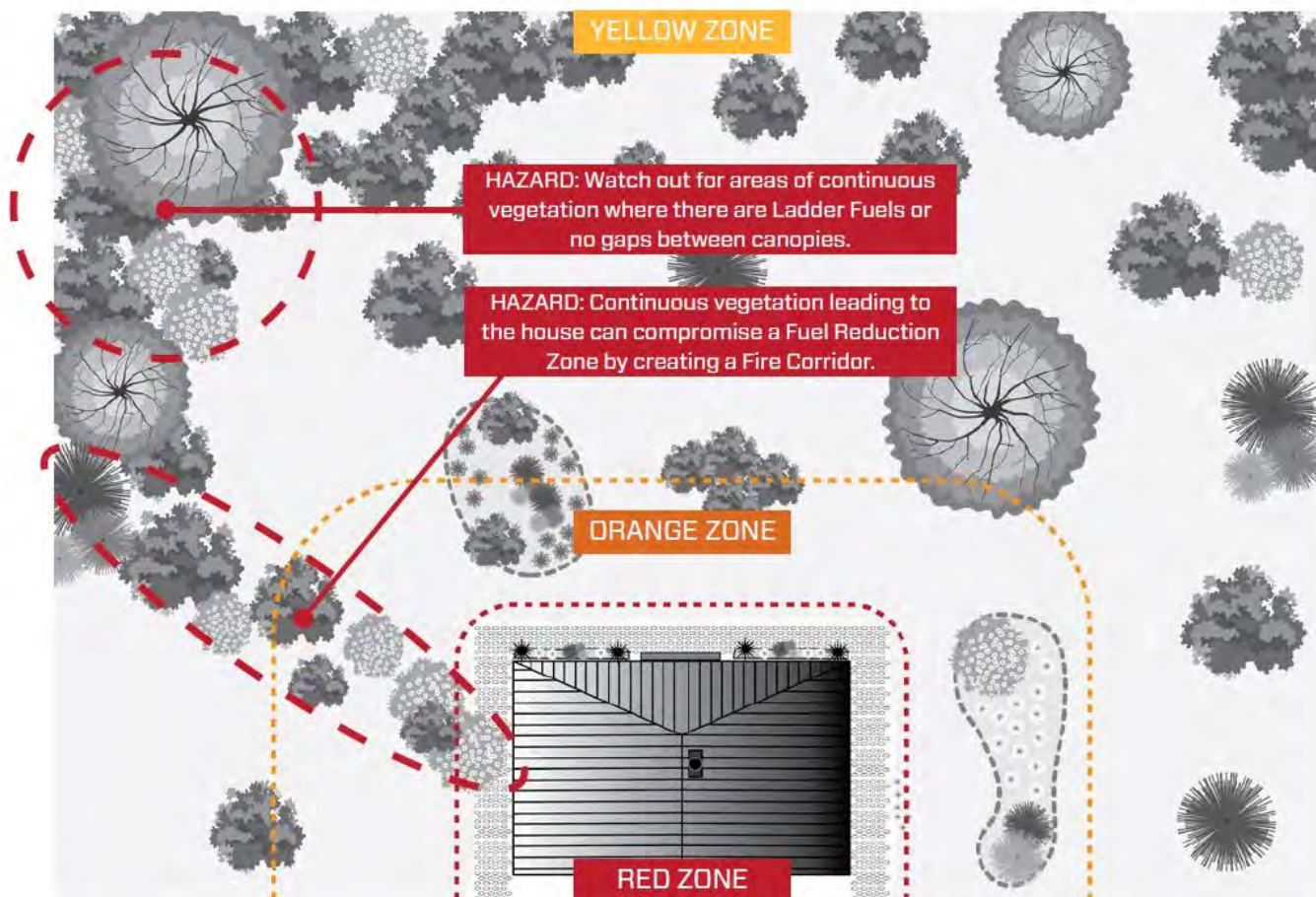
The Zone System

The zone system is a simple way to divide up the defensible spaces within the Home Ignition Zone or Fuel Reduction Zone. Note: The same principles apply to all structures, whether they are homes, offices, garages, buildings etc. This zone system is designed for rural or wildland interface homes and structures. This zone system can be applied for the **lower cable station area only**. Due to the exposure level of the upper cableway station, more intensive risk reduction measures will need to be invested in.

Red Zone covers 0 – 3m from the exterior walls of the structure

Orange Zone covers 3 – 10m from the exterior walls of the structure

Yellow Zone covers the area from 10m out to the perimeter or boundary or at least to 30m.



Red Zone (0-3m)

This is the area closest to the structure and fires starting here can have significant negative impact on the integrity of the structure during a wildfire incident. The following applies:

- Create a 3m wide zone of hardened landscaping, lawn or low growing fire-resistant vegetation around the structure.
- Clear fine fuels and keep grass areas trimmed to around 5cm height.
- Do not plant shrubs underneath windows, close to decks, close to combustible wall cladding or vents.
- Recommended groundcovers to use in this zone are:

For sunny areas

Cliffortia Ferruginea, Othlobium Decumbens, Dymoondia Margaretae, Gazania spp., Helichrysum argophyllum, Hermannia saccifera, Cotula lineariloba, Agathosma Ovata 'Kluitjies Kraal' and Vygies.

For shade areas

Plectranthus verticillatus, P. Neochilus (also sun) and P. Ciliatus 'Drege'.

