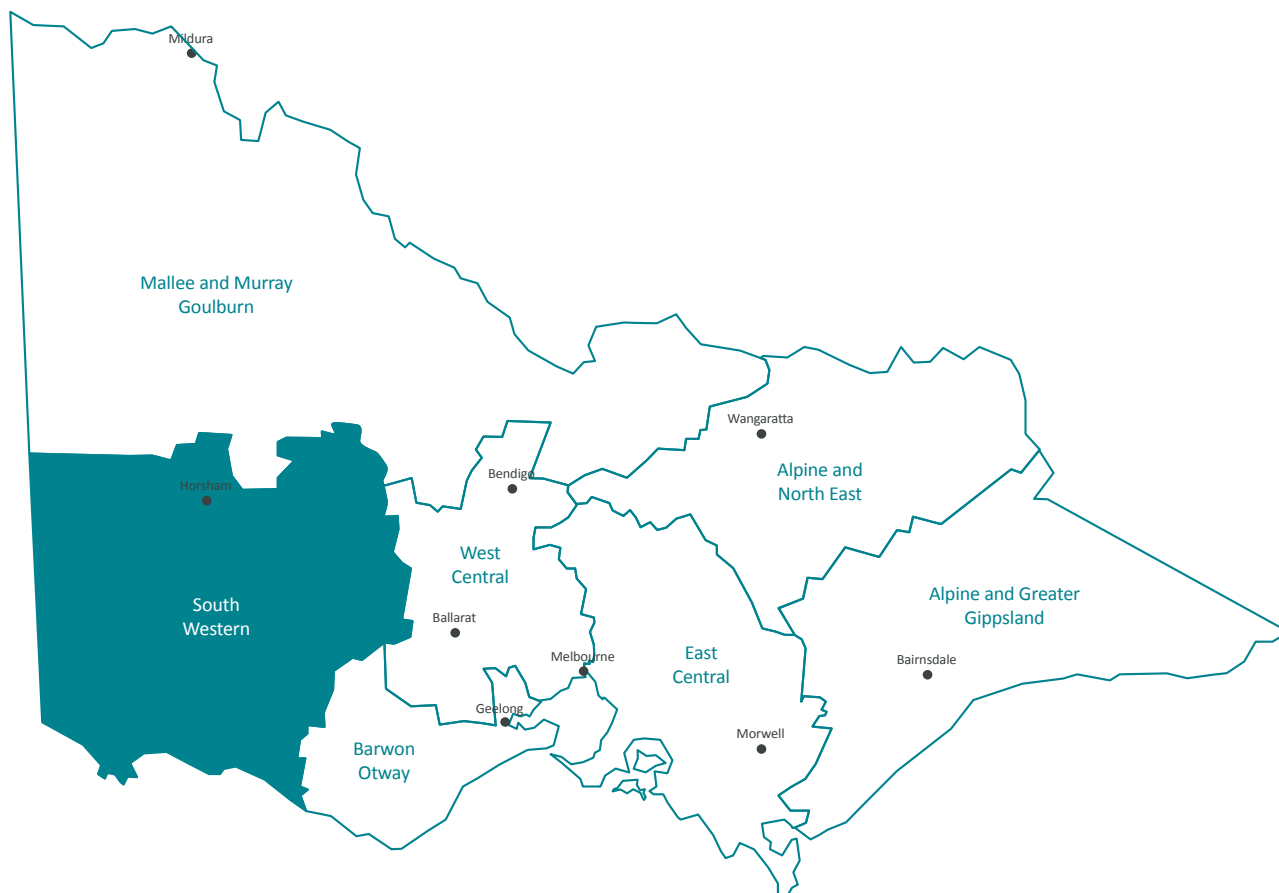


Strategic bushfire management plan

South Western





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Planned burning in the Grampians National Park © Glenn Rudolph

Introduction

Victoria is one of the most fire-prone areas in the world. In past decades, we have seen the disastrous effects that bushfires can have on communities — on people, properties, our economy and the environment.

Under the *Forests Act 1958*, and in line with the *Code of Practice for Bushfire Management on Public Land 2012*, the Department of Environment, Land, Water and Planning (DELWP) is responsible for managing bushfire risk on public land. The code of practice's two objectives are to:

- minimise the impact of major bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment: human life will be afforded priority over all other considerations
- maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage and forest products.

The code of practice requires DELWP to undertake strategic bushfire management planning. This is the first strategic bushfire management plan for the South Western bushfire risk landscape, one of Victoria's seven bushfire risk landscapes. The strategic planning approach we used to develop this plan replaces our previous fire protection planning approach.

We developed this plan in the context of Victoria's new emergency management arrangements. The Victorian Government's *Emergency Management Reform White Paper* and subsequent legislation aim to build community resilience through increased participation and shared responsibility.

This plan explains the fuel management strategy that we—DELWP and Parks Victoria (PV)—will undertake to minimise the impact of major bushfires on people, property, infrastructure, economic activity and the environment, to achieve the two code of practice objectives. It explains how we will do this by placing fire management zones—asset protection zones, bushfire moderation zones, landscape management zones and planned burning exclusion zones—on public land, and by doing other fuel management activities.

History tells us a small number of major bushfires have caused the greatest losses of human life, although any bushfire has the potential to result in loss of life and property. In some cases, major bushfires have also damaged fire-sensitive ecosystems and species.

As well as fuel management, the code of practice emphasises reducing bushfire risk through other strategies and actions for:

- prevention, to minimise the occurrence of bushfires, particularly those started by people
- preparation, so we are adequately prepared for bushfires and can better respond to them when they occur
- response, to ensure a timely and adequately resourced initial attack on all detected bushfires on public land
- recovery, to ensure we identify risks and damage resulting from bushfires.



Planned burning in the Wannon Heath, Grampians National Park © Glenn Rudolph

Over the next few years, with community and stakeholder engagement, we will refine and document risk-based strategies for bushfire prevention, preparedness, response and recovery.

We use a risk-based approach to planning for bushfire management, based on the International Standard for Risk Management ISO 31000. Our approach:

- pairs local knowledge with world-leading bushfire simulation software, historical data and the best-available science to understand how bushfires behave
- incorporates the views of communities, industries and other stakeholders about what they value and want to protect from bushfires
- proposes ongoing monitoring, evaluation and reporting about how implementation of our planning approach is reducing bushfire risk.

The international standard for risk management, with which our strategic planning approach complies, reflects the fact that risk can never be completely eliminated. Bushfires will still occur, and everyone needs to be prepared and ready to respond. But bushfire risk can be reduced with a high-quality risk management approach.

We thank everyone who is contributing to our planning approach. This includes staff and representatives of DELWP, PV, Country Fire Authority, Victoria Police, local governments, water corporations, catchment management authorities, traditional owners and private land managers;

industry representatives, including of plantation companies, apiarists and winegrowers; conservation and environmental management groups; and the public. We will continue to work in partnership with the agencies and organisations above, and with all other interested parties, to reduce bushfire risk on public and private land. We will also encourage residents and land owners to find out about bushfire risk on their property and have up-to-date bushfire plans.

We welcome this strategic, risk-based approach. As the officers responsible for ensuring DELWP's compliance with the code of practice, and for effective strategic planning and implementation at the regional level, we consider it will result in better bushfire risk management, safer communities and property, stronger local economies and more resilient ecosystems.

This document is a summary of our planning approach, and there is much information that sits behind it. To find out more, including how you can be involved in reviews and updates of the plan, visit www.delwp.vic.gov.au.

Alan Goodwin
DELWP Chief Fire Officer

Brendan Roughead
DELWP Regional Director
Grampians



Bushfire near Tallageira © Glenn Rudolph

About bushfire in our landscape

For strategic bushfire management planning purposes, DELWP and PV divide Victoria into seven bushfire risk landscapes. These are areas where bushfire behaviour—including the types of places that bushfires start, the terrain and vegetation through which they spread, and the types of impact they have—is sufficiently common to plan for the area as a whole.

Map 1 shows the South Western bushfire risk landscape. It is 4 051 447 ha, or 17% of the state's area. Of the South Western landscape, 17% is public land and 83% is private land.

Managing bushfire risk is essential. Since 1977, the most disastrous bushfires in our landscape have killed some 20 people and destroyed 254 houses and more than 500 other buildings. In the last three decades, DELWP responded to an average 72 bushfires a year in our landscape. We suppressed 71% of these bushfires before they grew to 5 ha. Rapidly detecting and suppressing bushfires before they grow to a size and intensity that makes them difficult to control is a core part of our approach to managing bushfire risk.

Accidental ignitions by people caused 51% of bushfires in our landscape between 1975 and 2013. These bushfires were mainly started by machinery, trains, escapes from campfires and private burn offs. Deliberate action by people accounted for 15% of bushfires and lightning 34%. On average, more area in our landscape is burnt by fires caused by lightning than by human-ignited fires.

On Severe, Extreme and Code Red fire danger days, bushfires can start and spread quickly to become major bushfires. Typically on such days, a strong north-westerly wind blows hot, dry air from central Australia across Victoria. If a bushfire ignites, or is already burning, this wind can push it rapidly south-east, creating a relatively narrow fire front and long fire flanks on its western and eastern sides. Then, an approaching cold front with a strong south-westerly wind can expand the bushfire's eastern flank into a wide fire front, and intensify the fire. These weather conditions can create fast-moving bushfires and powerful convection columns, which in turn cause ember storms, wind-blown debris, downbursts, fire tornadoes and explosive balls of igniting eucalyptus vapour. This was what we saw on 16 February 1983 (Ash Wednesday) and 7 February 2009 (Black Saturday).

