

Issues Paper: Nature and its Risks

Kinglake Ranges, Flowerdale and Toolangi Plan and Design Framework



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Prepared for

Victorian Bushfire Reconstruction and Recovery Authority [VBRR]

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1.0 Introduction

This issues paper addresses the theme of Nature and its Risks which encompasses all the inherent natural risks in living in the Kinglake Ranges, Flowerdale and Toolangi area, which contains and is surrounded by forests and much of which comprises steep terrain. These risks include but are not limited to fire, flood, landslip and storm events.

The risk profile of different locations within the study area is becoming better known through various studies that are or will be undertaken in the near future including:

- A flood study along the King Parrot Creek to better understand flood risks affecting the localities of Flowerdale and Hazeldene (currently being undertaken by the Goulburn Broken Catchment Management Authority)
- Fire Management Planning being undertaken by the Department of Sustainability and Environment for all public land (includes Kinglake National Park and State Forests within the study area)
- The Victorian Fire Risk Register (VFRR), recently completed for the Shire of Murrindindi, has been prepared by the CFA in collaboration with relevant stakeholders. The VFRR is a living document that will be regularly reviewed and identifies assets in the study area and priorities for risk mitigation
- A review is currently underway of the application of the Wildfire Management Overlay in the study area. Fire risk mapping being prepared by the CFA will be based on current remote sensing technology and will improve our understanding of risk profiles within the study area
- Wholesale changes are expected to the way in which the planning and building approvals systems manage fire risk following the findings and recommendations of the 2009 Victorian Bushfires Royal Commission.

Most residents who have attended community consultation meetings with the project team since June 2010 have expressed a strong desire to retain the bushland rural setting and environmental values of the study area, while acknowledging but also seeking to reduce the risks that come with living in such a setting.

This issues paper provides a summary of what has been learnt to date from discussions with relevant government agencies and the community and from a review of relevant background report and studies. The CFA is the lead agency for the management of fires on private land and is a largely volunteer force. There are brigades based in Kinglake, Kinglake West, Flowerdale and Toolangi manned by volunteers. The State Emergency Service (SES) is the lead agency in responding to floods, storms and earthquakes and also provides road rescue services. A SES unit manned by volunteers is based in Kinglake. The Department of Sustainability and Environment is the lead agency for the management of wildfire and the management of fuel loads on public land.

The Murrindindi Shire Council has a key role in emergency management. Local government plays a key role not only in supporting recovery activities but also in planning and preparing for emergencies and in undertaking activities to mitigate the impacts of emergencies. Key roles for the Murrindindi Shire Council include its functions as a planning authority, its role in preparing a Municipal Fire Management Plan, the Victorian Fire Risk Register, Township Protection Plans for settlements and in designating Neighbourhood Safer Places.

The final report of the 2009 Victorian Bushfires Royal Commission was released on 31 July 2010 and makes numerous recommendations relating to fire risk management within Victoria and the study area. The Victorian Government has responded by adopting the vast majority of the recommendations of the Royal Commission.