- Recommended Shrubs are:

Agathosma Serpyllacea, Phyllica Ericoides, Felicia spp., Natal Plum (Carissa macrocarpa & cvs.), Cotyledon orbiculate, Scabiosa spp., and Geelblombos (Athanasia dentata).

Orange Zone (3-10m)

Outside of the Red Zone, create a Fuel Reduced Area of hardened landscaping, that extends out to at least 10m from the structure. The following applies:

- Create 'islands' of flower beds surrounded by lawn, paving or gravel. Use fire-resistant shrubs and trees within these beds, ensure there is a 3m gap between the canopies of trees and shrubs or groups of trees and shrubs, so that fire cannot travel easily from canopy to canopy.
- Plant shrubs at wide intervals and do not plant directly underneath trees unless a clearance of 5m exists from the canopy of the shrub to the lower branches of the trees.
- Do not plant shrubs or trees close to windows.
- Clear fine fuels.
- Keep grass areas trimmed to 5cm in height.
- Recommended plants and shrubs for this zone are:

Resprouters: Lecadendron Salignum, Chondropetalum Tectorum, Erica spp., Maytenus Oleoides, Brachylaena Discolour, indigenous Salvia spp. (Salvia Africana Caerulea, Salvia Africana-lutea), Pelargonium Cucullatum, King Protea, Felicia Echinata, Wild Olive (Olea europaea subsp. Africana), Wild Peach (Kiggelaria Africana), Glossy Currant (Searsia syn. Rhus lucida).

Corky Bark: Leucospermum cococarpodendron, Protea Nitida, Mimetes Cucullatus, Aloe Plicatus.

Bulbs: Agapanthus, Watsonia, Haemanthis Coccineus, Cyrtanthus Ventricosus, Kniphofia Praecox.

Yellow Zone (10m+)

Within the Yellow Zone, create a Fuel Reduced Area of buffered landscaping, that extends out to the perimeter or boundary from the structure.

- Consider the placement of trees and shrubs and avoid creating paths (fire corridors) for fire to follow through the vegetation.
- Ensure there is at least a 3m gap between the canopies of trees and shrubs or groups of trees and shrubs, so that fire cannot travel easily from canopy to canopy.
- Plant trees and shrubs at wide intervals and do not plant shrubs directly underneath trees unless a clearance of at least 5m exists from the canopy of the shrub to the lower branches of the trees.
- The best trees to plant generally are those that occur naturally on or near the property.
- Recommended shrubs that do not burn easily are:

Krantz Aloe (Aloe Arborescens), Dune Crowberry (Searsia Crenata syn. Rhus Crenata), Sersia Glauca, Glossy Currant (Searsia Lucida), Tarchonanthus Camphorates, Pterocelastrus Tricuspidatus, Osteospermum Moniliferum.

- Recommended trees that do not burn easily are:

Cape Holly (Ilex Mitis), Cape beech (Rapanea Melanophloeos), Wild Almond (Brabejum Stellatifolium), Rooiels or Butterspoon Tree (Cunonia Capensis), indigenous Cherry (Maurocena Frangularia), Rock Elder (Canthium Mundianum), Milkwood (Sideroxylon Inerme) and Tree Fuschia (Halleria Lucida).

- Recommended bulbs that do not burn easily are:

Tulbaghia Violacea, Agapanthus and Watsonia.

- Recommended low growing ground covers are:

Vygies (Lampranthus, Malephora, Drosanthemum, Delosperma and Carpobrotus), Gazania, Arctotis, Cliffortia Ferruginea, Aloe Brevifolia and other suitable ground-covering aloes.

Fire breaks and fuel buffer zones around the property perimeter are vital. This has been discussed in greater detail in the recommendations section.

6.3 Recommendations

These recommendations have been designed to address the wildfire risks in cableway construction and operations phases with a focus on life safety, and structure preparedness. Vulcan Wildfire Management believe that all these will need to be addressed appropriately before stakeholders and role-players can assess whether not having an evacuation road has been addressed sufficiently by having other measures in place.

Before any further steps, it is recommended the client presents a detailed plan of how they will go about implementing these recommendations. This must also include operational plans, operational visitor numbers expected, facility and structure construction plans, building design and materials plans and importantly how their plans ensures that life safety risks, structures risk as well as construction and operation plans mitigate wildfire risks.

Recommendation	Comment	Helps Reduce Life Safety Risk	Helps Reduce Structure Risk
An emergency evacuation road is required, for the upper cable station, preferably with 2 route options.	The option to build a road to the upper cable station was considered, but due to the aquatic and terrestrial biodiversity constraints, the road was considered a fatal flaw from an environmental risk perspective.	✓	✓
Visitor Numbers Fire Danger Index (FDI)	<p>It is recommended that there is a detailed, expected visitor plan is put together which considers the maximum number of visitors that can be accommodated at the upper and lower cable way station area. This must include staffing requirements.</p> <p>This plan must help to inform the emergency and evacuation plan. It should consider all hazards such as wildfire threats, break downs of the cable way system, sudden severe weather impacts etc.</p> <p>On high FDI days, in particular red days, it is recommended that the cable way must suspend all operations due to unacceptable wildfire risk. This includes suspending work during the construction phase. For the other risk days, visitor numbers could be scaled to meet evacuation thresholds.</p>	✓	