Climate change is increasing bushfire risk in Victoria and lengthening the average fire season. Climate change projections indicate that Victoria is likely to have up to 70% more Severe, Extreme and Code Red days by 2050. We will also likely have:

- reduced average rainfall and streamflows
- fewer rainfall days (with heavier rainfall) and more consecutive dry days
- more frequent and widespread droughts
- more days over 35°, and a higher annual mean temperature.



Mt Lubra bushfire, Grampians National Park © Glenn Rudolph

Climate change is also likely to alter the attributes and availability of habitat for the landscape's plants and animals. This will magnify existing threats such as fragmentation (which isolates some species in particular areas) and loss of habitat (such as hollow-bearing trees). It may also increase the spread of some invasive species.

Map 1 shows the landscape's bushfire catchments. These are areas where the worst bushfires could start, spread and impact on priority communities and assets in a single day. These are important things to know because:

- at likely ignition points, we may conduct patrols on Severe, Extreme and Code Red fire danger days, and manage fuels (particularly if the spread or impact areas of these bushfires are difficult to treat)
- along spread paths, fuel management is the key to reducing the impact of major bushfires by reducing their spread and intensity
- managing fuel around and next to priority assets helps to minimise flame contact, radiant heat, ember generation and short-distance spotting potential. This fuel management can be difficult as it generally requires more resources and skills, and it may also rely on landowners making their properties as bushfire-safe as possible
- when a bushfire starts, we can use our knowledge of its likely spread paths and impacts to most effectively fight the fire, and provide information to communities that may be in its path.

Map 1 also shows where bushfire simulations predict bushfires would cause maximum damage to property. These locations have relatively high numbers of properties, and are in the path of many simulated bushfires. The map shows the simulated property risk is highest around Beaufort, Bolwarra, Halls Gap and Snake Valley.

Map 1: Bushfire catchments and simulated property risk

The public land in our landscape is highly fragmented and dispersed. Because we have a high proportion of private land compared to other landscapes, it is harder to mitigate bushfire risk by managing fuel on public land: major fires can go around our blocks, or the extent to which we would have to burn them to significantly reduce risk can be environmentally unacceptable. Fuel management on private land is particularly important in our landscape.

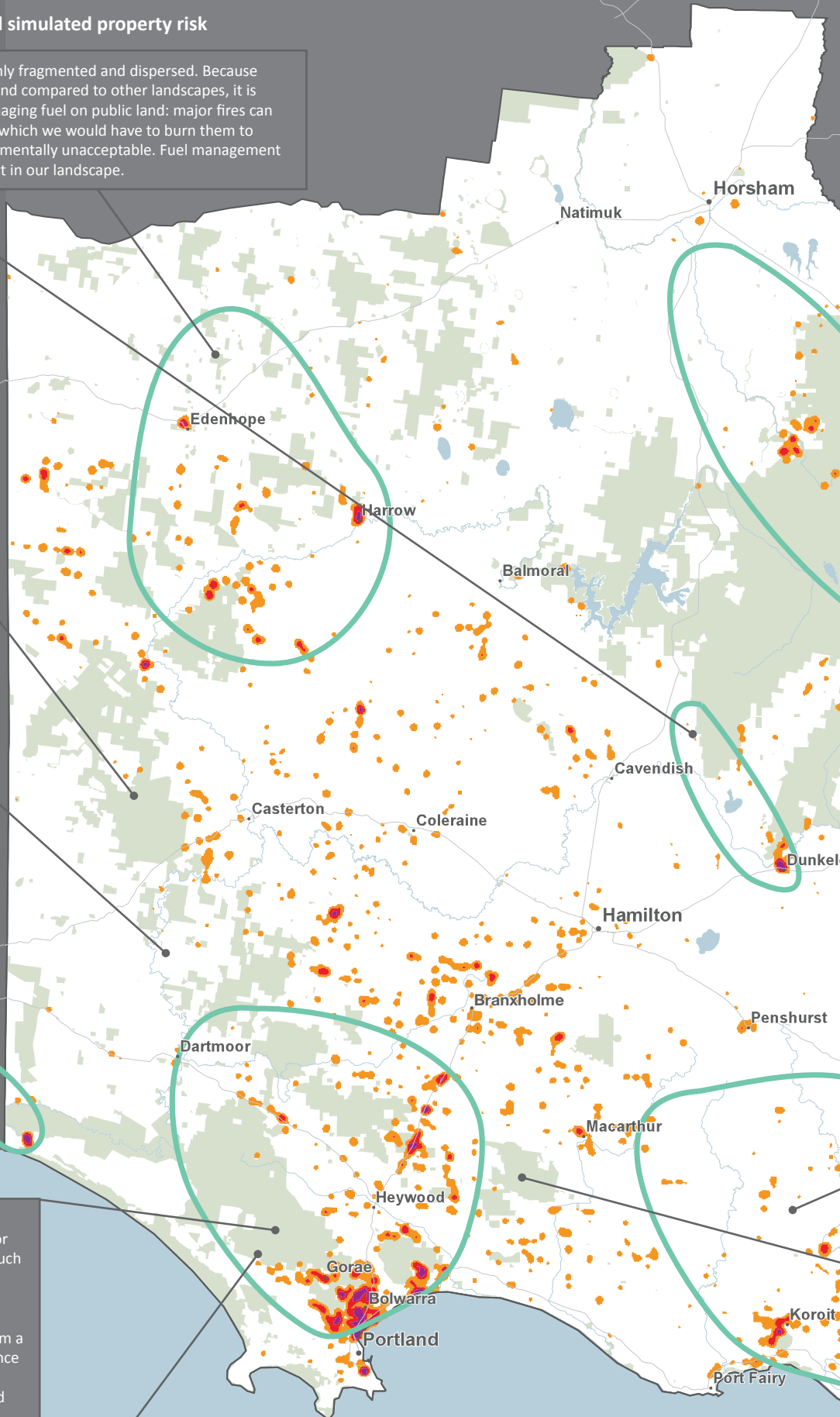
The Southern pipewort is a small, semiaquatic, annual herb endemic to a small area in western Victoria and adjoining South Australia. Less-frequent inundation of the wetland in which it grows is a threat to the survival of this species. We are protecting this sensitive herb from bushfires by burning around its wetland habitat, to protect it from bushfires that could burn the dry wetlands.

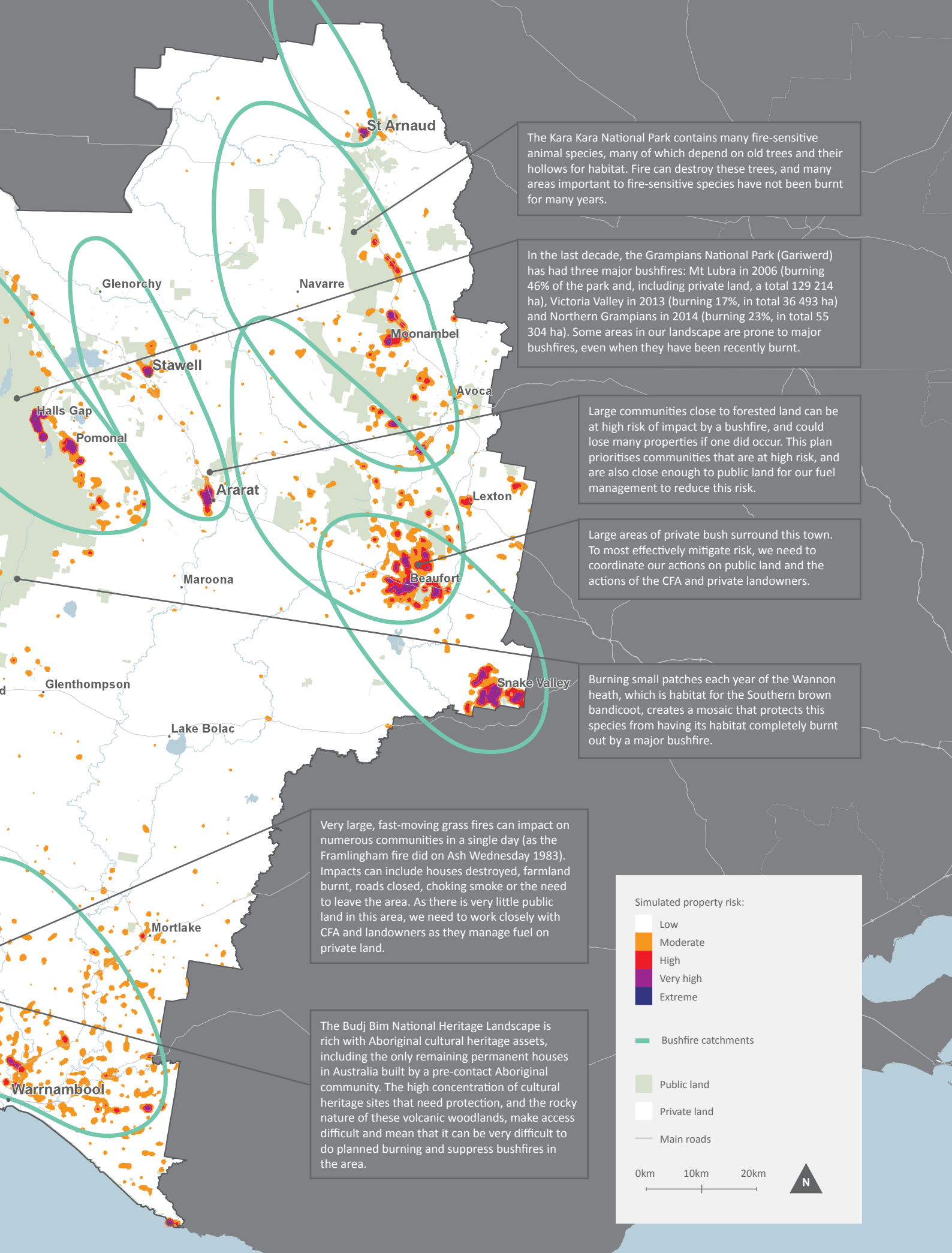
This area has large areas of Stringybark woodlands and is the main feeding habitat of the South-eastern red-tailed black-cockatoo, a rare and threatened species whose habitat is highly sensitive to fire.

