

Fire District Review Panel Discussion Paper

CFA Submission

19 November 2021

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Foreword

CFA performs a vital role in Victorian communities. Through the efforts of our men and women, lives are protected, loss to property and infrastructure is minimised and the community, industry and government are more confident in times of emergency. CFA and the Fire District Review Panel share a common objective in ensuring that Victorians are best served to prevent, and protect against, losses from fire effectively and efficiently.

CFA is a large, dispersed, and complex organisation. Our members are the essence of community, motivated by a common spirit: to do our best to help our neighbour in times of need. Our vision is to work together with communities to keep Victorians safe from fire and other emergencies. This is our ultimate end state. It reflects our broad reach across the state and our focus on empowering communities to understand and build a shared responsibility to address their fire risk.

CFA's service delivery occurs within the broad framework of emergency management, with Victorian legislation identifying CFA as responsible for the prevention and suppression of fires and other emergencies within the country area of Victoria, including all private land in rural and regional Victoria, as well as Melbourne's outer suburbs.

Today we have more than 50,000 members and many partner organisations. Whilst the history of fire in Victoria and CFA are intrinsically linked, our mission remains as relevant today as it has in times gone past; to protect lives and property. It drives our operating model, and it underpins all our services across fire prevention, mitigation, engagement, and preparedness activities through to emergency response and assisting communities to recover from the impacts of events.

As CFA has grown and evolved as an organisation, so has our knowledge, capabilities, programs and services. These experiences and our progress have enabled CFA to improve the effectiveness of our services to meet the needs and expectations of the communities we serve. Delivering on our vision for prepared and safe communities means we focus on empowering communities to understand risks and how to manage them, breaking the chain of consequence as early as possible. This means we tailor programs and services for maximum impact on local risk, focusing strongly on the causes of fires and the interventions that help prevent them. Contemporary research and a strong evidence base continue to inform the design of our programs that target those communities and individuals most vulnerable to the risk of fire.

CFA is a key stakeholder and seek to continue ongoing engagement with the FDRP and the review process to ensure the best community outcomes are delivered. We have significant experience to draw upon, including prior experience operating a volunteer and career firefighting service that required ongoing considerations to achieve optimal resource allocation. To that end, I hope this response to the discussion paper may positively influence the development and application of a conceptual framework that considers all possible interventions along the entire Incident Chain; ultimately benefiting the FDRP in presenting informed recommendations to the Minister and in turn the best outcomes for Victoria.

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Executive Summary

The Country Fire Authority (CFA) welcome the opportunity to respond to the Fire District Review Panel (FDRP) Discussion Paper and support the panel meet their legislated role in determining the Fire Rescue Victoria (FRV) Fire District Boundaries.

The FDRP has an important and challenging role. Developing recommendations regarding changes to Fire District Boundaries requires a robust evidence-based approach to understanding risk and how different interventions affect risk. The FDRP is required to undertake this assessment and ensure any recommendation to change the Fire District Boundaries is both necessary and desirable for the Victorian community.

The Discussion Paper outlines the proposed approach the FDRP intends to undertake to inform its recommendations. CFA has highly relevant experience and knowledge to contribute to the review of Fire District Boundaries. Prior to the Fire Services Reform the CFA operated all fire service models, from full volunteer, to integrated staff / volunteer locations to a wholly career model. The CFA had to plan for, amend and update these models in specific areas as risk changed.

Based on prior and current knowledge and experience the CFA considers there are opportunities to improve the proposed approach. By improving the current approach, the FDRP can recommend options to managing risk that are more targeted and proportional, more effectively achieve community outcomes and are more cost effective and sustainable.

The Fire District Review process outlined in the discussion paper can be improved

The current process proposed by the FDRP assumes that response times are the key factor driving changes to fire risk under different service models. The current approach also only considers two binary options to address risk. The options are to establish an FRV Fire District or maintain the existing CFA operating model. This approach can be improved by considering:

- all factors that influence the Trauma, Loss and Incident Chains, across planning, preparedness, response and recovery, that can affect risk
- a wide range interventions and fire service operating approaches.

To achieve these improvements, the FDRP decision-making process should build upon the foundations and concepts of the public health approach. The public health approach is a highly regarded and contemporary public-safety framework. The approach is widely used in Australian and internationally and forms the basis for understanding and responding to areas such as road safety, smoking, and family violence. It is also used by the CFA to understand, develop and prioritise multiple approaches to managing fire risk across prevention, preparedness and response. The public health approach aligns with other best practice public policy and economic analysis frameworks outlined in this submission.

The improvements outlined by CFA in this submission will better enable the identification, assessment and recommendation of more targeted and proportionate response options. A more proportionate response would better allow for an integrated fire service agency

response that better target risk across prevention, mitigation, preparedness, response and recovery. This non-binary approach to managing changes in fire risk will enable the delivery of more cost-effective responses and better outcomes for the community. The approach identified by CFA is consistent with the principles of good public policy and the role of the FDRP as described in *Fire Rescue Victoria Act 1958*.

Not addressing these limitations or broadening the considerations of the proposed approach may lead to recommendations of suboptimal intervention options, boundary locations or timing. This could result in significant upfront and ongoing costs associated with FRV establishment without confidence the benefits to the community outweigh these costs. Inappropriately considered or timed boundary changes can also lead to a loss of volunteer capability and engagement which also has implications for the sustainability of Victorian fire services.

Working together to achieve the shared vision of Victoria's fire agencies

Achieving the shared vision of Victoria's fire agencies and the emergency management sector requires partnership. Victoria's fire agencies are complementary and interdependent. This relationship enables the achievement of better outcomes for the community. A collaborative approach focussed on community outcomes would similarly benefit the review of Fire District Boundaries.

While the remit of the FDRP is one of fire risk and assessing Fire District Boundaries, any decision-making process should have consideration to the effects and application of the joint fire service operating model. The joint operating model of the fire services are agile, scalable, responsive and flexible. The services received by individual is the key consideration of this operating model and not which agency provided that service. When the agencies work together in a collaborative approach to optimise the deployment and allocation of interoperable resources, fire risk will inevitably be treated, and public safety outcomes improved. It is possible to have a material impact upon fire risk by changing how the operating model is applied rather than changing a Fire District Boundary. A binary approach can be limiting, and a more agile, dynamic and proportional approach may realise additional benefits.

Consistent with our commitment to working in partnership across the emergency management sector the CFA welcomes the opportunity to support the FDRP refine and improve the proposed approach and make sound recommendations to the Minister on Fire District Boundaries.

1. Working together to support the FDRP review purpose and objectives

Key points:

- CFA is committed to work in partnership with the emergency management sector and the community to ensure Victorian communities are prepared for and safe from fire
- CFA highlights and supports the legislated role of the FDRP to ensure any recommendation to change the Fire District Boundaries is found to be necessary and desirable for the Victorian community
- CFA welcomes the opportunity to support the FDRP make informed, sound and evidence-based recommendations to the Minister.

1.1 CFA is committed to ensure Victorian communities are prepared for and safe from fire

CFA's vision is that Victorian communities are prepared for and safe from fire. CFA puts the community at the centre of everything it does and works with partners to deliver high quality services to protect life and property. CFA support the community to prevent and prepare for fire as well as respond to emergencies. This is reflected in Section 20 of the *Country Fire Authority Act 1958*, which imposes a unique obligation on CFA - a general duty 'taking superintending and enforcing all necessary steps for the prevention and suppression of fires and for the protection of life and property in case of fire'.

Achieving this shared vision requires many organisations and the community to work in partnership. CFA, FRV, EMV, DELWP (FFMVic), the Victorian State Emergency Service, local government, Ambulance Victoria, Victoria Police and the community, amongst many others, all work together towards this common goal. No single organisation can reasonably achieve it alone. This is reflected in Section 6B of the *Country Fire Authority Act 1958* and Section 7A of the *Fire Rescue Victoria Act 1958*. These sections set the objective for both organisations in performing their functions and exercising their powers to contribute to a whole of sector approach to emergency management and promote a culture within the emergency management sector of community focus, interoperability and public value.

Consistent with Government's Fire Services Reform agenda, CFA is committed to supporting this shared vision by continuing to build and maintain a sustainable and effective volunteer-based agency to provide a community-centred emergency service for all Victorians.

1.2 CFA welcomes the FDRP discussion paper

CFA welcome the opportunity to review and provide input to support the Fire District Review

Panel (FDRP) to meet their legislated role in determining FRV fire district boundaries. The decisions made on the Fire District Boundaries of the FRV also change the boundaries, and therefore operating arrangements, of the CFA.

The role of the FDRP is outlined in the *Fire Rescue Victoria Act 1958*, including the legislated process and role for the FDRP in determining Fire District Boundaries within a specified timeframe. CFA appreciate that the FDRP are independent and are required to provide informed advice to the Minister. CFA support and highlight the importance of the overarching role of the FDRP as described in Section 4F of the *Fire Rescue Victoria Act 1958*:

4F Role of the Fire District Review Panel

The role of the Fire District Review Panel is to provide independent and informed advice to the Minister on the following matters —

(a) whether it is necessary or desirable for the Fire Rescue Victoria fire district to be changed;

(b) whether a change in fire risk, or something that may result in a change in fire risk, may warrant a review of the Fire Rescue Victoria fire district.

The FDRP has an important role. CFA specifically note, and support, that the role of the FDRP is to ensure any recommendation to change the Fire District Boundaries is found to be desirable for the Victorian community. Desirable can be interpreted in this context as a decision that maximises public value.

The Discussion Paper outlines that the FDRP will use a fire risk model, predominantly driven by spatial analysis, to measure changes in fire risk for the purpose of developing its recommendations to the Minister.¹ CFA appreciates the consultative approach of the FDRP, including briefing opportunities, that have provided additional information on the overarching process the FDRP is expecting to use for the Fire District Review.

From the information provided by the FDRP the CFA understands that the overarching process, including the specific role of the current modelling work as part of the final recommendations, is not yet clearly defined. The *Fire Rescue Victoria Act 1958* specifies a range of necessary interactions and considerations the Minister will make. However, CFA understands there is scope to support the FDRP through the Discussion Paper submission process to best enable the FDRP to make informed, sound and evidence-based recommendations to the Minister.

1.3 There are opportunities to work together on the review

CFA appreciate the FDRP face a significant challenge within the legislated timeframe to meet their remit. CFA are a key stakeholder and seek to continue ongoing engagement with the FDRP and the review process to ensure the best community outcomes are delivered. CFA have significant experience to offer, including prior experience operating a volunteer and career firefighting brigade, that will benefit the FDRP to present informed recommendations to the Minister.

The remainder of this submission responds to the Discussion Paper by articulating the opportunities to work towards community outcomes the FDRP review provides, the current

¹ Section 3 of *Fire Rescue Victoria Act 1958* defines change in fire risk.

limitations and implications of the Fire District Review process and improvements to the approach the FDRP should consider.

2. Victoria's fire agencies operate to deliver services that achieve community outcomes

Key points:

- CFA and FRV provide complementary and interdependent fire services, enshrined by common doctrine and interoperability, focussed on the delivery of community outcomes
- Changes to Fire District Boundaries should seek to allocate responsibility to the fire service authority most capable of managing risk and achieving community outcomes efficiently and effectively
- Changes to Fire District Boundaries will not prevent CFA, FRV and their partners in the emergency management sector continuing to work in partnership. However, Fire District Boundaries influence the delivery of community outcomes
- CFA offers a unique value proposition for Victorian communities and a cost-effective strategy for fire and emergency risk management
- In recognition of the principles of good public policy, any change to a Fire District Boundary must consider all options, outcomes and their respective costs and benefits.

2.1 Fire agencies share a common vision

Fire agencies have a common vision – Victorian communities that are prepared, safe and resilient. CFA and FRV are the two statutory fire agencies that work together to help achieve this outcome, including in partnership with each other and others. This partnership is recognised and supported in Section 2A of the *Fire Rescue Victoria Act 1958* and Section 2 of the *Country Fire Authority Act 1958*² and the respective outcomes frameworks of CFA and FRV, which both identify the importance of working together.

The fire services provided by CFA and FRV are complementary and are dependent upon each other to ensure all Victorian communities are prepared, safe and resilient (see Box 1: CFA and FRV as complementary fire agencies). CFA and FRV work together to manage risk from structural fires and bushfires as well as other important emergency incidents, including HAZMAT. The nature of the risks from these different forms of fire and emergency have changed since the formation of Victoria's fire and emergency services and is expected to continue to change into the future. As highlighted by the Government's Fire Services Reform agenda, Victoria's fire services must continue to adapt to ensure that risk is managed for the benefit of all Victorians.

² Section 2A of the *Fire Rescue Victoria Act 1958* and Section 2 of the *Country Fire Authority Act 1958*, for example, are explicit in the nature of the relationship and have identical wording: S.2A/S2 (a) *promote collaboration and coordination between fire services agencies to best meet the safety needs of the community.*

Box 1: CFA and FRV as complementary fire agencies

CFA and FRV are Victoria's statutory fire agencies. Empowered through state law, the services hold distinct responsibilities to prevent and suppress fires and other emergencies in Victoria.

FRV is a new fire and rescue service that helps protect Melbourne and Victoria's major regional centres. This new organisation was established on 1 July 2020 as part of Victoria's Fire Services Reforms.

CFA is a volunteer and community-based fire and emergency services organisation operating since 1945. CFA helps protect about 4 million Victorians, and more than one million homes and properties across the state.

CFA delivers services to communities through a network of over 1,200 stations across Victoria. There are 85 FRV fire and rescue stations across the state including regional stations co-located with CFA volunteer brigades. Together, CFA and FRV respond to fires, complex rescues, road crashes, emergency medical calls and hazardous chemical incidents.

FRV and CFA are committed to publicly advocating for community safety to ensure the risk to life, property and the environment from fire and other emergencies is reduced. Acknowledging that emergency management is a shared responsibility, CFA and FRV work closely with communities, service providers and all levels of government to support people to be equipped with the skills, information and tools needed to prevent, prepare, respond to, and recover from fires and other emergencies.

2.2 Fire services deliver community outcomes

A key tenet of the Fire Services Reform is that Victoria's fire agencies focus on the delivery of outcomes. The outcomes of each fire agency are described in their respective outcome frameworks.³ The focus on outcomes is consistent with the government's outcomes reform in Victoria, which remains focussed on demonstrating the value of government's service delivery to the community by measuring what government achieves (outcomes) not only what it does (outputs).⁴

Both CFA and FRV have established their commitment to delivering outcomes to the community. Principally, working to prevent fires and other emergencies where possible, and being ready to respond effectively to these incidents to ensure the consequence for individuals, households and communities is minimised.

The measurement of performance against the delivery of an outcome requires a clear understanding of the baseline condition. For example, understanding the potential change in fire risk over time requires a clear definition of the assumed baseline conditions over that

³ FRV Outcomes Framework: <https://www.frv.vic.gov.au/outcomes-framework> and, CFA Outcomes Framework: <https://www.cfa.vic.gov.au/ArticleDocuments/521/FINAL-CFA-Strategy-Outcomes-Framework.pdf.aspx?Embed=Y>

⁴ Source: <https://www.vic.gov.au/outcomes-reform-victoria>

period. Across Victoria, the built and natural environment is changing rapidly in response to environmental, regulatory, human behavioural and other factors. Understanding the baseline fire risk must account for these changes and expectations for the future before an informed response choice can be made.

The most recent quarterly report from Fire Services Implementation Monitor, released in September 2021, focussed on assessing the performance of CFA and FRV against their respective Outcomes Framework.⁵ It concluded that CFA and FRV continue to demonstrate a strong commitment to delivering the reformed fire services model for Victoria.

CFA view the FDRP review and subsequent amendments of the Fire District Boundaries as another opportunity to further demonstrate the commitment of Victoria's fire agencies and emergency services sector to put community outcomes first in any decision made.

2.3 Fire District Boundaries are one element influencing how fire agencies and other partners work together

Fire District Boundaries guide the designation of responsibility between fire agencies for managing fire risk. This designation should seek to allocate responsibility to the authority most capable of managing risk and achieving community outcomes efficiently and effectively. Fire District Boundaries are one element of how fire agencies work together, across Victoria, to manage risk efficiently and effectively.

Managing fire risk requires work across prevention, preparedness, response and recovery in both rural and urban environments. CFA and FRV work with Victoria State Emergency Services, DELWP (FFMVic) and EMV under a common doctrine to provide a collective response to emergency management that builds on the strengths of each agency. CFA, FRV and their partners provide emergency response to hazards which include fire, flood, storm, hazardous materials, tsunami and earthquake; and the tasks of road rescue, marine rescue and other specialist rescue (see Box 2: Working together – Mount Martha Rope Rescue). CFA and FRV also work with these partners in addition to local governments and regional communities to prevent and mitigate hazards and support communities to build resilience.

The community equally has an important role in emergency management. Resilience will be far more effective when there is a shared sense of responsibility. Individuals in the community must share responsibility for preventing, preparing for, responding to, and recovering from emergencies. They can do this by drawing on guidance, resources and policies of government and other sources, such as community organisations, to build an awareness of the threats relevant to their community. CFA, FRV and their partners play a role supporting individuals to build this awareness and a shared sense of responsibility

⁵ Source: <https://www.vic.gov.au/fire-services-implementation-monitor>

Box 2: Working together – Mount Martha Rope Rescue

On 26 December 2020 a 30-year-old male fell down a steep embankment at a location known as the Pillars in Mount Martha. CFA, FRV, Ambulance Victoria, Victoria Police and the Coast Guard all responded to the incident to assist with patient retrieval. CFA and FRV worked together to conduct a highly technical rope rescue involving the construction and deployment of systems to enable access to the patient. After approximately two hours, the patient was rescued.

The Mount Martha rescue demonstrates the focus of emergency services to serve the Victorian community by operating together. The Mount Martha rescue was possible due to the practical application of Victoria's integrated emergency management system enabled by a standard incident management, common doctrine, interoperable equipment, systems and training programs.

The integrated approach to emergency management recognises that the management of emergencies is a shared responsibility, including with the community. It also recognises the significant benefits of complementary and dependent emergency services. The intent of the common doctrine is to ensure that the operational activities of emergency services agencies are undertaken in a consistent manner and to aid the interoperability of the agencies. Interoperability of the agencies provides a mechanism for achieving better outcomes by maximising the capabilities of the agencies to work together effectively and efficiently through a unified understanding of roles and responsibilities and shared systems, processes, information, communications, technology and training.⁶

The integrated approach to emergency management offers substantial benefits to Victoria. An integrated approach allows for the effective deployment of a broad range of interventions along the Incident, Trauma and Loss Chains (see [Figure 1](#) for more information). Working together, emergency management agencies can deliver the interventions that best suit their capability. This non-binary approach to emergency management in Victoria provides an opportunity to best enable the effective and efficient delivery of outcomes for the community. By doing so, the emergency management sector is positioned to be sustainable and provide a response to changes in fire risk that is practical, nuanced and targeted.

CFA, FRV and their partners will continue to operate in partnership. However, Fire District Boundaries influence the delivery of community outcomes. Notably, CFA's operating model means it is focussed on being an active member of the communities it serves. This is achieved because of the CFA operating model which is based on volunteerism (see [Box 3: CFA's unique value proposition for Victorian communities](#)). Changing Fire District Boundaries will influence the role that CFA can take in the Victorian community.