Emergency and Evacuation Plan for Upper Cable Station	A detailed emergency and evacuation plan is required. Fire (heat) and smoke could potentially impact the upper station within 30-45 minutes under extreme conditions. Persons on the mountain could include elderly, children, disabled, and those not dressed for, or familiar with, mountain conditions. The plan needs to consider the (planned) expected numbers of visitors expected to be at the upper station and how these people would be evacuated in the case of a wildfire. The plan needs to consider worst case scenarios such as a nearby wildfire under unfavourable fire weather conditions, loss of power, breakdown of equipment etc. Scenario planning needs to consider contingencies. The real risk is to not be able to return everyone to the lower station before a wildfire impacts the area. In reference to the point above, evacuation numbers could consider operational plans for maximum visitor numbers on different FDI days.	✓	
Emergency and Evacuation Plan for Lower Cable Station	Compared to the upper station the access/egress provides for better emergency support and resource response, and the evacuation of this lower station area will be easier to execute. However, a detailed emergency and evacuation plan, including contingency planning is still required. Heat and smoke will still be a factor and could be a concern for visitors and staff. An early decision needs to be made to evacuate. This would also clear vehicles from the area which could be a hazard if they caught fire. The early movement of people and vehicles is also advisable as if you wait for the wildfire to impact the area, it creates major complications. Firefighting resources will need good access to the area, and it would be important not to block their pathway. Not evacuating will have people in harm's way that emergency services would have to focus on rather than the wildfire control efforts.	✓	
Emergency and Evacuation Plan for Stuck Cable Car	A detailed emergency and evacuation plan is required for the potential scenario of a cable car becoming stuck. This will be a requirement under normal circumstances, but how would this situation be dealt with during a wildfire and how will people be rescued. This needs to be detailed in a plan.	✓	
Evacuation Routes	If there is a cableway breakdown, paths out of the area could assist in moving fit and able people to areas of safety. Multiple paths/hiking trails need to be considered as alternative routes off the mountain. These paths would need to head in different directions and intersect with roads. Transportation of people from roads, out of the area would need to be included in an emergency evacuation plan. Note: We are not suggesting that hiking trails would be suitable if there was a wildfire in the immediate area. It would be dangerous to send people along paths with the potential for a wildfire to move through the area. This is a general recommendation for other types of shutdown scenarios - or if it is deemed that a wildfire is far enough away, the fire services may be consulted if hiking trail evacuation paths could be used. In this scenario, cable way staff consulting with the fire services would be vital.	✓	

<p>Early Wildfire Warning Detection System</p>	<p>Given the vantage point of the upper station, having camera detection systems to detect ignitions (smoke) as well as an early warning reporting mechanism linked to a watch room is essential. This must identify ignitions in a 360-degree area, at the greatest distance possible for detection systems. The cableway operations should link into the Stellenbosch Safety Partnership in some way with direct communication lines to the control room. (Which can be done via radio).</p> <p>An early warning wildfire detection system must also include a siren and public address system to alert all on the mountain.</p>	✓	✓
<p>Vegetation Management Strategy</p>	<p>The vegetation below the entire cableway and around the upper and lower stations must be kept well maintained to reduce risk in case of wildfire. In addition it is recommended the cable way company support vegetation management strategy operations by joining the Fire Protection Association and contributing to the vegetation management budget of the Fire Protection Association with a focus on local vegetation management operations within a 2.5km radius of both the lower and upper cable way stations.</p>  <p>2.5km radius around area</p> <p>The aim would be to assist in lowering the wildfire risks in the immediate and general proximity of the cable way stations. The cableway company should collaborate with other landowners and the FPA on the following measures:</p> <p><i>Invasive alien fuel clearing and maintenance programs:</i> The vegetation directly below the proposed cableway path is noted as having invasive alien vegetation particularly on the lower slopes and this needs to be cut, removed, and maintained prior to any operations. In addition, the general area has large areas of invasives that need to be cut, removed, and maintained.</p> <p><i>Fuel reduction operations:</i> Clearing, removing and prescribed burning of problematic fuels in general area. In addition, burning for biodiversity helps maintaining vegetation of different ages to prevent build-up of older vegetation across a large area required. In consultation with fynbos specialists this could be undertaken to lower the risk profile of a larger area, when the time is appropriate based in fuel age.</p>	✓	✓

