FIRE RISK Consultants

MOUNT ALEXANDER SHIRE

Roadside Fuel & Bushfire Risk Report

June 2021

DOCUMENT CONTROL

DOCUMENT	Mt Alexander Shire Roadside Fuel & Bushfire Risk Report
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SYNOPSIS	This Roadside fuel and ecological assessment project defines the possible impacts from bushfire on key strategic roads in five locations within the Mt Alexander Shire area. The report provides several mitigation strategies to reduce the likelihood and consequence of bushfire impacts.

Photo: Wattle Gully Gold Mine, Fryerstown

Cover photo: Rural abandonded building, Maldon

DISTRIBUTION SCHEDULE

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Where the term “Bushfire prevention and mitigation related activities” (or words to that effect) are used, this is to be defined as the clearance of vegetation in accordance with the Victorian State Government guidelines, including clearing and maintenance of existing fire breaks and/or fire access for fire fighters under electricity pylons and properties that have been constructed to Australian Standard AS3959 and/or the National Construction Code.

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Photo: The Elphinstone Hotel, Elphinstone

EXECUTIVE SUMMARY

Fire Risk Consultants was engaged by Mount Alexander Shire Council to undertake a roadside fuel and ecological assessment along roads within five townships at Chewton, Fryerstown, Elphinstone, Taradale and Barkers Creek.

The key objectives of the project are to assess the bushfire risks to people, property and the environment from bushfires along the road network and to provide preventative actions to mitigate the potential bushfire risks. This report provides a detailed assessment of the bushfire risk across multiple roadsides in the Mount Alexander Shire Council municipality.

The primary consideration for all bushfire mitigation and suppression efforts in Victoria is the preservation of life and property. The analysis completed in this project will help guide Mount Alexander Shire Council to make sound decisions regarding bushfire risk management based on these considerations.

This project has summarised the identified risks via a suite of mapping products and provides recommended treatments that are intended to provide a greater level of protection to the residents, first responding firefighters, road users, emergency services, the environment and the community generally in the Mount Alexander Shire Council area.

This report only deals with the part of the project related to bushfire risk in the local area and the assessments. A separate study on ecological values on the target roadsides and identification of values to be protected has been undertaken as a separate piece of work.

It is the intention of the Mount Alexander Shire Council Project Working Group to provide these assessments to the Municipal Fire Management Planning Committee for further assessment, validation and endorsement.

1 INTRODUCTION

Fire Risk Consultants Pty Ltd has been engaged by Mount Alexander Shire Council to complete a detailed fuel load and ecological assessment on multiple roads in the Shire area.

The information contained in this report is based on a desktop assessment of bushfire risk, on ground site assessments, a detailed analysis of fire simulation modelling (Phoenix) and the effect of bushfires on the roadsides and the properties adjacent to them, and aerial mapping information to assess the landscape bushfire risk.

An assessment of the bushfire risk associated with the sites and observations made by Fire Risk Consultants will further assist the Mount Alexander Shire Council with recommended actions to reduce bushfire risk to road users and surrounding landowners, community, buildings and critical infrastructure.

2 SITE INFORMATION

The five sites are located in close proximity (within 5 – 20 kms) of the Castlemaine township within the Mount Alexander Shire Council municipality. Broadly, the landscape in this area has fragmented areas of forest predominantly under public land management. The remainder of the landscape outside of the main townships is characterised by broad acre grass and farmland, with some remnant vegetation located on private property.

Weather during summer is typical of south eastern Australia with the potential for very high temperatures, low humidity and strong winds combined with a high drought index after prolonged and extended dry periods. Peak fire activity in this environment is usually from mid January to late February. When these factors combine, the bushfire fuel availability and weather environment is conducive to bushfires spreading freely, particularly during extreme fire weather events.

Photo: Historic granite and red brick rail bridge, Chewton

3 BUSHFIRE RISK IN SOUTH EAST AUSTRALIA

The south east of Australia is one of the most fire prone areas in the world.

The rate on which a bushfire spreads is based upon three components which are weather, fuel hazard (including size, moisture content, quantity and arrangement) and the topography in which the fire is burning. Bushfire fuel is the only one of these three factors that it is possible to modify.

Extreme fire conditions can occur in south eastern Australia (and in the location of these properties) when dry winters and springs are followed by summers where bushfire fuels become very dry.

When these conditions combine, fires can be expected to move quickly under the influence of strong, gusty north westerly winds. These fires can then move rapidly in a different direction if a subsequent south–westerly wind change arrives, which is a typical pattern when the most destructive fires occur. Fires that start under these conditions can reach a very high intensity, even in areas of relatively low fuel loads and can be difficult to control until the weather conditions abate.

The rate of a bushfire's intensity is directly linked to its destructiveness and the more difficult it is to control. As the rate of intensity increases so does the difficulty of containment and effective suppression. Very high intensity fires with flame heights greater than 10 metres are generally uncontrollable.

Fine fuels available to a bushfire are fuels such as grass, leaves, dead pine needles and twigs that ignite readily and are consumed rapidly when dry. They are often defined as those dead fuels less than 6mm in thickness. Fine fuel load (measured in tonnes per hectare) has therefore been used as a convenient measure of the underlying bushfire hazard in areas dominated by woody vegetation. The maximum levels vary for different vegetation types and for the same vegetation types in different locations.

It has been found that additional factors such as fuel type, moisture content and arrangement is possibly more important than the total fine fuel load in determining bushfire behaviour. Fuels in forests, woodlands and shrublands can be categorised into four layers with differing effects on fire behaviour (Hines, et al., 2010). These layers are:

Surface fine fuels: leaves, bark, small twigs and other fine fuel lying on the ground. These fuels provide the horizontal continuity that allows a bushfire to spread

Near surface fine fuels: grasses, low shrubs, bracken etc. up to about .5 m above the ground surface. Fuels in this layer will burn when the surface fuel layer burns and will increase bushfire intensity

Elevated fuels: larger shrubs and small saplings with most of the fuel closer to the top of this layer and a clear gap between them and the surface fuels. These interact with the two-layer fuel layers to further increase bushfire intensity. They also contribute to the vertical continuity of fire that allows fire to 'climb' into the tree canopy

Bark fuels: flammable bark on trees, saplings and large bushes from ground level to the canopy. Loose fibrous bark on string-bark eucalypts, and candle bark on some gums can generate large amounts of burning embers which can start spot fires ahead of the main fire front.

Victoria has two main vegetation types affecting the spread of bushfires: grass and forest.

Grass fires are predominantly wind driven and spread rapidly under the influence of strong winds. Grass fires burn at a lower intensity and flame height than forest fires and burn out quickly. Grass fires can often be quickly extinguished with water.

In contrast, forests have more fuel (leaf and bark litter on the ground, shrubs, grasses, trees etc.) available for a fire to burn. Wind speeds are lower in the forest and forest fires take some time to reach their full potential: however, once fully developed, forest fires usually have a greater flame height and intensity than grass fires, especially where the flames are burning the tree canopy. Large logs continue burning after the initial fire front has passed.

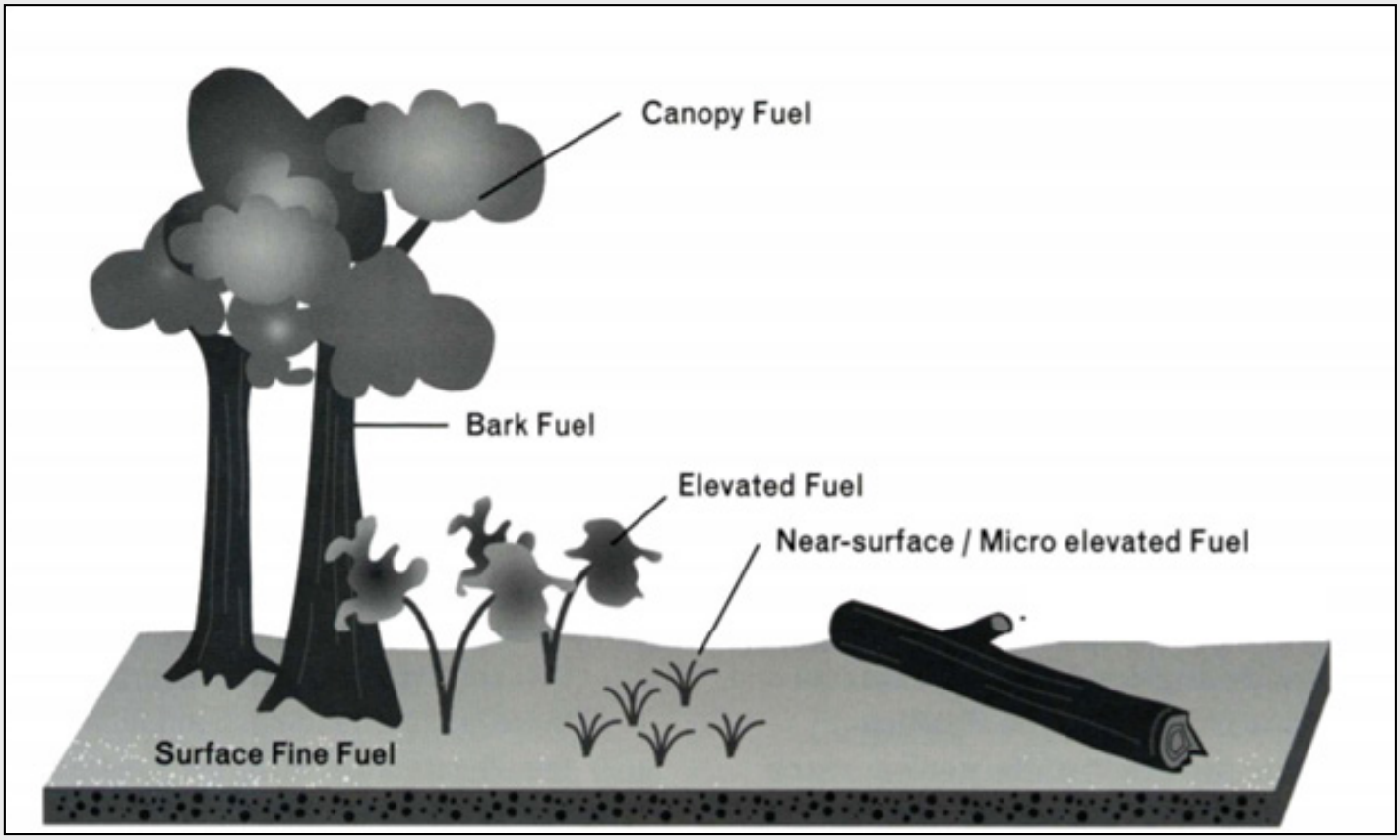

Figure 1 – Arrangement of bushfire fuels

4 VICTORIA'S BUSHFIRE HISTORY

Victoria is one of the most fire-prone areas in the world, with a history of catastrophic bushfires such as Black Friday (1939), Ash Wednesday (1983), 2003 Alpine Fire (2003), Great Divide Fire (2006), Black Saturday (2009) and most recently the Black Summer fires (2019 – 20).

Victoria's high bushfire risk is the result of factors that increase the likelihood and consequences of fire. These factors include large areas of the state comprising highly flammable dry eucalypt forest, protracted droughts and an increasing population density in bushfire-prone areas.

While bushfire is a significant risk facing Victoria, it is also a natural part of the environment and many plant species rely on fire to regenerate.

A variety of causes can ignite a bushfire: some bushfires result from events that are natural, such as lightning, while others result from human activity. Following ignition, the direction and speed of the fire's travel, and the height and intensity of the flames are determined by climatic and weather conditions, topography and fuel in the area. The climate in Victoria is characterised by mild, moist winters followed by hot dry summers. The Victorian fire season typically occurs between the end of October and the start of May.

Days of higher fire risk are often typified by the passage of a cold front, which causes fires to spread rapidly and then change direction. Coastal sea breezes can have a similar effect. Most of Victoria's catastrophic fires have been subject to this type of effect, with many fatalities resulting from people being trapped by these fires after they changed direction.