Plantations are concentrated in the south-west corner of our landscape, in the Green Triangle region, and contribute greatly to our regional economy. In some cases, they provide continuous fuel right up to the outskirts of communities, increasing their bushfire risk. But they are also an important economic asset, themselves at-risk from a bushfire.

The Cobboboonee National Park and adjoining forest park provide habitat for threatened and fire-sensitive species such as the Southern brown bandicoot, the Long-nosed potoroo and the Powerful owl. Communities living close to the Cobboboonee parks are also at risk from a bushfire. We aim to find the right balance between protecting communities and ensuring the survival of threatened and fire-sensitive species.

The Wrinkled cassinia is a small shrub that depends on fire or other disturbances for its survival. It is a threatened species and only occurs in small populations in swampy habitat. We are trialling early-autumn planned burning to encourage it to reproduce, to ensure its survival.





What this plan prioritises for protection

How do we decide what to prioritise for protection?

Our planning method is based on the International Standard for Risk Management ISO 31000. The risk assessment process aims to determine the likelihood and consequence of a major bushfire impacting on people and their property, on the landscape's key infrastructure and economic assets, and on ecosystem resilience. We prioritise something for protection if there is a strong likelihood a major bushfire would impact on it and there would be severe consequences if it did, and we can significantly mitigate bushfire risk to it through our fuel management strategy. That is, something has a high risk rating if:

- it is very likely to be exposed to a major bushfire
- it is vulnerable to fire: that is, if fire would damage and/or disrupt it
- there would be consequences ranging from important to catastrophic if bushfire damaged or disrupted it.

Once we have identified the assets at highest risk from bushfire, we design a fuel management strategy which prioritises those assets for protection.

Our planning method draws on the best available information from data and community consultation. We use the *Victorian Fire Risk Register*, past bushfire experience and local knowledge to identify our most at-risk communities and most important infrastructure.

We consult with communities, stakeholders and experts. This includes representatives of industry, land managers, emergency services and local governments, and with a wide range of experts including ecologists and cultural heritage experts. We consult about our modelling tools, bushfire behaviour, our risk assessment methods, the landscape's assets and the vulnerability of those assets. By drawing on the knowledge and experience of local communities, we can better understand what they value and how they see bushfire risk, and engage with them in planning the best course of action.

We use PHOENIX RapidFire bushfire simulation software, which is world-leading technology developed by The University of Melbourne and the Bushfire and Natural Hazards Co-operative Research Centre, in conjunction with DELWP. PHOENIX RapidFire simulates how bushfires spread from a grid of ignition points across the landscape, given:

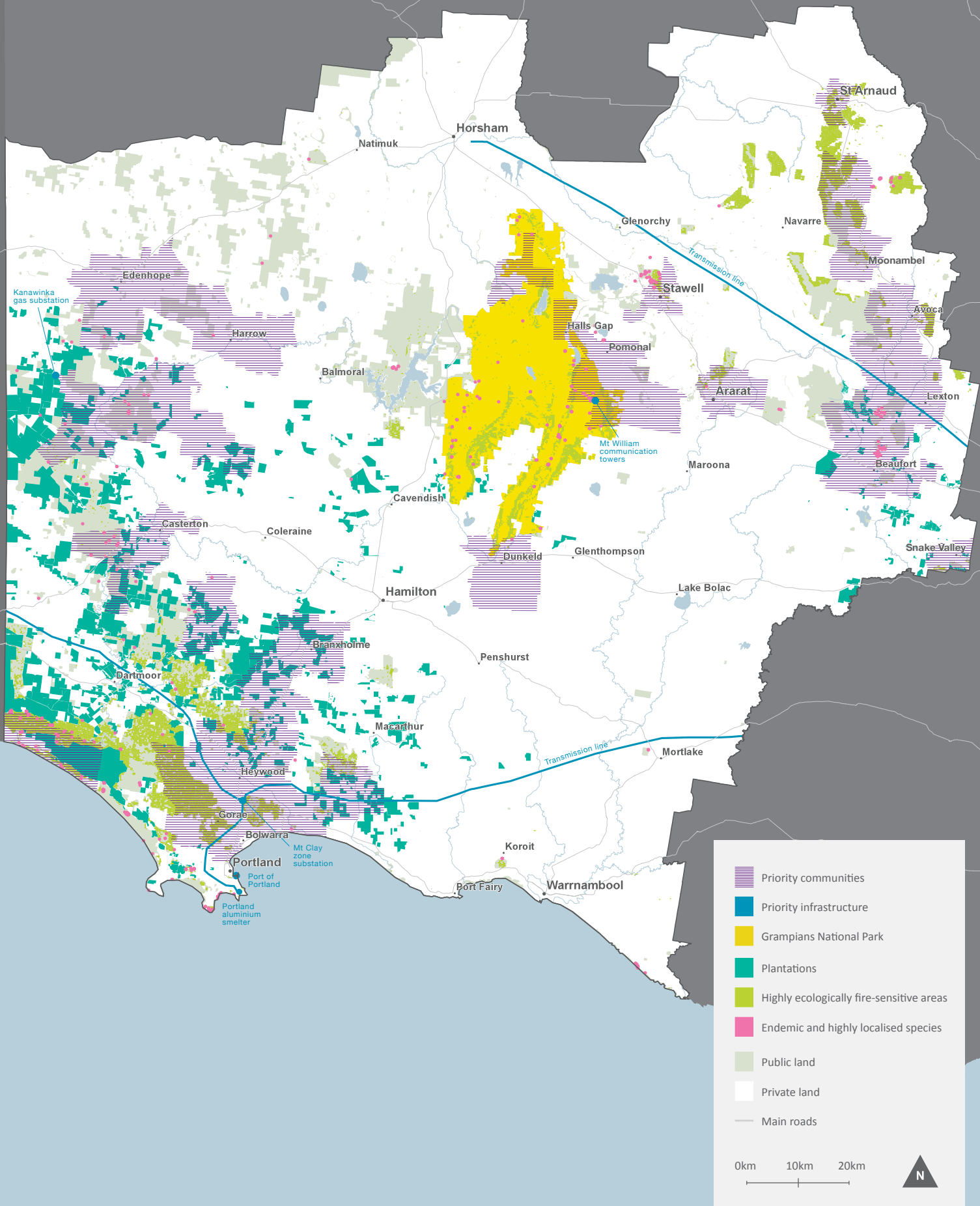
- terrain and fuel (being a result of any location's fire history, type of vegetation and modelled fuel accumulation) at the starting point and along spread paths
- weather conditions (we use worst-case weather conditions similar to those in Victoria on Ash Wednesday 1983 and Black Saturday 2009).

Victorian Bushfire Risk Profiles provides more information about how DELWP uses PHOENIX RapidFire to quantify risk.