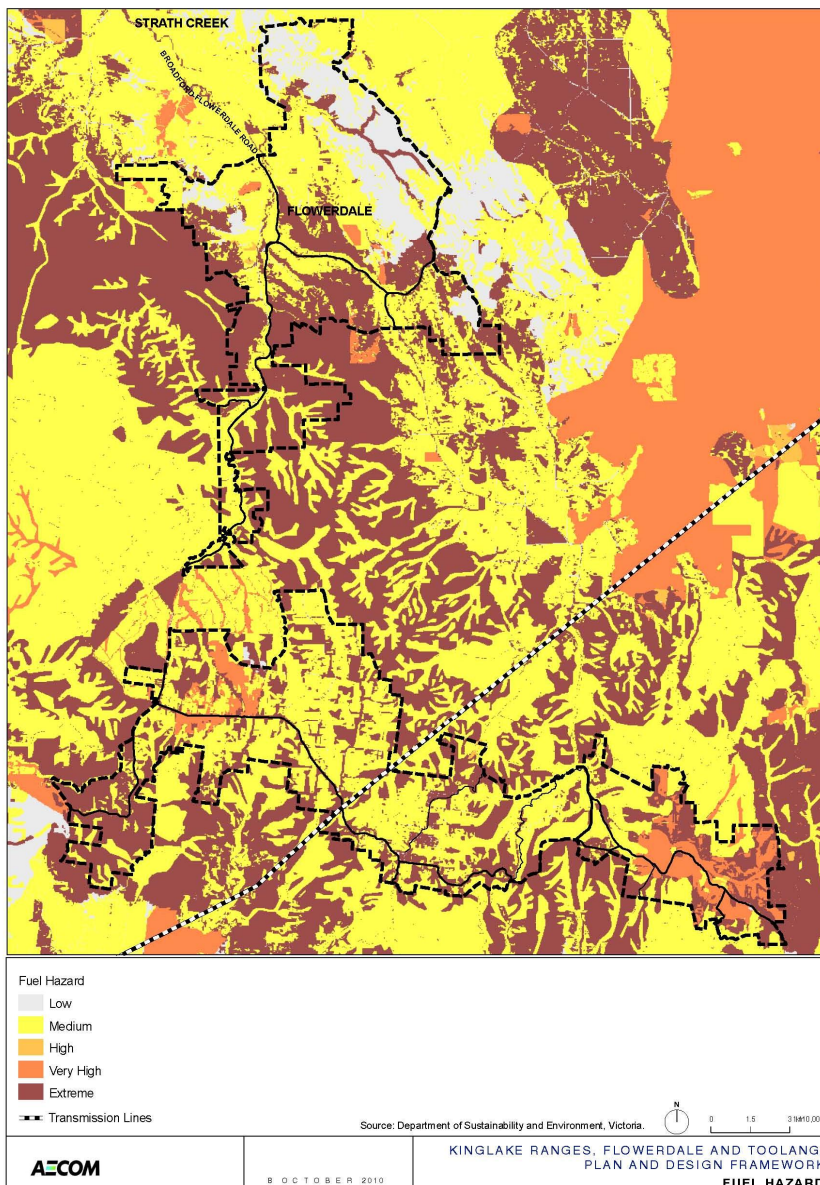
The issues paper documents the existing conditions of the study area and identifies the relevant and current policy context for planning for natural risks. A SWOT analysis is provided along with the identification of issues to be further considered in the following stages of the preparation of the Kinglake Ranges, Flowerdale and Toolangi Plan and Design Framework.

2.0 Existing Conditions

The study area encompasses a broad range of landforms, from the mountain range on which the Kinglake Ranges and Toolangi localities are located, to the northern slopes of the Great Dividing Range and narrow valleys of the localities of Castella, Flowerdale and Hazeldene. The risk profile varies considerably within the study area as would be expected given the diverse landform. However mapping of the risk profile is currently limited.

Fire risk mapping is currently being undertaken by the CFA and is likely to provide important information regarding fire risk within the study area. Fuel hazard mapping has been undertaken by the Department of Sustainability and Environment for the study area and is shown in Figure 1. This mapping, identifies area of extreme and very high fuel hazard within the study area and areas of medium fire risk which includes much of the farming areas within the study area. The location of high voltage transmissions lines is also shown on this map.

Figure 1: Fuel Hazard within the study area



The risk mapping exercise will lead to changes to the application of the Wildfire Management Overlay in the Murrindindi Planning Scheme which the 2009 Victorian Bushfires Royal Commission found had not been applied in a strategic manner.

Areas prone to flooding along the King Parrot Creek are identified in the Murrindindi Planning Scheme through overlays, with a study currently underway to review the flood risk along this waterway.

In relation to other natural risks such as storm events leading to damage to buildings and the felling of trees, parts of the study area are located along exposed ridge lines and much of the study area is located along a ridgeline that forms part of the Great Dividing Range. The State Emergency Service has advised that the Kinglake Ranges has the highest incidence of storm damage within the Hume Region.

The steeper areas of the study area, including around Flowerdale, Hazeldene and the southern slopes of the Kinglake Ranges are susceptible to landslip and erosion. These risks have increased following the February 2009 fire and have required considerable landslip risk mitigation along such roads as the Kinglake - Heidelberg Road which connects the Kinglake Ranges with St Andrews and the Diamond Valley area.

The February 2009 fires have burnt the vast majority of the public forests surrounding the study area, including 98% of the Kinglake National Park, however there are pockets of unburnt forest and private land within the study area including within Toolangi and within farming areas in Kinglake. The risk of a fire event in the short term is diminished following this fire, however this risk will increase over time as the forest regenerates. It also remains in areas that the fires did not burn.

The Murrindindi Planning Scheme provides some information regarding the known areas of specific risks from natural processes such as fire risk, landslip risk and flooding risks through the application of overlays. The following environmental overlays have been applied within the study area to identify areas of particular risk:

- Land Subject to Inundation Overlay – Flowerdale locality along the King Parrot Creek
- Floodway Overlay – Flowerdale & Hazeldene along the King Parrot Creek
- Erosion Management Overlay – Flowerdale & Hazeldene
- Wildfire Management Overlay – applied intermittently throughout the study area.