Whilst the joint operating model of Victoria's fire services is not the focus of the FDRP, the fact will always remain that there will be overlap and interdependencies between the agencies. When applied in a collaborative and constructive manner these will optimise public safety outcomes for the communities we serve. CFA's strategic focus of placing the community at the centre of what we do will ensure we continue to draw upon FRV's capability and capacity where it is appropriate to do so and where community outcomes can be improved. Similarly, where FRV do not have the capabilities or capacity required to meet operational needs of their risk environment, CFA will always remain willing and able to support and serve Victorians.

⁶ Source: Fundamentals of Emergency Management – Class 1, Emergency Management Victoria, 2015

Box 3: CFA's unique value proposition for Victorian communities

CFA provides Victoria with a trusted, community-connected and highly skilled emergency service that builds community resilience and protects life and property from fire and other emergencies. CFA offers a unique value proposition for Victorian communities centred on CFA volunteers.

CFA volunteers provide integrated capabilities located extensively across urban and rural Victoria. CFA volunteers are highly responsive and agile to managing fire and emergency risk and provide capacity to manage risk that would otherwise be unachievable. However, the capacity and capability of CFA volunteers goes beyond traditional fire service approaches by empowering the community and changing human behaviour. CFA is uniquely placed to enable this to occur because CFA volunteers are part of the communities they protect.

CFA volunteers have a connection to their communities that helps them build and maintain trust. As a valued and trusted part of Victorian communities CFA is uniquely placed to co-design and co-deliver activities that are effective and specific to the local operating environment. The co-design and co-delivery of community orientated prevention and mitigation programs provide an efficient and effective reduction in the effect of fire upon life, property and the environment.

CFA offers a unique value proposition for Victorian communities and a cost-effective strategy for fire and emergency risk management. Understanding this value proposition cannot be achieved through analysing response times alone. Any change to a Fire District Boundary must focus on other response options in consideration of all community outcomes and their respective costs and benefits.

2.4 Community outcomes must be at the centre of any decision to change Fire District Boundaries

Fire District Boundaries play an important role in allocating responsibility for managing risk. Any change in the allocation of responsibility has various effects that are important to consider in any decision to change Fire District Boundaries⁷. Government must consider all components that influence the efficient and effective management of risk and community outcomes when amending Fire District Boundaries.

Any change to Fire District Boundaries must be beneficial for the community. The principles of good public policy decision-making guide the considerations Government and support policy decisions that benefit community. In the context of the Fire District Review, an assessment must be made against effectiveness, equity and efficiency criteria of different options. The Victorian Guide to Regulation provides a basis to make such considerations

⁷ Fire Services Act 1958, Section 4J: *The object of a review of the Fire Rescue Victoria fire district is to conduct a risk-based assessment of the assignment of responsibility necessary for the provision of fire services by fire services agencies, in order to prevent, and protect against, loss of life and damage to property, infrastructure or the environment in Victoria.*

(See Box 4: Victorian Guide to Regulation).

Box 4: Victorian Guide to Regulation

In Victoria, regulation is guided by the principles established by the Victorian Guide to Regulation. Regulatory Impact Assessments and Statements support the development of best-practice regulation. By way of example, the Fire Rescue Victoria (General) Regulations 2020 were formally assessed against the requirements of the *Subordinate Legislation Act 1994* and the *Victorian Guide to Regulation* by addressing the following questions:

- *Why is the Government considering action? (problem analysis)*
- *What outcomes is the Government aiming to achieve? (objectives of action)*
- *What are the possible different courses of action that could be taken? (identify feasible options)*
- *What are the expected impacts (benefits and costs) of feasible options and what is the preferred option? (impact analysis)*
- *What are the characteristics of the preferred option, including small business and competition impacts? (summarise the preferred option)*
- *How will the preferred option be put into place? (implementation plan)*
- *When (and how) will the Government evaluate the effectiveness of the preferred option in meeting the objectives? (evaluation strategy).*

CFA views these broader considerations as critical to any future decision about Fire District Boundaries. Specifically, CFA supports consideration of the effect of changing Fire District Boundaries on community outcomes by understanding:

- the outcomes government is trying to achieve
- risk and how risk is changing over time
- the options available to manage and treat risk
- the capability and capacity of the fires services to deliver the options
- the costs and benefits of different options and delivery models, including upfront and ongoing costs and implications for Fire Service resourcing
- practical and legislative requirements or limitations.

Some, but not all, of these considerations are explicit within the Fire District Boundaries review process. CFA supports the FDRP taking a broader view to deliver its independent advice to the Minister.

3. The Fire District Review process outlined in the discussion paper can be improved to deliver the best community outcomes

Key points:

- The FDRP has a challenging task, however the decision-making approach could be improved by addressing key limitations, including the specific limitations of the proposed model.
- This current approach to managing risk, proposed by the FDRP, is limited and binary and does not appear to consider alternative intervention options which may be more effective or efficient.
- The FDRP's risk assessment model assumes that response times are the key factor driving changes to fire risk under different service models. This assumption overlooks the multiple measure, across planning, preparedness, response and recovery that can affect risk.
- The current FDRP approach does not adequately establish clear and appropriate objectives, decision criteria, and links between fire service outputs, risk outcomes, and benefits for community. The current approach also does not consider a wide range of fire service models which may address community needs more efficiently and provide additional benefits.
- If the current limitations to the FDRP approach are not addressed, the process may lead to the recommendation of an option which leads to undesirable outcomes for communities, is costly and poses a risk to the sustainability of Victoria's fire services.

3.1 The FDRP has been set a challenging task

The FDRP has a challenging task. Undertaking reviews and developing robust evidence-based recommendations regarding important public safety issues such as managing fire risk is difficult and complex.

The key challenge in identifying important public safety risks is the multiple factors influencing that risk. Analysis must be sufficiently sophisticated to be able to accurately measure the effect of each risk factor on the outcome while controlling for the effect of the other factors. Doing this inadequately within analysis can lead to suboptimal decisions. Whether a single analysis model can achieve this or whether targeted analyses for each risk factor are better able to serve this purpose depends on the context.

Despite the inherent challenge of the task, the FDRP has established the foundations of an approach to the review. CFA support an independent panel being used to lead the review and provide advice to the Minister for consideration. Such independence has the advantage of objectively weighing up the trade-offs of different options to ensure any recommendation is made in the best interest of the community.

The process for the review the FDRP has established to date also offers benefits to delivering sound recommendations. The CFA support the FDRP's approach to engage with key stakeholders early in the process. Noting the challenges that are typical to reviews of this nature, it will be important to collaborate and seek the input from all parties to help guide the identification and analysis of all relevant options. The CFA support the FDRP being open to the feedback they receive, including through interim discussions prior to this submission.

The use of a model for the purpose of understanding fire risk and informing the development and analysis of options will only have benefits if properly considered and supported by high quality data and evidence. A poorly developed or informed model can be counterproductive. The CFA support the FDRP to be comprehensive in their review and focused on making objective decisions. Developing sound recommendations for any changes to Fire District Boundaries can be supported using a model. However, it will remain important that the FDRP are clear on the assumptions and limitations of a model, the data available to inform any such model and the use of the model outputs within its decision-making process.

3.2 The FDRP's decision-making approach and risk assessment model could be improved

The FDRP's decision making approach could be improved by addressing key limitations, including the specific limitations of the proposed model. The proposed model and approach to making decisions has a bias towards response time analysis. This approach, if not amended, will not enable the development of sound review recommendations capable of delivering desired community outcomes.

CFA understands the FDRP's approach to providing recommendations to the Minister relies predominantly on outputs from the risk assessment model. CFA is not clear on the relevant weightings of other potential inputs to the recommendations of the FDRP, including consideration of alternative options to the management of fire risk such as prevention and preparedness.

If the FDRP seeks to rely on the model as its core evidence base, the limitations of the risk assessment model, presented below, should be addressed. The implications of not addressing these limitations may lead to inefficient, ineffective or potentially detrimental outcomes for the Victorian community.

CFA recognises that some limitations of the model may be impractical or unfeasible to overcome. In these instances, the FDRP should address these limitations within their broader decision-making framework. This further established the need for the FDRP to clarify the process by which model outputs and other factors are considered in determining the final recommendations made to the Minister. Clarification of the process would include any additional components the Minister should consider to meet the requirements outlined in in Section 4J of the *Fire Rescue Victoria Act 1958*, within the broader legislative context of both the *Country Fire Authority Act 1958* and *Fire Rescue Victoria Act 1958*. In broad terms, CFA recommends that the nature and extent of risks should define the nature and extent of services, supported by evidence-based analysis.

All fire risks, including bushfire and consideration of community needs and whole of government imperatives need to be addressed through fire services delivery. This would necessarily involve more than response-based services, involving hard and soft interventions within a holistic frame of reference to define needs and risks. These opportunities to improve the FDRP's decision-making approach and risk assessment model

are explored further in the following sections of the submission.

3.3 Addressing key limitations of the risk assessment model will improve decision-making

This section describes the limitations of the FDRP's risk assessment model that should be addressed to improve the decision-making process to ensure it leads to desired community outcomes. It is supported by Appendix A, which includes two case studies demonstrating additional considerations for the FDRP and implications of the current decision-making approach. The two case studies look at realised or potential fire management actions relating to the Victorian town of Moe and the growth area of Cardinia. The Moe and Cardinia case studies are referred to throughout this section in Box 6, Box 9 and Box 12.

The risk assessment model does not clearly define its objective, or the primary outcomes being addressed

A critical component of any decision-making framework is to determine the objective it seeks to achieve, and the outcomes the model seeks to predict. This allows any analysis which sits within the framework to be targeted toward this objective.

The objective of the FDRP's review has not been clearly articulated. As a result of this, the role of the risk assessment model in achieving this objective is also unclear. The objective in this instance needs to go beyond just modelling factors affecting the risk of a defined outcome (e.g., death, injury and property loss). It also must ascertain specifically how altering the FRV boundaries would more cost effectively alter the underlying risk factors and determine how this would change the outcomes.

A key underlying objective of the Fire District Review process is to ensure that fire risk across the state is managed efficiently, effectively, and within acceptable thresholds. Effective fire risk management means Victorian communities are prepared, safe and resilient. Acceptable thresholds help determine what the community deems to be effective, for their specific context. Efficient fire risk management occurs when desired risk outcomes are achieved at the lowest cost to communities and government.

As fire risk increases across Victoria, scarce emergency management resources are being stretched. This was recently highlighted during Victoria's unprecedented 2019-20 fire season, which destroyed or damaged more than 450 properties, burnt more than 1.5 million hectares, resulted in five deaths in Victoria, and cost Victorian communities and government over \$100 billion (based on initial estimates).⁸ It is critical that emergency management resources are allocated efficiently to ensure the sustainability of the sector. An Australian Climate Council Report released in December 2015 found that Australia will need to double its firefighting capabilities as climate change causes bushfire seasons to overlap and places existing resources under enormous strain⁹.

Optimisation of the resources available to FRV and CFA should be a key objective of the FDRP, and in extension the risk assessment model. By targeting the risk assessment model toward this objective, the FDRP will be more likely to provide recommendations which are

⁸ Source: <https://theconversation.com/with-costs-approaching-100-billion-the-fires-are-australias-costliest-natural-disaster-129433>

⁹ Source: Climate Council (2015). The Burning Issue: Climate Change and the Australian Bushfire Threat.

practical, efficient, and sustainable.

Model outputs and decision criteria are not clearly defined

The discussion paper does not adequately define the intended outputs of the model and the process the FDRP will use to examine these outputs and form recommendations to the Minister. CFA recognises that the FDRP is in the formative stages of the risk assessment, and that the availability and quality of key inputs is not yet known. However, even with these limitations, it is important that intended model outputs and their role in decision making are clearly outlined. If this process does not occur early, it is likely that the final decision-making process will overlook key considerations.

The FDRP's approach seeks to determine risk outcomes in terms of death, injury and property damage. However, there is no clear understanding of how these outcomes will inform decision making. Costs relating to measured risk outcomes could be combined into a single metric (e.g., a monetary cost to community in each scenario) or given weightings against one another to form coherent decision criteria.

Box 5: Road safety, speed cameras and resource allocation models

Road Safety practitioners are often required to ascertain the value of expanding specific risk mitigation measures. For example, when determining the effect of a speed camera program on the number of road fatalities observed, the relationship between measures of operation of the programs (hours enforced, sites used, infringements issued) and the number of fatalities observed in a region must be determined. Once this relationship is established the fatality reduction benefits of expanding the program can be estimated and the operational parameters around that expansion determined. This has been achieved in road safety through careful scientific evaluation of speed camera programs followed by the construction of a specific resource allocation model to inform the benefits of operational change.

The model does not consider alternative fire service models and interventions

The current approach to the Fire District Review considers two options to service fire risk in all Victorian communities – a CFA service model at current capacity and capability, or an FRV service model. This approach is limited and inflexible as it does not consider alternative fire service models that can service fire risk proportionally, efficiently and effectively. For example, a set of interventions which improve fire prevention and detection within a community may allow for similar or improved risk reduction outcomes at a more cost-effective rate.

Emergency management services can influence fire risk through a variety of interventions. Only some of these interventions relate to fire service response once a fire has started. Many others seek to protect life and property by providing communities with knowledge and tools to prevent and prepare for fires, and to take immediate action should a fire occur.

The Trauma and Loss Chains ([Figure 1](#) and [Figure 2](#)) show how different factors before and during fire affect outcomes for life and property. Figure 1 highlights that there are a range of pre-event factors affecting fire risk that can be influenced by CFA or other fire service agencies.

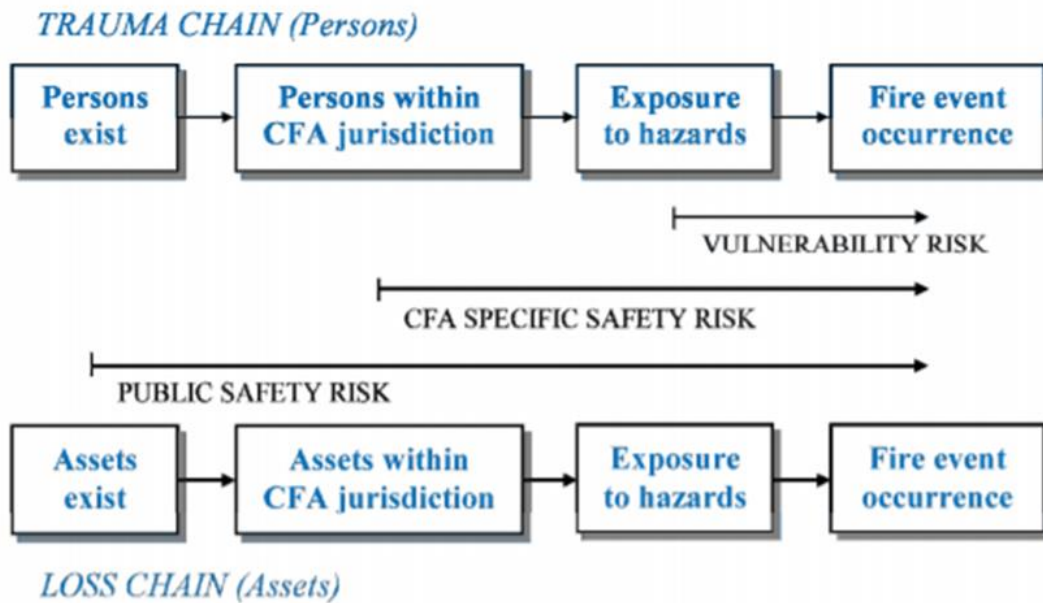


Figure 1 Trauma and Loss Chains - pre-event or before phase¹⁰

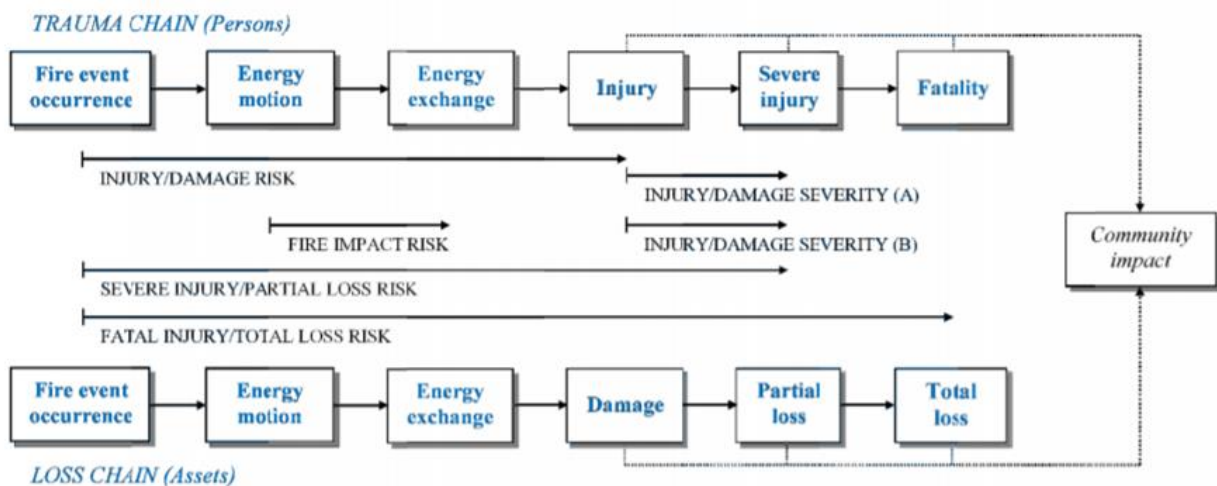


Figure 2 Trauma and Loss Chains - event or during phase¹¹

Interventions can be applied to influence risk factors both before and during a fire. This is depicted by the Incident Chain in Figure 3. The Incident Chain shows that there are a broad range of interventions which can be implemented to reduce fire risk before a fire occurs. There is strong evidence supporting the effectiveness of interventions to improve fire prevention and preparedness (See Box 8, Box 13 and Box 14 for examples).

Options to manage fire risk are the most effective and efficient when they are designed with consideration of the entire trauma chain. This includes consideration of a range of interventions affecting fire risk at different points along the chain. In many cases, the most

¹⁰ Source: Monash University (2015). A data conceptual framework for CFA.

¹¹ Source: Monash University (2015). A data conceptual framework for CFA.

desirable option will involve a combination of interventions targeted at prevention, mitigation, detection, response, and relief.

The FDRP's risk assessment model does not appear to consider interventions which affect fire risk through means other than turnout and response times. This includes interventions to prevent and prepare for fires, as shown in [Figure 3](#). This means that the model currently does not consider the risk outcomes of interventions which may provide the most desirable outcomes for Victorian communities.