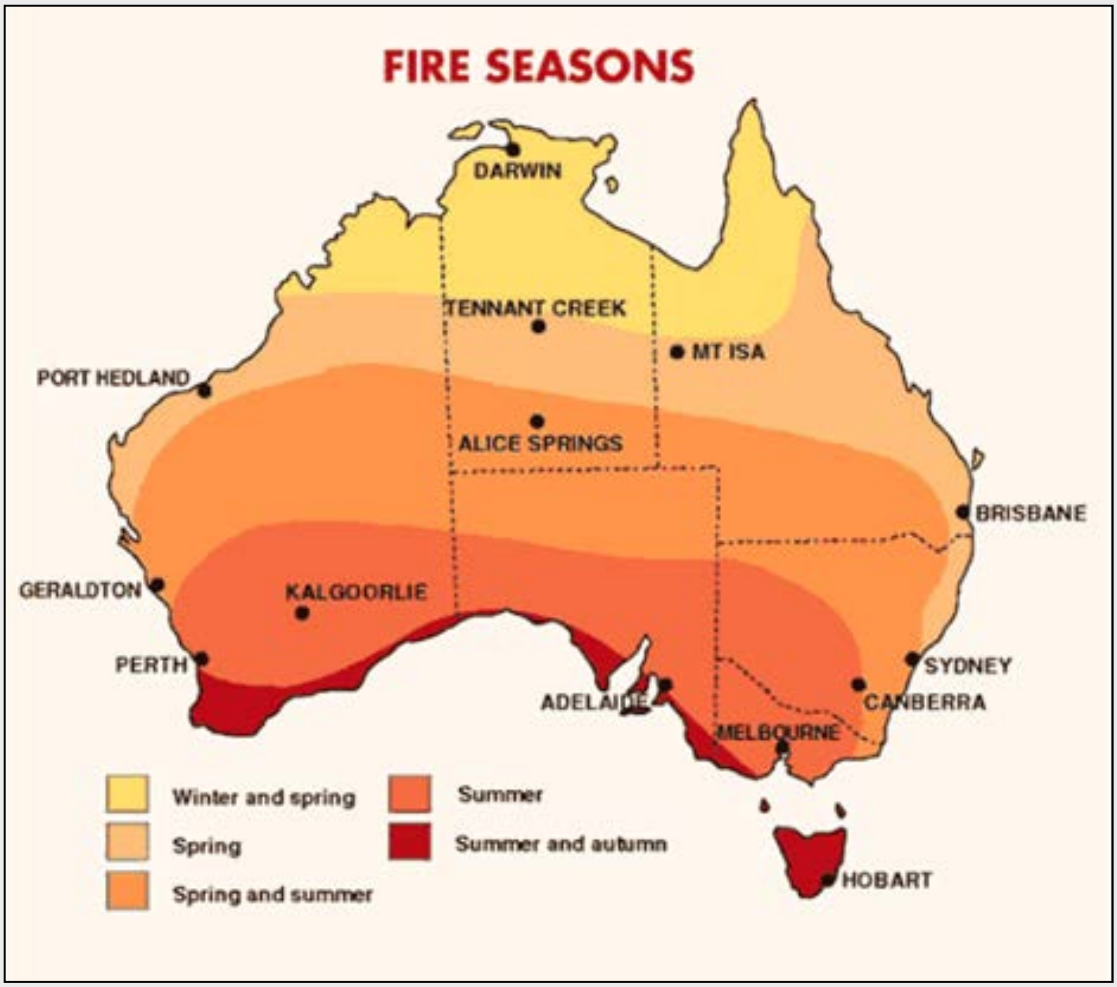

Figure 2 – Bushfire seasons in Australia
Source: Australian Government Bureau of Meteorology

Central Victoria has experienced a number of major bushfires that have caused loss of life and property. Two of the most significant of these fires are the Mt Macedon bushfire that occurred on Ash Wednesday in 1983 and the Avoca Maryborough fire of January 1985.

A more recent fire in the Mount Alexander Shire municipality was the Redesdale-Barfold fire of February 2009. This fire caused devastation to the area and was one of a number of major fires to burn across Victoria as part of the Black Saturday bushfires.

Other fires to impact the municipality include:

- 2003 – Barkers Creek
- 1986 – South east of Metcalfe
- 1981 and 1996 – Castlemaine Woollen Mill
- 1980 – North West of Maldon, Muckleford Forest
- 1979-80 – Golden Point (east of Maldon, Muckleford / Walmer area)

Photo: 1985 Maryborough and district bushfire

5 ROYAL COMMISSION RECOMMENDATIONS

2009 Victorian Bushfires Royal Commission

The 2009 Victorian Bushfires Royal Commission made several recommendations to support the future management of roadside bushfire risk. Relevant recommendations related to roadsides that were accepted by the Victorian Government in response to the Royal Commission include:

Recommendation 60

The State amend the exemptions in clause 52.17-6 of the Victoria Planning Provisions to ensure that the provisions allow for a broad range of roadside works capable of reducing fire risk and provide specifically for a new exemption where the purpose of the works is to reduce bushfire risk.

Recommendation 61

The State and Commonwealth provide for municipal council's adequate guidance on resolving the competing tensions arising from the legislation affecting roadside clearing and, where necessary, amend environment protection legislation to facilitate annual bushfire-prevention activities by the appropriate agencies.

Recommendation 62

VicRoads implement a systematic statewide program of bushfire risk assessment for all roads for which it is responsible, to ensure conformity with the obligations in s. 43 of the Country Fire Authority Act 1958 and with the objectives expressed in the VicRoads 1985 Code of Practice.

Royal Commission into National Natural Disaster Arrangements

After the devastating fires across eastern and southern Australia during the 1920 fire season, the federal government convened a National Royal Commission. Relevant recommendations related to roadsides that were submitted to the Commonwealth Government include:

Recommendation 12.1 - Roadside vegetation management

State and territory governments, working with local governments and fire and emergency service agencies, should ensure that there are appropriate arrangements for roadside vegetation management that take into account, among other things:

1. priority access and egress routes
2. road priority, utility and strategic value
3. cost, and
4. residual risk to national natural disasters.

Recommendation 12.2 Evacuation Planning – Evacuation Routes and Seasonal Populations

State and territory governments should ensure that those responsible for evacuation planning periodically review those plans, and update them where appropriate, including in relation to:

1. roles and responsibilities of state and territory governments, local governments and local communities
2. education and signage about evacuations and evacuation routes, including education of seasonal populations
3. the adequacy of evacuation routes; including contingencies if evacuation routes or centres are assessed as not being able to cope, and
4. the potential inability to evacuate, either by reason of circumstances or personal characteristics.

CSIRO Research

The premise of these recommendations related to bushfire risk and roadsides is supported by CSIRO research which demonstrates that,

'Vehicle fatalities track even higher than open air and structure-based fatalities. This is likely to be due to these fatalities occurring adjacent to roadside vegetation' (Life and house loss database description and analysis Final report, CSIRO – 2012)

These recommendations and supporting research provide a strong authorising environment for the Mount Alexander Shire Council to undertake works related to roadside bushfire risk management.

Photo: Historic railway bridge, Barkers Creek

6 PROJECT METHODOLOGY

Risk Management Methodology

The aim of this methodology is to assist the Mount Alexander Shire Council and the Municipal Fire Management Planning Committee to assess the bushfire risk associated with the roadside assessments within the townships of Chewton, Fryerstown, Elphinston, Taradale and Barkers Creek.

This methodology details the risk management approach that Fire Risk Consultants has applied to the prioritisation and determination of bushfire risk and mitigation activities within the project area.

The bushfire mitigation methodology aims to achieve a responsible balance between community safety and risk mitigation and to help the representative agencies of the Municipal Fire Management Planning Committee to not only meet their obligations but also to achieve best practice in bushfire mitigation.

The Risk Management Framework

Risk management is the process of recognising risk and developing methods to both minimise and manage the risk. The overall risk assessment process requires a consistent approach and the methodology has been developed and found in the AS/NZS ISO 31000:2009 as incorporated into the *National Emergency Risk Assessment Guidelines (NERAG)*.

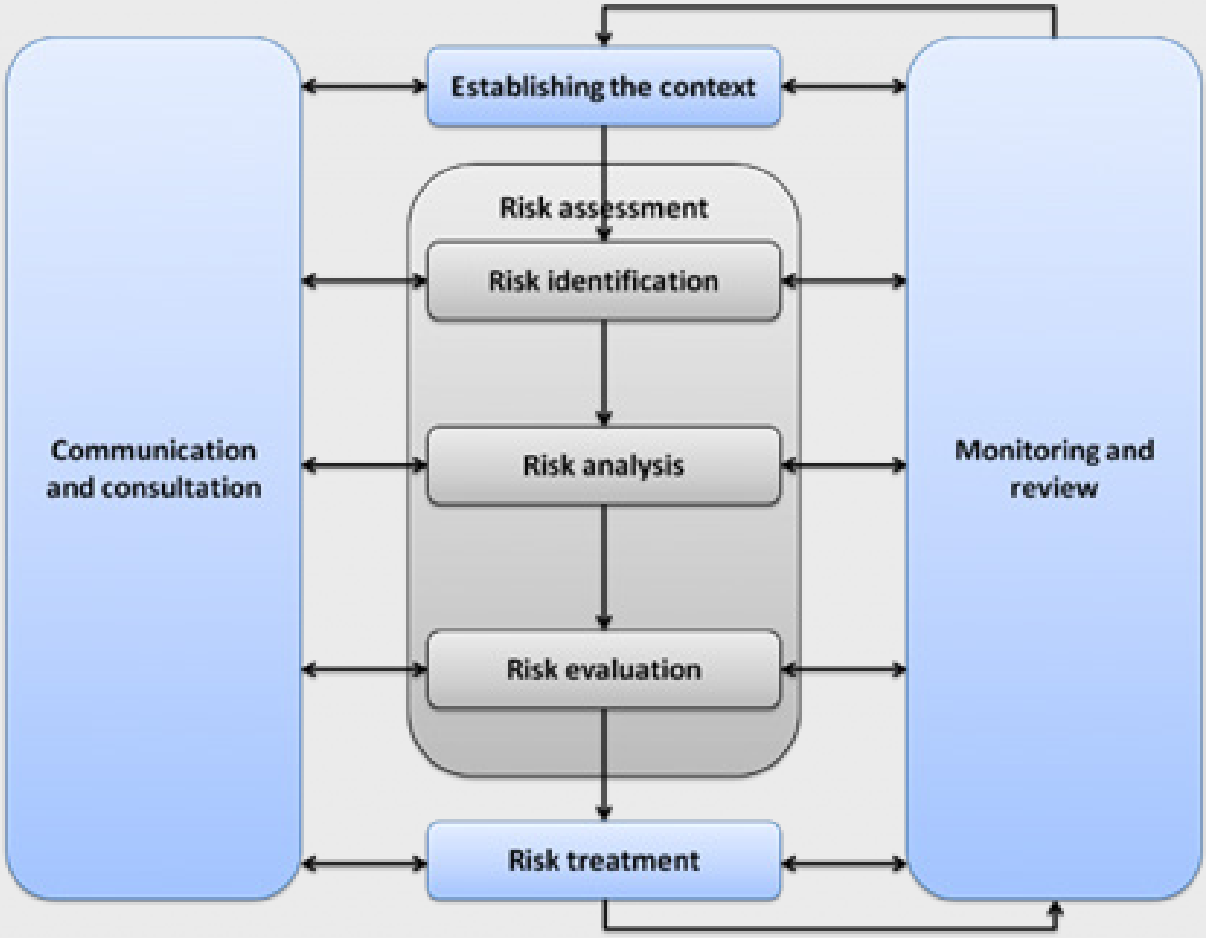

Figure 3 – Overview of AS/NZS ISO 31000-2009 Risk Management Process

Bushfire risk assessment is a analysis of the likelihood of an adverse event occurring and the consequence/s of the event. The bushfire risk assessment assists land managers, asset owners and private property owners to understand potential risks and to develop mitigation actions.

The key considerations that have been assessed in developing this report include:

- A fire occurring within the sites and spreading externally impacting neighbouring properties.
- A fire occurring on adjacent lands and entering the sites.

Bushfire Likelihood

An assessment of likelihood of a fire in the area impacting people and assets considers factors such as the:

- Potential for an unplanned fire to occur
- Potential for this ignition to develop and exhibit significant fire behaviour
- Potential for that fire to destroy assets adjacent to the roadsides
- The potential for it to develop into a major fire beyond the roadside ignition.

Risk management recommendations for bushfire mitigation actions in the area may be determined by a number of approaches depending on the level of assessed risk. Strategies to lower bushfire risk are provided to ensure the risk from bushfire is managed to an acceptable level. The mitigation measures, once implemented, will significantly reduce the ability for a bushfire to ignite and spread into, through or from the area.