However, it should be noted that the application of these overlays should not be taken as reflecting a comprehensive risk profile. For example the Wildfire Management Overlay has been applied intermittently within the study area despite the steep topography and heavily forested public and private land that abuts many of the townships (Refer to Figure 3).

Climate Change

The impacts of climate change will need to be considered when planning for the future of the study area, with the potential for more extreme weather events. Climate change is likely to alter the profile of existing natural risks increasing their frequency and/or magnitude. Climate projections for Victoria, prepared by the CSIRO in 2007, indicate that the future climate of south-eastern Australia will generally be characterised by the following which are of direct relevance to this study area:

- an increase in both rainfall intensity and the number of dry days, leading to longer dry spells interrupted by heavier rainfall events
- increased average temperatures
- an increase in the frequency of hot days and warm nights, and a decrease in the frequency of cold nights
- more frequent extreme fire danger days
- El Niño events becoming drier and La Niña events becoming wetter.

Even small changes in annual and seasonal temperature and rainfall conditions can be associated with large changes in extreme weather events, such as heatwaves, storms, stronger winds, flooding and higher intensity rainfall. In the shorter term, the 2007 research by the CSIRO found that the impacts of these extreme events are potentially of greater significance than changes in average conditions.

Climatic changes projected for the peri-urban region of Melbourne, which includes the study area, identified by the CSIRO for Victoria's DSE in 2008, indicate that the northern parts of the peri-urban region are likely to experience the most significant changes in climate. Table 1 provides a high level summary of the risks posed by changes in climate variables.

Table 1: Examples of risks posed by changes in key climate variables.

Climate Variable	Impacts
Average Temperature Increase	<ul style="list-style-type: none"> • Adverse impacts on biodiversity, including reduced habitat area (i.e. alpine species due to rising snowline) • Potential productivity losses in the agriculture sector • Increased maintenance costs of infrastructure (bridges, roads, pavements) as materials need to be replaced more often and / or with more resilient materials
Extreme Temperature Increase and Heatwaves	<ul style="list-style-type: none"> • Strains on the health system due to increase in heat related illness and death • Increased frequency and length of power blackouts due to increased power demand and stresses on distribution infrastructure • Increased risk of bushfires
Reduced Average Rainfall and Drought	<ul style="list-style-type: none"> • Reduced availability and quality of water supply for residential and commercial use (e.g. agriculture, snow making) • Increased cost of maintenance of public green spaces, parks and playing

Climate Variable	Impacts
	<p>fields in settlements</p> <ul style="list-style-type: none"> • Damage to infrastructure foundations and buried assets due to ground movement as a result of drying soils and changed soil composition
<p>Increased Rainfall Intensity and Flash Flooding</p>	<ul style="list-style-type: none"> • Increased residential, community and commercial property damage and insurance costs due to flooding • Increase in operating costs for councils and businesses to cover clean up and resident support • Tourism losses due to inability to provide service, safe access or attract visitors
<p>Increased Extreme Wind Speeds and Storm Intensity</p>	<ul style="list-style-type: none"> • Disruption of essential services (power or telecommunications) due to high winds and unsecured debris • Increase in storm related injuries and death due to windblown debris • Inadequate emergency management provisions causing increased damage, injury or death

3.0 Policy Context

Planning Policy Context

The *Planning and Environment Act 1987* provides the legislative framework for the planning system within Victoria. Section 4 of this legislation identifies the objectives of planning in Victoria which include:

(b) To provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity.

(c) To secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria.

The *Planning and Environment Act 1987* provides for the preparation of planning schemes to manage land use and development in a standard format known as the Victoria Planning Provisions. It should be noted that the planning system is only able to control new land use and development. Other means are required to provide for enforcement of risk management measures around existing land uses and development such as vegetation management on private land including such mechanisms as local laws.

The State Planning Policy Framework sets out Victorian Government planning policies and identifies environmental risk as a key theme.

In regards to settlement planning, the State Planning Policy Framework has recently been amended to include guidance specifically for development in Melbourne's hinterland areas, which includes all the land within the study area. Relevant policy statements in this section include:

- *Site and design new development to minimise risk to life, property, the natural environment and community infrastructure from natural hazards such as bushfire and flooding.*

The State Planning Policy Framework has also recently been amended to include more policy direction for regional areas, which includes the study area. The need to respond to the impacts of climate change and natural hazards and promote community safety are identified, with the following policy statement of direct relevance to this issues paper:

- *Developing adaptation response strategies for existing settlements in hazardous and high risk areas to accommodate change over time.*

In relation to the management of floodplains the State Planning Policy Framework identifies the following objectives:

To assist the protection of:

- *Life, property and community infrastructure from flood hazard.*
- *The natural flood carrying capacity of rivers, streams and floodways.*
- *The flood storage function of floodplains and waterways.*
- *Floodplain areas of environmental significance or of importance to river health.*

The State Planning Policy Framework identifies a number of strategies to achieve these objectives including:

- Identifying land affected by flooding in planning scheme maps (which includes all land affected by 1 in 100 year flood events)
- Avoiding intensifying the impacts of flooding through inappropriately located uses and developments.
- Locating emergency and community facilities outside floodplains
- Careful location of particular uses such as those which involve the storage of environmentally hazardous materials and waste or other dangerous goods outside floodplains

The risks associated with landslip and erosion are also addressed in the State Planning Policy Framework which aims to protect areas that are prone to landslip, erosion and other land degradation processes. This policy aims to prevent development on land that is unstable and subject to erosion or landslip.

In relation to the management of wildfire risk, the State Planning Policy Framework aims to assist in the minimisation of risk to life, property, the natural environment and community infrastructure from wildfire.

Strategies identified to achieve this aim include:

- Identification of wildfire risk environments in planning schemes in consultation with relevant fire authorities (through the Wildfire Management Overlay)
- Considering fire hazards in wildfire risk environments to avoid intensifying the risk of wildfire through inappropriately located or designed uses or developments.
- Seeking the advice of the relevant fire authority if compliance with policy guidelines is not likely or specific additional measures are necessary.

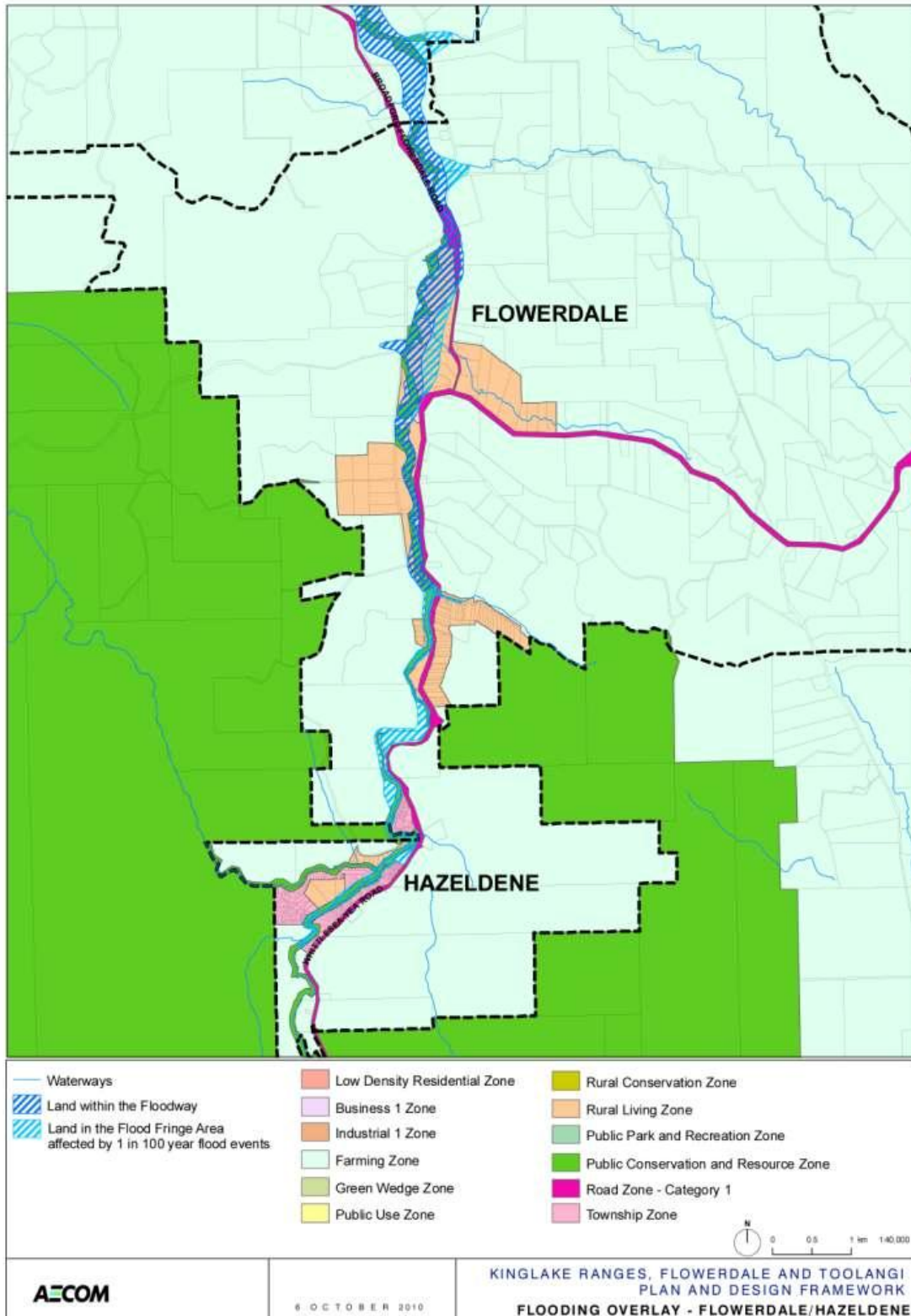
The State Planning Policy Framework identifies relevant policy guidelines for managing the risk of wildfire including:

- Municipal Fire Prevention Plans
- The *Code of Practice for Fire Management on Public Land* (Department of Sustainability and Environment, Revision No. 1, February 2006).
- *Bushfire Prone Areas* (Building Control Commission and Country Fire Authority, 1995).
- Wildfire Intensity Maps prepared by the Country Fire Authority.
- Building in bushfire-prone areas - CSIRO & Standards Australia (SAA HB36-1993, May 1993).
- *Requirements for Water Supplies and Access for Subdivisions in Residential 1 and 2 and Township Zones* (Country Fire Authority, 2004).
- *Planning Conditions and Guidelines for Subdivisions* (Country Fire Authority, 1991).

The Local Planning Policy Framework (LPPF) of the Murrindindi Planning Scheme identifies fire risk within the Kinglake Ranges as a key issue, particularly for settled areas adjoining forested land. The LPPF also identifies in some detail flood risks and the need to manage these in particular parts of the Shire. The need to better identify areas in the municipality that are subject to environmental risks such as flooding, landslip, fire risk and erosion is identified in the LPPF.

The Victoria Planning Provisions provide a number of controls that can be applied to land subject to flooding, these include environmental overlays such as the Land Subject to Inundation Overlay and Floodway Overlay and zones such as the Floodway Zone. The relevant floodplain manager, in the case of the King Parrot Creek the Goulburn Broken Catchment Management Authority, is a referral authority for development on floodplains. These controls have been applied to land located along the King Parrot Creek as shown in Figure 2. These controls ensure that due consideration is given to managing flood risks prior to any development or change in land use.

Figure 2: Flood affected areas along King Parrot Creek in Hazeldene and Flowerdale.



The Wildfire Management Overlay is applied to land where the intensity of wildfire is significant and likely to pose a threat to life and property. Development proposals that are likely to increase the number of people within areas affected this overlay are required to demonstrate how fire protection objectives have been addressed. The CFA is recognised as a referral authority in this overlay. Figure 3 show the current areas where the Wildfire Management Overlay has been applied within the study area. Note however, that this is likely to change in the future following the completion of fire risk mapping by the CFA.

Relevant agencies have advised that a number of reviews are currently underway which will lead to changes to the way that the Victorian planning system, including the Murrindindi Planning Scheme, manages natural risks, particularly flood and fire.

The CFA has advised that the application of the Wildfire Management Overlay (WMO) is currently being reviewed and that changes can be expected within the next 12 months. These changes will be based on detailed risk mapping that is currently being undertaken. The 2009 Victorian Bushfires Royal Commission recognised the need for a more strategic approach to the application of this overlay and that some significant changes are required to its content.

Building Code of Australia

The Building Code of Australia applies to all significant buildings constructed in Victoria and specifies detailed construction requirements that must be satisfied to obtain a building permit from a registered building surveyor. Australian Standard 3959 – *Building in Bushfire Prone Areas* (AS3959), which is referenced in the Building Code of Australia, applies to all land that has been declared bush fire prone. The requirement to undertake a Bushfire Attack Level assessment for houses in proximity to vegetation forms part of the building permit assessment process on bush fire prone land.

The application of AS3959, which was updated in March 2009, will ensure that new buildings, including dwellings will be constructed with regard to the applicable Bushfire Attack Level. It should be noted however that this standard does not provide an assessment of bushfire risk. A proper bushfire risk assessment would need to assess the development site in the context of its wider location, fire paths, fire history, weather conditions, separation to and management of bushfire prone vegetation and access provisions in order to determine the potential level of bushfire risk on a development.

2009 Victorian Bushfires Royal Commission

The 2009 Victorian Bushfires Royal Commission commenced its work in February 2009 less than two weeks after the fires and issued its final report on 21 July 2010 after 155 days of hearings. The terms of reference of this Royal Commission were broad and required the Commission to make recommendations regarding the preparation and planning for bushfire risk and recommendations relating to land use planning and management.