	Strategic Interventions: Contributing to local area as well as general area strategic firebreaks and fuel buffer zones would help fires services and landowners with tactical options when wildfires broke out. A more detailed and hands on approach to fire breaks, fuel buffer zones around the cable stations and cableway line is also advised.		
Shelter in Place Refuge	For the contingency that some visitors and staff cannot evacuate the upper cable station in time, there must be a designated safety zone constructed which limits exposure to smoke and heat and can accommodate the expected number of people in a last resort survival situation. This plan and construction must consider the contingency of the cable way losing operational ability and people being stuck or trapped. The construction would need to be an airtight space and constructed with the specific objective to house people during a wildfire. As such detailed plans, drawn up by construction and wildfire specialists would need to be considered to design and construct a facility safe enough for the purpose. Fuel reduction, water sprinklers systems, design materials etc. would all be needed to further enhance the protection of this area.	✓	✓
Helipad	There must be a constructed helipad for emergency operations and evacuations.	✓	
Annual Risk Assessment	The risk profile of the entire cableway and its operations must be assessed on an ongoing basis – annually is recommended.	✓	✓
Insurance	Apart from all the standard business insurances covering buildings, assets, liability etc. wildfire loss and suppression insurance for the landowner and cable station owner and operator is vital. This must include funds for wildfire aerial resources, emergency medical response, firefighting vehicles, and firefighting crews for response, mop up, monitoring and recovery from wildfires.	✓	✓
Training	It is recommended that cable way staff undergo basic wildfire, incident management, building fire safety and relevant OHSA training. It is recommended that construction staff undergo wildfire awareness and safety training prior to working in the remote location of the upper cable way station.	✓	
Fire Protection Association	The landowners where the cable way is situated must be compliant FPA members and maintain this status for cableway operations to continue. Compliance would include all aspects as specified by the FPA such as having fire equipment and personnel trained and available for wildfires. This would be to contain small fires before fire services arrived, assist fire services, or use these resources to protect the lower cable station area for example.	✓	✓
Wildfire Awareness	The lower cable station should have wildfire awareness information clearly displayed, such as a Fire Danger Index (FDI) board which indicates the current FDI and what this means to visitors. There should also be a safety briefing or announcement of some kind which draws visitor attention to the fact they are entering a wilderness area where wildfires are possible, and they must be informed on what steps to take if a wildfire is detected.	✓	

The cable station buildings, walkways, and facilities should be constructed with fire resistant materials.

Design and orientation of buildings should be mindful of how wildfire heat and embers may impact structures.

All construction staff and contractor visitors must have a site safety briefing before working or visiting the property. This safety briefing must include a summary of wildfire risk as well as measures that in place to prevent any construction activities causing a wildfire to surrounding property/land. These are further recommendations:

- Ensure fire safety during the construction phase by having fire suppression methods on site. (Fire extinguishers, bush beaters and backpack water sprayers or water hoses would be advisable).
- Store all flammable materials safely and away from area which could carry fire into surrounding vegetation.
- Before the buildings are complete, void spaces can create a wind tunnel effect. If a wildfire or fire occurs, be mindful of this factor which can lead to very intense flames.
- Hot work can introduce ignition sources to a construction site where sparks from welding, soldering, or grinding can smoulder and ignite combustibles both during work as well as hours after the work is completed. All hot work must be thoroughly assessed as safe before the workday is concluded.
- Grinding and mechanical cutting that produces sparks is particularly a high-risk activity for causing vegetation to ignite. All these activities must be done in an area away from vegetation and supervision of this activity must include a discussion of how ignitions will be prevented.
- Hot exhausts from portable pumps, and vehicles can cause vegetation to ignite. Vehicle and pump operators are to be made aware of this and avoid placing pumps close to vegetation or reversing vehicles exhausts into vegetation.
- Arson, vandalism, and theft from unsecured construction sites can occur. Security is advised.
- Carelessly discarded cigarettes pose a serious fire threat on construction sites. Rules and regulations must be established to prevent ignitions resulting.
- Temporary electrical connections and lighting should be regularly inspected and maintained.
- Unattended cooking/heating fires will pose a threat. These should not be allowed under any circumstances on the site.
- Be aware of high fire danger days (hot, dry, windy days) and proceed with extra caution on these days regarding the risk activities highlighted.
- If any fires occur during construction, immediately call fire services to activate a response. If the fire can be safely extinguished using fire suppression methods this should be done to eliminate the fire or slow it's spread until fire services arrive. All affected neighbours should also be notified. If the fire becomes dangerous the area should be evacuated.

✓

✓

Construction

Upper Cable Station Fuel Reduction in the Structure Ignition Zone	<p>The following should be considered in site design and construction to lower wildfire risk to structures.</p> <ul style="list-style-type: none"> • The use of walkways constructed from non-flammable materials that also act as fuels buffer zones for the structure. • Landscape the surrounding environment to reduce heat and ember exposure. This could include concepts such as large rocks to deflect heat, flattening out areas to reduce slope impact, rock or soil berms to guide air (heat, embers) over structures, setting structures into slopes or ground. • The upper station could also benefit from fuel reduction, fire breaks around structures of at least 30-50m in width, along with the other measures. • Rainwater tanks, connected to petrol pumps could power sprinklers to protect structures during wildfire impact. Heat sensors could trigger the pumps if no one was present. • Further design and construction guidelines from wildfire specialists could be offered once plans have been established. 		✓
Lower Cable Station Fuel Reduction in the Structure Ignition Zone	<p>The following should be considered in site design and construction to lower wildfire risk to structures.</p> <ul style="list-style-type: none"> • The use of walkways constructed from non-flammable materials that also act as fuels buffer zones for the structure. • Landscape the surrounding environment to reduce heat and ember exposure. This could include concepts such as large rocks to deflect heat, flattening out areas to reduce slope impact, rock or soil berms to guide air (heat, embers) over structures, setting structures into slopes or ground. • The lower station could also benefit from fuel reduction, and HIZ principles around structures for at least 30m along with the other measures. • The dam provides great resource to protect the lower facilities with water. Connected to petrol pumps, sprinklers could be used to protect structures during wildfire impact. • Hydrants, and overhead hydrants should be place strategically for fire service vehicles. • Emergency services vehicle bays should be reserved and designated. • All structures on the lower station site can pose a risk to one another during a wildfire if one were to catch fire. All structures should have wildfire ready principles applied to them and preparedness measures in place. • Further design and construction guidelines from wildfire specialists could be offered once plans have been established. 		✓
Power	There needs to be a plan of action to power the cable car during power outages such as loadshedding	✓	
Walkways, viewpoints	These should be constructed with non-flammable materials		✓
Upper Cable Station Facilities	Limiting facilities on the upper cableway area should be considered to reduce the visitor numbers on the top of the mountain. This should be aligned with evacuation plans.	✓	