Talpan wall, Grampians National Park © Steffen Schultz

Map 2: Priorities for protection

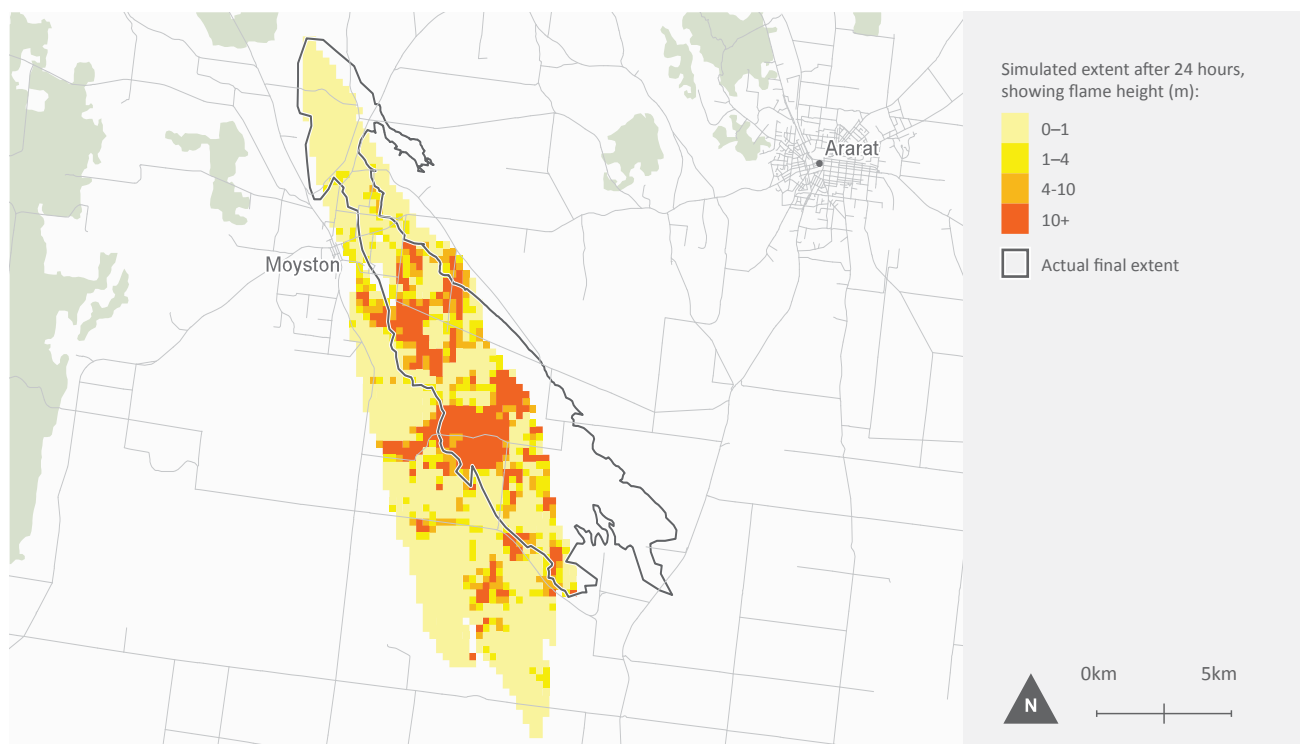




Running postman © Steffen Schultz

Map 3 compares PHOENIX RapidFire’s bushfire simulation to the actual final extent of the 2015 Moyston bushfire. The differences between the simulated and actual extent were mostly due to local weather dynamics—the simulation used weather data recorded at Stawell, which is 25 km away—and firefighting efforts to stop the bushfire spreading. The map also shows simulated flame heights, which indicate the intensity of the bushfire.

Map 3: Actual and simulated extent of 2015 Moyston bushfire





Frogmouth family © Steffen Schultz



Rufus songlark © Steffen Schultz

Communities

Map 2 shows our landscape's priority communities. The code of practice prioritises minimising the impact of bushfires on human life over all other considerations. Our ten highest priority communities are Beaufort, Snake Valley, Halls Gap, Ararat, Pomonal, Bolwarra, Branhholme, Gorae, Moonambel and Stawell.

We prioritised these communities because they have the highest risk to life and property, and we have the greatest ability to reduce their risk by managing fuel on public land. Simulations show these communities would lose the most houses when exposed to major bushfires, if there was no fuel management. This might be because of their location and local topography (as with Halls Gap), because they are close to forest (such as Bolwarra, near Portland), or because they have many people and properties (for example, Ararat). Although we can mitigate bushfire risk to communities close to public land by managing fuel, our ability to do so is limited if they are surrounded by private land (including private bush).

Some communities and groups of people are more vulnerable to bushfire than others, including those who lack experience of bushfire, summer visitors, people with disabilities or illness, the elderly and people from non-English-speaking backgrounds. These people and communities in particular tend to be less-aware of bushfire risks, less prepared for bushfire, and less able to quickly respond to it. These factors can also compromise evacuation and firefighting efforts.

To protect our priority communities, we:

- place asset protection zones or bushfire moderation zones close to communities, to slow bushfires before they reach those communities and to reduce short-distance spotting that causes ember attack on properties
- place bushfire moderation zones where bushfires that might threaten communities are likely to most quickly spread and intensify, making them more difficult to suppress. Reducing fuel load in these areas moderates the impacts of major bushfires.

Infrastructure

Map 2 shows our landscape's priority infrastructure.

They are the Moorabool to Heywood 500 kV transmission line, Heywood to Alcoa Portland 500 kV transmission line, Heywood to south-eastern (South Australia) switching station transmission line, Ballarat to Horsham 220 kV transmission line, Kanawinka gas substation, Mt Clay zone substation, Mt William communications towers and Port of Portland.

We prioritised this infrastructure because bushfire damage to it would impact on Victoria and indeed Australia. Port of Portland handles some 6 million tonnes of agricultural, forestry and mining products a year, worth about \$2.5 billion to the regional economy. The prioritised gas, electricity and communications infrastructure services much of Victoria's south-west and parts of south-east South Australia, and bushfire damage would cause major disruptions.

To protect our priority infrastructure, we:

- check that zoning decisions we make to protect communities and assets also result in an acceptable level of protection for priority infrastructure
- Work with the owners and managers of the infrastructure to help them implement their fire plans.

Economy

Map 2 shows our landscape's priority economic assets, the Portland aluminium smelter and the landscape's hardwood and softwood plantations. We also prioritised the Grampians National Park (Gariwerd), which is important for tourism and water harvesting.

We prioritised these assets because they are major contributors to the local and Victorian economies, and bushfires could cause great economic losses. The Portland aluminium smelter is one of Victoria's largest exporters and a major employer in our landscape. Tourism contributed some \$949 million to the Grampians' economy in 2011–12 (22% of gross regional product) and employed about 8300 people.



Bearded dragon © Kirrin Brown



The Green Triangle region between Mt Gambier, Hamilton and Warrnambool has about half Victoria's hardwood plantations (more than 145 000ha), and many softwood plantations (more than 76 000 ha). Plantations are generally fragmented and are often adjacent, or close to, native forest. They can increase bushfire risk by providing continuity of fuel for bushfires to spread.

We recognise bushfires have other major economic impacts. Bushfires destroy and damage buildings, fencing, machinery and equipment. They kill and injure livestock and damage productive plants, such as timber plantations and grape vines. Smoke from fires can permeate the skin of fruits. The viticulture industry is particularly vulnerable to smoke taint during the summer bushfire season and autumn planned burning periods, which are when fruit ripens. Bushfires also damage the natural environments and infrastructure on which tourism industries rely.

To protect our priority economic assets, we:

- place bushfire moderation zones in and around the Grampians National Park, to reduce the bushfire risk to the tourism industry
- check that zoning decisions we make to protect communities and assets also minimise post-bushfire landslide risk, which could degrade water quality in the area
- work in partnership with owners of plantations as they implement their own fuel management strategies.

Environment

Map 2 shows our landscape's priority environmental assets, which are our highly ecologically fire-sensitive areas and the known locations of endemic and highly localised species.

Highly ecologically fire-sensitive areas include large amounts of habitat of threatened, fire-sensitive animals, vegetation

highly at-risk from fire (such as wetlands) and vegetation that cannot produce seed, and thus survive, if it is burnt too frequently. These areas are most at risk from both bushfire and planned burning, so we prioritise them for protection.

Endemic and highly localised species we prioritise are species found mainly in our landscape, and which are often confined to small parts of it. If bushfire or planned burning occur too frequently, the entire species may become extinct.

Environmental assets can be at risk both from bushfires and from fuel management activities. While most native vegetation in our landscape needs fire to regenerate, some is sensitive to being burnt too often, in the wrong season, or by fire that is too intense; or to too much area of an ecological fire group or individual species being burnt at once. These risks can result in individuals and even entire species dying out, if there are no viable seeds or seedlings to recolonise the area. If this happens, the composition of the species in the area will change. Multiple fires (bushfires or planned burning) can reduce the capacity of environmental assets to withstand and recover from a range of disturbances, including fire and drought.

To protect our priority environmental assets, we prefer not to zone highly ecologically fire-sensitive areas and areas where endemic and highly localised species live as asset protection zones or bushfire moderation zones (zones in which planned burning occurs more frequently). However, we do sometimes need to place these two zones in areas with priority environmental assets, if this is necessary to reduce high risk to life and property. If so, we aim to do planned burning in a way that minimises the impact on priority environmental assets. This may include burning when species (such as orchids) are dormant and can therefore tolerate fire, or protecting important habitat (such as the nest trees of Powerful owls) during individual burns.



Large duck orchid © Steffen Schultz



South-eastern red-tailed black-cockatoo © Michael Sverns

South-eastern red-tailed black-cockatoo

The South-eastern red-tailed black-cockatoo is a rare, large nomadic cockatoo found only in south-west Victoria and south-east South Australia. The state and Commonwealth governments recognise it as threatened, and it is one of Victoria's most fire-sensitive animal species. A national recovery team, formed in 1997 and including our representatives, coordinates the management and recovery of the cockatoo, and we have actively participated on this team since its inception.

The cockatoo is mainly restricted to stringybark woodlands where it relies on the seeds of Brown stringybark and Desert stringybark for food. Fire is important for the health of the highly flammable stringybark woodlands: bushfires are common and the vegetation's reproductive cycle depends on fire. However, fire also reduces (for about 10 years) the amount of seeds stringybark trees produce, reducing the cockatoo's food source. This is particularly important during breeding season, when the species needs the most food.

When we do planned burning of stringybark woodlands, we aim to minimise burning in areas where the cockatoos feed. We have researched how to reduce scorching of the stringybark canopy when we do planned burning, to minimise the reduction in seed production. We are also researching how to improve monitoring methods, identifying the best mix of growth stages for stringybark woodlands for the cockatoo and other species that live there, and improving our data about the cockatoo's range and preferred habitat.

To ensure we can continue to enjoy the sights and sounds of this beautiful bird, we will continue to work with species experts and land managers to increase knowledge of the cockatoo's biology and best balance community protection and ensuring the cockatoo can find enough food now and in future. We will do this by supporting research, educating staff in how to conduct burns in the cockatoo's habitat and continuing our involvement in the national recovery team.