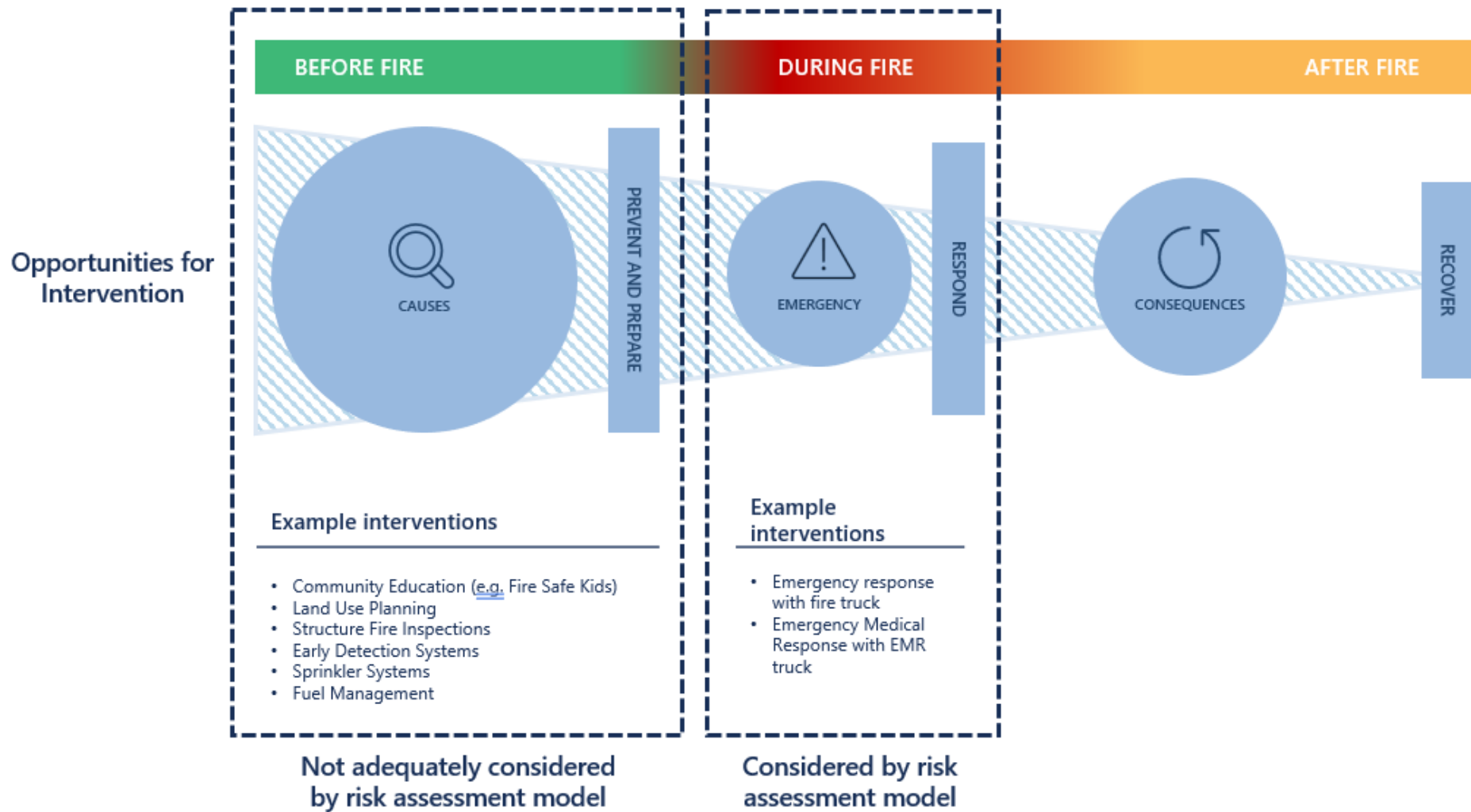


Figure 3 Opportunities for intervention along the trauma chain and interventions considered by the FDRP’s risk assessment model

Source CFA, 2021

The current approach also overlooks other levers which can improve the efficiency and effectiveness of the chosen option. For example, the current approach does not consider whether it would be more effective or efficient to delay the establishment an FRV district. A staged transition between CFA and FRV which allows career firefighters to supplement volunteer brigades is also not considered by the model.

Box 6: Interventions to manage growing fire risk in Cardinia

The FDRP is likely to consider changing FRV Fire District boundaries in a number of communities across the state. This includes Cardinia, a town with a population of around 400 people. It is expected that Cardinia and surrounding areas will experience significant population growth over the next decade due to existing and expected Precinct Structure Plans. This will result in a significant increase in fire risk. The town is currently serviced by six surrounding CFA brigades.

In the context of a green fields site such as Cardinia, the FDRP is likely to consider two investment options as part of the Fire District Review:

- Do nothing - allow CFA to retain primary responsibility for servicing fire risk with current resources
- Establish an FRV Fire District.

This approach is binary and does not consider alternative options which may be more effective or efficient. Another option that could be considered would be to improve fire prevention, detection and response in Cardinia through a CFA Fire Service model. This option may be more efficient and effective than the alternative options and should be considered by the FDRP.

Appendix A discusses the costs, outcomes and benefits of investment options for the Cardinia case study in more detail.

The model does not adequately consider how FRV and CFA actions affect fire risk

To determine the merit of a change in FRV Fire District boundaries it is important to understand how this change will affect fire risk compared to a 'do nothing' scenario. If the establishment of a FRV Fire District will result in a reduction in costs from fires, such avoided loss of life and property, and this benefit outweighs additional implementation costs, it is likely that the district change would be desirable. Alternatively, if the establishment of a FRV district would have an immaterial effect on fire risk, it would be unlikely that the change would be desirable.

The FDRP's risk assessment model assumes that response times are the key factor driving changes to fire risk under different service models. This assumption is an overly narrow assessment of the multiple measures, across planning, preparedness, response and recovery that can affect risk. The assumption is also flawed as there is a lack of evidence linking faster response times to improved risk outcomes for fires in an urban setting.

Response time

An implicit assumption of the approach outlined by the FDRP is that response times have a clear and consistent effect on risk outcomes. However, evidence of how response times influence fire risk is lacking, and a causal link is yet to be determined in an Australian

context.

The use of response time as the key metric for assessing fire service performance is no longer aligned with current practice. CFA and FRV have adopted outcomes-based measures of performance focused on public safety. For example, a fire agency can meet time-based response performance criteria without actually engaging in firefighting or having any effect or influence on the fires it attends.

Response times also does not consider time between fire ignition and detection ([Figure 4](#)). This time is often unknown and can vary widely depending on occupant behaviour and other risk factors. Ignition to detection time is critical for fire risk outcomes, and many of the outcomes of a fire event are determined before a fire service is notified. For example, whether the occupants can take quick and effective on-scene suppression action or self-evacuate.

These simplified examples demonstrate the lack of connection between agency outputs and public safety outcomes. A focus on public safety outcomes would result in a more comprehensive consideration of all available options that reduce the effect of a fire on public safety.

Response time standards for fire and emergency services across Australia are highly variable. In most cases, this variability does not appear to contribute to changes in fire risk outcomes (see [Box 7](#)). [Table 1](#) demonstrates this variability. A comparison to Victoria Ambulance is also provided by way of further highlighting this variability by comparing response times for different types of emergency response agencies.

INTERVENTION TIMELINE



DETECTION	ALARM NOTIFICATION	TURNOUT	TRAVEL	PREPARE FOR INTERVENTION	INTERVENTION
Time dependant on fire/emergency being detected.	90 sec	INTEGRATED 90 sec ←→ VOLUNTEER 4 – 10 min ←→	Time dependant on location of fire/emergency and factors affecting travel.	Time dependant on people, skills, equipment required and complexity of fire/emergency.	Time dependant on complexity of fire/emergency.

PERFORMANCE MEASUREMENT
 Hazard Class 2 = 8 mins
 Hazard Class 3 = 10 mins
 Hazard Class 4 = 20 mins
 Hazard Class 5 = N/A

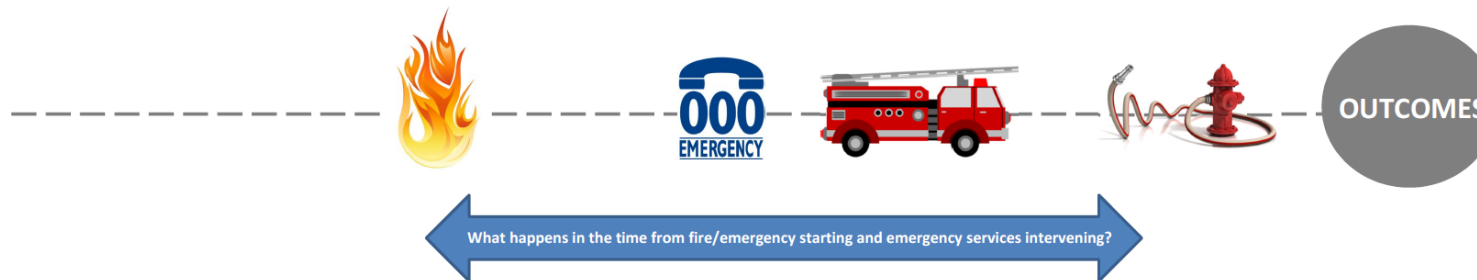


Figure 4 Fire service intervention timeline

Box 7: The effectiveness of response times for protecting life and property

Evidence for the effect of response times on fire risk outcomes is mixed. There is some evidence supporting correlations between response times and property damage, however there is limited evidence to support links between response times and fire fatalities.

Decreased response times may have some benefits, including decreased property damage. A preliminary study in New Zealand by Challands (2010)¹² estimates that a one-minute improvement in response times is correlated with \$4,800 in average avoided property damages (2021 \$AUD). However, the study acknowledges that improvements to response times between four and eight minutes may result in much smaller benefits.

Data produced by the Productivity Commission for the Report on Government Services (RoGS) provides insightful information on fire service response times and correlation with key fire risk outcomes. Data from the RoGS shows that average Victorian fire service response times have been consistently faster than the Australian average. From 2010-11 to 2019-20, response times to fire averaged 6.8 minutes in Victoria, compared with over 7.7 minutes in 6 other states and territories (including NSW and Queensland).

RoGS data suggests that there is limited correlation between average response times and risk outcomes such as fire fatality rates and flashover rates. Victoria's performance on these measures is similar to the Australian average despite average response times being one minute faster than the Australian average. Figure 5 shows the RoGS data for Victorian response times and fire related deaths per million people between 2010 and 2019. The number of fire related deaths appears to fluctuate and there is limited correlation with response times. Other studies, such as those undertaken by Challands (2010) and Monash University (2016)¹³ support the notion that response times do not have a significant effect on fire-related deaths. Other interventions, particularly targeted prevention, preparedness and detection options, may be required to further reduce fire related deaths.

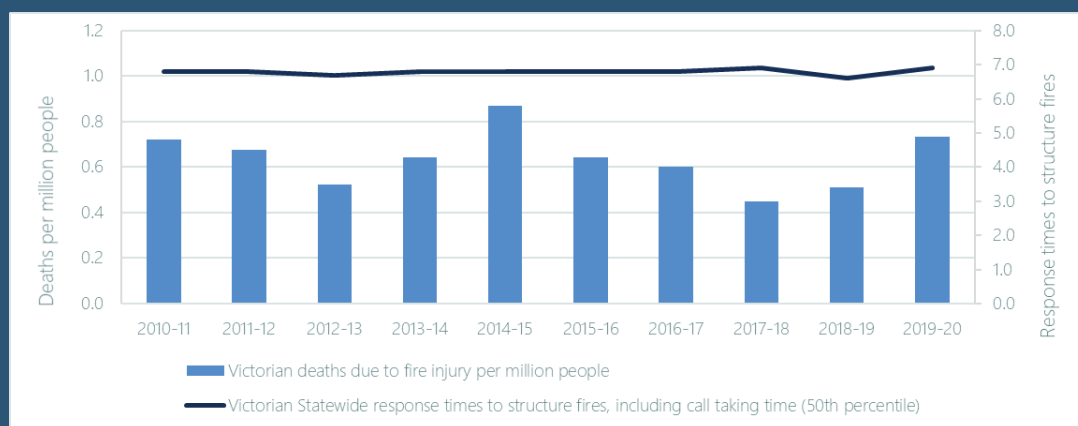


Figure 5 Average response times and fire related deaths per million people

Source: Productivity Commission, 2021

¹² Source: Challands, N. (2010). The Relationships Between Fire Service Response Time and Fire Outcomes.

¹³ Source: Stuart, G., et al. (2016). Factors Affecting the Incidence and Impact of Residential Fires.

Table 1 Response times for jurisdictions in Australia

Jurisdiction	Response Time Standard	Setting	Target
Queensland	14 minutes	Structure Fires	90 th Percentile
South Australia	7 mins	Urban Area	90 th Percentile
	11 mins	Regional Area	90 th Percentile
Western Australia	12 mins	Career Station	90 th Percentile
	14mins	Volunteer Station	90 th Percentile
New Zealand	8 mins	Career Station	80 th Percentile
	11 mins	Volunteer Station	80 th Percentile
	30 mins	Bushfire	90 th Percentile
Victoria	7.7 mins	FRV	90 th Percentile
	9.2 mins	FRV – Medical Calls	90 th Percentile
	8 mins	CFA Urban	90 th Percentile
	10 mins	CFA Low Urban	90 th Percentile
	20 mins	CFA Rural	90 th Percentile
	No Target	CFA Remote	N/A
New South Wales	11minutes, 58 seconds	Structure Fires in Urban Areas	N/A
Ambulance Victoria	15 mins	All Code 1 Responses	85 th Percentile
	15 mins	Code 1 Responses in towns with populations greater than 7500	90 th Percentile

Time to flashover is a critical threshold for injuries, loss of life and property damage. The National Fire Protection Association (NFPA) states that the upper limit of human temperature tenability is 212°F (100 C). This is well below temperatures found in most significant structure fires that are beyond the incipient stage. In today’s fire environments, temperatures in excess of 500°F (550 C) can be easily obtained within three to four minutes. Flashover which occurs at about 1,100°F (593 C), has been demonstrated to occur well under five minutes.¹⁴

The reduction in time to flashover in the residential fire environment over the past several decades is driven by changes to modern homes such as their size, geometry, increased petroleum based synthetic fuel loads, and the constant evolution of construction materials to included highly engineered, lightweight materials.¹⁵ As a consequence, even with the

¹⁴ Source: Marsar, S. (2010). Survivability Profiling: How long can victims survive in a fire. Fire Engineering.

¹⁵ Source: Kerber, S. (2012). Analysis of Changing Residential Fire Dynamics and Its Implications on Firefighter Operational Timeframes. Fire Technology, 865–891. Retrieved from <https://doi.org/10.1007/s10694-011-0249-2>

extremely short response time benchmarks applied by Victorian fire services, in most cases a fire beyond its development stage has transitioned to flashover prior to arrival. A reduction in response times can have minimal benefit to the outcome of a fire if it does not prevent flashover. In most instances, it is impractical to reduce response times to below this critical threshold.

Consideration of the importance of time to flashover versus response time demonstrates the need for the FDRP to broaden its consideration of options to manage fire risk. The Productivity Commission distinguishes the outputs and outcomes of emergency services for fire events and a more comprehensive range of options to manage outcomes (Figure 6). Output information is critical for equitable, efficient and effective management of government services. Whilst outcomes are the impact of services on the status of an individual or group; in the case of fire services, this normally aligns to public safety.

The FDRP must better consider a larger range of outputs and better assess the relationships between those outputs and outcomes in its decision making. Reliance on response time alone is insufficient.

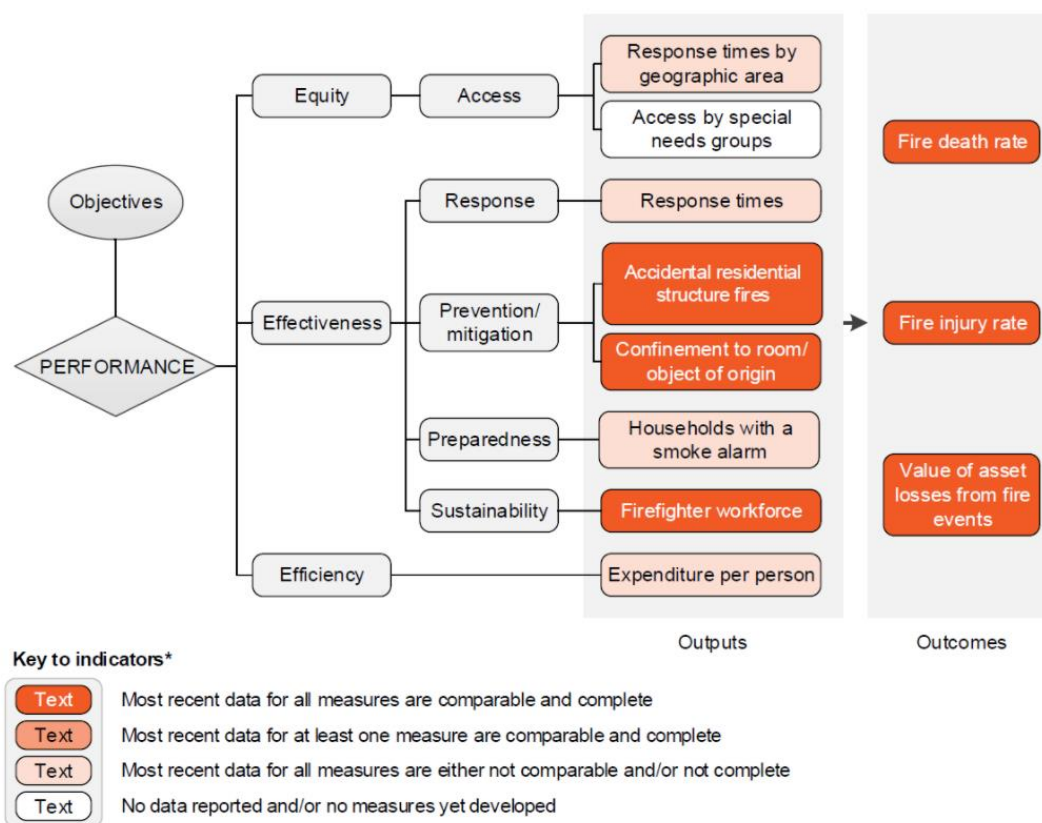


Figure 6 Productivity Commission performance indicator framework¹⁶

Planning and preparedness

The FDRP’s risk assessment model does not consider the effect of planning and preparedness measures, such as community education programs or smoke alarm installations, on fire risk outcomes.

¹⁶ Source: Productivity Commission. (2020). Report on Government Services. Canberra: Australian Government

To ensure that the emergency management sector remains sustainable, it is critical that communities and fire service agencies share responsibility for fire risk. Planning and preparedness measures such as community education, evacuation planning and land use planning play a key role in ensuring community ownership of risk. The FDRP has stated that planning and preparedness measures will be considered qualitatively in assessment, and will not be integrated into risk modelling. The weighting of qualitative assessment on final recommendations to be made to the Minister is also unclear.

Box 8: Risk outcomes from interventions to improve fire prevention and detection

There is strong evidence that interventions to improve fire prevention and detection in residential properties, such as sprinklers and smoke alarms, result in improved risk outcomes.