A likelihood scale refers to the potential of unplanned fire beginning in the area and spreading to adjoining properties. An assessment of likelihood considers factors such as:

- Sources of ignition such as powerlines
- Usage
- History of ignitions
- Ability to spread through the area.

Bushfire Consequence

Consequence refers to the potential seriousness of the damage that could occur should a bushfire occur in a specific area in proximity to people and assets. In assessing the possible consequences, the assessment considers a variety of hazard, exposure and vulnerability factors including:

- Number of surrounding properties
- Proximity to dwellings adjacent to the roadsides
- The fuel levels present within the Road Reserves
- The size of the road easement
- The level of access into the area for suppression actions should a fire occur.

The consequence scale refers to the potential seriousness of the damage which could occur should a bushfire occur.

Risk Score

The risk assessment process is used to combine likelihood and consequence to obtain a risk score. The risk score is used to aid decision making by determining which areas are at the greatest risk of a fire starting and spreading through the estate. Actions can be prioritised using this method to determine where risk mitigation works will occur.

The bushfire risk assessment process results in a number of outputs that will assist the Municipal Fire Management Planning Committee with managing bushfire risk on the roadsides within the five project areas. These outputs include:

- Prioritised list of roadsides and recommended treatments
- Phoenix modelling highlighting areas of greatest risk.

Victoria's Roadside Bushfire Risk Assessment Tool

The Victorian State Government, through one of its major road asset managers (Regional Roads Victoria) has commissioned the *Road Bushfire Risk Assessment Guidelines and Risk Mapping Methodology* to support road managers in the assessment of bushfire risk. This document was endorsed in April 2013 and provides the primary guidance for assessing bushfire risk related to vegetation and other factors on roadsides in Victoria.

This guideline and the supporting assessment tool was heavily used by the Consultants during the assessment phase of roadsides within the five townships.

The methodology for this project utilised a variety of inputs to ensure that the assessment process considered all of the key factors required for effective decision making, including:

- Relevant strategies addressing risk management
  - Victorian Fire Risk Register
  - Lodden Mallee Regional Fuel Management Strategy
- Factors affecting potential fire behaviour
  - Overall fuel hazard assessment guide
  - Localised slope analysis / features
  - Distances between vegetation and road corridor
  - General landscape conditions beyond the assessment zone
  - Any features that will limit a bushfires impact on a roadside
- Roadside management standards for access and egress
  - CFA Roadside management legislation
  - Road management legislation
- Conservation and ecological requirements
  - Victorian Biodiversity Atlas
  - Internal guidance from Mount Alexander Shire Council

These inputs were used to guide the assessment process and identified risks to individual roads were categorised as either:

- Low to Moderate
- High to Very High
- Extreme

Recommended treatment options were then applied to each road, including:

- Grass slashing
- Mulching/mechanical works
- Dangerous tree mitigation
- Planned burning
- Grazing

As an additional value add to the risk assessment process, Fire Risk Consultants have used extensive Phoenix modelling to assess the existing bushfire risk on roadsides and then reassess the bushfire risk after the recommended treatments have been applied. This includes house loss probability modelling adjacent to the roadside corridors. Further analysis of this modelling is included in Section 10 of this report.

Through this process, Fire Risk Consultants were able to identify the level of risk and potential treatment options to assist in prioritisation of works.

Figure 4 – Road Bushfire Treatment Selection Tool - Risk Worksheet

Road name:
Road maintenance category
Segment (from - to):
Length of segment:
Distance from Brigade:

Date:
Assessors:

Photos:

Risk worksheet

N
W E
S
Facing (circle)

Predominant land use
1 ☐ Transport
4 ☐ Cropping
1 ☐ Grazing
9 ☐ Forest
9 ☐ Plantation
9 ☐ Residential
7 ☐ Industrial/commercial

Topography
1 ☐ Rugged
4 ☐ Gentle

Potential for fire spread
9 H 5 M 3L

Assets within 30m

High value	9 Y/N
Moderate value	7 Y/N
Low value	5 Y/N

Fuel break 3Y/5N

History of ignitions
> 20% above median ☐ 9
Within 20% of median ☐ 3
> 20% below median ☐ 1

SCORE TOTAL:

width ____ m

Fire place present 5 Y / N

Vegetation

Grass	Forest	Wood	Heath	Non-vegetated
5 ☐	9 ☐	7 ☐	7 ☐	0 ☐

Dries out 6 Every year / 3 Most / 1 Rarely

Fuel Hazard	M	H	VH	Ext
Surface/nr surface	1 ☐	3 ☐	5 ☐	9 ☐
Elevated	2 ☐	4 ☐	7 ☐	9 ☐
Bark	3 ☐	6 ☐	9 ☐	9 ☐

Conservation status H / M / L

Assets present

Road furniture	Y / N
Rest area	Y / N
Power	4 Y / N
Water	Y / N
Telecoms	2 Y / N

SCORE TOTAL:

width ____ m

Road formation

Road on steep gradient	Y / N
Bridge	Y / N
Cutting	Y / N
Embankment	Y / N

SCORE TOTAL:

width ____ m

Vegetation

Grass	Forest	Wood	Heath	Non-vegetated
5 ☐	9 ☐	7 ☐	7 ☐	0 ☐

Dries out 6 Every year / 3 Most / 1 Rarely

Fuel Hazard	M	H	VH	Ext
Surface/nr surface	1 ☐	3 ☐	5 ☐	9 ☐
Elevated	2 ☐	4 ☐	7 ☐	9 ☐
Bark	3 ☐	6 ☐	9 ☐	9 ☐

Conservation status H / M / L

Assets present

Road furniture	Y / N
Rest area	Y / N
Power	4 Y / N
Water	Y / N
Telecoms	2 Y / N

SCORE TOTAL:

width ____ m

Fire place present 5 Y / N

Predominant land use
1 ☐ Transport
4 ☐ Cropping
1 ☐ Grazing
9 ☐ Forest
9 ☐ Plantation
9 ☐ Residential
7 ☐ Industrial/commercial

Topography
1 ☐ Rugged
4 ☐ Gentle

Potential for fire spread
9 H 5 M 3L

Assets within 30m

High value	9 Y/N
Moderate value	7 Y/N
Low value	5 Y/N

Fuel break 3Y/5N

History of ignitions
> 20% above median ☐ 9
Within 20% of median ☐ 3
> 20% below median ☐ 1

SCORE TOTAL:

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7 BENEFITS FOR CONDUCTING A BUSHFIRE RISK ASSESSMENT

Benefits of the project to reduce bushfire risk include:

- An awareness of existing bushfire risks along the roadsides in the five townships
- An appreciation of the increasing bushfire risks we face as a community that should be addressed
- Identifying opportunities to work collaboratively with other stakeholders to reduce bushfire risk across the broader landscape
- Alignment with Stage Government policy through the adoption of the protection of life as the highest priority and a coordinated approach to bushfire risk mitigation and initiatives
- Justify the investment in resources, systems and process to lower the consequence of bushfires impacting permanent residents, visitors, assets and surrounding properties
- Updates to existing Emergency Management Plans and the Victorian Fire Risk Register

Determining Specific Objectives

The objectives established will define both the aims of the risk mitigation works as well as what the risks will be measured against.

The overall objectives are to prioritise and plan bushfire mitigation works that will:

1. Reduce the risk to human life from bushfire
2. Protect key infrastructure and assets from bushfire
3. Provide responding firefighters from the Agencies increased safety and optimised opportunities to contain roadside fires at first attack
4. Create a safer environment for community to exit high risk bushfire environments before and during bushfire events.

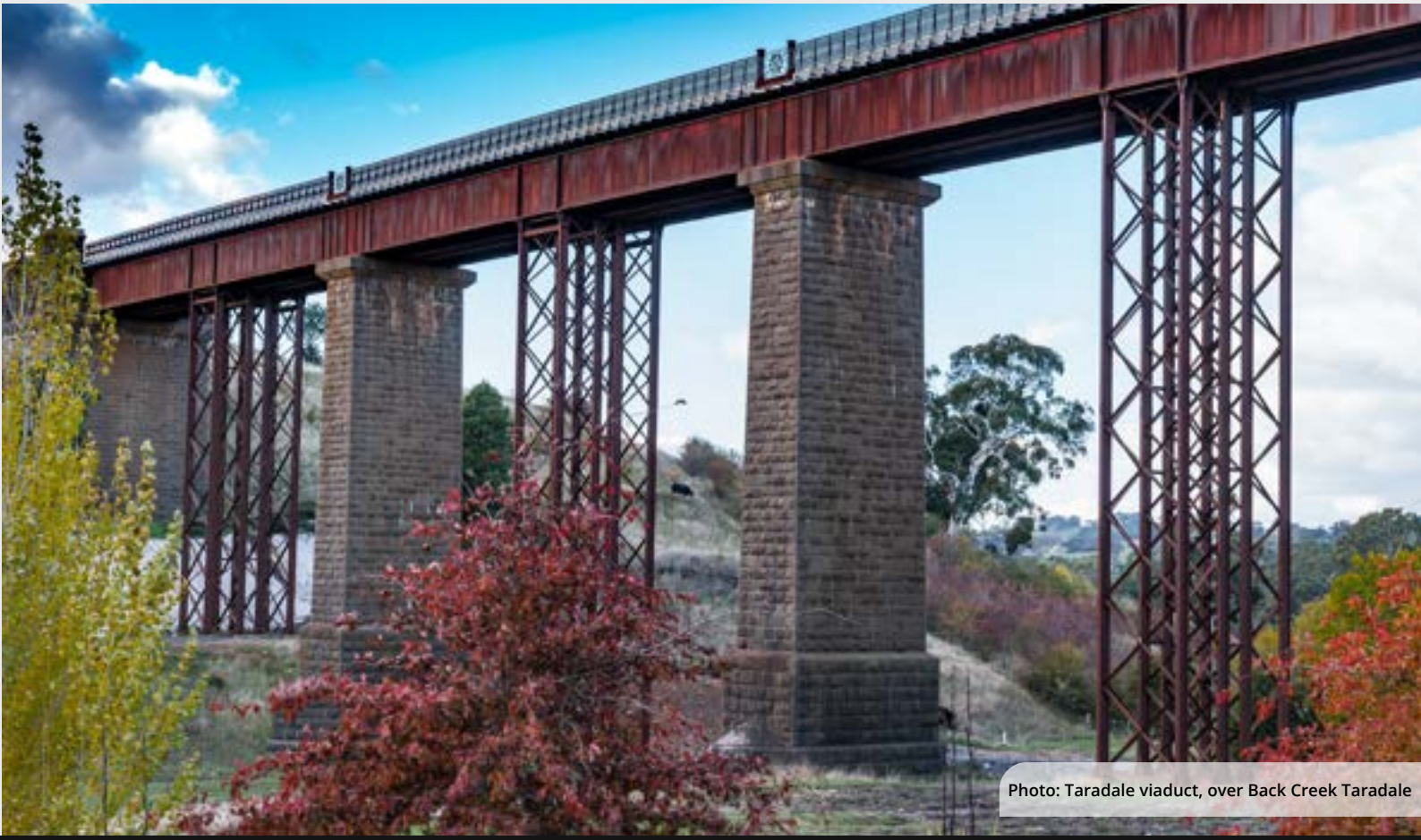

Photo: Taradale viaduct, over Back Creek Taradale

8 EXISTING CONDITIONS

Broader Landscape

The most common scenarios for high intensity, difficult to suppress, fast moving fire runs in Victoria include being impacted from a fire travelling from either the north west or south west under the prevailing weather conditions. These fires will be more destructive when there is higher amounts of forest and/or grass fuels as well as the presence of topographical features such as hills and mountains.

Analysis of the likelihood and consequence for bushfires int eh Mount Alexander Council area demonstrate a very high risk for destructive bushfires impacting the area from the broader landscape during the hotter, dryer months.

The broader landscape and the potential scale and size of a bushfire are important considerations in the assessment of bushfire risk at a particular site.

This is due to the fuel and weather factors described earlier in the report combined with the presence of topographical features such as hills in the surrounding landscape driving the likelihood and the presence of residents and visitors, including vulnerable people, critical infrastructure and other assets resulting in potentially major damage (consequence).