Indigenous cultural burning © Andrew Govanstone

Cultural heritage

Our landscape's cultural heritage stretches back thousands of generations and includes the use by Aboriginal people of fire for environmental, economic and social purposes. Our landscape today has thousands of Aboriginal cultural heritage sites including ceremonial gathering places, shell middens, burial sites, scar trees and artefact scatters. It also has post-contact sites, such as missions and conflict sites.

The Lake Condah area in the Budj Bim National Heritage Landscape has the remains of one of Australia's and the world's oldest aquaculture systems, dating back 6000 years, and the only remaining permanent houses built by a pre-contact Indigenous community in Australia. The Grampians National Park (Gariwerd), which is also a national heritage landscape, is one of the richest Indigenous rock-art sites in south-eastern Australia.

Bushfire risk management must draw on the wisdom and experience of our Traditional Owners, and support the landscape's Aboriginal people to rebuild and maintain connections to Country.

The registered Aboriginal parties in our landscape are Barengi Gadjin Land Council Aboriginal Corporation, Dja Dja Warrung Clans Aboriginal Corporation, Gundtj Mirring

Traditional Owners Aboriginal Corporation, Martang Pty Ltd and Wathaurung Aboriginal Corporation. There have also been three successful native title determinations with the Gunditjmara, Eastern Maar and Wotjobaluk people, and the Dja Dja Wurrung people have achieved the first full settlement under the Victorian *Traditional Owner Settlement Act 2010* providing for a recognition and settlement agreement with the state. We will continue to work with these groups to ensure the best possible protection of our cultural heritage.

The landscape also has many non-Indigenous cultural heritage sites including community buildings, churches, sawmills, lighthouses, war memorials, settler's homesteads and cemeteries relating to the last 200 years of settlement. In 1857, Chinese immigrants discovered the Canton Lead, one of the world's richest alluvial goldfields, and founded Ararat, the only Australian city founded by Chinese immigrants. The landscape has many culturally significant assets and sites relating to these pioneers.

To protect our priority cultural heritage assets, we:

- protect known cultural heritage sites from disturbance when we manage fuel, and when we suppress bushfires
- during all of our activities, keep a watch out for unidentified sites: only a very small percentage of Victoria's area has been formally assessed for Aboriginal cultural heritage.

How we will protect our landscape

Our fuel management strategy

About our fuel management strategy

Map 4 shows the landscape's fuel management strategy. The strategy comprises fire management zones, which establish our long-term balanced fire regime on public land by defining objectives for fuel management across the landscape. Zones specify the location and frequency of fuel management on public land.

The main fuel management action is planned burning, which is deliberate burning to reduce the quantity of leaf litter, twigs, bark and undergrowth. It is the most effective method of managing fuel on large areas of public land, and the main way we reduce bushfire risk. Fuel management also serves ecosystem resilience purposes, such as regeneration of plant species and habitat. We also manage fuel by ploughing, mulching, applying herbicide, chain rolling, grazing, thinning, mowing and slashing: we use the most efficient and effective method depending on the circumstances.

To develop our fuel management strategy, we combined our knowledge of bushfire behaviour and PHOENIX RapidFire simulations with our prioritisation of communities and infrastructure, environmental, economic and cultural heritage assets.

Reducing bushfire residual risk

Residual risk is the risk, on average and across the whole landscape—including public and private land—that bushfires will impact on life, property or other assets. It is expressed as the percentage of the risk that remains after bushfire history and fuel management (mainly planned burning) activities are taken into account. For example, 80% residual risk means that the risk of property and infrastructure being impacted by a bushfire—on average, throughout the landscape—is 20% less than it would have been had we never had bushfires and fuel management to reduce the fuel load. The complex mosaic of fuel-managed and bushfire-burned patches—with different times since the last fire—across the landscape is mainly what determines residual risk at any point in time. Residual risk changes constantly as bushfires burn new areas, as we manage fuel, and as fuel accumulates.

One way DELWP measures the effectiveness of the fuel management strategy is by how well it reduces residual risk. PHOENIX RapidFire allows us to simulate the reduction in residual risk at any particular location, at a particular point of time, if we reduce fuel load at the ignition points and along the spread paths of bushfires that could impact on it.

Annual fuel management activities will be guided by a long-term residual risk target.



Planned burning © Glenn Rudolph

Map 4: Fuel management strategy

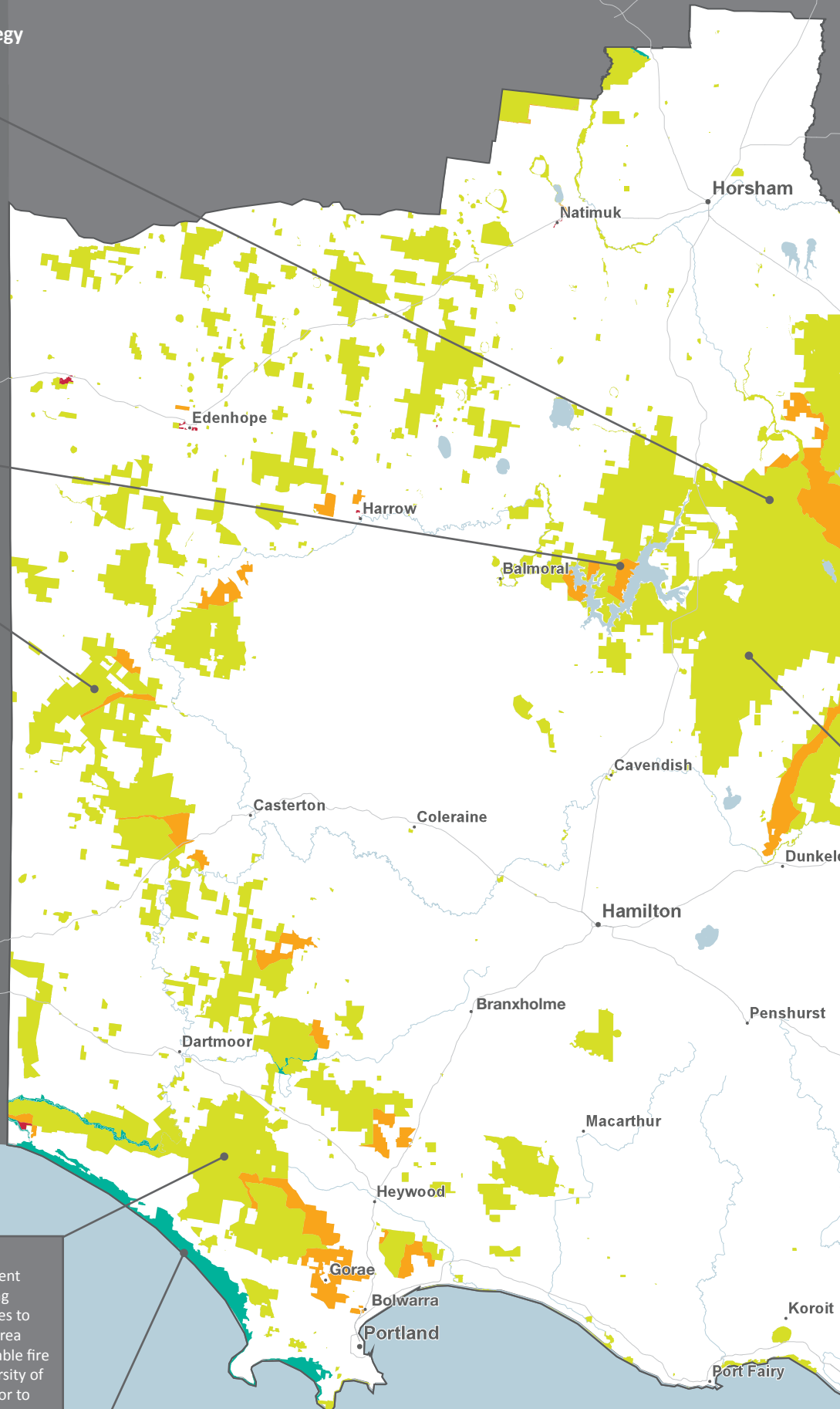
Our strategy aims to provide a high level of protection to priority communities, infrastructure, economic activity and environmental assets consistent with the two code of practice objectives.

The bushfire moderation zone in this area will help to protect popular camping areas.

We use planned burning to create strategic fuel-reduced strips in large forest sections, to prevent the whole forest being burnt by a major bushfire. This helps us protect environmental assets and suppress major bushfires before they develop an intensity and spread that threatens communities. To do this, we burn bushfire moderation zones and some adjoining areas of landscape management zones.

We do planned burning in landscape management zones for fuel management and ecological reasons (such as burning around an area with a particular species to protect it from bushfires, burning an area that's approaching its maximum tolerable fire interval, or burning to maintain a diversity of age classes in an ecological fire group or to implement a mosaic).

This planned burning exclusion zone helps to protect the many Aboriginal cultural heritage assets in this area.