7. Impact Assessment Tables



Impact Assessment Table 1 of 3

PLANNING, DESIGN AND DEVELOPMENT PHASE	
Potential impact and risk:	Damage and/or loss of cableway construction materials, infrastructure, and compromised working environment after a wildfire.
Nature of impact:	Wildfire could result in heat and smoke, damaging cableway construction materials, infrastructure and destabilises areas where work needs to take place.
Extent and duration of impact:	Local, Short Term.
Consequence of impact or risk:	Damage or loss of materials will disrupt or prevent cableway completion. Depending on the type of materials burned, this may impact surrounding environment with burned material residue. If a wildfire has burned through a wilderness area, the lack of vegetation can destabilise the soil and rocks. The construction activities and workers walking through the natural areas may cause erosion and rock falls. Construction may need to be delayed until the area stabilised after a wildfire has recovered. In addition, natural seed beds in the soil need to be allowed time to germinate before workers move through burned areas.
Probability of occurrence:	Low-Probable
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss - significant loss
Degree to which the impact can be reversed:	Partly reversible
Indirect impacts:	May result in project delays.
Cumulative impact prior to mitigation:	Negligible
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium-High, negative
Degree to which the impact can be avoided:	N/A – The project would have no control over potential wildfires starting off-site.
Degree to which the impact can be managed:	Low: Should a wildfire burn onto wilderness sites; the impact would be difficult to manage and will require significant mitigation measures.
Degree to which the impact can be mitigated:	Moderate (the impact can be partly mitigated)
Proposed mitigation:	Construction materials should not be left in wilderness areas where they can possibly burn during wildfires. No construction workers to travel to construction site in a wildfire until the soil has stabilised. Fuel breaks around lower cableway site need to be sufficient before construction. Please see further recommendations in section 6.3 of this report.

Residual impacts:	Low
Cumulative impact post mitigation:	Negligible
Significance rating of impact after mitigation (e.g., Low, Medium, Medium-High, High, or Very-High)	Low-Medium negative, negative
OPERATIONAL PHASE	
Potential impact and risk:	Damage and/or loss of cableway-built structures, infrastructure, walkways, or assets.
Nature of impact:	Wildfire result in heat and smoke, which could damage cableway buildings, and destabilise areas such as walkways / hiking routes.
Extent and duration of impact:	Local, Short Term.
Consequence of impact or risk:	Damage or loss of structure, walkways, or assets. Soil, rocks maybe become destabilised. This will disrupt or prevent repairs. Depending on the type of materials burned, this may impact surrounding environment with burned material residue.
Probability of occurrence:	Highly probable: most likely that the impact will occur at some stage. (Natural and manmade ignitions result in wildfires burning in this area and surrounds with a regular occurrence).
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss - significant loss
Degree to which the impact can be reversed:	Partly reversible
Indirect impacts:	Additional impact to the landscape should structures, walkways, etc., require reconstruction.
Cumulative impact prior to mitigation:	Negligible
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium - High, negative
Degree to which the impact can be avoided:	Low: the impact is difficult to avoid and will require significant mitigation measures.
Degree to which the impact can be managed:	Low: the impact is difficult to manage and will require significant mitigation measures
Degree to which the impact can be mitigated:	Moderate (the impact can be partly mitigated)
Proposed mitigation:	Please refer to section 6.2 Risk to Structures and 6.3 Recommendations
Residual impacts:	Medium
Cumulative impact post mitigation:	Negligible
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium, negative

“No-Go Option”

The no-go option will be to not implement the proposal. Therefore, the risk to construction and structures of proposed cableway is no longer a concern as the project, and structures will not exist, and the natural environment and wildfires regime will continue as it has before.

Impact Assessment Table 2 of 3

PLANNING, DESIGN AND DEVELOPMENT PHASE	
Potential impact and risk:	Wildfires started by cableway contractors, staff, or workers.
Nature of impact:	Heat and smoke damage to natural fauna and flora. Possible damage, and losses to rural, farming, and urban interface areas from wildfire spread, and possible damage to own infrastructure
Extent and duration of impact:	Local, Short Term.
Consequence of impact or risk:	Loss of structures, infrastructure, and assets. Potential health and safety risk to staff.
Probability of occurrence:	Unlikely: low likelihood of the impact occurring
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss - significant loss
Degree to which the impact can be reversed:	Partly reversible
Indirect impacts:	Loss of structures and impact to land and property of surrounding areas. Too frequent fires burning vegetation, leading to loss of biodiversity.
Cumulative impact prior to mitigation:	Negligible
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low - High, negative
Degree to which the impact can be avoided:	Moderate: impact is avoidable with moderate mitigation
Degree to which the impact can be managed:	Moderate - High
Degree to which the impact can be mitigated:	Moderate (the impact can be partly mitigated)
Proposed mitigation:	Please refer to section 6.3 Recommendations for Construction
Residual impacts:	Low
Cumulative impact post mitigation:	Negligible
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low, negative
OPERATIONAL PHASE	
Potential impact and risk:	Wildfires started due to operational activities.
Nature of impact:	Operational activities, such as visitors smoking, spark or heat source from equipment could cause a fire.
Extent and duration of impact:	Local, Short Term.
Consequence of impact or risk:	Damage to environment. Loss of structures and assets. Possible threat to life, injury,
Probability of occurrence:	Unlikely to Probable
Degree to which the impact may cause irreplaceable loss of resources:	Marginal - Significant loss
Degree to which the impact can be reversed:	Partly reversible