The recommendations of this report and the subsequent Victorian Government response which adopted the vast majority of the recommendations of the Royal Commission has significant implications for the preparation of the Kinglake Ranges, Flowerdale and Toolangi Plan and Design Framework.

The Commission examined the policies, systems and structures established by the Victorian Government and relevant agencies to respond to fires in considerable detail. The Commission examined Victoria's bushfire safety policy which is colloquially known as 'stay or go' but is more accurately described by its full title, 'Prepare, Stay and Defend or Leave Early'. The Commission found that the central tenets of the stay or go policy remain sound, however there were weaknesses in the way it was applied on Black Saturday. For example the Commission found that the stay or go policy failed to allow for the variations in fire severity that can result from differing topography, fuel loads and weather conditions.

The Commission found that advice about bushfires must be provided to the community in an engaging way and that population growth on the urban fringe is continuing and the demographics are changing.

The importance of local planning and emergency management processes were identified by the Commission as being crucial to the formulation of this advice. The Commission recommends that the fact that not all houses are defensible in all circumstances needs to be conveyed to residents within fire risk areas more forcefully.

The final report of the Commission emphasizes the principle of shared responsibility, with everyone; the Victorian Government, local government, individuals and the broader community needing to accept greater responsibility for bushfire safety in the future.

The Commission examined ways to reduce the damage caused by fire and identified that the risks associated with bushfires are potentially increasing as a result of population growth in the rural-urban interface and the probable effects of climate change. The Commission identified that the protection of human life should always be the overriding objective with some areas having such a high bushfire risk that development should be restricted.

The Commission recommends strengthening the consideration of bushfire throughout the land use planning process by giving greater recognition to bushfire risk without imposing unacceptable biodiversity costs. The Commission recommended changes to Victoria Planning Provisions in how they relate to bushfire and the CFA guidelines for assessing permit applications in areas of high bushfire risk. The changes should give higher priority to protecting human life and ensuring that

development does not occur in areas in which either the bushfire risk or the environmental cost of making people safe is too high.

The Commission also makes recommendations regarding improvements to information and understanding of bushfire through better mapping of both bushfire risk and Victoria's biodiversity in the Victorian planning system.

In regards to the management of vegetation along roadsides the Commission recognises that this provides a particular challenge for local Government and VicRoads with differing objectives for road safety, biodiversity protection and bushfire prevention which can at times be difficult to reconcile. The Commission recommends that the land use planning system is amended to facilitate a broad range of roadside works to reduce bushfire risk.