The Phoenix modelling highlighted in this report is generated by a sophisticated simulation tool that generates animated 'runs' of a potential bushfire based on various inputs, including fuel, weather and topography. It can be a useful tool to highlight how a bushfire will move through a landscape and the potential consequences (generally expressed as the number of houses burnt). Weather inputs can be adjusted to demonstrate the different outcomes based on lower or higher Fire Danger Indices (FDI).

However, Phoenix RapidFire simulations have limitations including the use of input data of varying quality. Phoenix RapidFire is one of several bushfire models currently available, each with its own strengths and weaknesses. Like all models, Phoenix RapidFire gives only an approximation of reality. Some of the factors that may limit the accuracy of Phoenix RapidFire results are:

- The quality of its inputs. Phoenix RapidFire uses a range of data inputs to model bushfire behaviour, including fuel types, ignition locations, weather variables, topography and previous fire history. These data sets vary in accuracy.
- All bushfires have been simulated using the same weather scenario, which has been designed to represent a typical 'worst case' fire day in Victoria, including a strong wind change in the afternoon from the north west to the south west.
- A full understanding of bushfire risk requires consideration of both the likelihood and consequence of bushfire impacts on human life, property and other values. Phoenix RapidFire mainly considers the consequence element of bushfire risk and the likelihood of particular ignitions is explicitly ignored.

The results of Phoenix RapidFire simulations need to be validated against the information collected from on-site data collection, as this provides a more accurate overview of the fire risk and residual risk from fire hazard mitigation works.

The location of the roadsides in the context of bushfire management planning can be considered challenging due to the location of surrounding forested areas, making them vulnerable to impacts from bushfires. This is exacerbated by:

- High to very high fuel hazard (forest fuels) along a significant proportion of the roadsides
- A complex road network, including significant number of clear and present danger trees, without any defined strategic roads for access and egress
- Significant increase in road users unfamiliar with the area i.e. tourists during peak holiday periods

Figure 5 – Surrounding landscape highlights the proximity to forested areas, which significantly increases the risk of destructive bushfires impacting the townships.
Main fire runs from the north west (1) and the south west (2) after the wind change also identified.

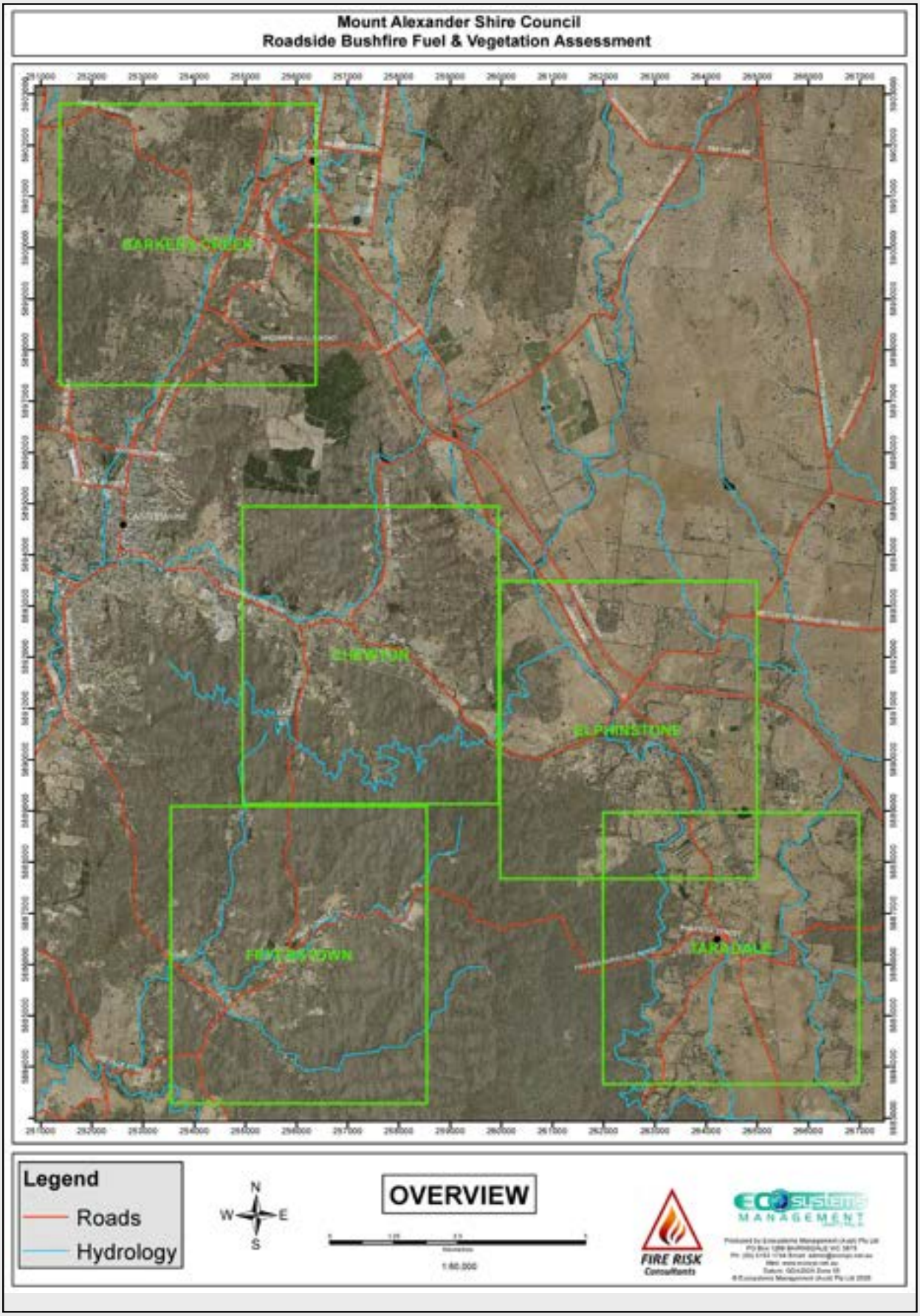

Figure 6 – Surrounding landscape with the five project area assessment zones identified.

Victorian Fire Risk Register – Bushfire

Data from the Victorian Fire Risk Register – Bushfire (VFFR – B) supports the analysis that extreme bushrisk for Human Settlements exists across much of the five townships.

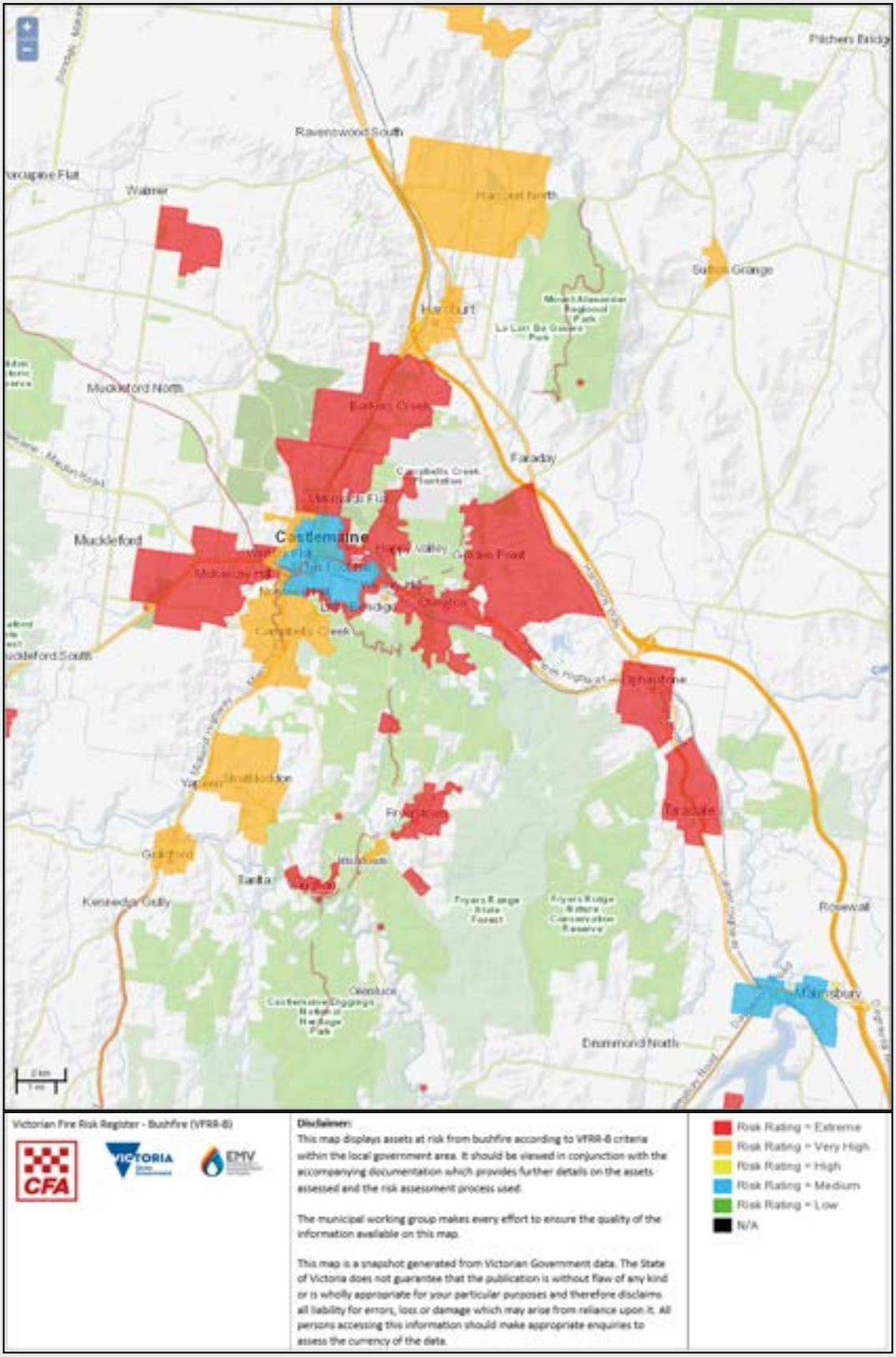

Figure 7 – VFFR – B Risk rating for Castlemaine area highlights the extreme level of risk for the five sites.

9 BUSHFIRE ROADSIDE RISK TREATMENT RECOMMENDATIONS

Bushfire Management Planning

The draft Castlemaine Bushfire Mitigation Plan (2021) highlights the various strategic and management plans that exist at the State, Regional and Municipal levels and demonstrates a robust and thorough approach to bushfire management planning in the area. The risk posed by roadsides is considered in the context of bushfire management planning at all levels and the recommendations identified in this report as a result of these assessments will provide actionable tasks that will link with existing strategic frameworks and as previously highlighted, the Federal and State Royal Commission recommendations provide the authorising environment to conduct the works.

Local road conditions and access/egress

The ability to move around the local area quickly and safely is important for emergency services during suppression operations and for the quick and efficient movement of vehicles during any evacuation procedures.

Consideration for access and egress must include:

- Suitability for heavy (emergency) vehicles all year round
- Access during potential congestion periods
- Ability to turn around
- Access to water
- Secondary escape route

A good road and track network can:

- Improve bushfire response times, which increase the likelihood of bushfires being suppressed in minimal time and to a minimal area
- Improve firefighter safety, by providing a safer platform from which firefighters can prepare for and fight bushfires
- Provide greater protection for assets
- Improve the speed of evacuation of the area, if required.

Recommendations & Observations

OBSERVATIONS

- The roads across the five sites vary significantly in terms of condition i.e width, sheeting, vegetation, general condition. Some roads would pose a significant risk in the context of a bushfire, including entrapment of road users, difficult access for emergency services and increase in the spread and intensity of a bushfire.
- There are significant numbers of clear and present danger trees in close proximity to the roads, which can significantly increase the risks during bushfire events by trapping road users whilst trying to escape and direct impact to road users/emergency services personnel
- As demonstrated in the figures below, the total level of risk across the five townships from highest to lowest is,
- Fryerstown
- Chewton
- Barkers Creek
- Elphinstone
- Taradale

The following figures show the risk rating across all of the roads assessed and includes recommended treatment options. A full explanation of the recommended treatment options is provided in Appendix 1.

