Frankston City Council

Natural Reserves Bushfire Management Strategy

2024

Report commissioned by
Frankston City Council

Frankston Natural Reserves Bushfire Management Strategy
Report prepared by Terramatrix on behalf of Frankston City Council
Terramatrix project code: FrankstonCC-2023-01

Terramatrix Pty. Ltd.
ACN 129 163 373
ABN 44 129 163 373
PO Box 1391, Collingwood VIC 3066
P: 03 9417 2626
www.terramatrix.com.au

Approvals

Accountability	Name
Data collection, analysis and report compilation	Jon Boura, Managing Director Mark Garvey, Senior Analyst

Version Control

Version	Date	Comments	Undertaken by / distribution
0.1	2024-01-21	Draft report	JB
1.0	2024-03-14	Second draft report inc. FCC feedback	JB
1.1	2024-03-19	Final report	JB

Table of Contents

Acronyms and abbreviations	
AFAC	Australia and New Zealand National Council for Fire and Emergency Services
AFDRS	Australian Fire Danger Rating System
APZ	Asset Protection Zone
AS/NZS	Australian Standard/New Zealand Standard
BAL	Bushfire Attack Level
BHL	Bushfire Hazard Level
BMO	Bushfire Management Overlay
BMZ	Bushfire Moderation Zone
BPA	Bushfire Prone Area
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEECA	Department of Energy, Environment and Climate Action
EM	Emergency Management
EMV	Emergency Management Victoria
EVC	Ecological Vegetation Class
FBI	Fire Behaviour Index
FCL	Fire Control Line
FDP	Fire Danger Period
FDR	Fire Danger Rating
FFMVic	Forest Fire Management Victoria
FMP	Fire Management Plan
FMS	Fire Management Statement
FMZ	Fire Management Zone
FPN	Fire Prevention Notice
FRB	Fuel Reduction Burning
FRV	Fire Rescue Victoria
IAP2	International Association of Public Participation
LGA	Local Government Area
LMZ	Land Management Zone
MEMP	Municipal Emergency Management Plan
MEMPC	Municipal Emergency Management Planning Committee
MFPO	Municipal Fire Prevention Officer
NERAG	National Emergency Risk Assessment Guideline
PV	Parks Victoria
TFB	Total Fire Ban
TFI	Tolerable Fire Interval

1 Summary

1.1 Introduction

Terramatrix were commissioned by Frankston City Council to update their *Natural Reserves Bushfire Management Strategy* (the Strategy). The original Strategy was developed by Frankston City Council and Terramatrix in 2013 and provides a framework for managing fire risk in 67 natural reserves within the Frankston local government area (LGA) that contain significant areas of native bushland.

The Strategy aims to provide a consistent approach to fire management in natural reserves across the municipality, to meet public safety, environmental care, community, and organisational expectations.

The objectives of the Strategy are to:

- Provide a consistent risk-based approach to fire management across the Frankston City natural reserves.
- Document a suite of fire management treatments that will achieve the Frankston City Council's legislative fire management obligations, whilst minimising any adverse environmental impact.

The Strategy uses a consistent risk-based methodology to develop a best practice approach to fire management in natural reserves. This is achieved by conducting a high-level assessment of the risk to the community from a bushfire within each natural reserve. Based on this high-level assessment, each reserve is then assigned to a group (1-3) based on their physical and risk characteristics and the assessed priority for fire management. Each group then has a suite of treatment options commensurate to the priority level and risk characteristics of the reserve.

The Strategy is a resource to assist Frankston City Council make high quality decisions about fire management in the reserves they manage. It should be recognised that there are many considerations, other than bushfire, to take into account when making reserve management decisions, for example biodiversity conservation, land/soil stability, amenity value etc. The relative priority given to fire management should reflect the assessed level of risk.

The Strategy does not constitute a fire management plan for each of the reserves, nor is it a works plan. These documents have been developed and will be reviewed separately where required; but should be underpinned and guided by the assessment and information in this Strategy.

1.2 Bushfire context

Frankston is a predominantly urban municipality on the south-eastern outskirts of Melbourne, with major business activity centres and coastal suburbs. It covers an area of approximately 130 sq. km. To the north are the mainly urban areas of the City of Kingston and the City of Greater Dandenong; whilst to the east is the City of Casey and to the south Mornington Peninsula Shire, both of which contain more rural residential and agricultural areas.

The only part of Frankston City with the potential to carry a bushfire of significant size is the south-eastern corner in the Langwarrin – Baxter area. There is, however, a significant complex of bushland reserves, vegetated creek gullies and water industry reserves throughout the municipality. These are managed by several different land management agencies, the most important of which are Frankston City Council and Parks Victoria. Due to the relatively small size of the Frankston City natural reserves, large high intensity fires are unlikely, but the combination of steep slopes and fire prone vegetation running up to and between residential streets can produce short, sharp but locally damaging fires.