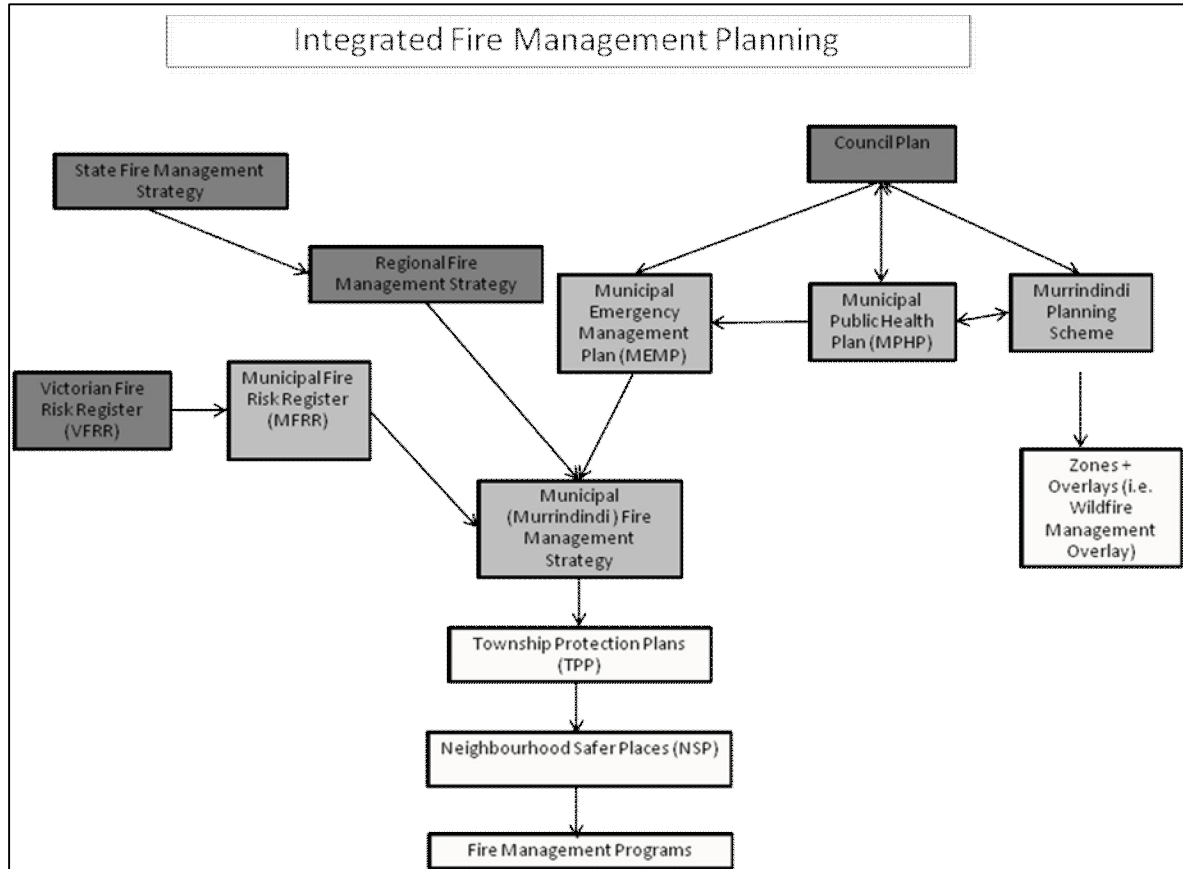
3.1.1 Current Initiatives

The relevant agencies have undertaken significant steps to improve planning for natural risks, particularly fire risks following the 2009 fires, including the following initiatives which are underway:

- Fire Management Planning Process – will identify the appropriate fire management measures for public land taking into account environmental values and asset protection on nearby private land. This involves the preparation of Regional Fire Management Plans and Municipal Fire Management Plans.
- Victorian Fire Risk Register – this has recently been completed for the Murrindindi Shire and identifies communities and assets and the level of protection required and applies a risk classification based on a State wide standard approach. The register enables local Government and agencies to reduce fire risk through management actions which will be prioritised. It is noted that the Fire Risk Register is a living document that will require regular review. The Fire Risk Register provides a useful guide to future decision making by Council and other agencies
- Township Protection Plans – these plans will be prepared in consultation with the community, the Murrindindi Shire Council expects to prepare 2 – 3 such plans per year. A township protection plan has recently been completed for Eildon township and will be prepared for the other main towns within the Shire of Murrindindi.
- Neighbourhood Safer Places (NSP) – these locations are essentially places of last resort should a fire threaten an area. A NSP has not yet been identified within the study area, however the Kinglake West Football Oval and Flowerdale Community Centre are currently being assessed for NSP status. It is noted that not all areas will have a NSP and that some residents may need to travel to another locality
- Integrated Fire Management Planning – an integrated approach to fire management planning was initiated in 2007 and is progressing. This approach will lead to the preparation of Regional Fire Management Plans (currently in the scoping stage) and concurrently Municipal Fire Management Plans will be prepared and endorsed by local government. These plans will identify protection and response measures and are outcome focused
- Community Emergency Risk Management – all Councils are currently undertaking this process which will identify all hazards, including natural hazards such as fire, flood and storm events. This process is based on ISO 31000:2009 *Risk Management – Principles and Guidelines* and will form part of Councils risk management plan
- The GBCMA is currently reviewing flood levels along the King Parrot Creek in Flowerdale and Hazeldene to improve the accuracy of previous flood modeling on which planning scheme controls are based.

A flow chart which provides an indication of the relationship between these initiatives and current policy for fire management planning is provided in Figure 4.

Figure 4: Relationship between fire management initiatives and policies



4.0 SWOT Analysis

Strengths

- The current agency risk mitigation initiatives that are currently underway as identified in this report
- The community is aware of and accept some level of risk in living in this area and wishes to protect the environmental values that attracted them to the area rather than have these impacted upon significantly to try to reduce risks
- The natural environment within the study area is adapted to fire and is resilient to its impacts, although the recovery period from extreme fire events can be considerable
- Current initiatives to better understand risk profiles within the study area, such as the review of the flood levels along the King Parrot Creek in Flowerdale and Hazeldene by the GBCMA to improve the accuracy of previous flood modeling on which planning scheme controls are based.

Weaknesses

- The topography of the study area and surrounding public forests render much of the area, particularly those areas in close proximity to the public forests and bushfire prone vegetation on private land, as high fire risk areas. These factors also contribute to the frequency and extent of other risk events such as storms and temperature.
- Many of the settlements within the study area are located close to heavily forested public lands and on steep ridgelines and in the case of Flowerdale and Hazeldene some residential properties are located in areas subject to flood events
- Poor accessibility is a feature of many of the settlements and rural residential areas within the study area, making risk mitigation measures more difficult
- Land management and enforcement activities to ensure that risk mitigation measures are being implemented (i.e. fuel management on private land) is beyond the resources of local agencies.