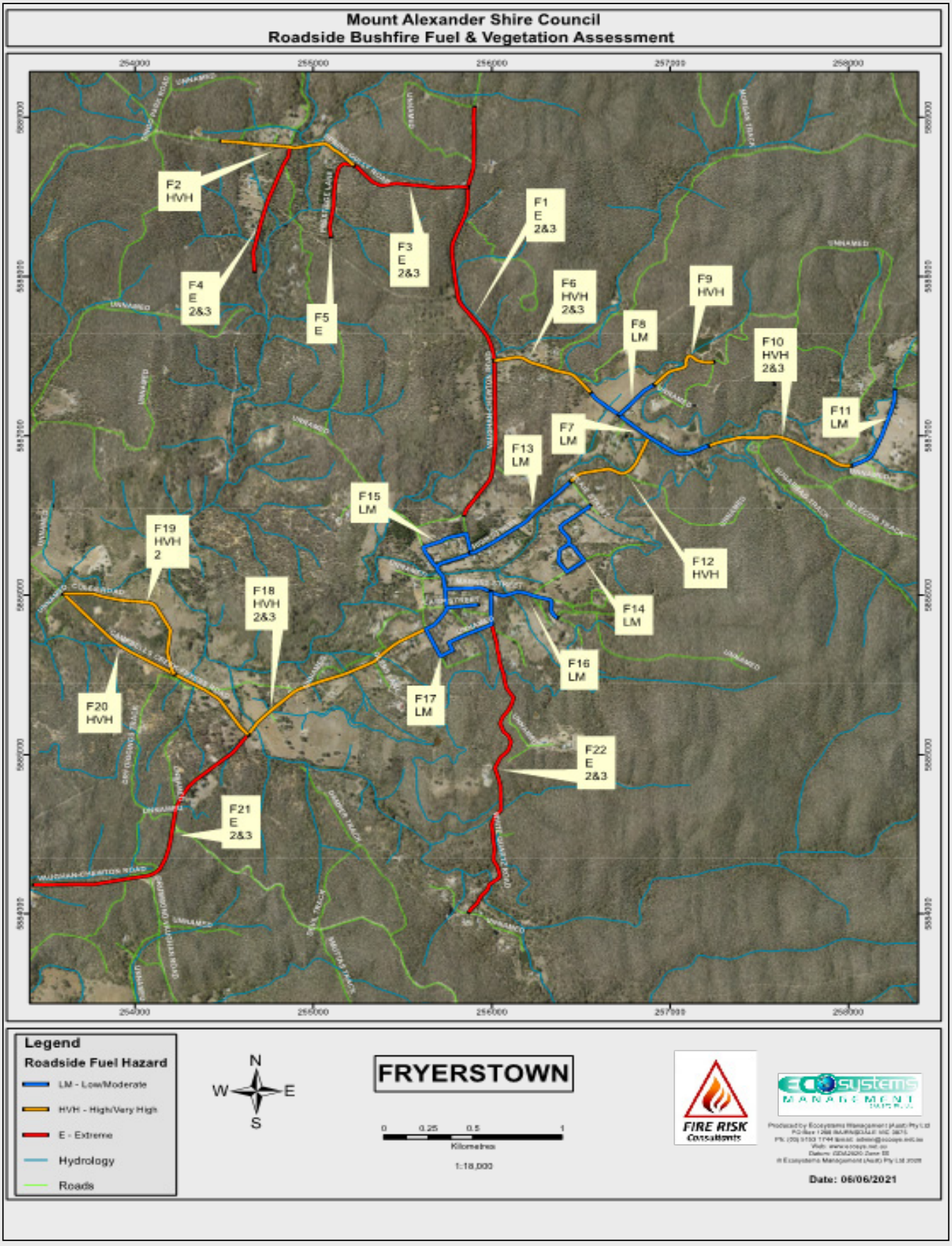

Figure 8 – Map of the local road network at Fryerstown highlights the significant level of extreme and high – very high risk that currently exists

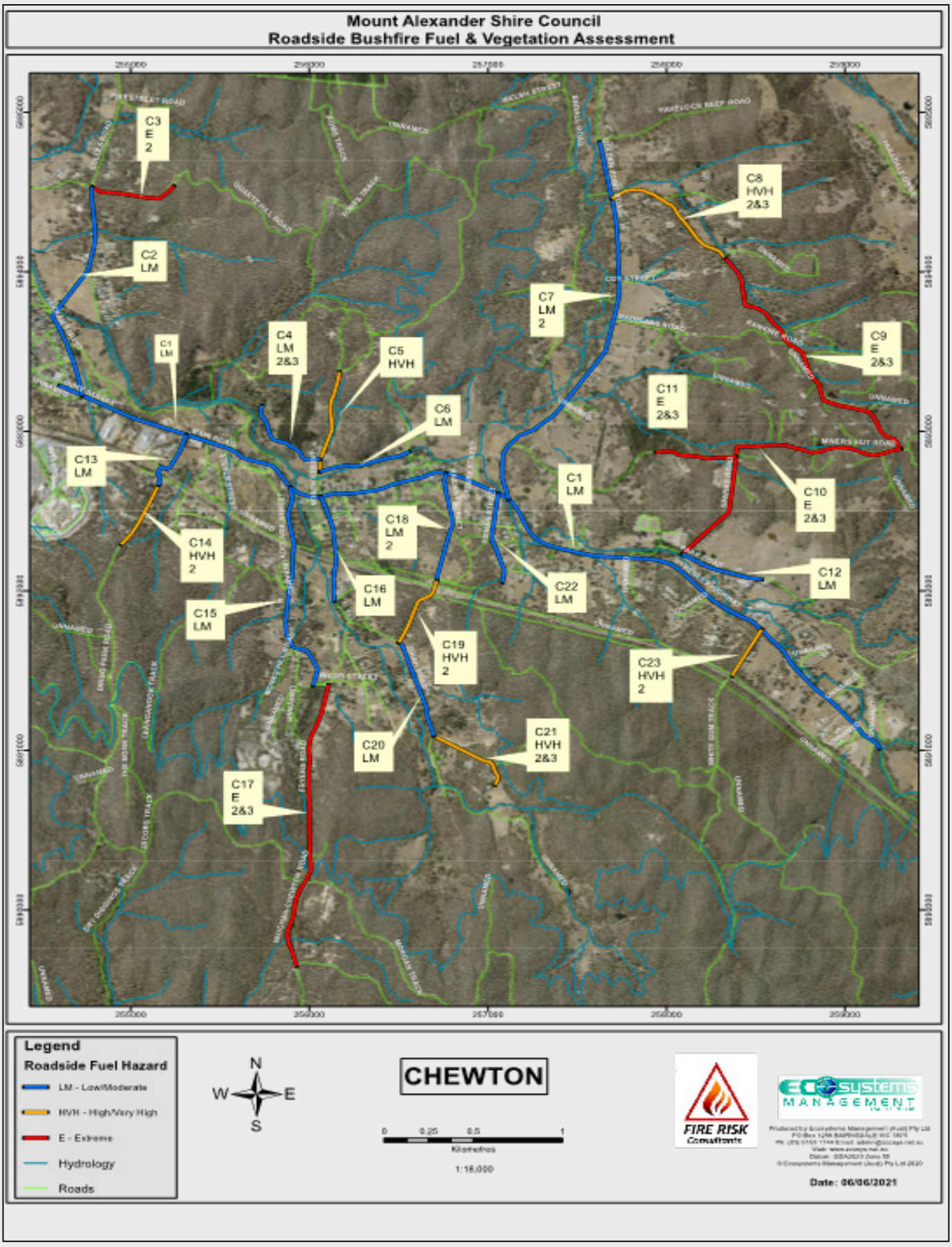

Figure 9 – Map of the local road network at Chewton highlights the moderate level of extreme of risk broken up with large sections of roads with low – moderate that currently exists

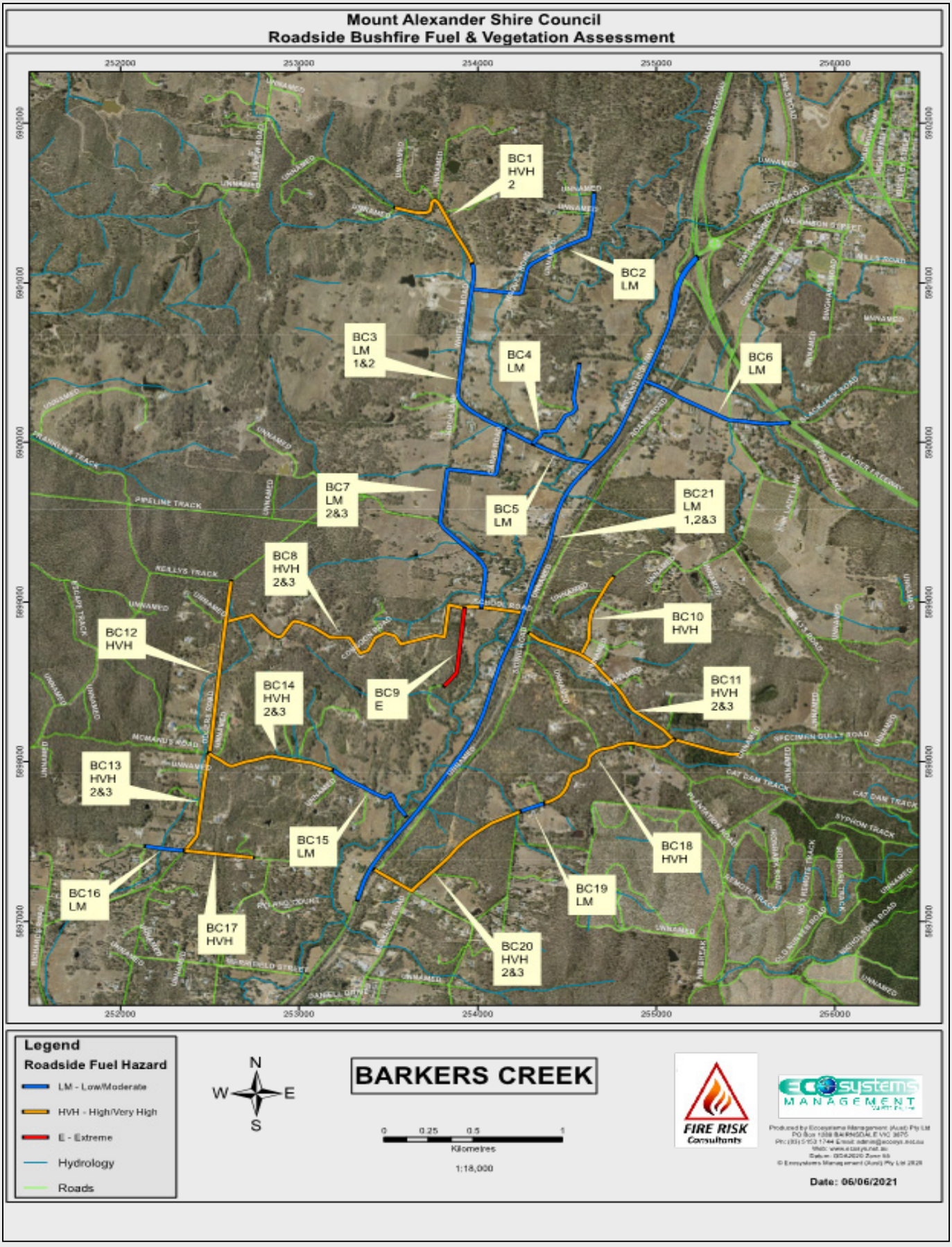

Figure 10 – Map of the local road network at Barkers Creek highlights the moderate level of high – very high risk of risk broken up with large sections of roads with low – moderate that currently exists