Indirect impacts:	Loss of structures and impact to private property. Too frequent fires burning vegetation, leading to loss of biodiversity
Cumulative impact prior to mitigation:	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low - High, negative
Degree to which the impact can be avoided:	Moderate: impact is avoidable with moderate mitigation
Degree to which the impact can be managed:	Medium
Degree to which the impact can be mitigated:	Moderate (the impact can be partly mitigated)
Proposed mitigation:	Please refer to section 6.3 Recommendations
Residual impacts:	Low
Cumulative impact post mitigation:	N/A
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low, negative

“No-Go Option”

The no-go option will be to not implement the proposal. Therefore, the risk wildfires started by cableway contractors or operations for the proposed cableway is no longer a concern as the project, and structures will not exist, and the natural environment and wildfires regime will continue as it has before.

Impact Assessment Table 3 of 3

PLANNING, DESIGN AND DEVELOPMENT PHASE	
Potential impact and risk:	Injury or loss of life of construction workers.
Nature of impact:	Wildfire starting in area or from adjacent natural areas could threaten or enter the working area, trapping staff.
Extent and duration of impact:	Site specific, short term
Consequence of impact or risk:	Loss of life or injury
Probability of occurrence:	Unlikely - Probable
Degree to which the impact may cause irreplaceable loss of resources:	Significant (injury) to Complete loss of people (resources).
Degree to which the impact can be reversed:	Irreversible: where the impact is permanent.
Indirect impacts:	N/A
Cumulative impact prior to mitigation:	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High, negative
Degree to which the impact can be avoided:	Moderate: impact is avoidable with moderate mitigation
Degree to which the impact can be managed:	Moderate: impact is manageable with moderate mitigation
Degree to which the impact can be mitigated:	Moderate: the impact can be partly mitigated.
Proposed mitigation:	Please see recommendations in section 6.3 of this report. The mitigation is non-negotiable and mitigation measures are not necessarily easy to achieve and must be implemented to a high standard
Residual impacts:	Medium

Cumulative impact post mitigation:	All impacts described are still possible.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium - High, negative
OPERATIONAL PHASE	
Potential impact and risk:	Injury or loss of life of staff or visitors due to a wildfire
Nature of impact:	Wildfire starting in area or from adjacent natural areas could threaten or enter the operational area, trapping visitors and staff.
Extent and duration of impact:	Site specific, short term
Consequence of impact or risk:	Loss of life or injury
Probability of occurrence:	Unlikely - Probable
Degree to which the impact may cause irreplaceable loss of resources:	Significant (injury) to Complete loss of people (resources).
Degree to which the impact can be reversed:	Irreversible: where the impact is permanent.
Indirect impacts:	N/A
Cumulative impact prior to mitigation:	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High, negative
Degree to which the impact can be avoided:	Moderate: impact is avoidable with moderate mitigation
Degree to which the impact can be managed:	Moderate: impact is manageable with moderate mitigation
Degree to which the impact can be mitigated:	Moderate: the impact can be partly mitigated.
Proposed mitigation:	Please see recommendations in section 6.3 of this report. The mitigation is non-negotiable and mitigation measures are not necessarily easy to achieve and must be implemented to a high standard
Residual impacts:	Medium
Cumulative impact post mitigation:	All impacts described are still possible.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium – High, negative

“No-Go Option”

The no-go option will be to not implement the proposal. Therefore, the risk to life by the proposed cableway is no longer a concern as the project will not exist, and the natural environment and wildfires regime will continue as it has before.



Wildfire Risk

Prepare for High Risk / Low
Frequency Incidents



Priorities

Protect Life
Protect Property
Protect Business



Help

Seek expert help and guidance to
overcome challenges.

Conclusion

High Risk / Low Frequency Wildfire Incidents is a category of risk for wildfires (and other types of incidents) where there is potential for loss of life, property, infrastructure, and assets. The wildfire threat can come from a small or a large wildfire, but in both instances the extreme nature of the incident and fire behaviour is the factor that will put the incident into a High Risk / Low Frequency category. Disaster can strike when factors align such as drought, high fuel loads, extreme weather, elements of topography, location of ignition, direction of fire spread, proximity of structures, stretched resources, rapid escalation of the incident.

It is vital to **be prepared to deal with the worst-case scenarios.**

It takes hard work to prepare for this threat level. Small details matter and it is the reason why certain themes and topics have been highlighted and repeated throughout this report. There is no way to eliminate risk however having an action plan and performing the necessary preparation before wildfires occur, helps to lower the risk profile.

Project Description

The project involves the design and statutory approvals of an aerial cableway in Franschhoek. Included but not limited to lower base station; top station; additional facilities and parking as required.

After this wildfire assessment, there are several concerns which need to be addressed before a definitive decision about the wildfire risks can be made.