In 2017, the NFPA conducted a statistical review of the presence and performance of sprinklers based on historical data for nearly 500,000 reported fires in the US between 2010 and 2014. In general, the presence of sprinklers was correlated with a significant reduction in the loss of life and property from fire. Their effect was most strongly observed in the reduction of civilian fire deaths to 0.8 per 1,000 fires compared to 6.3 per 1,000 fire events for fire events with no sprinkler. The presence of sprinklers was also associated with notable reductions in injury rates, and for most dwellings, the average loss per fire.

In February of 2021, the NFPA released a research report that documented findings from a statistical review of the presence and performance of smoke alarms. The review draws on historical data for roughly 350,000 reported home structure fires in the US between 2014 and 2018. The review found that the death rate per 1,000 home structure fires was 55 per cent lower in homes that had a working smoke alarm than in homes with no smoke alarm, or a smoke alarm that failed to operate.

RoGS data (Figure 7) shows that Victoria has experienced less residential fires over the last 10 years, despite consistent average response times across the same period. This suggests that improvements in community prevention and preparedness over this time period was the main driver for reduced residential fire rates.

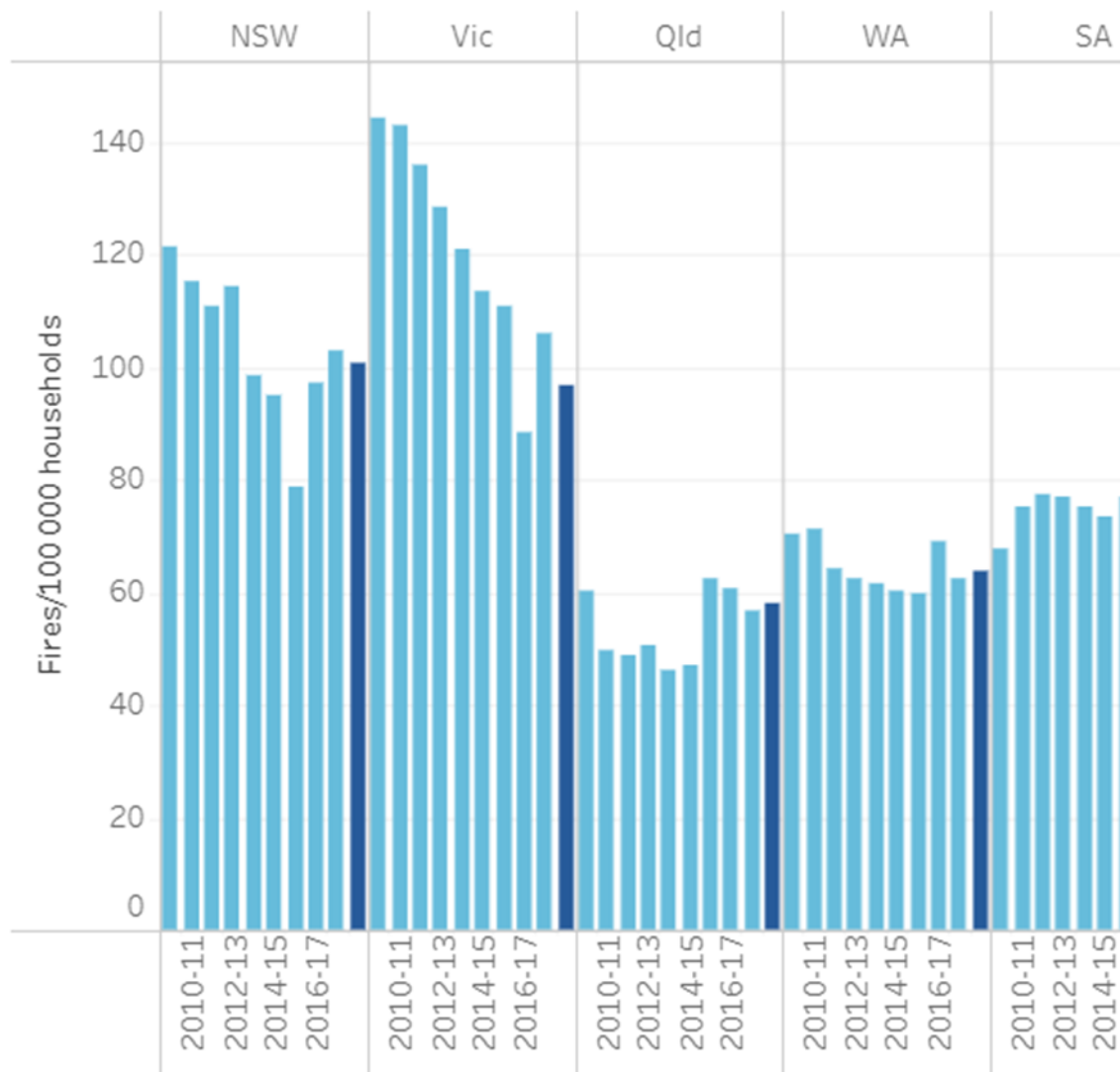


Figure 7 Accidental residential structure fires over time in NSW, Vic, Qld, WA and SA

Source Productivity Commission 2021

The model does not consider the costs and benefits of fire service models and interventions

The current approach does not consider the full range of benefits and costs of different fire service models. Section 4F of the *Fire Rescue Victoria Act 1958* states that a key role of the FDRP is to provide independent and informed advice on “*whether it is necessary and desirable for the Fire Rescue Victoria fire district to be changed*”. Desirable can be interpreted in this context as a decision that maximises public value. To determine the desirability of an FRV district, it is critical to consider all benefits and costs that will result from this action, and who will incur these benefits and costs. This includes risk-related benefits and costs such as loss of life, damage to buildings and infrastructure, mental and physical health effects and business interruptions. It should also include other economic, social, and environmental benefits and costs which are unrelated to risk.

The benefits and disbenefits of a fire management action can be identified with the support of a conceptual map which links actions to outputs and to outcomes, costs and benefits. For example, [Figure 14](#) in Appendix A identifies a range of benefits that can arise from changes

in fire detection, prevention, and response, as well as changes to volunteerism. **Table 2** in Appendix A outlines a detailed list of benefits and disbenefits that may arise due to relevant fire management actions.

CFA and FRV fire service models have a number of benefits and costs that are not being adequately considered by the review process. By maintaining an active presence in community and contributing to risk management in a variety of contexts, CFA volunteers create significant social and economic value for themselves and their communities. CFA brigades continue to operate under an FRV model, however their ability to continue to undertake core activities such as community engagement is reduced.

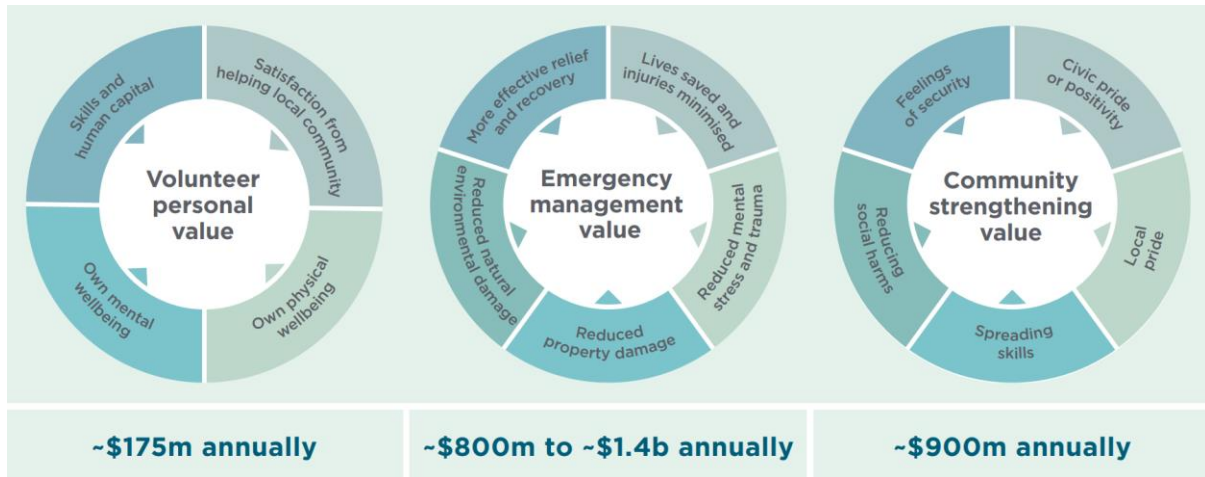


Figure 8 The value of Victoria's emergency volunteers

Source EMV 2020

Box 9: The benefits and costs of alternative fire management actions in Cardinia

The costs, outcomes and benefits of alternative fire management actions are demonstrated through a case study of Cardinia (see Box 6 and Appendix A for more details). The costs, outcomes and benefits of three options to manage increasing fire risk in Cardinia can be compared to determine which option is likely to be the most effective and efficient. For the purposes of this case study, three options are compared:

- Option 1: improve fire response by establishing an FRV Fire District
- Option 2: improve response capacity and capability under a CFA service model
- Option 3: improve fire detection, prevention and response under a CFA service model.

A key outcome of all options would be a reduction in response times to residential fires. Option 3 includes additional interventions such as sprinkler and smoke alarm installation which would improve fire detection time, fire prevention and community awareness of fire risks.

Basic estimates for the costs of each option were modelled based on CFA experience managing both volunteer and career firefighting forces. Option 1 is not based on actual FRV costs. Option 1 would result in approximately \$40 million in extra costs between 2025 and 2034 when compared to Option 2, or around \$25 million in extra costs when compared to Option 3. Figure 17 in Appendix A depicts the undiscounted and discounted cost of each option (relative to the base case) over time.¹⁷

Qualitative analysis suggests that Option 2 and Option 3 would be likely to provide benefits at a more cost-effective rate than Option 1. CFA can improve response times at a more cost-effective rate than FRV, due to differences in costs to establish and maintain volunteer and career firefighting forces.

Option 3 is likely to be the most desirable option. Targeted interventions which improve fire prevention and detection can be more cost effective than interventions to improve response times. Consideration of a range of interventions across the Incident, Trauma and Loss Chains allows fire agencies to develop an optimal mix of interventions which protect life and property at the most cost-effective rate.

The Cardinia case study demonstrates that:

- The current approach to Fire District Review may not adequately consider alternative investment options which provide more efficient and effective solutions for managing fire risk. The FDRP should consider a broader range of options to manage fire risk in their decision-making process.
- Fire risk outcomes can be significantly affected by factors independent of fire service response time, such as fire prevention, detection and awareness. These factors should be given sufficient weight in the Fire District Review decision-making process.

¹⁷ In economics, the costs (and benefits) of interventions are often discounted to account for the time value of money. This is the concept that a cost incurred at a later date is preferred over a cost incurred now. Undiscounted costs do not account for the time value of money.

- Changes to fire service models can have a broad range of costs, outcomes, and benefits. All costs and benefits of a change in fire service models should be considered in the Fire District Review decision-making process.

3.4 There will be implications for communities, government, and fire service agencies if these limitations are not addressed

If the current limitations to the FDRP approach are not addressed, the process may lead to the recommendation of an option which leads to undesirable outcomes for communities, government, and fire service agencies.

The current FDRP approach does not adequately establish clear and appropriate objectives, decision criteria, and links between fire service outputs, risk outcomes, and benefits for community. The current approach also does not consider a wide range of fire service models which may address community needs more efficiently and provide additional benefits.

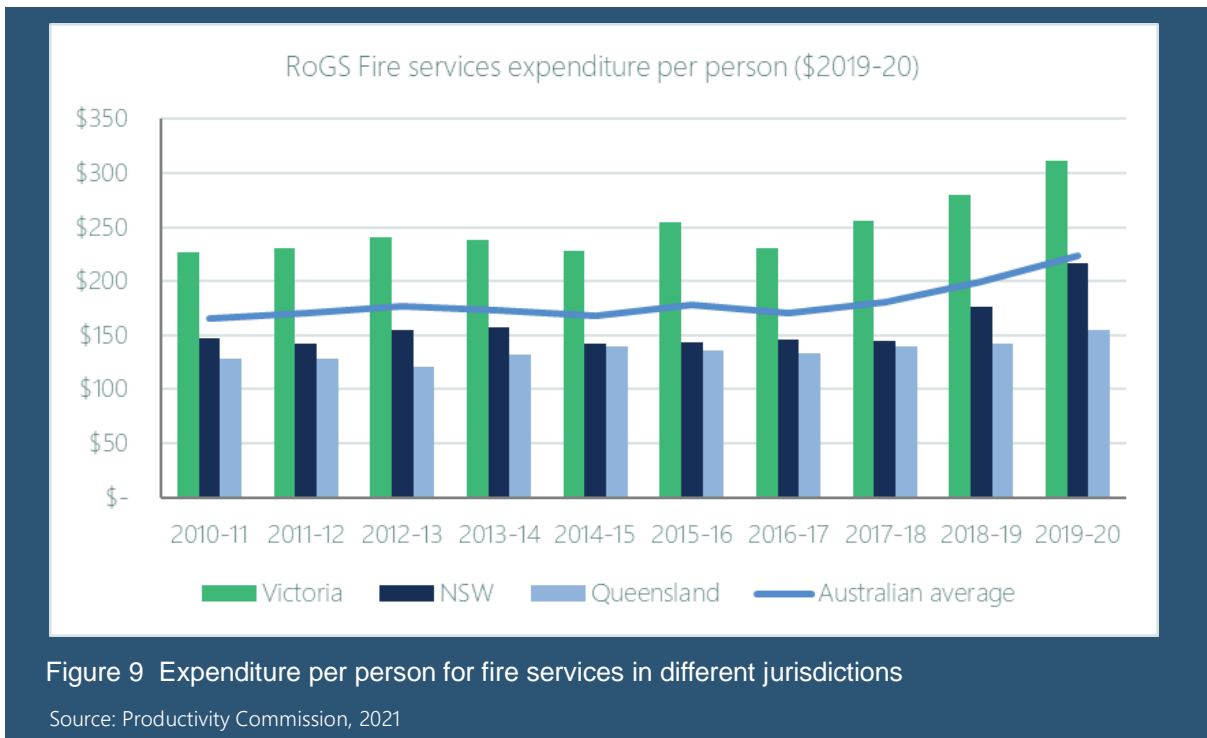
An FRV service model can result in upfront and ongoing costs which can have a significant effect on total fire service expenditure. This poses a risk to the sustainability of Victoria's fire services, which already spend more than all other Australian states on a per person basis (see Box 10).

Box 10: Fire service expenditure in Victoria

The Productivity Commission's annual RoGS collects information on the performance of government services in Australia. This includes collecting information on 11 indicators for publicly provided fire and emergency services.

One indicator tracks expenditure per person on emergency and fire services. Figure 9 shows expenditure per person for the Victorian, NSW and Queensland fire services from the 2010-11 to 2019-20 financial year (\$2019-20). This data is benchmarked against the Australian average. Victorian fire services expenditure has been consistently above the national average, while the other two major Australian states are generally below this average.

The relative performance across jurisdictions in terms of number of fires, injury rates, death rates and response times is explored further in Box 7. However, in general, Victoria is only shown to perform better than other states with respect to response times, but not in terms of number of fires, injury rates and death rates. This evidence anecdotally suggests that a focus on response time may be contributing to above average expenditure on fire services in Victoria, while not necessarily contributing to improved outcomes.



A career firefighter service model can also be difficult to scale in comparison to a volunteer service model. For example, if a single FRV crew is limited in its ability to service demand, FRV would be required to insert an additional crew. This would result in double the costs even if demand had not doubled. Comparatively, a volunteer service model is more scalable and therefore allows for a more gradual cost curve as demand increases.

The current operating model utilising career staff requires a minimum of two crews to be deployed to each emergency event. In regional or peri-urban settings this can be challenging to achieve where only a single crew is located and multiple overlapping career staff locations do not exist. In these instances, a second career staff crew will often be drawn away from their primary response area; this often creates a subsequent void in coverage where volunteer capability is not recognised.

A number of unintentional outcomes can arise if a FRV District is established without careful consideration of benefits, costs and practical implications. The recent establishment of a FRV District in Moe (see Box 12) is demonstrating early indication of unintentional outcomes. Unintentional outcomes can include an inability to respond to diverse or specific community needs, fire in various hazard environments or land tenures, seasonal risk, and the inefficient allocation of resources affecting the long-term sustainability of fire services. Community resilience may also be affected by the loss of planning, mitigation and preparedness programs and activities delivered by CFA.

FRV Districts can also impact volunteerism. A change can affect a volunteer's sense of purpose, their activity levels, and morale, impacting upon CFA's volunteer base and influencing the desirability for community members to consider volunteering their time with CFA. Volunteers provide significant value to their local communities by bringing local knowledge, fire history and contributing to risk reduction and community connectedness, while also provide the vital surge capacity for seasonal risk (see Box 11), major emergencies and high intensity fire seasons. In 2020, CFA's volunteer operational firefighters numbered

around 31,000, compared to around 3,600 operational firefighters under the employ of FRV. These benefits are lost if a volunteer base cannot be maintained.

Box 11: Volunteer service models and seasonal risk

A volunteer service model can provide critical surge capacity for communities such as Phillip Island which experience significant fluctuations in fire risk across the year.

Phillip Island is a CFA serviced community with a permanent population of around 10,000. Phillip Island has a large seasonal population which typically reaches 45,000 during peak periods. 3.5 million people visit Phillip Island annually.

During peak periods, CFA brigades can effectively service fire risk due to a large membership base. CFA brigades are also supported by visiting CFA volunteers, who can respond to emergencies while at their secondary residence or temporary occupancy. A new CFA station in Cowes is expected to be complete by 2022 and will enable improved performance as its location will overcome several impediments that currently hinder brigade operations.

CFA's volunteer base may be significantly affected by the Fire District Review. CFA's largest and most active brigades are situated in larger towns and communities which are likely to be areas of interest for the FDRP. These same brigades are often called upon during times of major emergencies to underpin the state surge capability. The recent Royal Commission into National Natural Disaster Arrangements states that "Sustaining an effective volunteer workforce is vital to ensuring future capabilities of fire and emergency services to respond to natural disasters. Volunteers make up the majority of the fire and emergency services workforce in Australia."¹⁸

Box 12: Establishment of an FRV Fire District in Moe illustrated the challenges of change and identifies lessons for future changes

Moe is a regional Victorian town located in the Latrobe Valley with a population of around 8,800. Following Fire Services Reform and the transition of CFA's career firefighters to FRV, a decision was required to define a FRV Fire District across Latrobe West in 2020. As the FRV District has only been established for 12 months the case study highlights the potential impacts of the FRV District establishment based on early indications and observations.

Rough estimates of the cost of the transition were modelled based on CFA's previous experience establishing and operating career firefighter forces. (Figure 10). The total cost of the intervention from 2018 to 2027 is estimated at around \$49 million, which represents a significant cost to government. This estimate is likely to vary from actual FRV costs.

This transition likely resulted in some benefits to community due to decreased response times. However, it is unclear if this transition has produced the desired effect on fire risk outcomes such as injuries and deaths from fires.