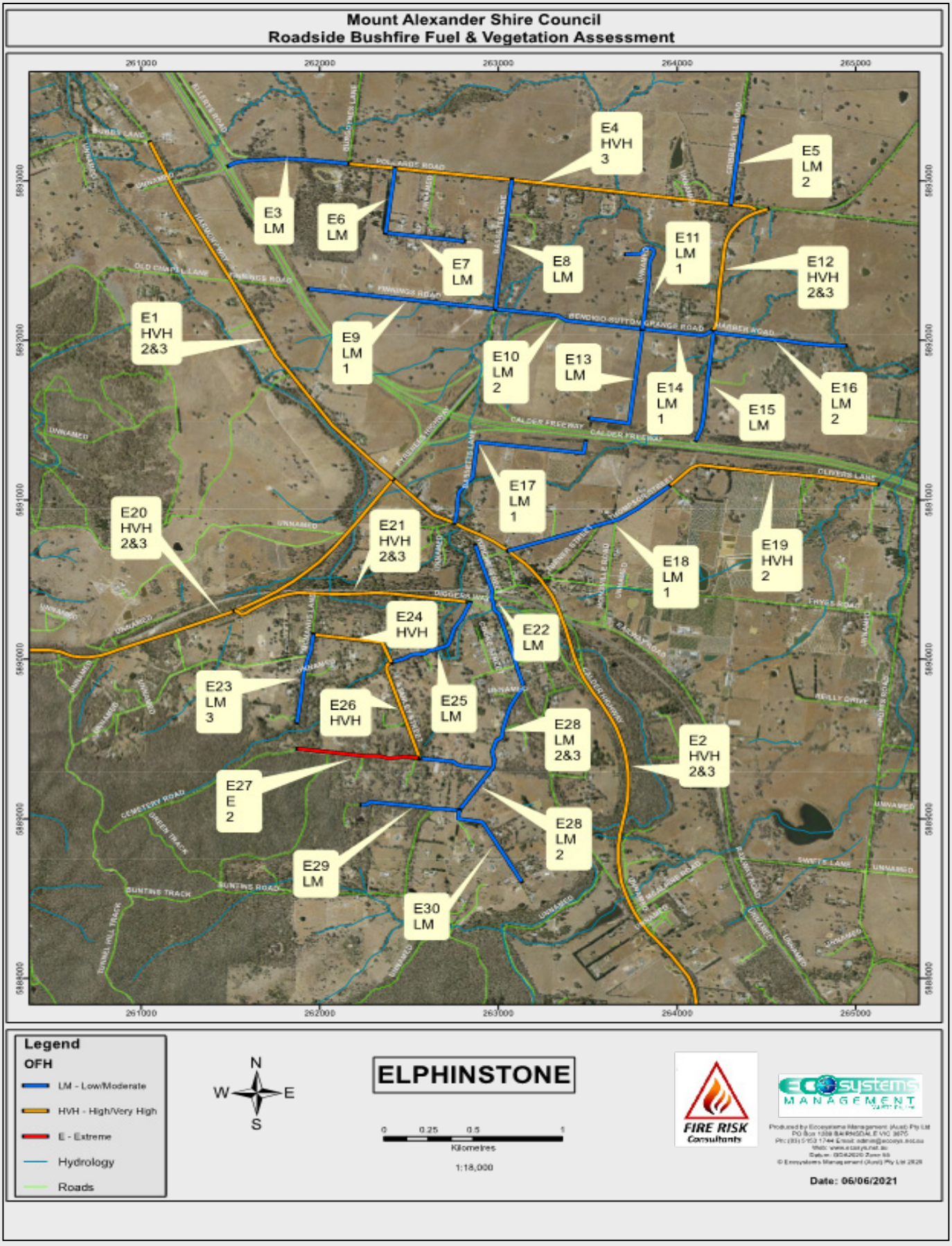

Figure 11 – Map of the local road network at Elphinstone highlights the moderate level of high – very high risk broken up with large sections of roads with low – moderate that currently exists

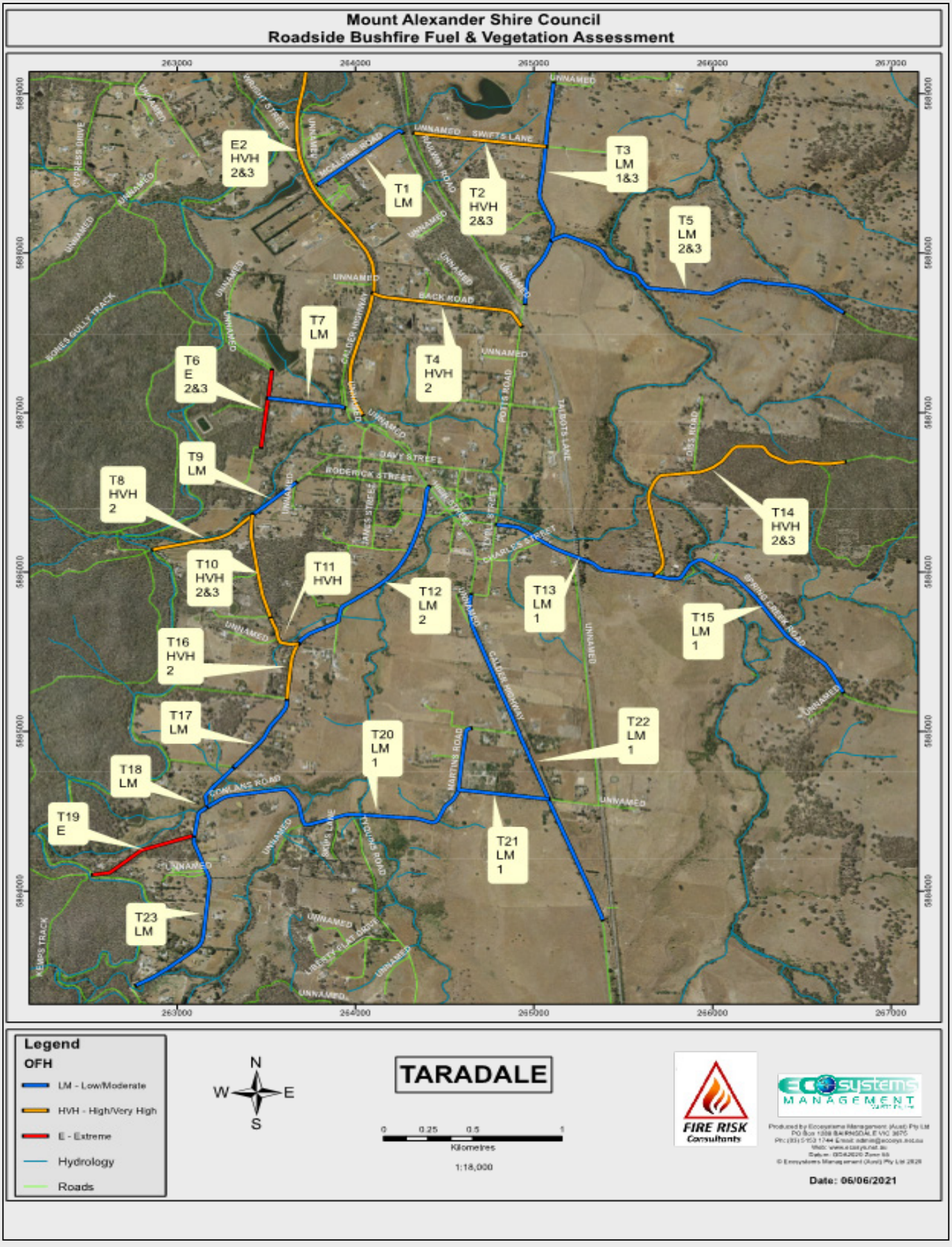

Figure 12 – Map of the local road network at Taradale highlights the low level of high – very high risk broken up with large sections of roads with low – moderate that currently exists

10 PHOENIX RAPIDFIRE ANALYSIS

Analysis of the Phoenix runs undertaken for this project were as follows:

- Elphinstone - Fire Danger Index 35 – Start to the NW of Point E2, Calder Highway
- Barkers Creek - Fire Danger Index 35 – Start to the NW of Point BC18, Specimen Gully Rd and Blakely Road.

Each of these scenarios analysed the potential impacts for the following two factors:

- General spread of the bushfire at specific time points, with and without the effect of the fuel hazard treated on the specified roadsides
- Potential house loss, with and without the effect of the fuel hazard treated on the roadsides

Potential spread of fire summary

A summary of the outputs from **unmodified roadsides** showed the following:

Elphinstone

Fire Danger Index 35 – Private land ignition to the NW of Location E2

A bushfire starting to the NW of Location E2 has the potential to run about 24.1 kilometres and build to a final size of 10,300 hectares (Figure 13).

Barkers Creek

Fire Danger Index 35 – Private land ignition to the NW of Location BC18

A bushfire starting to the NW of Location BC18 has the potential to run about 10 kilometres and build to a final size of 2,775 hectares (Figure 14).

A summary of the outputs from **fuel modified roadsides** showed the following:

Elphinstone

Fire Danger Index 35 – Private land ignition to the NW of Location E2

A bushfire starting to the NW of Location E2 has the potential to run about 23.5 kilometres and build to a final size of 9,170 hectares.

Barkers Creek

Fire Danger Index 35 – Private land ignition to the NW of Location BC18

A bushfire starting to the NW of Location BC18 has the potential to run about 5 kilometres and build to a final size of 1,000 hectares.

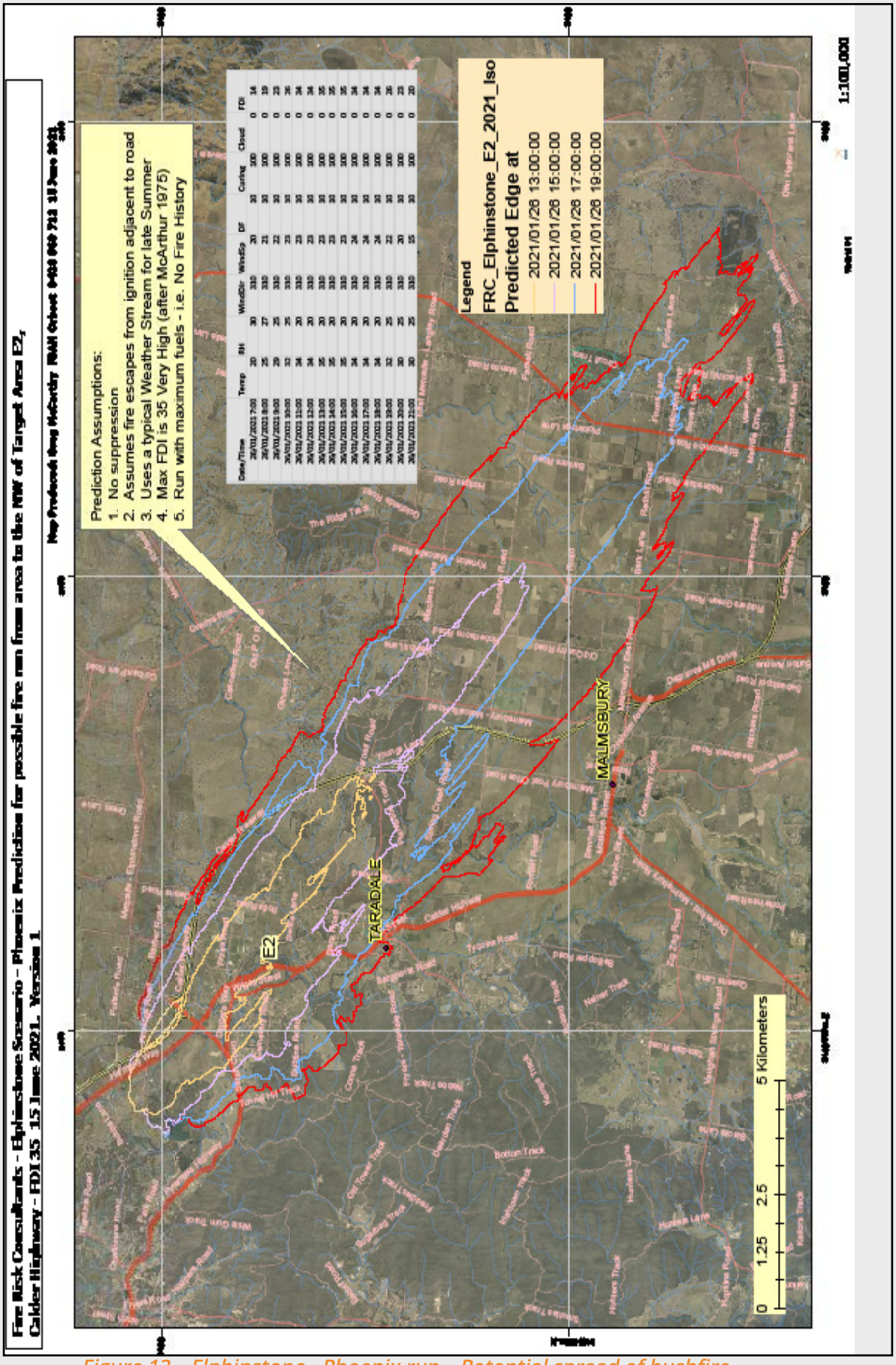

Figure 13 – Elphinstone - Phoenix run – Potential spread of bushfire.
Fire Danger Index 35 – Private land Ignition - NW of E2