If there are no wildfire mitigation measures undertaken, or if the mitigation measures are not particularly well planned or committed to, it would be recommended that this project is a “no-go” due to the considerable wildfire risk.

Vulcan Wildfire Management hopes that the detailed analysis and recommendations can help the client and project management team to prepare sufficient mitigation measures and put together comprehensive plans to satisfy all wildfire stakeholders that life and property safety can be adequately addressed.

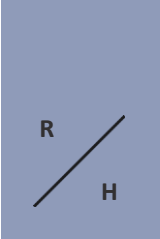
Note: Extracts of this report cannot be represented without the full report being made available and referenced.

Ryan Heydenrych
Director: Vulcan Wildfire Management
Email: ryan@vulcanwildfire.co.za
Phone: 083 969 7776



Appendixes

- I. Curriculum Vitae – Ryan Heydenrych, Vulcan Wildfire Management.
- II. Curriculum Vitae – Patrick Ryan, Vulcan Wildfire Management.
- III. Specialists Declaration of Independence.
- IV. Signed Attendance Register of Wildfire Stakeholders Meeting.



Curriculum Vitae **Ryan Heydenrych**

Co-Founder & Director

Vulcan Wildfire Management (Pty) Ltd

Vulcan Training (Pty) Ltd



PROFILE

Wildfire specialist with a focus in training, risk analysis and reporting, Incident Management Systems and being an active contributing member of the wildfire fraternity.

EDUCATION

AAA School of Advertising
BA Marketing Communication (Honours)
2002 -2004, 2006

Account Management (Distinction)
Brand Management (Honours)
Media Management (Distinction)

Rondebosch Boys' High School
Matric with Exemption, 1999

COURSES & PERSONAL DEVELOPMENT

Basic Wildfire Suppression
Wildfire Crew Leader
Incident Command System 100-400
Incident Commander Type 5
Division Group Supervisor
Operations Section Chief
ICS Public Information Officer
First Aid Level 3
Wildfire, ICS, Training Facilitator
Training Assessor (SAQA / FP&M)
Training Moderator (SAQA / FP&M)
Short Course: Beyond Response. Better Preparedness for Environmental Emergencies, by DisasterReady.org

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Introduction

Ryan has 15 years of wildfire experience in Integrated Fire Management. The specialised and positive contributions Vulcan Wildfire Management have made in the industry have been done at a high standard of professionalism. Ryan is a member of the US Hotshot Association and is a regular contributing member of the National Disaster Resilience Roundtable, which was formed in the wake of the 2017 Knysna Fires to bring about positive change with regard risk from natural disasters. Ryan is also very involved in training and development of wildfire personnel and is an accredited Training Assessor and Training Moderator for SAQA & FP&M Seta, with Vulcan being an accredited training provider in basic wildfire suppression training. Volunteer firefighters play a significant supporting role to formal firefighting resources. Ryan is a long-standing volunteer firefighter and has been a Director, Operations Manager & Station Manager for the VWS.

Vulcan Wildfire Management (Pty) Ltd, Co-Founder & Director 2014 – present

- Vulcan Wildfire Management researched & produced a landmark report on the 2017 Knysna Fires for the Western Cape Government. This data continues to drive intelligent preparedness strategies to prevent future disasters. This report is currently hosted on the United Nations Office for Disaster Risk Reduction knowledge sharing platform, [Prevention Web](#).
- Vulcan successfully developed South Africa's first specialised wildfire ground crew, setting the standard for what wildfire crews can achieve. The crew worked in: Fuel reduction, risk mitigation work around households. Stack burning and prescribed burning to reduce fuel hazards. Public awareness talks in communities. Completed comprehensive Integrated Fire Management plans and risk assessments. Provided a highly specialised ground firefighting crew, operating in remote areas. The specialised crew was tasked at structure protection on multiple incidents. Provided a high level of leadership able to make in the field complex decision making and provide valuable feedback to Incident Command Staff.
- Check Protect Survive™ and WildfireReady. Vulcan has developed and put into practice their own contemporary risk analysis system which is used to assess risk and further identify measures, which implemented, can help to reduce risk to life, property, and assets. The risk assessment tool they have developed can be used for large properties, farms, and communities as well as individual homes in the wildland urban interface.
- Awareness and Communication. Conceptualised, designed and developed a Disaster Ready communications toolkit in partnership with Santam and the Cape Winelands District Municipality.
- Vulcan designed the South African Incident Command System Toolkit, as well as a Fireline Safety Pocket Guide (similar to the US Incident Response Pocket Guide) and a pocket version of the ICS Form 214.

Vulcan Training (Pty) Ltd, Co-Founder & Director 2017– present

- Development and delivery of Wildfire Fireline Safety Training since 2016 for the Western Cape Government delivered to Municipal firefighters, private and volunteer firefighter as well as NGOs.
- Wildfire Intelligence Task Force. As part of the development of the Fireline Safety Training for the Western Cape Government, Vulcan sent a Wildfire Intelligence Task Force to Knysna to record and capture information to enhance the development of criteria for Fireline Safety Training.
- SAQA and FM&M accredited training company for basic wildfire suppression.
- South African Incident Command System Working Group endorsed training company for training Incident Command System courses.
- Specialist Wildfire Training Courses for Crew Leadership and Wildfire Management.