¹⁸ Source: Royal Commission into National Natural Disaster Arrangements, Chapter 6: National emergency response capability, Paragraph 6.5, Available: <https://naturaldisaster.royalcommission.gov.au/publications/html-report/chapter-06>

Early indications suggest that the transition has begun to affect a number of communities and CFA brigades with consequential impacts beginning to be observed including loss of CFA volunteers, practical limitations which prevent FRV appliances from accessing some areas of the Fire District, and loss of bushfire management actions previously undertaken by CFA. If these effects continue, they have the potential to lead to several disbenefits, including:

- Loss of personal and community value provided by volunteers, including health, human capital, and social benefits
- Loss of risk reduction benefits provided by volunteers, including volunteer contribution to campaign fire seasons and large fires
- Loss of risk reduction benefits and operational capability in environments where FRV appliances are not fit for purpose, such as agricultural land and bush settings
- Difficulties dispatching the most appropriate fire agency to reported incidents where Fire District Boundaries cut across and through property boundaries.

The materiality of the costs of the transition and the potential disbenefits suggest that, if the observed issues are not addressed, the benefits of the intervention may not be commensurate with the costs. High costs and loss of volunteer engagement also have implications for the sustainability of Victorian fire services and their ability to continue protecting Victorian communities into the future.

The Moe case study demonstrates that establishment of FRV Districts based on limited or narrow decision criteria may not lead to desirable outcomes. The FDRP should consider the broader implications of FRV District establishment in their review, including the impacts upon the joint operating model and a full assessment of intended and unintended outcomes, costs and benefits arising from transition.

Observations drawn from the experiences associated with changes to the Fire District Boundaries around Moe, provide tangible examples and valuable insights to the potential role the joint fire service operating model could play in responding to changes in risk across a dynamic environment. Unlike the binary approach to changing Fire Service Boundaries, the application of the operating model has the necessary elements to be agile and responsive to environmental shifts and local needs by ensuring resource allocations and capability deployments are made commensurate with the proportionality of risk. While there will always be threshold considerations and finite resources, the application of the joint operating model by the fire services has the potential to fill a critical role across the spectrum of fire risk.

A detailed assessment of costs, outcomes and benefits arising from establishment of the Latrobe West FRV Fire District can be found in Appendix A.

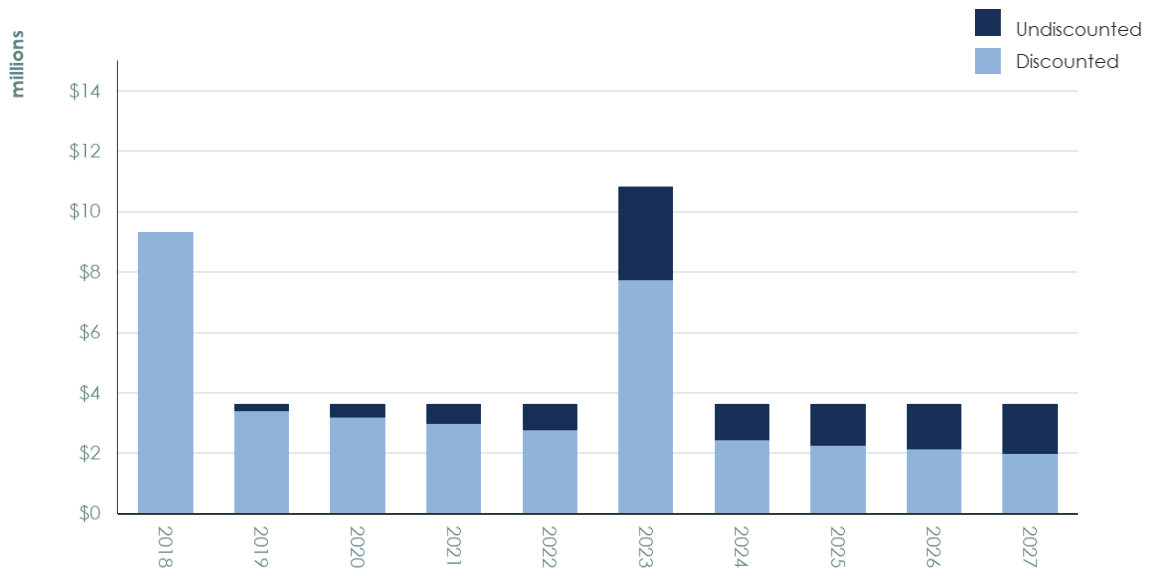


Figure 10 Estimated costs of establishment of an FRV Fire District in Moe

4. There is an opportunity to improve the current approach

Key points

- CFA is committed to supporting the FDRP refine and improve the proposed approach and model being developed.
- A comprehensive Fire District Boundary decision-making approach, that includes but is not limited to a risk assessment model, is required to ensure community outcomes are achieved effectively and efficiently.
- The panel should consider alternative options and not be constrained by a binary approach. The application of the joint fire service operating model in determining how and where capabilities are deployed has the necessary attributes to play a critical role across the spectrum of fire risk to improve public safety outcomes.
- The approach to the risk assessment model, and the entire Fire District Review process, would be improved by building it upon the foundations and concepts of the public health approach.

4.1 Work together to design an evidence-based decision process

Working together

Achieving the shared vision of Victoria's fire agencies and the emergency management sector requires partnership. Victoria's fire agencies are complementary and interdependent upon each other. This relationship is built on a common doctrine and interoperability of fire agencies and a legislative framework that enables the achievement of better outcomes for the community. A collaborative approach focussed on community outcomes would similarly benefit the review of Fire District Boundaries.

CFA has highly relevant experience, knowledge and information that will be valuable to the review process. Prior to the Fire Services Reform the CFA operated all fire service models, from full volunteer, to integrated staff / volunteer locations to a wholly career model. The CFA had to plan for, amend and update these models in specific areas as risk changed. This role now sits with the FDRP. There is still significant experience and knowledge within CFA that can assist the FDRP. The CFA also gathers and manages several data sets that can provide useful inputs to the FDRP model and decision-making process.

CFA welcomes the opportunity to support the FDRP make sound recommendations to the Minister on Fire District Boundaries. CFA is committed to supporting the FDRP refine and improve the proposed approach and model being developed. CFA has outlined a proposed approach in the remainder of this section to support the FDRP.

A comprehensive decision-making approach

A comprehensive Fire District Boundary decision-making approach is required to ensure community outcomes are achieved effectively and efficiently. Consistent with the *Fire Rescue Victoria Act 1958*, CFA recognise that the FDRP provides independent recommendations to the Minister who makes the final decision on any change to Fire District Boundaries. However, the FDRP has the opportunity to ensure that its recommendations are based on a clear and comprehensive decision-making approach that recognises and accommodates the limitations of the proposed model. A comprehensive decision-making approach should be based on the foundations of good public policy, as outlined in Section 3.

The use of a model for the purpose of understanding fire risk and informing the development and analysis of options has benefits when done well. However, even when done well all models will have limitations. At worst, when done poorly it can be detrimental to achieving community outcomes. It will remain important that the FDRP are clear on the assumptions and limitations of a model, data inputs, and the use of the model outputs within its decision-making process. CFA would welcome the opportunity to support the FDRP develop and use a comprehensive decision-making process that recognises the outputs of the model are only one component.

While the remit of the FDRP is one of fire risk and assessing Fire District Boundaries, any decision-making process should have consideration to the effects and application of the joint fire service operating model. The effect fire service interventions can have on fire risk is directly influenced by the joint operating model whereby the services received by individual is the key consideration and not which agency provided that service. It is possible to have a material impact upon fire risk by changing how the operating model is applied rather than changing a Fire District Boundary. A binary approach can be limiting, and a more agile, dynamic and proportional approach may realise additional benefits.

By virtue of being emergency service organisations, the joint operating model of the fire services are agile, scalable, responsive and flexible. The fire risk environment within Victoria is not static and is influenced by a wide range of factors. The effect of fire risk changes and threshold considerations drive decision making in respect to resource allocation and the deployment of various capabilities and interventions. When the agencies work together in a collaborative approach to optimise the deployment and allocation of interoperable resources, fire risk will inevitably be treated and public safety outcomes improved. Across the spectrum of fire risk with binary choices at each end, the operating model fills much of the void and provides a critical alternative to that of simply changing boundaries.

The development of the proposed model to be used in a more comprehensive decision-making process also requires improvements. The following section outlines an approach to developing a model that can better support decision-making.

4.2 Developing a model to support decision making

As outlined in Section 3.3 the current approach to risk assessment proposed by the FDRP has a number of critical limitations. The approach to the model, and the entire Fire District Review process, would be improved by building it upon the foundations and concepts of the public health approach.

The public health approach is a highly regarded and contemporary public-safety framework. The approach is widely used in Australian and internationally and forms the basis for

understanding and responding to areas such as road safety, smoking, family violence and other types of violence¹⁹. It is also used by the CFA to understand, develop and prioritise multiple approaches to managing fire risk across prevention, preparedness and response. The public health approach aligns with other best practice public policy and economic analysis frameworks outlined in this submission.

At its core the public health approach is useful for understanding the causes and consequences of safety-related issues, and how to prevent them from occurring through primary prevention, policy interventions and advocacy. In this way, the public health approach targets the two aspects of risk – likelihood and consequences. Figure 11 outlines the four steps of the public health approach:

1. Define the problem through the systematic collection of information about the magnitude, scope, characteristics and consequences of the problem.
2. Establish why the safety issue occurs in the first place, using research to determine causes and correlates of safety problems, to identify factors that increase or decrease the risk, and to understand the factors that could be modified through intervention.
3. Identify what works in preventing safety problems by designing, implementing and evaluating interventions.
4. Scale up and implement policies and programs at the population level, with monitoring and evaluation of the effects of these interventions on risk factors and target outcomes.

The public health approach aims to provide maximum benefit for the largest number of people possible, and to expose a broad segment of the population to prevention measures that reduce and prevent safety issues at a population level. In some safety settings, public health interventions can be highly effective when they provide protection without requiring individual action at the time. This can be seen in areas such as road safety (such as airbags or autonomous emergency braking in cars), and fire safety (such as sprinkler systems in buildings). These interventions are activated automatically when a problem is detected. Intervention effectiveness is further enhanced when these types of interventions are combined with prevention measures aimed at changing individual behaviours.

¹⁹ Source: ABS, 2009. 4529.0 – Conceptual Framework for Family and Domestic Violence. , 2009.
<https://www.abs.gov.au/ausstats/abs@.nsf/2f762f95845417aeca25706c00834efa/c4b065e9441f901fca2575b70016d915!OpenDocument>



Figure 11 The public health approach

Source: World Health Organisation²⁰

The FDRP should review and revise its approach to the proposed risk assessment methodology and its broader decision-making approach to align with the public health approach. It must also have regard to risk management standards, included but not limited to ISO 3100:2009, AS/NZ 4360, the National Emergency Risk Assessment Guidelines (NERAG) and modelling and standards agreed by the nations fire agencies through AFAC such as the Fire Brigade Intervention Model (FBIM). [Figure 12](#) summarises the broad steps the FDRP should undertake to develop a risk assessment method or model, which aligns with the scope of the public health approach. Each of these steps is further detailed below.

²⁰ World report on violence and health: summary. Geneva, World Health Organization, 2002

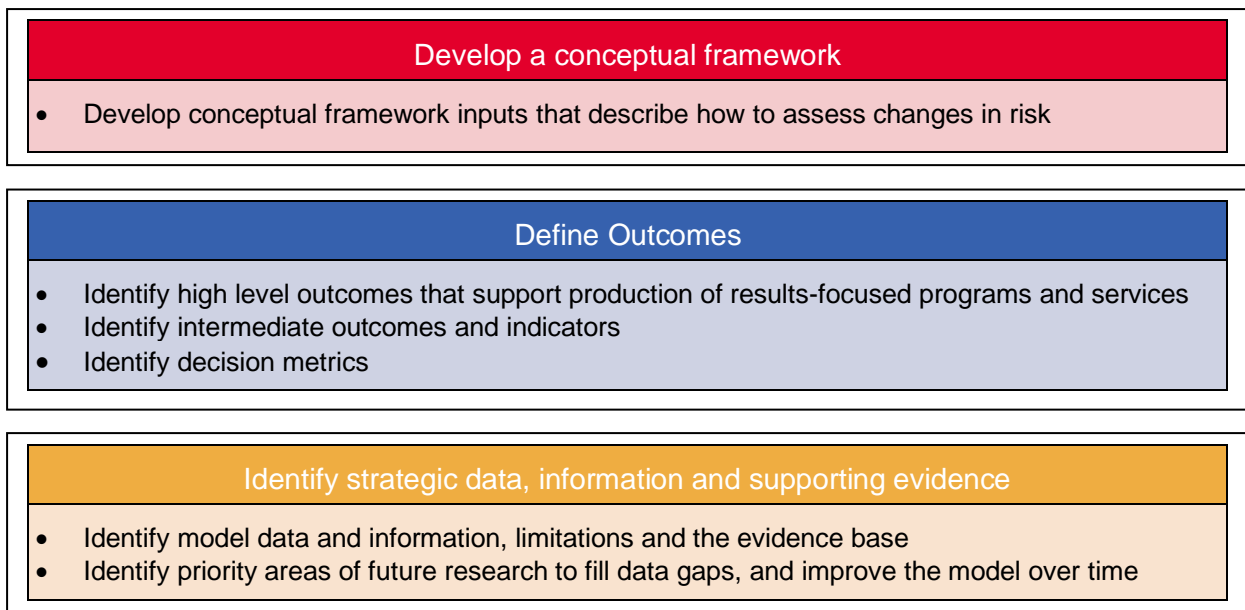


Figure 12 Developing a risk model to support decision making

1. **Conceptual framework** – Develop conceptual framework inputs that describe how to assess changes in risk incorporating elements from relevant risk concepts including the Incident Chain, Trauma Chain and the Loss Chain. Constraints in the conceptual framework should also be identified. Constraints can include social acceptance, CFA/FRV capability and performance standards.
2. **Define Outcomes** – Moving to an outcomes-based approach involves identifying and measuring high level outcomes against which strategic targets can be set; understanding the chain of causality leading to fire events, and to death, injury and property damage once an event has occurred; and identifying the structures that support production of results-focused programs and services. The identification of outcomes also allows for the determination of appropriate decision criteria and metrics. At this stage intermediate outcomes and indicators, for tracking progress towards outcomes can also be developed.
3. **Identify strategic data, information and supporting evidence** – Once a conceptual framework and outcomes have been defined the scope of the model can be developed. This includes:
 - a) Identifying model data and information
 - b) Identifying technical application and limitations and gaps
 - c) Identifying how model will support / integrate with other decision metrics
 - d) Identifying evidence base that supports the incorporation of data and decision metrics
 - e) Identifying priority areas of future research to fill data gaps, and therefore improve the use of the model over time.

Once each of these steps has been undertaken a fit for purpose model, or models, can be

developed. The application of this model to assess the effects of potential interventions can then be undertaken to guide decision-making.

Even when following a robust process like the one outlined above, it is likely that data, information and evidence gaps remain. Importantly, limitations may relate to data and information gaps but also data and information quality required for the purpose of the model. There may also be uncertainties as to the relationships within the conceptual framework. It is for these reasons that it will be important to undertake a process of continuous improvement and adaptative management.

The conceptual model, built upon the public health approach, allows all potential options and interventions across the entire breadth of the Incident, Trauma and Loss Chains to be considered. It avoids a narrow focus on one option to address one point these chains. It also allows for all cost, benefits and disbenefits to be considered in the context of the community outcomes that are being targeted. This approach provides policy makers with confidence the combination of interventions selected to address a specific public safety problem will deliver intended outcomes and benefits to communities, efficiently and effectively.

4.3 Monitor, evaluate and improve

The approach to developing a sound model to support decision-making outlined above will improve upon the approach FDRP have proposed. However, FDRP have been set a challenging task. The public health approach recognises the challenges in this type of modelling and decision-making by explicitly identifying the need to monitor and evaluate the use of the model in decision-making for the purpose of improvement over time. The FDRP should equally seek to build a process of monitoring, evaluation and improvement that enables FDRP to improve their decision-making process over time.

CFA expects that as a result of following the approach outlined above, the FDRP will identify the need for ongoing prioritised research to fill data gaps and the evidence base. Undertaking this research will support improved decision-making for future Fire District Boundary reviews. Over time this will lead to better decisions on Fire District Boundaries by establishing a clearer understanding of how different options can deliver the most beneficial outcomes for Victoria's communities. CFA welcomes the opportunity to support the FDRP to deliver on this objective.

5. Appendix A – Economic analysis

Economic analysis for robust public policy decision making

Use of economic frameworks and/or analyses in the Fire District Review can support development of a decision-making process which develops effective and efficient solutions for managing fire risk. Economic frameworks and analyses are aligned with and support best practice public policy decision-making. They are also imbedded in [Victorian Government guidelines](#). For example, the Department of Treasury and Finance typically requires cost-benefit analyses in business cases for large infrastructure and policy investments.

The scope economic analyses for investment decision-making can vary from case to case. However, all economic analyses follow similar steps:

1. Articulate the objective/s of investment
2. Consider all reasonable options for achieving the objective/s, including a 'do nothing' scenario (the base case)
3. Identify an exhaustive list of costs, outcomes and benefits resulting from chosen options relative to the base case
4. Value the costs and benefits of chosen options and identify who incurs them (e.g., community, government, insurers)
5. Recommend an option based on clear and transparent evidence and decision criteria.

This process is designed to ensure that all of the costs, outcomes and benefits of an investment option are properly considered in the decision-making process. It also supports decision-making by providing confidence that the chosen solution achieves the desired outcomes effectively, efficiently, and without significant perverse outcomes. Economic analyses can range from simple and qualitative to quantitative and complex.

An economic framework can be applied to the Fire District Review to assist in understanding the costs and benefits of FRV Fire Districts. An economic framework would allow the FDRP to identify and understand:

- The full range of benefits and costs relating to different fire service models which should be considered
- Alternative options which should be considered in addition to immediate establishment of FRV Fire Districts
- The magnitude of the costs and benefits of FRV Fire Districts compared to alternative options.
- The following sections describe how the steps of economic analysis can be applied to the FDRP's decision making process. Qualitative economic analyses are undertaken on two case studies (see [The FDRP's ability to value some costs, benefits and disbenefits of fire](#))

management actions may be limited by the availability of credible scientific and economic data. In these cases, the FDRP should still consider costs and benefits qualitatively and give them appropriate weight in the decision-making process.

Economic case study: Moe and Cardinia) to demonstrate the value of an economic framework for decision making. This includes identifying potential improvements that could be made to the current approach.

Step 1. Defining the objectives: managing fire risk

Current approach

The objectives of investment (and, by extension, the Fire District Review) are currently informed by Section 4F of the *Fire Rescue Victoria Act 1958*:

The role of the Fire District Review Panel is to provide independent and informed advice to the Minister on the following matters —

- (a) whether it is necessary or desirable for the Fire Rescue Victoria fire district to be changed;*
- (b) whether a change in fire risk, or something that may result in a change in fire risk, may warrant a review of the Fire Rescue Victoria fire district.*

Changes or additions to be considered

The current approach does not clearly show how it will demonstrate the desirability of changes to the FRV Fire District. The FDRP's assessment should be expanded to address the desirability of changes to the FRV Fire District, which can be broken down into:

- The effectiveness of changes to the FRV Fire District compared to alternative interventions to manage fire risk. Do proposed fire management actions achieve desired fire risk outcomes and benefits?
- The efficiency of changes to the FRV Fire District compared to alternative interventions to manage fire risk. Do proposed fire management actions make efficient use of available emergency management resources?