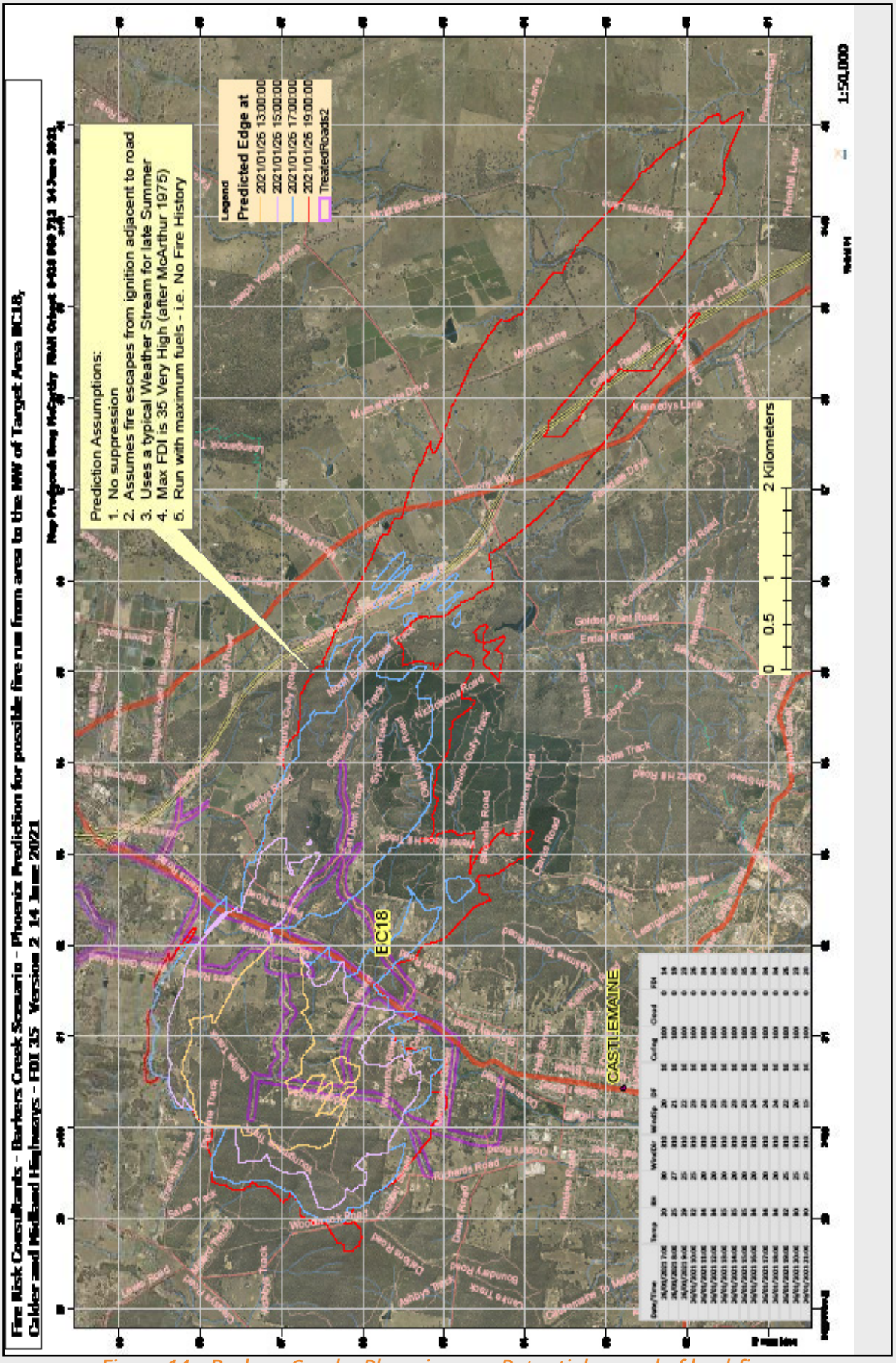

Figure 14 – Barkers Creek - Phoenix run – Potential spread of bushfire.
Fire Danger Index 35 – Private land Ignition - NW of BC18

Potential house loss summary

A summary of the outputs from **unmodified roadsides** showed the following:

Elphinstone

Fire Danger Index 35 – Private land ignition to the NW of Location E2

There is a high risk for house/asset loss in the built up areas (Figure 15).

Barkers Creek

Fire Danger Index 35 – Private land ignition to the NW of Location BC18

There is a high risk for house/asset loss in the built up areas (Figure 16).

A summary of the outputs from **fuel modified roadsides** showed the following:

Elphinstone

Fire Danger Index 35 – Private land ignition to the NW of Location E2

There is still a high risk for house/asset loss in the built up areas, but the house loss probability is notably reduced when the roadsides have been fuel-modified (Figure 17).

Barkers Creek

Fire Danger Index 35 – Private land ignition to the NW of Location BC18

There is still a high risk for house/asset loss in the built up areas, but the house loss probability is notably reduced when the roadsides have been fuel-modified (Figure 18).

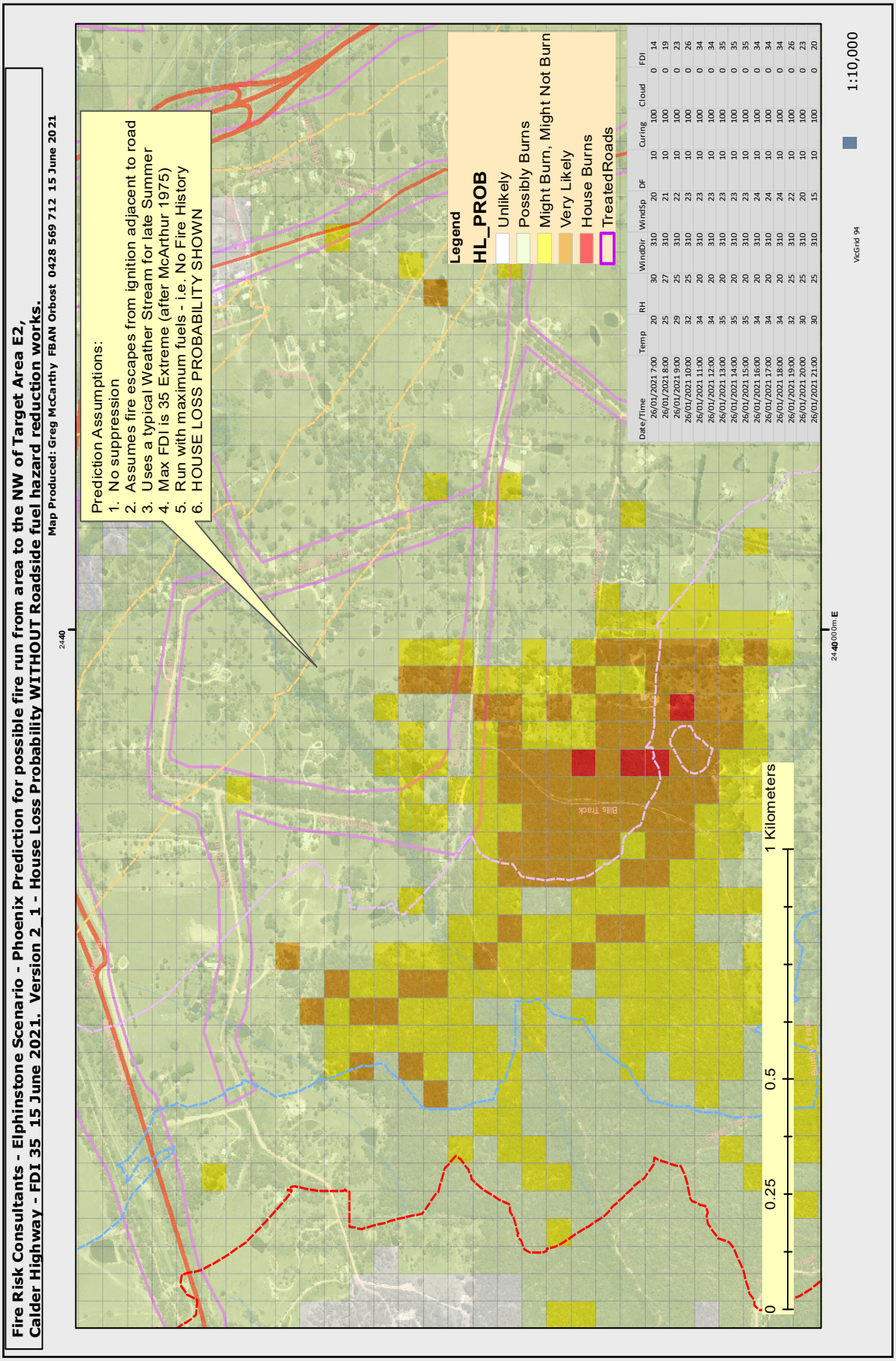

Figure 15 – Elphinstone - House loss probability with NO roadside hazard reduction. Fire Danger Index 35 – Private land Ignition - NW of E2

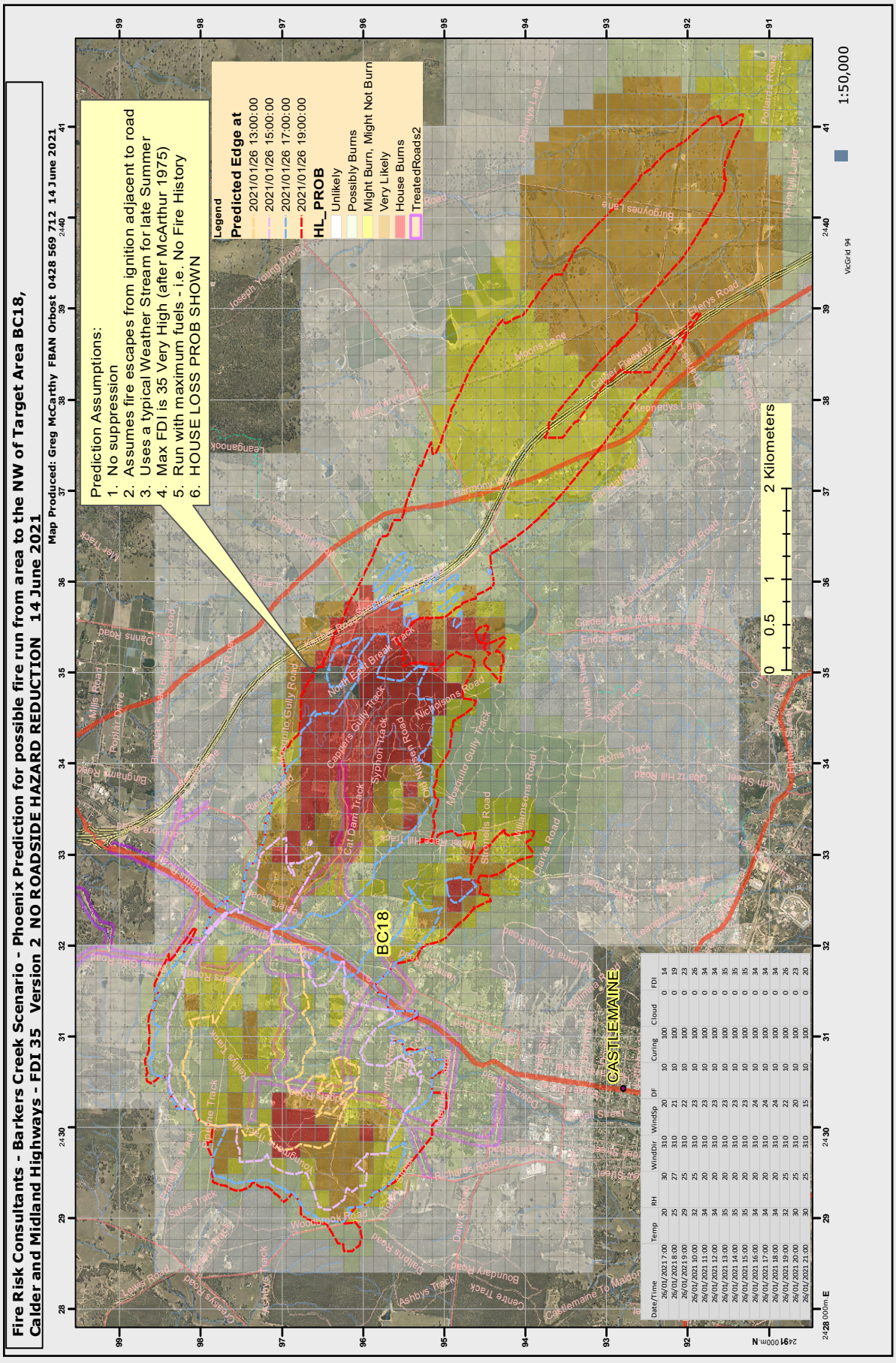

Figure 16 – Barkers - Creek House loss probability with NO roadside hazard reduction. Fire Danger Index 35 – Private land Ignition - NW of BC18