There is also potential for fires originating in the reserves on the eastern or southern edge of the municipality to spread beyond the municipal boundaries through the more rural areas of Langwarrin, Baxter, Mt Eliza, and Moorooduc and grow to a more considerable size.

Frankston's position, with its northern and western sides protected by the metropolitan area and Port Philip Bay respectively, means there is relatively little opportunity for an established fire to burn into the municipality. Whilst the Bangholme area to the north-east retains grassland, it is not considered credible for a large bushfire to spread into the municipality from this direction.

1.3 Fire management objectives

Frankston City Council has statutory responsibilities for bushfire prevention under the CFA Act, 1958 and FRV Act, 1958:
'…it is the duty of every municipal council and public authority to take all practicable steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from –

- Any land vested in it or under its control or management; and
- Any road under its care and management' (CFA Act s.41(2) and FRV Act s.5(1)).

Strategic objectives for the *Natural Reserves Bushfire Management Strategy* are drawn from the *Code of Practice for Fire Management on Public Land* to ensure consistency across land tenure:

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

The *Natural Reserves Bushfire Management Strategy* documents how relevant objectives from the *Metropolitan Bushfire Management Strategy 2020* (DELWP 2020) will be applied in the context of the Frankston natural reserves. In particular:

Human life, communities and economies

- To minimise the loss of human life, houses and properties.
- To minimise disruption to essential services and critical infrastructure.
- To minimise the social impacts of bushfires and fire management actions.
- To increase community understanding and ownership of bushfire risk management.

Cultural heritage

- To minimise the impacts of bushfires and fire management actions on cultural heritage.

Biodiversity and ecosystem resilience

- To maximise the persistence of ecological communities and species.
- To minimise declines in threatened species and communities.
- To minimise declines in plant and animal populations including threatened species and communities from bushfires and fire management actions.

To do this, the *Natural Reserves Bushfire Management Strategy* provides:

- A consistent risk-based approach to fire management planning across the Frankston City natural reserves.
- An assessment of fire risk in the natural reserves.
- A suite of fire management treatments, commensurate to the varying level of risk across the natural reserves.
- A schedule for review and evaluation of fire risk management and the Strategy.

1.4 Risk assessment

The Strategy considers risks to the local community from a bushfire within a natural reserve managed by Frankston City Council, in terms of possible impacts on people, buildings[1], infrastructure, environmental values and delivery of Council functions. The Strategy considers both an external bushfire impacting a Frankston natural reserve and a fire that starts within a reserve.

Each reserve was assessed for three risks:

1. There is potential that during the Fire Danger Period a bushfire (either a local ignition or a large established fire in the wider landscape) burning in a Frankston City natural reserve will cause injury or loss of life to users or neighbours, economic loss through damage to Council assets or adjacent private property and/or environmental damage through adverse impact on flora, fauna, soil, water or air quality.

[1] It should be noted that highest priority is given to dwellings and critical community infrastructure, with less importance attached to fences, sheds and local park infrastructure.

2. There is potential that during the Fire Danger Period an accidental or deliberate ignition will result in an unplanned fire starting in a Frankston City natural reserve that will spread beyond the reserve boundaries and cause injury or loss of life, economic loss through damage to critical infrastructure and/or private property and/or environmental damage through adverse impact on flora, fauna, soil, water or air quality.

3. There is potential that fire management in a Frankston City natural reserve will cause environmental damage through vegetation removal, soil disturbance or an inappropriate fire regime that will adversely affect flora or fauna.

Each reserve has been assigned to a group (1-3) based on a high-level assessment conducted of the risk to the community from bushfire burning under a Catastrophic Fire Danger Rating. The risk assessment used the process and risk criteria of the *National Emergency Risk Assessment Guideline*, scaled to the Frankston LGA to rate the likelihood of a specified consequence level occurring, given the risk controls currently in place.

The risk assessment considered the physical and risk characteristics of each reserve that contribute to the potential for fire development and impact. The characteristics considered include:

- Landscape setting – whether in the designated BPA or covered by the BMO in the Frankston Planning Scheme and whether contiguous to other bushland.
- Potential for fire development – size of reserve, area and connectivity of bushland, type of vegetation, slope and aspect, fire run length, run direction, potential for spread by flame front or spotting, and fire history.
- Exposure – number and proximity of buildings and significant infrastructure within 100 m, environmental values, ease with which people within the reserve could reach a safe area.

The reserves in each group are shown in Table 1 and the results of the risk assessment for each reserve are summarised in Table 2, Table 3 and

Table 4 below, with more detail provided in Section 5. A summary of each reserve is provided in Part B of the Strategy.