By working toward these objectives, the FDRP's recommendations can support the intent of the legislation and the optimal allocation of scarce emergency management resources. This is critical for ensuring desirable outcomes for communities and the ongoing sustainability of the emergency management sector.

Step 2. Defining the base case and options for managing fire risk

Current approach

The current approach considers options for investment in regions currently within CFA's jurisdiction. Under this approach, only two options for investment are considered – continuation of CFA operations, or immediate establishment of an FRV Fire District. This approach is binary and does not appear to consider alternative options (such as delayed establishment of an FRV Fire District) which may be more effective or efficient.

It is unclear how the current approach defines a base case for comparison. It is important to establish a base case to understand outcomes that would arise without intervention. This allows the decision maker to understand changes caused by investment options.

Changes or additions to consider

The FDRP should consider additional options which achieve desired investment objectives. A base case should also be clearly identified and defined. The base case and project options which the FDRP may consider could consist of:

- Base case: do nothing. CFA maintain responsibility for the region with no additional resources.
- Option 1: establish an FRV Fire District. FRV are assigned responsibility for managing fire risk within the region.
- Option 2 and beyond: Alternative interventions to manage fire risk. This may include:
 - Improving response capacity and capability through a volunteer fire service model
 - Improving fire prevention and detection through targeted planning and preparedness measures.

The base case and Option 1 are considered in the current approach, while Option 2 reflects an alternative option for managing fire risk. The alternative option allows for greater flexibility than the base case or Option 1 and could include several interventions which manage fire risk efficiently and effectively (Figure 13).



Figure 13 Long list of CFA interventions focused on prevention and awareness, detection, and response for residential fire and bushfire

Other alternative options may also be considered, such as delayed establishment of an FRV Fire District. Specific examples of these options are explored further in the subsequent case studies.

Step 3. Identifying all costs and benefits of options for managing fire risk

Current approach

The current approach attempts to identify several fire risk outcomes resulting from changes in response times. This includes the effect of interventions on expected property damage and loss of life.

Some material outcomes from interventions to manage fire risk are not considered within the FDRP's technical model. These outcomes include changes to fire prevention, detection times, community awareness, and social outcomes relating to volunteerism. These outcomes can result in significant benefits and costs to government, communities and other stakeholders, and failure to adequately consider these outcomes will result in an incomplete understanding of the merits of an intervention.

Changes or additions to consider

The FDRP should consider a broader range of costs, outcomes and benefits resulting from CFA and FRV service models, as well as any alternative options that are considered.

To support this task, it can be useful to develop a conceptual map of costs, outcomes and benefits that may arise from different management actions. An example of a high level conceptual map for actions to manage fire risk is presented in Figure 14. Specific actions (or combinations of actions) will have varying outcomes, resulting in varying benefits and disbenefits. The conceptual map:

- Recognises that there are a broader range of levers than response times for managing fire risk
- Recognises that some actions for managing fire risk may be more efficient (cost-effective) than others
- Recognises important co-benefits associated with different management actions, such as the social benefits of volunteerism.

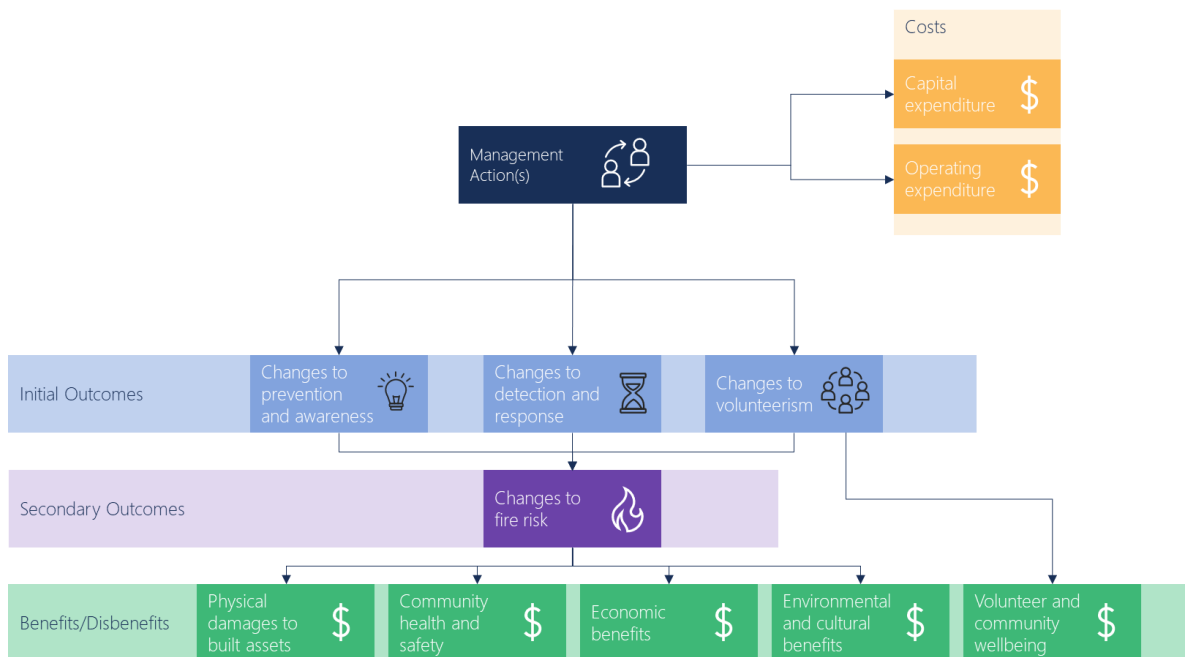


Figure 14 Conceptual map of potential outcomes and benefits from fire management actions

The FDRP's decision making approach should be expanded to adequately recognise investments which affect fire detection, prevention and awareness. This will allow the FDRP to recognise the costs and benefits of these investments in relation to investments which affect response times.

Many of the benefits and disbenefits arising from fire management actions relate to changes in fire risk. These include:

- Changes to physical damage to buildings, assets and infrastructure
- Health and safety benefits/disbenefits, including changes in the number of fire-related injuries and deaths and the mental health costs of fires
- Economic benefits/disbenefits due to changes in fire risk
- Environmental and cultural benefits due to changes in bushfire risk.

Fire management actions can also have benefits and disbenefits which do not directly relate to changes in fire risk. For example, changes in volunteer firefighter engagement and participation may affect health and human capital benefits for volunteers and provide additional social benefits to the broader community. Volunteer participation and engagement can also affect fire risk in the event of campaign fire seasons or large fires where additional capacity is critical for protecting communities.

Table 2 provides a detailed description of potential costs and benefits that may arise from fire management actions. This table includes benefits and costs that are relevant to urban and rural settings.

Table 2 Long list of potential benefits/disbenefits associated with managing fire risk in rural and urban environments

Benefit	Description	Relevant risk setting
Physical damages		
Buildings	Reduced fire risk can result in avoided replacement and disruption costs due to damage or destruction of residential, commercial or industrial buildings.	Rural, urban
Infrastructure	Reduced fire risk can result in avoided replacement and disruption costs due to damage or destruction of critical infrastructure.	Rural, urban
Agricultural assets	Reduced fire risk can result in avoided replacement and disruption costs due to damage or destruction of critical infrastructure.	Rural
Community health and safety		
Reduced loss of life	Reduced fire risk can result in avoided loss of life.	Rural, urban
Health	Reduction in fire risk results in avoided health costs from mental or physical trauma or air pollution.	Rural, urban
Volunteer and community wellbeing		
Human capital	Skills and knowledge gained from volunteerism can enable participants to undertake higher value activities, for example, moving from unemployment to employment.	Rural, urban
Health	Volunteer participants can experience improvements to wellbeing and life satisfaction which can directly or indirectly improve physical and mental health.	Rural, urban
Community resilience	Volunteer participants can experience a strengthened sense of connection to community which in turn may provide improved community resilience.	Rural, urban
Economic benefits		
Goods and services	Reduced fire risk can result in avoided costs from disrupted supply and demand of commercial goods and services due to direct fire damage or proximate fire.	Rural, urban
Tourism and recreation	Protection of built and natural assets provides tourism and recreation benefits to local community, visitors and businesses.	Rural, urban
Direct response costs	Reduced fire risk can result in avoided costs from fire suppression, rescue, volunteer time, first aid and investigation.	Rural, urban
Environmental benefits		
Amenity and aesthetics	Reduced bush fire risk can provide additional amenity and aesthetic value to local community and visitors.	Rural
Carbon sequestration	Changes in biomass can affect carbon sequestration and storage levels in an ecosystem.	Rural

Benefit	Description	Relevant risk setting
Flood and water-yield regulation	Healthy forests regulate water flow by absorbing water during heavy rainfall and releasing it gradually. This results in avoided flood damages and consistent water yields.	Rural
Plants and animals	Communities derive wellbeing and satisfaction from the existence of biodiversity and culturally significant plants and animals.	Rural
Soil retention	Healthy forests prevent soil erosion, which can lead to reduced water quality and landslides affecting built assets.	Rural
Cultural benefits		
Sacred and significant sites	Communities derive wellbeing and satisfaction (existence and bequest value) from protection and rejuvenation of culturally significant sites.	Rural

Step 4. Valuing costs and benefits

Current approach

The current approach seeks to quantify fire risk outcomes resulting from changes in fire service response times, such as property damage, injuries and loss of life. The current approach does not attempt to quantify the costs and benefits of investment options in monetary terms.

Changes or additions to consider

The FDRP should consider expanding the approach to value the costs, benefits and disbenefits of fire management actions. This will require an understanding of fire risk outcomes resulting from changes in fire response, detection, and prevention.

This approach would allow the FDRP to understand the efficiency and effectiveness of different options. Implementation of efficient and effective fire management solutions is critical to ensuring desirable outcomes for communities and the ongoing sustainability of the emergency management sector.

The FDRP's ability to value some costs, benefits and disbenefits of fire management actions may be limited by the availability of credible scientific and economic data. In these cases, the FDRP should still consider costs and benefits qualitatively and give them appropriate weight in the decision-making process.

Economic case study: Moe

Key messages

This case study explores the potential costs, outcomes and benefits of the establishment of an FRV District in the regional community of Moe in 2020. The case study compares the FRV service model to a counterfactual scenario in which CFA continued to service the area using a volunteer service model. As the FRV District has only been established for 12 months the case study highlights the potential impacts of the FRV District establishment based on early indications and observations.

The case study suggests the transition to an FRV service model has resulted in significant additional upfront and ongoing costs for the Victorian Government. The FRV service model has also likely resulted in additional benefits to the community through decreased response times. However, it is unclear if this transition has produced the desired effect on fire risk outcomes such as reduced injuries and deaths from fires.

Early indications suggest that the transition has begun to affect a number of communities and CFA brigades. If these effects continue, they will lead to a loss of CFA volunteers, practical limitations which prevent FRV appliances from accessing some areas of the Fire District, and loss of bushfire management actions previously undertaken by CFA. This has the potential to result in several disbenefits, including:

- Loss of personal and community value provided by volunteers, including health, human capital, and social benefits
- Loss of risk reduction benefits provided by volunteers, including volunteer contribution to campaign fire seasons and large fires
- Loss of risk reduction benefits and operational capability in environments where FRV appliances are not fit for purpose, such as agricultural land and bush settings
- Difficulties dispatching the most appropriate fire agency to reported incidents where Fire District Boundaries cut across and through property boundaries.

The materiality of costs and disbenefits suggest that if current trends continue, the benefits of transitioning to an FRV service model may not outweigh the costs. High costs and loss of volunteer engagement can also have implications for the sustainability of Victorian fire services and their ability to continue protecting Victorian communities into the future.

The Moe case study demonstrates that establishment of FRV Districts based on limited or narrow decision criteria may not lead to the most desirable outcomes. The FDRP should consider the lessons from this case study and the broader implications of FRV District establishments in their review, including the effect upon the joint operating model and a full assessment of intended and unintended outcomes, costs and benefits arising from transition.

Background to case study

Moe is a regional Victorian town located in the Latrobe Valley with a population of around 8,800. Moe is subject to urban fire risk as well as bushfire risk from surrounding agricultural land. CFA previously had primary responsibility for servicing fire risk in Moe and surrounding towns such as Newborough, Westbury and Trafalgar. These are older, established communities with stable populations and strong networks and social fabric. These communities have always identified with CFA and CFA brigades identify with their community.

Following Fire Services Reform and the transition of CFA's career firefighters to FRV, a decision was required to define a FRV Fire District across Latrobe West in 2020. Several reasons prompted the transition, including the Moe CFA volunteer brigade's ability to consistently achieve service delivery performance targets and the broader capability demands originating from some of the La Trobe Valley's hazard facilities (for example, power stations).

Prior to the Fire Services Reform, CFA established the La Trobe West Fire Brigade and deployed career firefighters to supplement existing volunteer capability and capacity across the localities identified. CFA's operating model at that time did not designate or assign the La Trobe West Brigade with a primary fire district. This approach ensured existing volunteer brigades maintained primary responsibility for their communities with the operating model ensuring any shortcomings in volunteer brigade performance was supplemented by career staff. This model also ensured career staff were well placed to support their neighbouring volunteer brigades with additional training and development opportunities that ultimately supported the ongoing building of CFA's capability across the La Trobe Valley.

FRV now has primary responsibility for servicing fire risk in Latrobe West. This includes parts of neighbouring communities of Westbury and Trafalgar. The Moe CFA Brigade continues to operate without primary responsibility for their community and has 55 active volunteers as of November 2021.

The original intention of this decision was to reduce the Moe community's exposure to fire risk. However, early indications suggest the establishment of the FRV District may result in several unintended outcomes, including loss of volunteers, effects on neighbouring communities, loss of CFA interventions and practical limitations which affect FRVs ability to respond to fire risk in some areas of the Fire District.

This case study explores the costs and benefits of establishing the Latrobe West FRV Fire District. Experiences in Moe provide a useful context from which future decisions regarding FRV Fire Districts can be framed.

Base case and Project option(s)

Two options to manage fire risk in Moe and neighbouring communities were considered at the time of investment:

- Base case: continue CFA operations (do nothing)
- Option 1: establish an FRV Fire District.

No alternative options were considered.

Base case: Continue CFA operations

Economic analysis is generally completed in reference to a counterfactual or prevailing scenario called the base case. The base case reflects what would happen in the absence of different program options for managing fire risk. In this case study, the base case involves continuation of CFA operations in Moe, consisting of a volunteer-only firefighting force.

Option 1: Establish an FRV Fire District

The Victorian Government considered establishment of the Latrobe West FRV Fire District as an alternative to the base case. Establishment of an FRV Fire District involves:

- Establishing a full-time paid fire service including the construction of a new fire station
- Assigning FRV primary responsibility for managing fire risk and the contribution of other fire service agencies within the Fire District

- Relinquishing primary responsibility for servicing fire risk in the Fire District from CFA Brigades. CFA Brigades continue to operate and support FRV to manage fire risk.

Comparison of costs, outcomes and benefits

Table 3 provides a high-level overview of the costs, benefits and disbenefits of establishing the Latrobe West FRV Fire District. The intervention was focused on improving response times and performance standards for the region. This outcome was achieved, however at a significant cost to government. It is likely that some risk reduction benefits were realised due to improved response times, however it is not clear whether these benefits outweigh the costs of investment.

The intervention does not have material effect on fire detection times or prevention and awareness in an urban setting. This means that urban risk reduction benefits are likely to be limited to those related to changes in response times.

The intervention has likely to have a negative effect on fire detection and prevention in a rural setting. Early indications suggest that FRV service delivery is likely to have practical limitations in respect to the capability and capacity requirements to meet the demands of fire in the natural environment and agricultural and rural areas of the Fire District. The intervention also has the potential to result in:

- the loss of CFA interventions to reduce bushfire risk, such as vegetation management, community education and engagement
- unintended outcomes for CFA volunteers in Moe and surrounding communities such as Westbury, Trafalgar and Newborough, leading to the loss of benefits provided by volunteers to themselves, their local community, and the rest of the state
- difficulties dispatching the most appropriate fire agency to a reported incident where Fire District Boundaries cut across and through property boundaries
- a potential reduction in community confidence in fire risk management that is appropriate for the area.

Table 3 Moe case study - summary of costs, benefits and disbenefits of Option 1

	Option 1 – Establishment of an FRV Fire District
Costs	<ul style="list-style-type: none"> Undiscounted cost (2018-2027) - \$49 million Discounted cost (2018-2027) (7 percent discount rate) - \$38 million • Implementation and operation of temporary FRV site • Implementation and operation of permanent FRV site • Continued operation of Moe CFA brigade
Benefits	<ul style="list-style-type: none"> • Avoided residential fire costs due to improved response
Disbenefits	<ul style="list-style-type: none"> • Loss of benefits provided by CFA volunteers <ul style="list-style-type: none"> ○ Personal benefits ○ Social benefits for community ○ Emergency management benefits for the community and the state • Loss of benefits from bushfire planning and preparedness measures undertaken by CFA

Costs

Cost estimates for both the Base case and Option 1 were developed by CFA. Cost estimates for Option 1 are based on CFA’s experience establishing and operating fire stations with career firefighters. Actual FRV costs may vary.

Costs in Option 1 are predominantly associated with establishment and operation of a new FRV fire station. Under the Base case, these costs only include ongoing operations and maintenance costs associated with the existing CFA facility. A summary of included costs for both the Base case and Option 1 are provided in Table 4.

Table 4 Moe case study - cost allowances under the Base case and Option 1

Cost	Description	Estimated timing
Base case		
Operation of Moe CFA brigade	<ul style="list-style-type: none"> • Station maintenance • Appliance maintenance • Ongoing out of pocket costs • Initial firefighter recruitment and training 	2018 onward
Option 1		
Implementation of temporary FRV site	<ul style="list-style-type: none"> • Appliance build and commission • Temporary station build/lease • Initial firefighter recruitment and training 	2018
Operation of temporary FRV site	<ul style="list-style-type: none"> • Temporary station lease • Station maintenance • Appliance maintenance • Ongoing out of pocket costs • Ongoing firefighter staff costs including training 	2019-2022
Implementation of permanent FRV site	<ul style="list-style-type: none"> • Land purchase and station build • Traffic signalling • Out of pocket costs 	2023 onward
Operation of permanent FRV site	<ul style="list-style-type: none"> • Station maintenance • Appliance maintenance • Ongoing out of pocket costs • Ongoing firefighter staff costs including training 	2023 onward

Cost estimates

Based on CFA cost estimates, the costs of Option 1 were higher than costs under the base case. This was primarily due to additional costs associated with establishing an FRV fire station, purchasing new appliances, and hiring and training career firefighters. Figure 15 presents the difference in costs over a 10-year forecast, starting from 2018. Total undiscounted costs from 2018-2027 under Option 1 are estimated at \$49 million.

High costs may be appropriate where improved outcomes and therefore benefits are also realised. However, the benefits of the intervention must exceed its costs and disbenefits to be considered cost effective. An intervention is inefficient if its costs and disbenefits exceed its benefits.