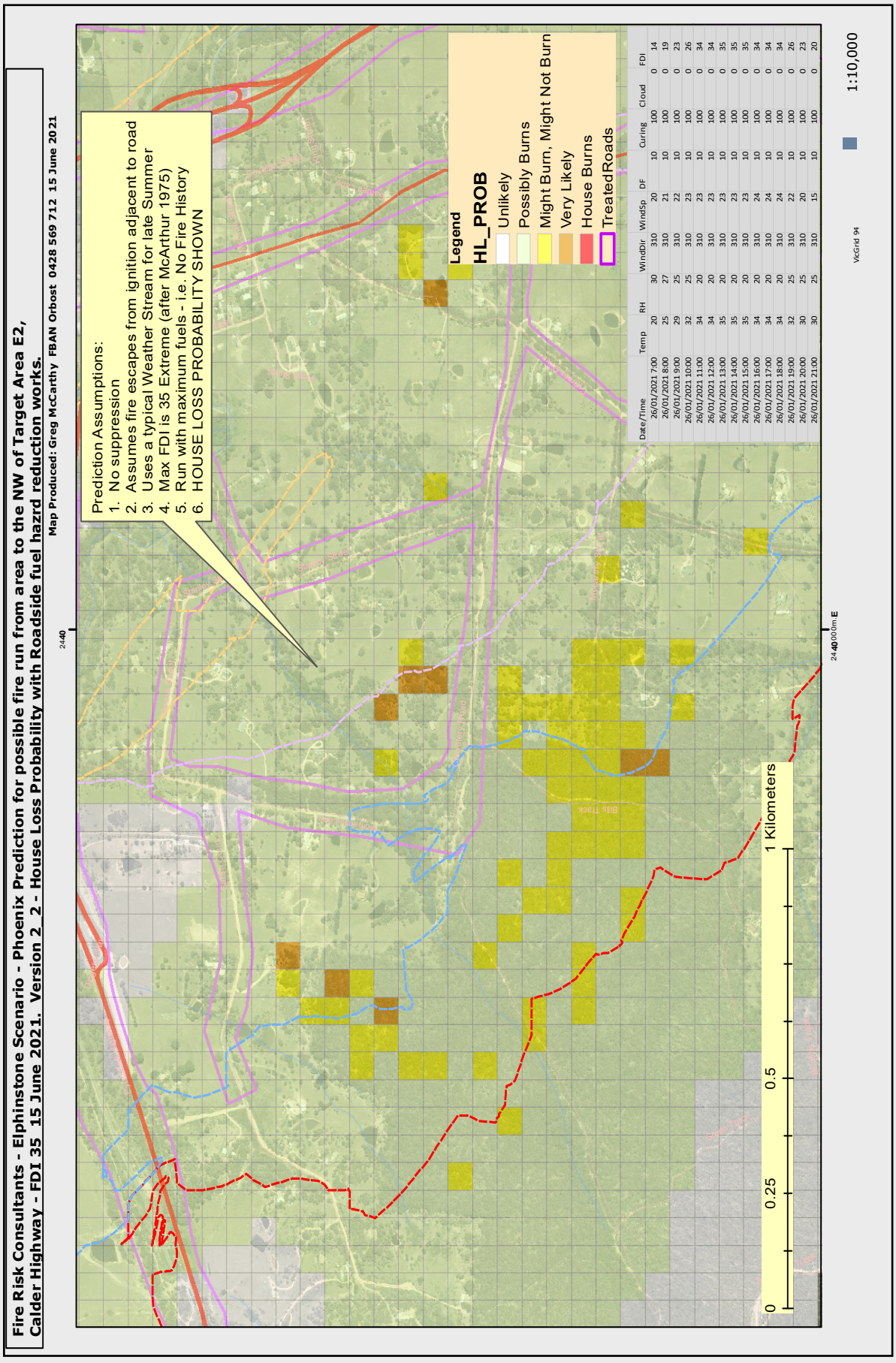

Figure 17 – Elphinstone - House loss probability WITH roadside hazard reduction. Fire Danger Index 35 – Private land Ignition - NW of E2

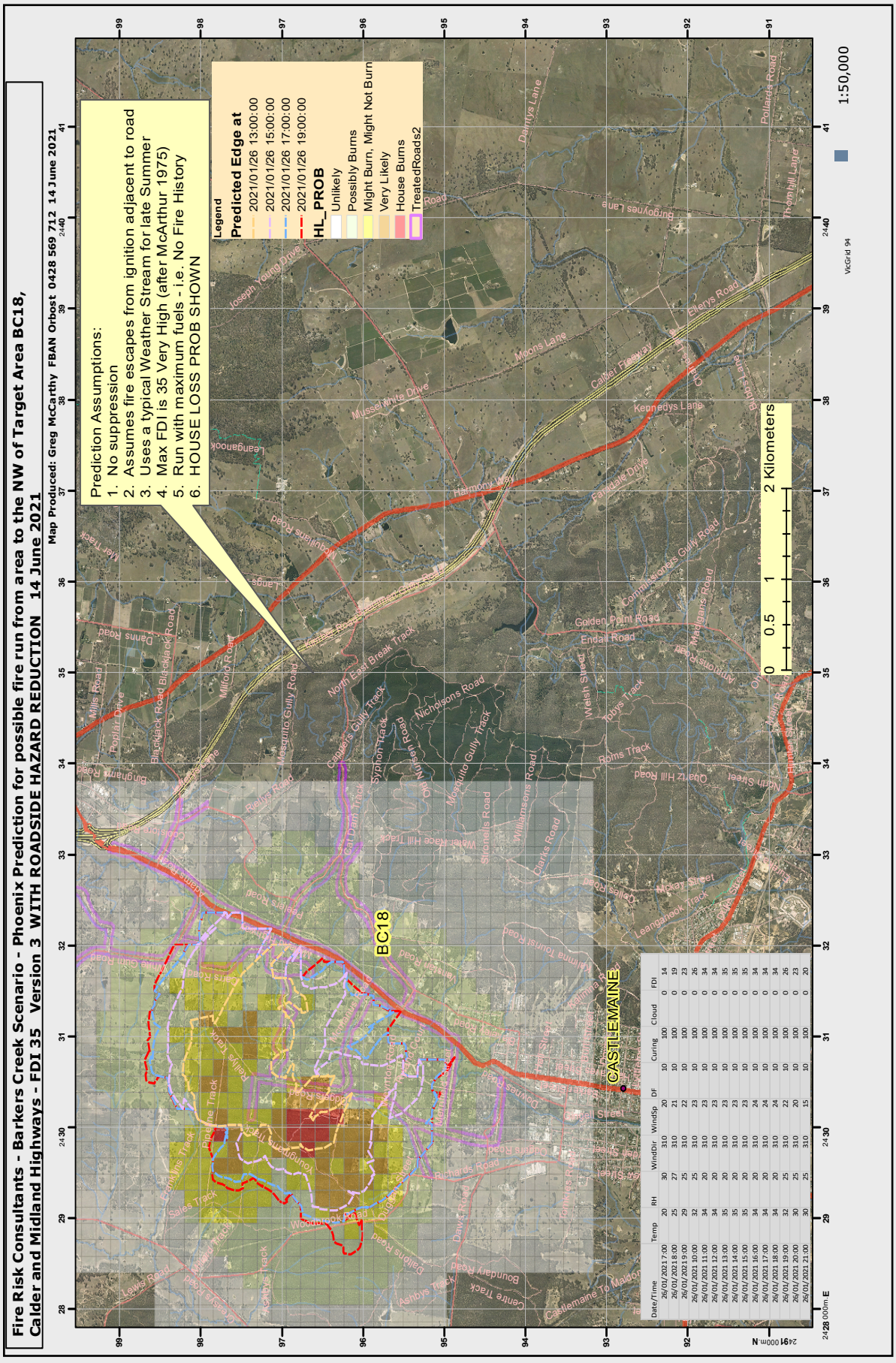

Figure 18 – Barkers Creek - House loss probability WITH roadside hazard reduction. Fire Danger Index 35 – Private land Ignition - NW of BC18

11 CONCLUSION

South eastern Australia is one of the most bushfire prone areas in the world. Bushfires do not respect land management boundaries or lines on a map. They burn freely across all landscapes if available fuel is present and the weather conditions are conducive to fire spread. Therefore, we have not only assessed various sites but have assessed the bushfire risk at a landscape level. This includes the risk of fire entering the roadsides from the surrounding landscape.

Specific issues with this area from a bushfire planning point of view include visitors and users who may come from an urban environment and not aware of the fire season implications including daily monitoring of the weather. Other issues include high to very high/extreme risk at many of the roads, significant numbers of clear and present danger trees in close proximity to the roads and poor access and egress via some of the roads for users to effectively leave the areas during a bushfire event and/or for emergency services to safely and efficiently reach the fireground.

Bushfires are extremely unpredictable. Road users in these townships are subject to a level of bushfire risk every Summer. The objective of all bushfire management activities in Victoria is to reduce the impact and consequences of bushfire on people, property and the environment, with the protection of human life the highest priority.

In Victoria, bushfire safety is considered a shared responsibility between the fire services, the Victorian Government and local government, communities and individuals. All parties are responsible for preparing prior to the fire season in order to protect themselves and their interests from the impact and effect of bushfires.

A suite of actions has been made to assist the Mount Alexander Shire Council make informed decisions to assist with prioritisation of works to effectively reduce the risk to residents and road users.

Photo: Dilapidated farmhouse, Newstead

APPENDIX 1

Mount Alexander Shire Council

Roadside Vegetation & Bushfire Risk Assessment 2021

Fuel Management Treatment Recommendations/Descriptions

1 - TREATMENT RECOMMENDATION - GRASS SLASHING

The modification of grass fuels, with a maximum height of roadside grassland in the identified zones being maintained at <100mm for the duration of the Fire Danger Period (FDP).

Slashing recommended as part of the project assessment area compliments existing Mount Alexander Shire Council roadside slashing programs.

2 - TREATMENT RECOMMENDATION - MULCHING/MECHANICAL WORKS

An area of intensive fuel management adjacent to the road corridor, where vegetation structure modification forms a key part of the treatment.

Linked to Overall Fuel Hazard (OFH), this work method normally involves the mechanical treatment of surface, near surface and elevated fuels to modify fuels locally in the area. These proposed areas, adjacent to roadsides in the project area, have the following benefits:

a. Provide a safer work environment for firefighters in the event of a fire (reduced radiant heat and safer access and egress).

b. Provide an established boundary from which to carry out hazard reduction burning, or in the event of an approaching bushfire, back burning operations.

c. Provide an area between vegetation and the road corridor to limit radiant heat and flame exposure and reduce short distance spotting (ember attack) on the adjacent structures in the event of an approaching bushfire.

3 – TREATMENT RECOMMENDATION - DANGEROUS TREE MITIGATION

Trees assessed under the CFA / FFMVic Guideline for structural integrity. Where road zones have been assessed and nominated for treatment “Clear and Present Danger Trees” have been identified in numbers on roadside corridor. The presence of dangerous trees on roadside poses a serious safety issues for firefighters and community members.

4 – TREATMENT RECOMMENDATION - PLANNED BURNING

The controlled use of fire under carefully managed conditions to reduce bushfire fine fuel such as dead wood, leaf litter, bark and shrubs. Burning is also used by land managers to maintain the health of plants and ecosystems that need fire.

5 – TREATMENT RECOMMENDATION - GRAZING

The use of farm animals (usually sheep, cattle and goats) for the grazing and programmed management of grasses and shrubs for fuel reduction / defined management outcomes. Can be linked to OFH.

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