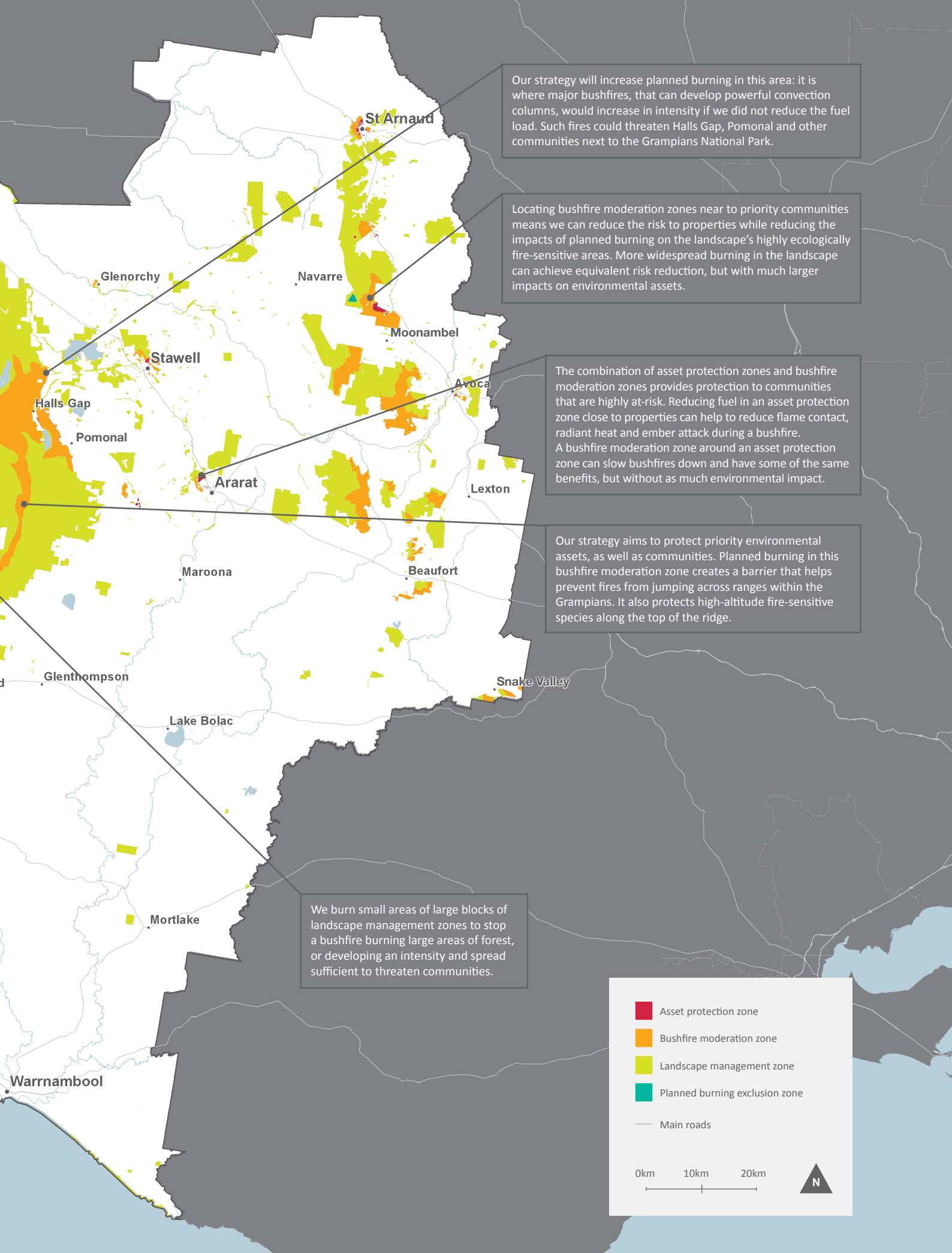


Figure 1 shows measured and expected residual risk in our landscape from 1980 through to 2050. It shows residual risk (the blue line and shaded darker blue area):

- decreased to about 80% as a result of the 2006 Mt Lubra bushfire in the Grampians
- has steadily decreased since 2006, with planned burning and bushfires
- by implementing our fuel management strategy on public land, could reduce to 65%.

The exact residual risk in future will depend on where we schedule our planned burns each year within the zones; the size, intensity and location of bushfires when they occur; and how quickly fuel re-accumulates in burnt areas. We have forecast the future residual risk using PHOENIX RapidFire bushfire simulation software and multiple planned burning scenarios. The uncertainty of all the factors that influence residual risk reduces our ability to pinpoint exactly what residual risk will be in the future. However, continuous improvement in our planning methods and operations should see residual risk decrease towards the lower end of the indicated range.

The figure shows (the green dotted line) that planned burning on public land could theoretically reduce residual risk to as low as 46%. However, this would require us to treat all public land every year, which is not realistic. It is also not possible to treat all areas of public land because some areas are inaccessible, because it is not safe to manage fuels on some,

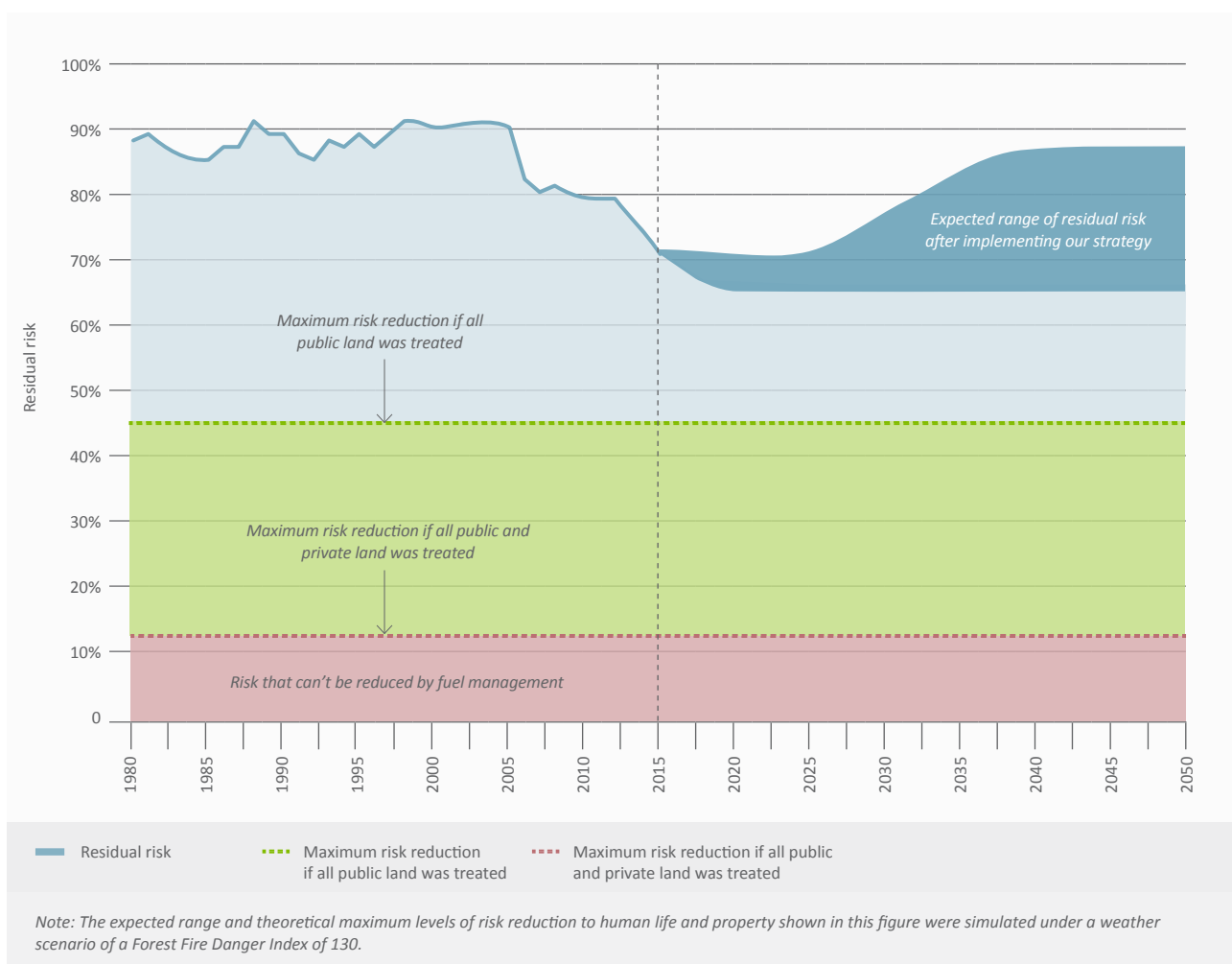
because fire-sensitive ecosystem areas could be threatened by repeated burning, or for other reasons (such as fuel and weather conditions limiting the number of days in any given year we can safely do planned burning). Also, in some areas, the environmental damage that would result would outweigh any small temporary reductions in risk we achieved.

The figure also shows (the red dotted line) that fuel management on private land could theoretically reduce residual risk to as low as 13%. However, this would need all public and private land to be treated annually, which is unrealistic. It does however indicate that total residual risk can be reduced by about 30% by fuel management on private land. DELWP will support other agencies (mainly CFA and local governments) and landowners to prioritise and focus their fuel management activities on the highest-priority areas of private land. Local governments can also use our information and products when developing their own strategies for managing risk on private land.

The remaining 13% of risk, which is on public and private land and which cannot be treated by fuel management, highlights the importance of other bushfire management strategies for prevention, preparedness, response and recovery.

The fuel management strategy aims to ensure that through to 2050, residual risk to life and property will not return to pre-2010 levels as fuel re-accumulates in forests burnt in 2006, 2013 and 2014.

Figure 1: Residual risk 1980–2050





Planned burning stringybark woodlands © Kirrin Brown

Fire management zones

Fire management zones (FMZs) define objectives for fuel management across the landscape. FMZs were first established in Victoria in 1995 and outline how frequently to treat areas. We will review and adjust FMZs occasionally, as new technology, science and information become available. This plan incorporates the outcomes of a review of our landscape's FMZs.