PROFILE

An ability to think outside the box of standard procedures has seen me bring my creative skill sets and experience in leadership and communication to driving progressive development within Integrated Wildfire Management. In particular with regards addressing risk recognition, good governance, awareness and communications in order to bring about risk reduction and leadership development.

EDUCATION

1975 – 1985 • Matric • Diocesan College
1986 – Post Matric • Diocesan College
1987 – 1992 • Cape Technikon • National Higher Diploma Graphic Design / Honours - History of Art and Design
2010 – Basic Wildfire Suppression
2012 – Crew Leader
2013 – ICS I-100/I-200
2013 – Incident Commander Type 5
2014 – Division and Group Supervisor
2015 – ICS I-300/I-400
2019 – ICS Public Information Officer
2020 – Certified Training Assessor (SAQA / FP&M)
2021 – Institution of Fire Engineers - Level 3 Fire Operations & Incident Command / Fire Safety

CONTACT

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REFERENCES

Name: Clinton Dilgee
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Email: clinton.dilgee@sanparks.org

Name: Dale Nortje
Position: Manager Winelands Fire Protection Association
Tel: 071 682 4612
Email: manager@winelandsfpa.co.za

PATRICK RYAN

DIRECTOR & ENTREPRENEUR

WORK EXPERIENCE

2014 – Present • Managing Director • Vulcan Wildfire Management (Pty) Ltd

Key Responsibilities: Business Development, Crew Development, Marketing, Strategic Planning, Business Administration.

Milestone Projects

- Progressing public disaster preparedness through communication and driving action to a ground-up level. The #DisasterReady campaign incorporates a GIS based all-hazard map that, in combination with carefully designed awareness material, is used to affect behavioural change and improve preparedness.
- Knysna Fires 2017: A Lessons Learned Analysis is a landmark report on the largest wildfire disaster to date (November 2020) in South Africa. The information collected via in-person interviews, on-site analysis and visual documentation continues to inform preparedness strategies to aid in reducing future wildfire disaster impact.
- Successfully conceptualised and co-developed South Africa's first specialised ground crew, setting the standard for wildfire ground crews within South Africa.

Key to Success

- Co-created a social enterprise recognised as a positive change agent that delivers on the core values of duty, integrity and respect.
- Solutions driven with a focus on ensuring strategies developed result in on-the-ground actions that reduce risk.
- An ability to interpret industry insights and develop tailored and targeted public communication materials allowing for wider dissemination and understanding.

2017 – Present • Executive Director • Vulcan Training (Pty) Ltd

Key Responsibilities: Business Development, Course Development, Marketing, Strategic Planning, Business Administration.

Milestone Projects

- Adaptation of the Incident Command System I-100 and I-200 to an online training platform.
- Successfully developed and implemented a 'first-of-it's-kind' Wildland Fire Safety course for all personnel and public involved in wildfire.

Key to Success

- Operational incident experience and a previous career as a lecturer, allows for dynamic course development and delivery through learning touch points that allow for real growth of people and organisations.
- Drawing on a 20 year career of creative design and image creation, courses are crafted to engage and stimulate students.
- Based on experience, analysis of training techniques and problem-solving industry challenges, solutions focus on enhancement of capabilities and ongoing knowledge development.

2012 – 2015 • Director • Volunteer Wildfire Services (VWS) NPC

Key Responsibilities: Corporate Governance, Marketing, Public Relations, Strategic Planning, Business Administration.

Key Achievements

- Initiated a review and ultimately a restructuring of the organisation in order to become aligned with good corporate governance and the principles of King IV.
- Ensured the organisation had the necessary marketing tools, platforms and personnel in place to grow the brand visibility when the right opportunity presented. This opportunity presented during the Muizenberg Fire (2015) and elevated the organisation into the wider public eye, resulting in a large increase in donations and securing a funding future.
- New Recruit of the Year Award 2011.

PERSONAL ACHIEVEMENTS

- Gold Winner in International Graphis Awards 2009. Gold in Photo District News 2005. Bronze in International One Show Awards 2007.
- International Colour Awards – Nominations 2007, 2009, 2010, 2011, 2015, 2017.
- Nomination in B&W Spider Awards 2012.
- Represented Western Province Schools in Diving, Lifesaving and Hockey. Western Province U21 B team Hockey 1987 and 1988.

DECLARATION OF THE SPECIALIST

I Ryan Heydenrych, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
 - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
 - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



Signature of the Specialist:

15/07/2022

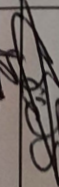
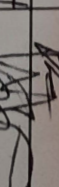
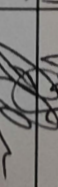
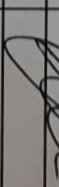
Date:

Vulcan Wildfire Management

Name of company (if applicable):

Attendance Register

Franschhoek Cableway
 Meeting to Discuss Wildfire Risk
 Thursday 09 June, 10:00, Franschhoek Council Chambers

Name & Surname	Organisation	Position or Title within Organisation	Contact Phone Number	Signature
1 Ryan Heidebrecht	Vulcan Wildfire Management	Director	083 464 7776	
2 Laurence van der Beeke	Vulcan Wildfire Management	Consultant	082 782 7508	
3 Ashley Bevan	WFA	Chairperson	083 477 4106	
4 Maryle Josides	WFA	FRS Chair	082 305 4544	
5 Reginald Pfeiffer	Ward Council for Stb	Ward Councillor	079 597 2105	
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