Group 1 reserves are a high priority for fire management. They are typically moderate sized (Seaford Wetlands and Kananook Creek Reserve are the the largest at approx 55 ha and 34 ha respectively, but most reserves are less than 15 ha) reserves or part of a larger bushland area with potential for high intensity bushfire to impact on adjacent assets and, in some cases, for significant spread and impact well beyond the reserve boundaries. The size of the reserves makes egress from them less easy. There are significant built assets adjacent to the reserves and downwind under typical severe fire weather. Reserves were assigned to Group 1 if they received a risk rating of Medium for one or more of the 'reserve users', 'dwellings', 'special life risk buildings' or 'infrastructure' consequence categories for Risk 1, or for 'downstream' consequences for Risk 2.

Group 2 reserves are a moderate priority for fire management. They are typically small to medium sized reserves with some potential for bushfire development, but threat is restricted to immediately

adjacent assets. There is easy egress for reserve users into the adjacent low threat urban area. Alternatively, they are reserves where the level of use increases the chance of accidental ignitions and there is high potential for spread and impact well beyond the reserve boundaries under typical severe fire weather. Reserves were assigned to Group 2 if they received a risk rating of Low for one or more of the 'reserve users', 'dwellings', 'special life risk buildings' or 'infrastructure' consequence categories for Risk 1, or for 'downstream' consequences for Risk 2.

Group 3 reserves are a low priority for fire management. They are typically very small reserves or small patch(es) of native vegetation within a larger reserve that are isolated from other areas of bushland. There is very limited potential for bushfire development, with threat largely restricted to individual combustible elements close to individual adjacent buildings. There are few built assets directly exposed under credible fire scenario, and either low level of use or easy egress for reserve users into the adjacent low threat urban area. Reserves were assigned to Group 3 if they received a risk rating of Very low or N/A for all of the 'reserve users', 'dwellings', 'special life risk buildings' or 'infrastructure' consequence categories for Risk 1, and for 'downstream' consequences for Risk 2.

It is considered that the 'direct' risk (Risk 1) to reserve users and immediate neighbours from bushfire in the Group 2 and 3 reserves is being mitigated to a level that is 'as low as reasonably practical'. None of the risks are rated higher than Low with existing controls in place and an inherent assumption that the controls are implemented and operate as intended. The risk assessment found only Low priority for additional investigation or risk treatment.

The Medium risk rating for bushfire within the Group 1 reserves is driven by the potential for Moderate consequences in the 'Assets/Economic' category due to the presence of dwellings, special life risk buildings and/or important community infrastructure close to and downwind of the reserves. It is recommended that:

- The adequacy of perimeter APZs to protect adjacent dwellings continue to be assessed periodically as reserve Fire Management Plans are reviewed.
- Adjacent schools, aged care facilities etc. have appropriate Bushfire Emergency Management Plans.
- Infrastructure providers assess the vulnerability of the electricity transmission lines, terminal stations and water infrastructure within or adjacent to the reserves.

The potential for downstream consequences from a fire that starts within some Group 1 or 2 reserves also poses a significant risk. Under the worst-case scenario, Moderate consequences in multiple impact categories could result. Consequence management in this scenario is beyond the scope of reserve management and is reliant on broader fire protection by the responsible land manager and owner of the assets at risk, fire suppression and emergency management arrangements. Reserve management can, however, have a role role in reducing the likelihood of a fire occurring within the reserve. It is recommended that consideration be given to:

- Restricting/discouraging use of Group 1 and 2 reserves on days with an Extreme or Catastrophic FDR.

- On days with an Extreme or Catastrophic FDR, Council staff patrolling high use Group 1 and selected Group 2 reserves, to prevent unsafe behaviours and detect and report ignitions.

The High or Medium risk rating for damage by fire management works (mainly in Group 1 and 2 reserves) is due to the potential need for vegetation management to create or maintain APZs, the difficulty of providing an appropriate long-term fire regime in peri-urban bushland reserves, and the danger of fire suppression requiring the creation of additional access tracks or fire control lines in areas of very high biodiversity value.

The decision to implement additional risk treatments or enhance existing controls to address these risks should be based on a cost-benefit analysis and Frankston City Council's comfort with the level of assessed risk. Fire management decisions need also to recognise the biodiversity/conservation value of the natural reserves and the requirements of applicable environmental legislation.

Table 1 - Reserve groupings.