There are four types of FMZs. They are:

- **Asset Protection Zone:** an area around properties and infrastructure where we do intensive fuel management to provide localised protection against radiant heat and ember attack in the event of a bushfire
- **Bushfire Moderation Zone:** an area where we manage fuel load to reduce the speed and intensity of bushfires, and to protect nearby assets, particularly from ember attack in the event of a bushfire
- **Landscape Management Zone:** an area where we manage fuel to reduce residual risk, improve ecosystem resilience, and for other purposes (such as to regenerate forests and protect water catchments)
- **Planned Burning Exclusion Zone:** an area where we try to avoid planned burning, mainly because the vegetation cannot tolerate fire or because we cannot burn it safely.

Map 4 shows the location of FMZs in our landscape.

In asset protection zones, we aim to reduce the fuel hazard by planned burning or other methods about every 5–7 years. If fuel accumulates and the fuel hazard increases more rapidly, we will burn more frequently.

In bushfire moderation zones, we aim to reduce the fuel hazard about every 8–15 years. We will burn areas in this zone more frequently if they have higher bushfire risk (due to their location or fuel load) or are on the likely spread paths

of bushfires. In the other areas of these zones, we will also consider ecological objectives.

In landscape management zones, we will do planned burning mainly to maintain and improve ecosystem resilience, and also to reduce the fuel hazard. We will use the tolerable fire intervals of fire-sensitive vegetation in these zones to determine the frequency of planned burning. This means that in particular areas of these zones the frequencies of burning may be very different: this acknowledges that some areas are more fire-sensitive than others, and that some also contribute to reducing risk to communities and assets.

Fire operations planning

Each year we produce an updated fire operations plan for each fire management district in our landscape. These plans:

- are rolling schedules of fuel treatments specifying the total area where we aim to reduce fuel, and the location and sequencing of individual burns and other treatments
- are guided by priority fuel management areas, to ensure our fuel management program continues to drive down residual risk
- cover all fuel treatment on public land, including areas of lower risk
- address factors such as public safety and access
- identify how specific assets within or adjacent to fuel treatment areas will be protected.

The actual residual risk reduction we achieve across the landscape depends on the extent to which we can implement our fire operations plans: how much fuel management we are able to conduct (given the weather and other operational constraints), the amount of area where we can reduce fuel, the arrangement of the burns or other treatments in the landscape and other factors. Over time, the residual risk will also be influenced by bushfires.

To inform fire operations planning, each year we identify priority fuel management areas, areas of public and private land where it is most important to reduce the current fuel hazard and bushfire risk. When identifying these areas, we take account of recent bushfires and fuel management activities.

We recognise that planned burning can affect communities, infrastructure, economic activity, cultural heritage and community assets and ecological assets. We will continue to identify measures to mitigate these impacts through fire operations planning and burn planning—without compromising our strategic fuel management objectives—and to implement our procedures to mitigate risks to priority environmental assets.

DELWP will ensure our fire operations planning process:

- is directly informed by the fuel management strategy and priority fuel management areas
- fully complies with the objectives of FMZs.

Balancing our fuel management approach

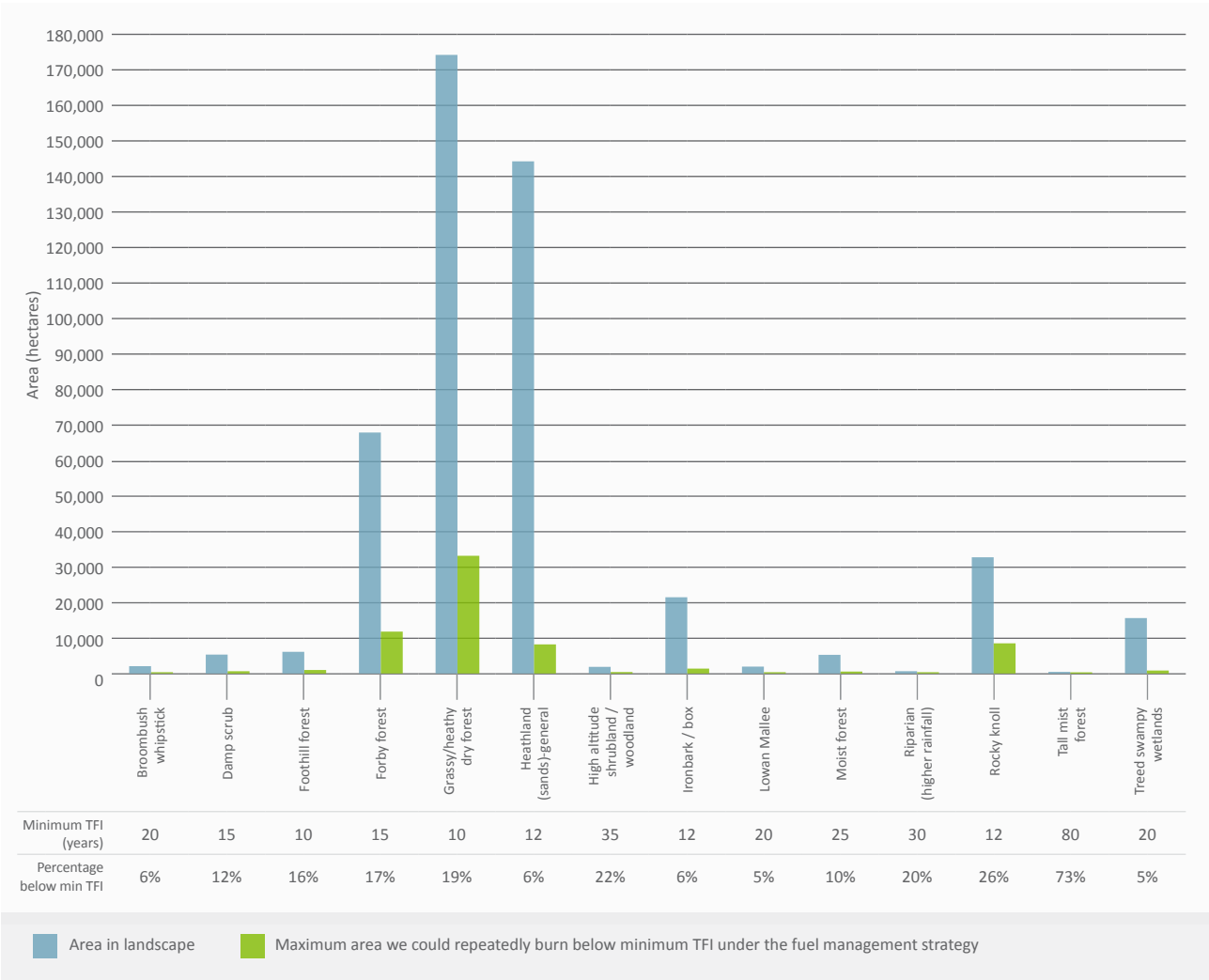
While the primary aim of our fuel management strategy is to reduce the risk of bushfire impacts on life and property, we also aim to maintain and improve ecosystem resilience.

An ecosystem’s resilience is reflected in its capacity to withstand and recover from a range of disturbances, including fire. We measure ecosystem resilience by looking at the whole landscape and at multiple fires with various frequencies of burning.

We currently measure risk to ecosystem resilience across the landscape using tolerable fire intervals (TFIs). TFIs are the minimum and maximum recommended times between fire events for a particular group of vegetation communities with common ecological requirements for fire, and common fire behaviour characteristics. These groups of vegetation communities are known as ecological fire groups (EFGs). TFIs are an interim measure: we are working on other measures, including growth stages of vegetation.

Burning within these intervals can assist in maintaining healthy and resilient ecosystems. Burning repeatedly outside these intervals increases the risk that there will be fundamental changes in the abundance and composition of species and in the type of vegetation in the EFG. It may

Figure 2: EFGs proposed for repeated planned burning below minimum TFI



also increase the risk of weed invasion, erosion and the loss of nutrients in the soil. We are currently investigating ways to better understand the impacts of burning outside the minimum and maximum TFIs.

Multiple major bushfires can also result in EFGs being burnt under minimum TFI and can negatively affect fire-sensitive ecosystems and species. Elements of our fuel management strategy try to reduce the impact of these outcomes.

Initial work on the measure (growth stage of vegetation) is showing promising results in measuring ecosystem resilience. The growth stage of vegetation depends on when it was last burnt, or subject to other disturbance. Each vegetation type passes through distinct stages following disturbance, each stage differing in the quality of the habitat it provides for plants and animals. Lack of diversity of growth stages in a landscape may reduce the ecosystem's capacity to resist damage and maintain its basic structure and type after being disturbed by fire.

Figure 2 shows the area of the EFGs in our landscape we expect to repeatedly treat by planned burning below their minimum TFI under the fuel management strategy.

Under the strategy, a total of 67 339 ha, or 9.7% of the landscape's public land, will be repeatedly burnt below its minimum TFI, primarily in asset protection zones and bushfire moderation zones. Although this risks changing the vegetation

in these areas, we consider it achieves an acceptable balance between reducing bushfire risk to life and property and maintaining ecosystem resilience across the landscape.

Under the strategy, up to 19% of the Grassy/heathy dry forest EFG might be burnt below its minimum TFI; up to 17% of Forby forest; up to 26% of Rocky knoll; and up to 6% of Heathland (sands) - general. Tall mist forest has the highest percentage of its area (73%) that could potentially be burnt: however, it is usually in small patches and we can often exclude it from individual burns, so we expect to burn less than this percentage.