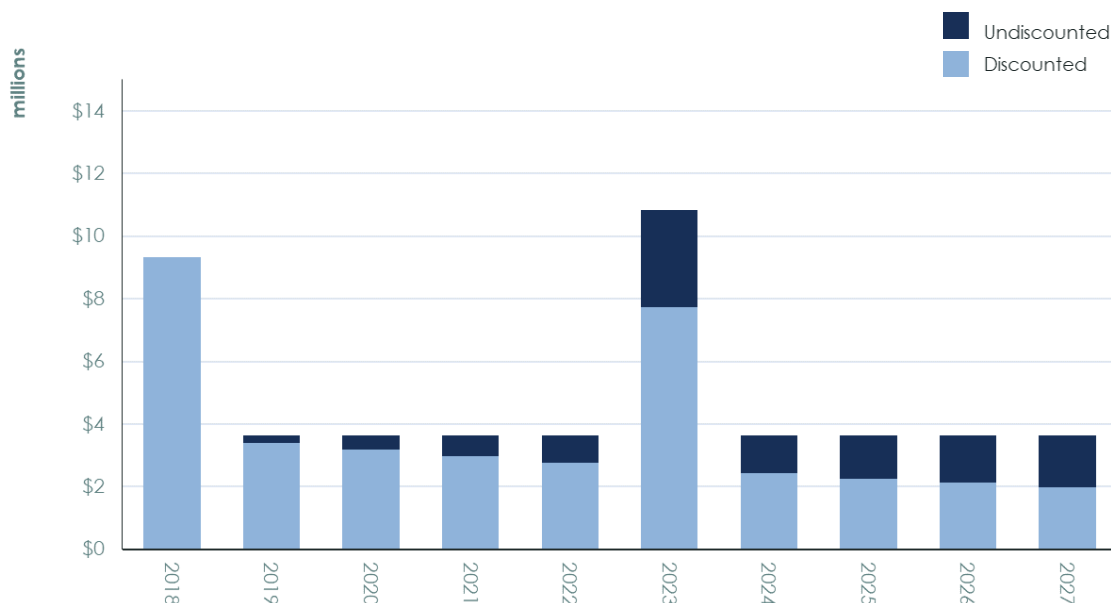


Figure 15 Estimated costs of establishment of an FRV Fire District in Moe

Inefficient solutions to manage fire risk can negatively affect the sustainability of Victoria's emergency management sector. They also limit the funding available to other interventions which may have a higher benefit-cost ratio and therefore provide additional value to the community.

A trend of high-cost operations has been observed more generally across Victoria's Fire Services. Evidence from the Productivity Commission's Report on Government Services (RoGS) demonstrates that Victorian Fire Services have higher costs when compared with other Australian jurisdictions. Box 10 explores this trend in more detail.

Outcomes

Table 5 documents the outcomes that may have been expected under the Base case and those that are have the potential to be realised, if current trends continue, under Option 1.

Table 5 Outcomes under the Base case and Project options in Moe

Actions	Outcomes		
	Prevention and awareness (Likelihood)	Detection and response (Impact)	Volunteerism
Base case			
No new actions	No change	No change	Volunteer base in Moe CFA brigade maintained.
Option 1			
Establish FRV service	Loss of prevention and awareness capability. Planning and preparedness measures undertaken by CFA no longer performed.	Improved response times in most scenarios. Local access restrictions prevent FRV trucks from operating effectively in some areas of the FRV Fire District.	Reduced volunteer engagement and participation.

Benefits and Disbenefits

The benefits of Option 1 are presented below. Reported benefits (or disbenefits) reflect those above and beyond any benefits that may have been reasonably expected to arise under the Base case. As outlined in the outcomes section, these include general improvements to detection and response (benefit), and reduced volunteerism (disbenefit).

Option 1

In general, Option 1 achieves some benefits associated with improved response time. There is uncertainty regarding the expected magnitude of benefits from improving response times. There may be unintended negative consequences of establishing an FRV service model, particularly in relation to bushfire risk.

Detection and response

Transition to an FRV district and establishment of a full-time paid fire service has resulted in more consistent turnout and response times across the region. The previous 90th percentile response times under the CFA operating model between 2017 and 2019 was between 11.5 and 12.5 minutes²¹. Under the FRV service model, the 90th percentile response time has improved to 9.1 minutes²² This has included an increase in the percentage of emergency incidents that meet service delivery standards from around 60 per cent to 88.3 per cent for the region.

Faster response times are often associated with several benefits including reduced property damage and reduced risk of fire related injuries and loss of life. There is some empirical evidence to suggest that improved response times can lead to reduced property damage.

²¹ CFA, 2021. *Emergency response times quarterly updates for the previous years*. <https://www.cfa.vic.gov.au/about-us/publications/emergency-response-times/previous-quarters>

²² FRV, 2021. *Q2 Response Times Code 1*. <https://www.frv.vic.gov.au/sites/default/files/2021-08/2021-21per cent20Q2per cent20Responseper cent20Timesper cent20Codeper cent201per cent20per cent20Table.pdf>

However, there is uncertainty with respect to how detection times contribute to this effectiveness. Perhaps more critically, there is limited empirical evidence that connects improved response times with reduced fire related injuries and death. This does not suggest that there is no relationship, only that the current evidence base is limited and that there may be other factors that are important for achieving these outcomes (e.g., along the trauma chain). Box 7 explores these issues in relation to the current evidence base in greater detail.

Finally, with respect to detection and response, it is also worth acknowledging that despite observable improvements to response times, there are qualitative suggestions that response capability may have decreased under certain discrete scenarios. Specifically, early indications suggest the introduction of an FRV service has affected the fire service operating model across several La Trobe Valley communities. Previously these communities were reliant on their own volunteer CFA service. A critical responsibility of the previous volunteer service was conducting bushfire mitigation and preparedness activities in these regional communities. This is one function that the FRV service model has not replaced. Therefore, while residential fire risk may have decreased, it is possible that bushfire risk in Moe's satellite communities may have increased following implementation of the FRV service model. Overall, this boundary amendment does not appear to have been a proportional change to the shifts observed in the community fire risk profile.

Volunteerism

The establishment of the Latrobe West FRV district resulted in an increasing lack of engagement and loss of morale in Moe CFA brigade. Volunteers provide a range of benefits to themselves, their communities, and the broader state. Loss of volunteer engagement and participation in CFA brigades can lead to:

- A loss of personal value from volunteerism. This includes mental and physical health benefits for volunteers as well as human capital benefits arising from upskilling opportunities.
- A loss of community value. Volunteerism provides individual volunteers an opportunity to connect with their broader community.
- A loss of emergency management capability and capacity, including surge capacity for large fires and campaign fire seasons.

The 3Vs Final Report: Uncovering the Hidden Value outlines the value generated by Victoria's emergency management volunteers, volunteering and volunteerism (the 3Vs). The three layers of value include volunteer personal value, emergency management value, and community strengthening value. Together, Victoria's emergency volunteers provide \$2 billion to \$2.6 billion (2021 AUD) per year in social and economic benefits for themselves, their community, and the state of Victoria.

Valuation methods and estimates for aggregate volunteer benefits in the 3Vs report can be used to estimate total annual benefits provided by CFA volunteers (Table).

Table 6 Annual benefits provided by CFA volunteers

Benefit	Total annual benefits from CFA volunteers
Volunteer personal value ²³	\$101 million
Community strengthening value ²⁴	\$519 million
Emergency management value ²⁵	\$847 million to \$1.5 billion
Total	\$1.5 billion to \$2.1 billion

Source CFA 2020.

Economic case study: Cardinia

Key messages

This case study explores the costs, outcomes and benefits of three options to manage fire risk across the communities of Cardinia, Clyde, Clyde North and Officer South. These options are:

- Option 1: improve fire response by establishing an FRV Fire District
- Option 2: improve fire response by increasing CFA capacity and capability
- Option 2: improve fire detection, prevention and response under a CFA fire service model

A key outcome of Option 1 and Option 2 would be a reduction in response times to residential fires. However, the actions undertaken to achieve this outcome differ between the options. Option 3 includes interventions such as sprinkler and smoke alarm installation which would improve fire detection time, fire prevention and community awareness of fire risks. Similar to Option 2, Option 3 includes interventions to build CFA's response capacity and capability in the region.

Option 1 would result in higher costs to government than Option 2 and Option 3. Qualitative analysis suggests that Option 2 and Option 3 would be likely to provide benefits at a more cost effective rate than Option 1. CFA can improve response times at a more cost effective rate than FRV, due to differences in costs to establish and maintain volunteer and career firefighting forces.

Option 3 is likely to be the most desirable option. Targeted interventions which improve fire prevention and detection can be more cost effective than interventions to improve response times. Consideration of a range of interventions across the trauma chain allows fire agencies to develop an optimal mix of interventions which protect life and property at the most cost

²³ Based on total volunteer personal value from 3Vs report and CFA volunteer count of 54,186. Assumes that volunteer personal value scales linearly with number of volunteers.

²⁴ Based on total community strengthening value from 3Vs report. Assumes that community strengthening value scales linearly with volunteer hours. Assumes 9.9 million CFA volunteer hours annually based on recorded hours and estimates of non-recorded hours from CFA brigades and groups.

²⁵ Based on total emergency management value from 3Vs report and CFA volunteer count of 54,186. Assumes that emergency management value scales linearly with number of volunteers.

effective rate.

The Cardinia case study demonstrates that:

- The current approach to Fire District Review may overlook alternative investment options which provide more efficient and effective solutions for managing fire risk. The FDRP should consider a broader range of options to manage fire risk in their decision-making process.
- Fire risk outcomes can be significantly affected by factors independent of fire service response time, such as fire prevention, detection and awareness. These factors should be given sufficient weight in the Fire District Review decision-making process.
- Changes to fire service models can have a broad range of costs, outcomes, and benefits. All costs and benefits of a change in fire service models should be considered in the Fire District Review decision-making process.

Background to case study

Cardinia is a Victorian town with a population of around 400 which is located on the south-eastern fringes of Greater Melbourne. Cardinia is bordered by the Clyde and Clyde North localities, which have experienced significant growth since 2011 (Table). Cardinia is expected to experience continued growth over the next 10 years due to new property and infrastructure developments in the region.

Table 7 Population of Cardinia and surrounding localities from 2011 to 2016

Locality	Population 2011	Population 2016
Clyde North	196	7,953
Officer South	81	75
Cardinia	372	374
Clyde	860	2,133

CFA currently has primary responsibility for servicing Cardinia, Clyde North, Clyde, and Officer South. These localities are serviced by 6 CFA brigades. These sites are likely to be a focus area for the Fire District Review due to increasing fire risk associated with urban population growth. It is possible that an FRV Fire District will be established upon completion of the Fire District Review to ensure that service delivery standards can continue to be met across the region.

Base case and Project option(s)

Based on the FDRP's approach to the Fire District Review, it is likely that the FDRP will consider two options to manage fire risk in Cardinia and surrounding localities:

- Base case: continue CFA operations (do nothing)
- Option 1: establish an FRV Fire District.

For the purposes of this case study, two alternative options are assessed against Option 1 and the Base case:

- Option 2: improve response capacity and capability under a CFA service model
- Option 3: improve fire prevention, detection and response under a CFA service model

Base case: continue CFA operations

In this case study, the base case involves continuing operations in the Clyde CFA Brigade, consisting of a volunteer-only firefighting force. The CFA brigade is supported by 5 surrounding CFA Brigades and 2 surrounding FRV fire stations.

Option 1: Establish an FRV Fire District

The FDRP is likely to consider the establishment of an FRV Fire District across Cardinia, Clyde, Clyde North and Officer South as an alternative to the base case. Establishment of an FRV Fire District involves:

- Establishing a full-time paid fire service including the construction of a new fire station
- Assigning FRV primary responsibility for managing fire risk and the contribution of other fire services within the Fire District
- Relinquishing primary responsibility for servicing fire risk in the Fire District from CFA Brigades. CFA Brigades continue to operate and support FRV to manage fire risk.

Option 2: Improve response capacity and capability under a CFA service model

Option 2 allows for a more gradual transition from a volunteer service model under CFA to a career fire firefighter service model under FRV. This is enabled by additional assets, infrastructure and volunteers which allow CFA to improve response times and meet SDS standards further into the future. It is likely that CFA would be able to improve response times at a more cost effective rate than would be possible under an FRV service model.

As population growth in Cardinia and surrounding communities continues, it is likely that an FRV Fire District would eventually be required due to the practical limitations of a volunteer fire service model. Volunteer brigades' ability to respond to regular daily call outs can be limited due to variability in volunteer availability across days, weeks, and seasons. This is only a significant issue in large towns and cities with high daily churn.

Option 3: Improve fire prevention, detection and response under a CFA service model

Option 3 combines response interventions in Option 2 with additional interventions which manage fire risk through improvements to fire prevention, detection and community awareness.

Option 3 is intended to demonstrate the effectiveness and efficiency of a mix of interventions which are community-specific and target multiple points along the trauma chain. Four key interventions are considered under Option 3:

- Installation and maintenance of residential smoke alarms
- Community education for fire prevention and awareness

- Sprinkler installation in homes with vulnerable residents
- Improved CFA capacity and capability for turn out and response.

In practice, it is likely that Option 3 would also include other planning and preparedness measures to manage fire risk. For example, CFA may undertake vegetation management and land use planning to reduce bushfire risk. For the purposes of this case study, only the interventions listed above are considered.

Comparison of costs, outcomes and benefits

The costs, outcomes and benefits of Option 1, Option 2 and Option 3 are compared relative to the base case.

Option 1 and Option 2 focus on improvements in response times and do not affect detection, prevention and awareness. Option 1 may also result in a lack of volunteer engagement in the region as FRV takes primary responsibility for servicing fire risk.

Option 2 and Option 3 are likely to improve response times at a more cost effective rate than Option 1. Growth and maintenance of CFA’s volunteer base in Option 2 and Option 3 will also result in other social benefits for volunteers and their communities.

Figure 16 provides an overview of the outcomes affected by Option 3. In contrast to Option 1 and Option 2, Option 3 targets a wide range of outcomes which affect fire risk, including fire prevention, awareness, detection and response.

Table provides an overview of costs, benefits and disbenefits under each option.

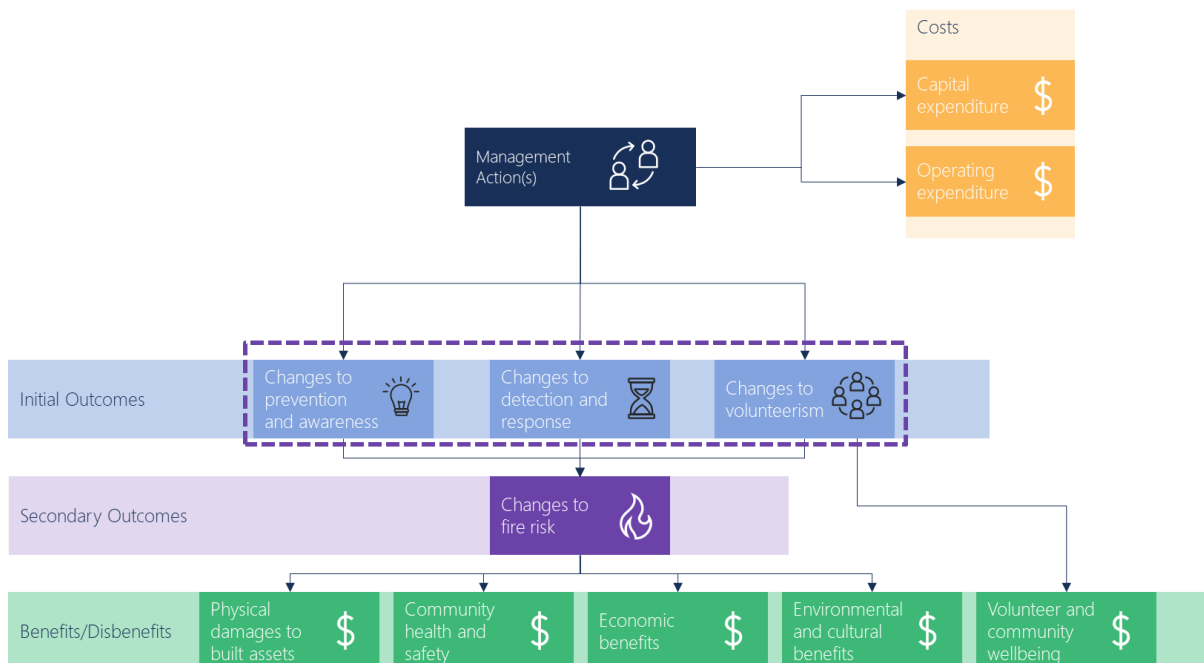


Figure 16 Cardinia case study - cost-benefit analysis concept map for Option 3

Table 8 Cardinia case study - summary of costs and benefits for Option 1, Option 2 and Option 3

	Option 1 – Establish an FRV Fire District	Option 2 – Improve response under a CFA service model	Option 3 – Improve prevention, detection and response under a CFA service model
Costs			
Undiscounted	\$45 million	\$6 million	\$20 million
Discounted (7 per cent discount rate)	\$27 million	\$3 million	\$13 million
Benefits			
Avoided or reduced property damage	Medium	Low/Medium	High
Avoided injury and loss of life	Low	Low	High
Volunteer benefits (social)	Benefits lost relative to base case	Medium	High
Volunteer benefits (emergency management)	Benefits lost relative to base case	High	High

Costs

Costs in Option 1 are predominantly associated with establishment and operation of a new FRV fire station within the new FRV Fire District. Costs in Option 2 are associated with new assets, infrastructure and volunteers to improve CFA’s response capability in Cardinia and surrounding localities. Costs in Option 3 include all costs present in Option 2 as well as planning and preparedness measures for residential fire risks.

Under the Base case, costs only include ongoing operations and maintenance costs associated with the Clyde CFA brigade. A summary of included costs for the base case, Option 1, Option 2 and Option 3 are provided in **Table 9**.

Table 9 Cardinia Case Study - cost allowances under the Base case and Project options

Cost	Description	Estimated timing
Base case		
Operation of Clyde and Officer CFA brigades	<ul style="list-style-type: none"> • Station maintenance • Appliance maintenance • Ongoing out of pocket costs 	2021 onward

Cost	Description	Estimated timing
	<ul style="list-style-type: none"> Recruitment of additional volunteers Training, PPC and equipment for additional volunteers 	
Option 1		
Implementation of permanent FRV site	<ul style="list-style-type: none"> Land purchase Station build and fit out Appliance build and commission Initial firefighter recruitment and training 	2026
Operation of permanent FRV site	<ul style="list-style-type: none"> Station maintenance Appliance maintenance Ongoing out of pocket costs Ongoing firefighter staff costs including training 	2026-2034
Option 2		
Implementation of satellite CFA site	<ul style="list-style-type: none"> Appliance build and commission Temporary station build/lease Initial firefighter recruitment and training 	2026
Operation of satellite CFA site	<ul style="list-style-type: none"> Temporary station lease Station maintenance Appliance maintenance Ongoing out of pocket costs Ongoing firefighter staff costs including training 	2026-2030
Implementation of permanent CFA site in Cardinia	<ul style="list-style-type: none"> Land purchase Station build and fit out Appliance build and commission Initial firefighter recruitment and training 	2030
Operation of permanent CFA site in Cardinia	<ul style="list-style-type: none"> Station maintenance Appliance maintenance Ongoing out of pocket costs Ongoing firefighter staff costs including training 	2030-2034
Option 3		
Option 2 costs	See above	See above
CFA planning and preparedness costs	<ul style="list-style-type: none"> Installation and maintenance of additional smoke alarms Installation and maintenance of sprinklers in new homes Education program costs 	2025-2034

Cost Estimates

Total estimated costs for Option 1, Option 2 and Option 3 relative to the base case are presented in Figure 17. These costs are rough estimates and are intended to demonstrate potential cost differences between options in a hypothetical scenario.