Opportunities

- Improve strategic planning for natural risks through the numerous initiatives currently underway
- To strike a better balance between the environment and the risks that it presents (i.e. through the implementation of a process of hazard reduction which retains the integrity of the bushland whilst removing accumulated fuels loads, such as through the provision of asset protection zones)
- To build more resilient housing stock through application of AS3959 as part of the building permit process for all new houses in the study area
- To improve the resilience of existing housing stock to fire through ember protection measures which are not overly expensive
- To learn from the outcomes of the 2009 Victorian Bushfires Royal Commission

Threats

- Climate change and the increased frequency of extreme weather events, increased temperatures (including an increase in Code Red days)
- Increase, over time as the forest fuels return, of the bushfire risk levels

5.0 Conclusions/Future Directions

It is clear that there is considerable work underway to better understand the risks associated with nature and to improve the way in which these risks are managed by Government agencies and the community with a particular focus on fire risks.

Through our discussions with key stakeholders we have identified a number of issues that need to be considered and given further attention in terms of the Plan and Design Framework, as follows:

- There is a strong focus on how agencies respond to fire risks, however other natural risks such as flood and storm events and the increased likelihood of extreme weather events resulting from climate change also need to be considered
- The current study into flood levels along the King Parrot Creek should provide a better understanding for the residents of Flowerdale and Hazeldene and relevant agencies, of the risks associated with flooding events in this area.
- It is evident from our research that a more strategic approach to risk management is now being taken by the relevant agencies, as reflected in the many initiatives currently underway. Many of these initiatives will have spatial and infrastructure implications for the Plan and Design Framework. A good example of where a more strategic approach to risk management is required is the application of the WMO in the Murrindindi Planning Scheme. It is clear from our review and ground truthing that the WMO has not been applied in a strategic manner in the study area.
- Clarity needs to be provided by public land managers as to how public land will be managed in the study area, particularly public land that is located in close proximity to dwellings such as occurs in many locations within the study area. In these areas fine fuel reduction is critical as well as thinning of canopy trees with the need to balance environmental values with fuel management. The clearing and bulldozing of vegetation is unnecessary and clearly in conflict with the desires of the majority of the community who wish to retain the bushland setting which attracted many of them to live in the area in the first place.
- There is a need to carefully balance the at times conflicting values of biodiversity and fuel management, particularly in proximity to buildings and along road sides. Balancing environmental values with fuel management does not require complete removal of vegetation; however fuel management can impact upon the character and identity of an area.
- Mandatory construction standards for buildings will not provide protection from catastrophic bushfires. Those construction outcomes may impact on built form which in turn can influence character and identity. Further, the emphasis on construction standards for buildings may lead to a sense of security which will not exist unless the community recognises that there is a need to manage the bushfire risk on a broader basis including through the reduction of combustible fuels from bushfire prone vegetation. This does not mean wholesale clearing of vegetation but periodic removal of ground fuels such as bark, leaves and twigs.
- A process of identifying where 'village protection' management zones should be introduced has merit – these would typically be fuel managed areas on the edge of residential areas/villages and could include rural residential development which has strict requirements on fuel management/landuse or a sacrificial area managed by DSE that adjoins existing residential development.
- The aim of providing village protection management zones is to manage the fuels to decrease fire intensity on the outer edge of development. This will change the nature of the vegetation (it does not mean clearing trees) but it will provide added protection to the residents in the 'built up areas'. The width of these zones would be determined on the assessed level of bushfire risk. It is noted that in parts of the study area the settlements seem to have the forest woven through them.

Specific design measures that should be considered for any further development within the study area include:

- Provision of perimeter roads in all new residential/rural residential estates and an internal road layout that includes regular connections to the perimeter road so as to provide a safe exit to those dwellings located on the edge of the development
- The design of new estates should recognise the issue of evacuation routes. It is not good planning to locate a development 'node' that requires residents to travel through unmanaged corridors of bushfire prone vegetation to get to a 'safer place'

Consideration to these measures should also be given to existing development.

The 2009 Victoria Bushfires Royal Commission has highlighted the need to manage risk and plan appropriately. The Victorian Government has accepted the vast majority of the recommendations of the Commission. The resulting policy changes will inform the preparation of the Kinglake Ranges, Flowerdale and Toolangi Plan and Design Framework. The task of the Plan and Design Framework is to provide clear direction for how nature and its risks are to be managed in this study area.