We recognise that fuel management activities have impacts. These can be local and species-specific, and we can manage them through fire operations planning (such as scheduling burns in the season necessary for a species to survive) or during planned burning (such as protecting particular areas or habitat before we burn). At other times, our impacts can be widespread and affect many species. We will work with partner agencies, community and industries to mitigate the impacts of our fuel management activities. We will continue to identify measures to mitigate these impacts through fire operations planning and burn planning, without compromising our strategic fuel management objectives.



Planned burning near Amphitheatre © Steve Balharrie



Reducing bark hazard © Andrew Govanstone



Candy spider-orchid © Kirrin Brown



Vegetation recovery after fire, Grampians National Park © Glenn Rudolph

Other bushfire management strategies

As well as implementing our fuel management strategy, we will also undertake prevention, preparedness, response and recovery actions on public land. We will also continue to share bushfire risk information and work in partnership with other agencies (including CFA, local government, Emergency Management Victoria, and Victoria Police). These actions will strengthen bushfire management across our landscape.

Preventing bushfires

Preventative actions minimise the occurrence of bushfires, particularly those started by people when weather conditions are extreme. To improve bushfire prevention, DELWP and PV will:

- prioritise compliance activities, including community education and enforcement patrols with Victoria Police and other land and resource managers, to reduce intentional ignitions
- close some state forests and national parks on days of extreme bushfire weather, to increase public safety and reduce the likelihood of fires starting in forested areas
- share bushfire risk analysis information with local governments, other emergency services agencies, land managers and community-based planning forums, to improve bushfire prevention activities on public and private land.

Being prepared for bushfires

We must be adequately prepared for bushfires, to improve our response to them when they occur.

Well-maintained roads and tracks are essential for quick response and for community and firefighter safety. DELWP manages roads on public land in our landscape; they allow access for heavy firefighting machinery, safe access for bushfire response and a safe environment for planned burning.

DELWP will manage our strategic roads and bridges to the standard for bushfire management agreed with other agencies, and ensure road maintenance budgets are prioritised consistent with this.

Each year, before the bushfire season, DELWP and CFA will jointly assess the bushfire risk across the whole landscape to identify priority areas for response, fuel management and community engagement, and develop local mutual aid plans that cover our joint preparedness and response activities.

DELWP and PV will review and revise emergency management plans for closing, evacuating and protecting priority visitor sites (such as camping sites, walking tracks and day-use areas) when the fire danger rating is Severe or above, and where people may be at risk from bushfire.

DELWP will work with relevant agencies and infrastructure managers to develop and implement bushfire mitigation actions for infrastructure identified as having high-to-extreme risk of bushfire damage.

DELWP will develop and maintain its staff capability in bushfire management, including emergency response.

DELWP will work in partnership with other agencies (including Emergency Management Victoria, CFA, local governments and Victoria Police) to include strategic risk analysis and PHOENIX RapidFire simulation in municipal and regional fire and emergency management planning.

DELWP will provide bushfire risk information to Victoria Police, local governments and CFA to help them develop evacuation and traffic management plans for priority communities and locations.

Responding to bushfires

DELWP is responsible for suppressing fires in state forests and national parks, and on protected public land. To improve bushfire response, DELWP will:

- continue to provide an integrated response to bushfires with CFA and other emergency managers
- share bushfire risk assessment data and information with other fire agencies and land managers (such as PV, CFA, VicForests and private plantation owners) to support bushfire response
- continue to identify and validate our landscape's priority assets for protection.

Recovering after bushfires

DELWP and PV are responsible for the recovery of public land after a bushfire. To improve bushfire recovery, DELWP will:

- work with other agencies and communities to identify recovery priorities
- address recovery priorities to re-establish access to public land in a timely manner, and support bushfire-impacted communities to return to normal daily life.



How we will continuously improve the planning process

DELWP and PV will monitor, evaluate and report on implementation of our planning process. We will identify what monitoring activities need to be done—and where and when they need to be done—to support evaluation of the effectiveness of our planning. This will enable us to make more informed decisions over time. We will continue to engage with the community and key stakeholders in all aspects of our planning, monitoring and implementation. Bushfire management will continue to evolve with advances in science, technology and how we engage with communities. We intend to continually improve our bushfire management planning approach.

We will continue to engage with the regional Traditional Owners and work in partnership with those who have settlement agreements with the state on public land, to achieve a balanced fuel management strategy.

Monitoring activities in our landscape will be guided by the statewide monitoring, evaluation and reporting framework. These activities will measure changes to:

- residual risk, by assessing fuel load in asset protection zones
- ecosystem resilience, by assessing key habitat attributes and key plant and animal species.

We will use the information we collect about fuels, habitat and ecosystem resilience to:

- evaluate the extent to which the fuel management strategy has reduced the impact of bushfires on life, property and the environment
- refine and improve the models that underlie our strategic planning.

We will assess how effectively our activities are achieving the two code of practice objectives. Through DELWP's annual fuel management reporting, we will report on how we are monitoring our activities and progressing towards the two code of practice objectives. We will use the *Monitoring, Evaluation and Reporting Framework for Bushfire Management on Public Land* to guide how we monitor and evaluate implementation of this strategic bushfire management plan, particularly:

- the extent to which the fuel management strategy has reduced the impact of bushfires on communities and the environment
- the risk to ecosystem resilience in areas that may be burnt below their TFI (such as Forby forest, Grassy/heathy dry forest, Rocky knoll and Heathland [sands] – general).

We will report to the community regularly. We will report annually on fuel management activities (in the fuel management report); every five years on the effectiveness of the fuel management strategy and other actions in this plan; and at least every ten years on achievement of the code of practice objectives.

Through DELWP's *Bushfire Science Strategy 2013–17*, we will invest in research to improve the information available for future plans. We plan to improve our risk assessment method by better incorporating weather patterns, ignition likelihood weightings, convection strength and fire danger indexes as experienced at different elevations, and by developing better measures for ecosystem resilience and environmental assets. We also plan to improve how we identify and rate public administration assets and social (including cultural heritage) assets.



Aftermath of a bushfire, Grampians National Park © Glenn Rudolph

We will develop a long-term burn schedule. The schedule will take into account changes in vegetation structure and other aspects of habitat that are affected by bushfires or other fuel management activities. This will help us to better balance immediate asset protection needs with long-term vegetation and ecosystem resilience needs. It can also be adjusted to reflect the impacts of any bushfires that may occur.

We will further analyse particular areas to better understand the best places to manage fuel to maintain and improve ecosystem resilience, including:

- the stringybark feeding habitat of the South-eastern red-tailed black-cockatoo, and how to best manage fuel in it
- areas where we plan to frequently manage fuel that have many fire-sensitive threatened species and native vegetation (such as the Cobboboonee National Park and adjoining forest park).

We aim to use vegetation growth stages as one of several measures of ecosystem resilience. Major bushfires since 2006 have resulted in a large-scale shift from older to younger native vegetation, particularly in the Grampians. Less growth stage diversity reduces habitat for plants and animals, and may reduce the ecosystem's capacity to resist damage and maintain its basic structure and type.

Glossary

Asset Protection Zone – an area around properties and infrastructure where we do intensive fuel management to provide localised protection against radiant heat and ember attack in the event of a bushfire.

Bushfire Moderation Zone – an area where we manage fuel load to reduce the speed and intensity of bushfires, and to protect nearby assets, particularly from ember attack in the event of a bushfire.

CFA – Country Fire Authority.

Code of practice – *Code of Practice for Bushfire Management on Public Land 2012*.

DELWP – Department of Environment, Land, Water and Planning.

Ecological fire group (EFG) – a grouping of ecological vegetation classes with common ecological requirements for fire, and common fire behaviour characteristics.

Fire Management Zone (FMZ) – an area of public land where fire is used for specific asset, fuel and overall forest and park management objectives. There are four types of fire management zone: Asset Protection Zone, Bushfire Moderation Zone, Landscape Management Zone and Planned Burning Exclusion Zone.

Highly ecologically fire-sensitive area – areas we prioritise for protection because they have large amounts of habitat of threatened, fire-sensitive animals, vegetation highly at-risk from fire (such as wetlands) and vegetation that cannot produce seed, and thus survive, if it is burnt too frequently.

ISO 31000 – a family of standards relating to risk management codified by the International Organization for Standardization.

Landscape Management Zone – an area where we manage fuel load to reduce fuel hazard, improve ecosystem resilience and for other purposes.

PHOENIX Rapidfire – software that simulates how bushfires spread given terrain, fuel and weather conditions.

Planned burning – deliberate burning to manage the quantity of leaf litter, twigs, bark and undergrowth in order to reduce bushfire risk.

Planned Burning Exclusion Zone – an area where we try to avoid planned burning, mainly because the vegetation cannot tolerate fire, or because we cannot burn it safely.

PV – Parks Victoria.

Residual risk – the risk, on average and across the whole landscape – including public and private land – that bushfires will impact on life, property or other assets. Residual risk is expressed as the percentage of risk that remains after bushfire history and fuel management (mainly planned burning) are taken into account.

Tolerable fire intervals (TFIs) – the minimum and maximum recommended times between fire events for a particular ecological fire group (EFG). Burning regularly outside these intervals increases the risk that there will be fundamental changes in species' abundance and composition, and the type of vegetation.

Victorian Fire Risk Register (VFRR) – The *Victorian Fire Risk Register* is a systematic process used to identify assets at risk from bushfires, assess the level of risk to assets and record a range of current treatments to mitigate the risk. The register includes human, economic, environmental and cultural assets. The Country Fire Authority (CFA) facilitates and manages the VFRR.

We – DELWP and PV, together.

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