Total undiscounted costs for Option 1, Option 2 and Option 3 are estimated at \$45 million, \$6 million and \$20 million respectively. In present value terms, Option 1 costs \$24 million more than Option 2 and \$15 million more than Option 3.

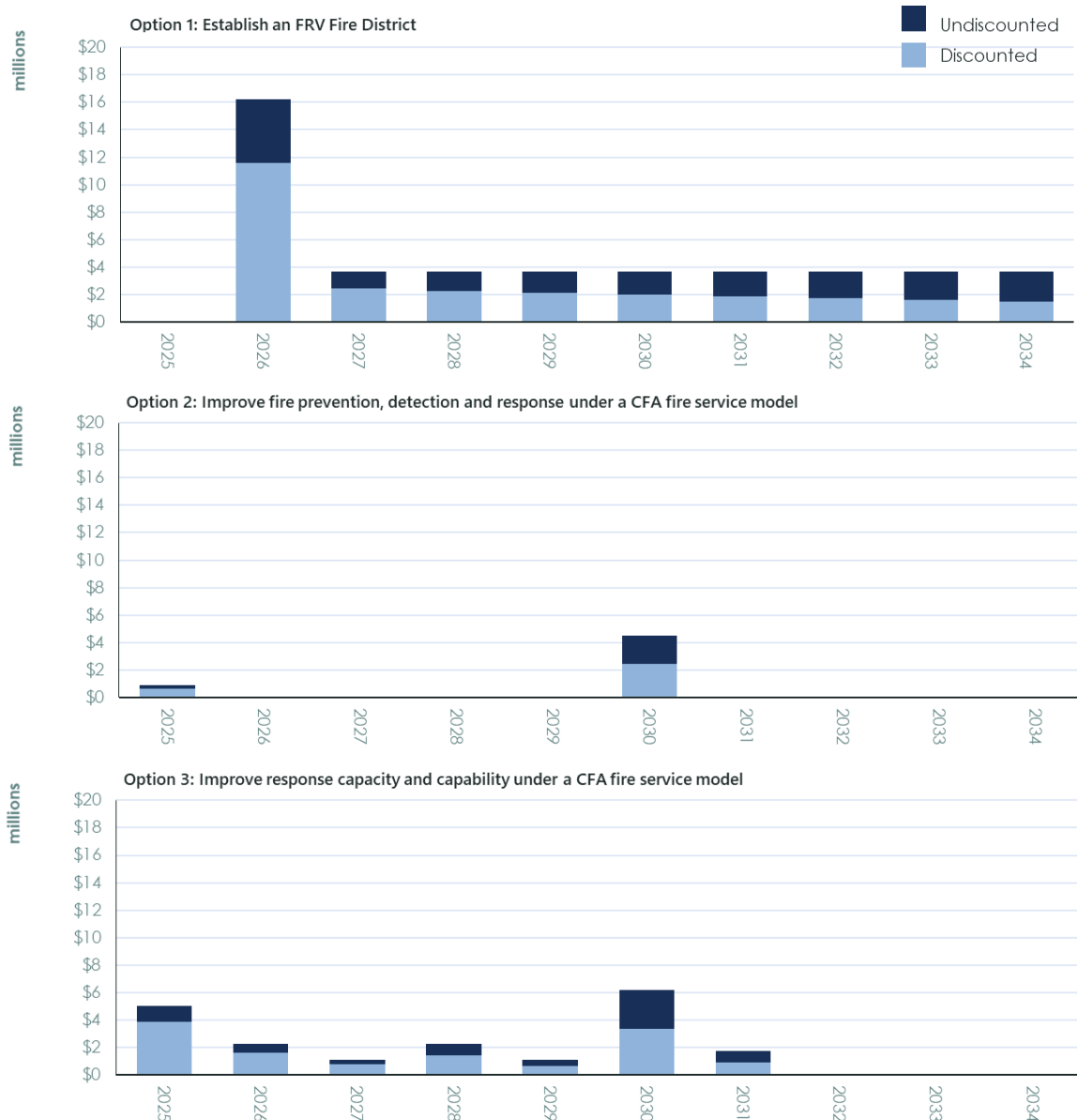


Figure 17 Cardinia case study – cost per year of Option 1, Option 2 and Option 3

The higher cost of Option 1 may be warranted if Option 1 provides more benefits than costs and achieves desired risk outcomes. However, Option 3 is likely to achieve desired risk outcomes and provide more benefits per dollar spent than Option 1. This is due to Option 3's focus on improving a number of factors which affect fire risk, rather than a singular focus on turnout and response times.

FRV costs in Option 1 were estimated by CFA and are based on CFA’s previous experience establishing and operating fire stations for career firefighters. Actual FRV costs are likely to vary from presented estimates.

Costs for planning and preparedness interventions in Option 3 were modelled based on the assumptions outline below.

Population growth

The number of households in the region is assumed to grow from 3,844 to 17,844 by 2031. A number of new Precinct Structure Plans (PSPs) are currently under development to the West and North of the township Cardinia. These PSPs will introduce and remove several new Risk Environments with an increase the Residential Risk Environment. It is also assumed that further growth will occur through future PSPs. **Table** details growth assumptions used for the case study.

Table 10 Cardinia case study - assumed household growth from 2025 to 2031

Year	Total number of new households
2025	1,400
2026	4,200
2027	5,600
2028	8,402
2029	9,800
2030	11,900
2031	14,000

Intervention coverage and costs




- Sprinkler systems are assumed to be fitted in 10 per cent of households in the region. Sprinkler system costs are assumed to be \$7,107 per household. this is based on a cost per square metre of \$30.90²⁶ and an average house size of around 230m².
- The remaining 90 per cent of households in the region are engaged by CFA and are offered free maintenance for existing fire alarms as well as installation of additional smoke alarms in their homes. The cost of engagement is assumed to be \$93 per household, based on the cost per engagement of similar CFA programs in other regions. It is assumed that each household targeted for engagement is visited once across the appraisal period (2025 to 2034).
- 25 per cent of households participate in a community education program for fire prevention and detection. The cost of community education is assumed to be \$13 per participating household, based on a total cost per program of \$450 and average participation of 35 households per program.

²⁶ \$30.90/m² is the midpoint of the cost of sprinkler standards FPAA101D (\$20/m²) and AS 2118.1/AS 2118.4 (\$41.80/m²).

Outcomes

Table documents expected outcomes under the Base case, Option 1, Option 2 and Option 3.

Table 11 Potential outcomes under the Base case and Project options in Cardinia

Actions	Outcomes		
	Prevention and awareness (Likelihood) 	Detection and response (Impact) 	Volunteerism 
Base case			
No new actions	No change	Response performance likely to deteriorate due to increased demand	No change
Option 1			
Establish FRV service	No change	Improved response	Reduced volunteer engagement and participation
Option 2			
Expand CFA response capability	No change	Improved response	Improved volunteer engagement and participation
Option 3			
Expand CFA response capability	No change	Improved response	Improved volunteer engagement and participation
Install residential sprinklers	Improved prevention	Improved detection	No change
Install residential smoke alarms	No change	Improved detection	No change
Community education	Improved prevention and awareness	Improved detection and occupant safety	Improved social connection

The expected benefits of Option 1, 2 and 3 are presented below. In contrast to Case Study 1 where benefits were based on known outcomes, benefits reflect likely or expected outcomes (ex-ante). Reported benefits (or disbenefits) for each option reflect those above and beyond expected benefits under the Base case. Specific benefits vary by option.

Option 1

In general, Option 1 is expected to achieve the same benefits as in the Moe case study, namely those associated with improved response time. There is uncertainty regarding the expected magnitude of benefits from improving response times.

Detection and response

Establishing an FRV district is likely to improve response times and performance against

service delivery standards in relation to the Base case. This may have several benefits including reduced property damage, reduced risk of fire related injuries and reduced loss of life. As outlined in Box 11, a strong causal relationship between response times and these benefits is not yet established. It is probable that improved response times may reduce property related damages, however the effect on fire related injuries and death is less clear. A key area of uncertainty regarding the effectiveness of response times is the uncertainty with respect to detection times. A more detailed analysis should attempt to rigorously quantify these potential effects.

Finally, there may be unintended negative consequences of establishing an FRV service model, particularly in relation to bushfire risk. These disbenefits are most likely to arise in small regional areas that are actively managing their bushfire risk under an existing CFA volunteer model. Some of the negative effects reported in the Moe case study may be avoided with a greater emphasis placed on the specific approach to implementation.

Volunteerism

In line observations in the Moe Case Study, the establishment an FRV district may result in decreased engagement and a loss of morale for local CFA brigades. Volunteers provide a range of benefits to themselves, their communities, and the broader state. A reduced number of CFA volunteers is likely to result in:

- A loss of personal value from volunteerism. This includes mental and physical health benefits for volunteers as well as human capital benefits arising from upskilling opportunities.
- A loss of community value. Volunteerism provides individual volunteers an opportunity to connect with their broader community.
- A loss of emergency management capability and capacity, including surge capacity for large fires and campaign fire seasons.

Option 2

Option 2 will result in benefits associated with improved response times. It is likely that these benefits will not be as large as risk reduction benefits in Option 1 due to the practical limitations of a volunteer-only service model. However, it is likely that Option 2 will provide more benefits per dollar spent than Option 1. This is because:

- A volunteer-only service model can provide many of the same risk reduction benefits as a career firefighter service model at a much lower cost.
- Growth of CFA's volunteer base in the region would result in social benefits for new volunteers and community, as well as risk reduction benefits due to increased surge capacity for large fires and campaign fire seasons.
- Planning and preparedness measures undertaken by CFA would not be affected under Option 2, in contrast to the loss of these measures in Option 1.

Option 3

Option 3 would result in benefits relating to improved response which are likely to be roughly

equivalent to benefits in Option 2. Option 3 would also result in additional risk reduction benefits relating to improved fire prevention, detection, and community awareness. There is strong empirical evidence to suggest the installation and maintenance of effective smoke alarm and sprinklers systems may achieve significant benefits in terms of reduced fire risk relative to their costs. These actions may also achieve important secondary benefits in terms of reduced injuries, and therefore increased availability of fire service workers.

Prevention and awareness

The expected benefits of combined prevention and awareness actions under Option 3 include avoided costs of property damage, reduced risk of fire injury, reduced loss of life, and reduced resources required for response. The extended CFA option includes prevention and awareness actions that are focused on reducing fire risk along the trauma chain. Specific actions considered in this case study include installing residential sprinklers and community education and outreach programs.

Sprinklers have been used to effectively manage fire risk in public and commercial settings for several decades. Contemporary research conducted by the United States (US) National Fire Protection Association (NFPA) finds that residential sprinklers can greatly reduce loss of life and property from fire. These findings are explored in Box 13.

The installation of sprinklers is complemented with community education programs. These programs support and encourage community members to adopt behaviours that reduce the likelihood and consequence of fire. For example, this could include programs that encourage and raise awareness around discrete household actions such how to check and replace smoke alarm batteries. While there is limited empirical evidence to connect such programs to reduced fire risk, reports from fire service members suggest routine community engagement encourages behaviour that is known to lead to reduced fire risk. A more detailed analysis should attempt to understand these effects.

Box 13: The effectiveness of sprinklers for managing fire risk

In 2017, the NFPA conducted a statistical review of the presence and performance of sprinklers based on historical data for nearly 500,000 reported fires in the US between 2010 and 2014. Despite reflecting a slightly different geography, the study represents one of the more comprehensive and statistically robust reviews of sprinklers and their relationship to fire risk.

In general, the presence of sprinklers was correlated with a significant reduction in the loss of life and property from fire. Their effect was most strongly observed in the reduction of civilian fire deaths to 0.8 per 1,000 fires compared to 6.3 per 1,000 fire events for fire events with no sprinkler (top left of Figure 18). The presence of sprinklers was also associated with notable reductions in injury rates, and for most dwellings, property loss per fire. Of note is the significant reduction in firefighter injuries (bottom left of Figure 18). Reduced firefighter injuries means a greater number of firefighters are available to fight fires. This implies that the presence of sprinklers (or lack thereof) may have secondary effects for a fire services ability to manage fire risk.

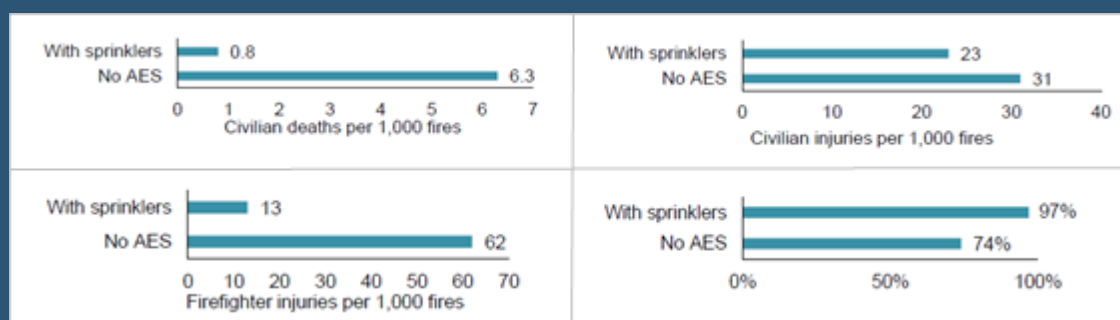


Figure 18 Deaths (top-left), injuries (top-right), firefighter injuries (bottom-left), contained to room of origin (bottom-right) with/without sprinklers per thousand structure fires 2010-2014

Source: NFPA, 2017

Sprinklers are expensive relative to other planning and preparedness interventions. For new residential homes, the cost of a residential sprinkler system can range from around \$4,600 to \$9,600 (AUD) for an average sized home of 230m². Despite this, they can be an effective intervention when targeted toward vulnerable community members who have a high fire fatality risk.

Detection and response

CFA is likely to be able to maintain service delivery standards relating to turn out and response times at a more cost-effective rate than FRV. Additionally, installation and maintenance of smoke alarms supported by CFA intervention will reduce average fire detection time for the community, resulting in significant reductions in expected property damage, injuries, and loss of life.

Previous examples such as Wyndham Vale, Berwick and Eynesbury have shown that CFA can develop and maintain an active volunteer base in rapidly growing communities. Combined with additional stations and appliances, it is likely that CFA would be able to maintain service delivery standards. This would provide risk reduction benefits (primarily through reductions in property damage) at a more cost-effective rate than an FRV model. A key limitation of a volunteer model is the variable availability of volunteer firefighters. Many

CFA volunteers have jobs outside volunteer duties, reducing the availability of volunteers to respond to call outs during work hours. In larger communities where residential fires occur more often, this can result in poor turn out and response times or failure to respond to calls.

To support their capability to effectively respond to fires, CFA would actively support the ongoing maintenance of smoke alarm systems. This could include installation of smoke alarms in additional rooms and maintenance/battery replacements for existing alarms.

There is a mature evidence base that supports the effectiveness of operating smoke alarms. However, smoke alarms are often not well-maintained rendering them ineffective. While the base case will likely include the widespread installation of smoke alarms associated with new housing, ensuring these smoke alarms continue to operate effectively represents a cost-effective way for CFA to manage fire risk. Smoke alarms and their effectiveness for managing fire risk is explored further in Box 14.

Box 14: The effectiveness of smoke alarms for managing fire risk

In February of 2021, the NFPA released a research report that documented findings from a statistical review of the presence and performance of smoke alarms. The review draws on historical data for roughly 350,000 reported home structure fires in the US between 2014 and 2018.

The review found that the death rate per 1,000 home structure fires was 55 per cent lower in homes that had a working smoke alarm than in homes with no smoke alarm, or a smoke alarm that failed to operate (Figure 19).

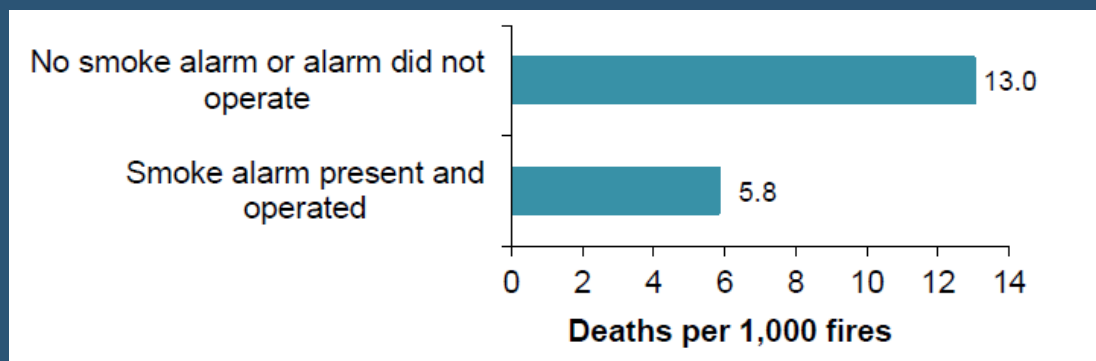


Figure 19 Deaths with/without working smoke alarms per thousand structure fires 2014-2018

Source: NFPA, 2021

A number of cost-benefit analyses undertaken on smoke alarm installation programs in the US support the notion that smoke alarm installation programs can be cost effective. For example, The Injury Prevention Center of Greater Dallas (2017) find that an ongoing smoke alarm installation program in Dallas, Texas resulted in \$3.21 (US dollars) in health benefits for every dollar spent²⁷.

There is some evidence that smoke alarm installation interventions can be inefficient if they are not properly targeted. For example, the Australian Building Codes Board found that options to legislate additional smoke alarms in newly construction homes

²⁷ Source: Injury Prevention Center of Greater Dallas (2017). Preventing Deaths and Injuries from House Fires: A Cost-Benefit Analysis of a Community-based Smoke Alarm Installation Program.

(in addition to existing requirements in the National Construction Code) would result in significant net costs to Australia²⁸. This finding highlights the importance of targeting risk reduction interventions to suit community-specific problems and needs. Community-based smoke alarm installation programs such as the intervention proposed in Option 3 are flexible and able to effectively target high risk households.

Volunteerism

Finally, the ongoing presence of a CFA brigade under an increasing population will mean that the volunteer base in Cardinia and Clyde is likely to increase under Option 3. Volunteers provide a range of benefits to themselves, their communities, and the broader state. An increased number of CFA volunteers in Cardinia is likely to result in personal value to volunteers, social benefits for communities, and risk reduction benefits due to increased surge capacity for large fires and campaign fire seasons.

²⁸ Source: Australian Building Codes Board (2012). Assessment of options for residential smoke alarm provisions in the National Construction Code.