Group 1 **High priority for fire management.** Moderate sized reserve or part of a larger bushland area with potential for high intensity bushfire to impact on adjacent assets and, in some cases, for significant spread and impact well beyond the reserve boundaries. Size of reserve makes egress from it less easy. Significant built assets adjacent to the reserve and downwind under typical severe fire weather.	Group 2 **Moderate priority for fire management.** Small to medium sized reserve with some potential for bushfire development, but threat is restricted to immediately adjacent assets. Easy egress for reserve users into adjacent low threat urban area. Alternatively, a reserve where the level of use increases the chance of accidental ignitions and there is high potential for spread and impact well beyond the reserve boundaries under typical severe fire weather.	Group 3 **Low priority for fire management.** Very small reserve or small patch(es) of native vegetation within a larger reserve that is isolated from other areas of bushland. Very limited potential for bushfire development, with threat largely restricted to individual combustible elements close to individual adjacent buildings. Few built assets directly exposed under credible fire scenario, and low level of use or easy egress for reserve users into adjacent low threat urban area.
Boggy Creek Link	18R Marcus Road Reserve	Armstrongs Reserve
Bunarong Park	Austins Reserve	Banjo Rise Nature Reserve
Kananook Creek Reserve	Baxter Park	Bonacci Reserve
Lexton Reserve	Belvedere Bushland Reserve	Carrum Woods Nature Reserve
Little Boggy Creek Reserve	Casuarina Reserve	Cell 3 Pines Flora & Fauna Reserve
Lower Sweetwater Creek Reserve	Escarpment Bushland Reserve	Centenary Park Golf Course
North Reserve	Flame Robin Reserve	Clifton Grove Reserve
Paratea Flora & Fauna Reserve	Frankston Foreshore	Colemans Reserve
Stevens Reserve	Jubilee Park	Cotoneaster Reserve
Stringybark Bushland Reserve	Langwarrin Equestrian Reserve	Derinya Reserve
Seaford Wetlands	Lloyd Park	Esplanade Reserve
Studio Park	Monique Bushland Reserve	Franciscan Reserve
Upper Sweetwater Creek Reserve	Olivers Hill Foreshore	Gumnut Bushland Reserve
	Overport Park	Hafey Wetlands
	Park Valley Reserve	Illawong Reserve
	Rinella Reserve	Kooluna Reserve
	Robinsons Bushland Reserve (130R)	Lawson Reserve
	Seaford Foreshore	Mulgra Reserve
	Serenity Reserve	Nepean Gateway Reserve
	Southgateway Reserve	Oakwood Reserve
	Swampy Rise Wildlife Reserve	Outlook Reserve
	Wallace Reserve	Pobblebonk Wetlands Reserve
	Witternberg Reserve & Robinsons Park	Raphael Reserve
	Yuille Street Reserve	Shaxton Circle
		Solferino Reserve
		Songlark Link Conservation Reserve
		Stotts Bushland Reserve
		Tangenong Creek Reserve

Group 1	Group 2	Group 3
High priority for fire management. Moderate sized reserve or part of a larger bushland area with potential for high intensity bushfire to impact on adjacent assets and, in some cases, for significant spread and impact well beyond the reserve boundaries. Size of reserve makes egress from it less easy. Significant built assets adjacent to the reserve and downwind under typical severe fire weather.	**Moderate priority for fire management.** Small to medium sized reserve with some potential for bushfire development, but threat is restricted to immediately adjacent assets. Easy egress for reserve users into adjacent low threat urban area. Alternatively, a reserve where the level of use increases the chance of accidental ignitions and there is high potential for spread and impact well beyond the reserve boundaries under typical severe fire weather.	**Low priority for fire management.** Very small reserve or small patch(es) of native vegetation within a larger reserve that is isolated from other areas of bushland. Very limited potential for bushfire development, with threat largely restricted to individual combustible elements close to individual adjacent buildings. Few built assets directly exposed under credible fire scenario, and low level of use or easy egress for reserve users into adjacent low threat urban area.
		Wattlewood Bushland Reserve
		Wilton Bushland Reserve

Table 2 - Summary of risk assessment for Group 1 'High priority' reserves.

Note - Shaded cells are those determining the group the reserve is in.
Note – N/A indicates this risk does not occur for this reserve.

Group 1
HIGH PRIORITY

	Risk 1					Risk 2	Risk 3	2013 priority
	Users	Dwellings	Special life risk	Infrastructure	Environment	Downstream	Environment	
Boggy Creek Link	Very low	Medium	N/A	Low	Low	N/A	Low	N/A
Bunarong Park	Low	Medium	N/A	Low	High	N/A	High	High
Kananook Creek Reserve	Very Low	Medium	Low	Low	Medium	N/A	Medium	High
Lexton Reserve	Very low	Medium	N/A	Very low	High	N/A	High	High
Little Boggy Creek Reserve	Very low	Medium	N/A	Very low	High	N/A	High	High
Lower Sweetwater Creek Nature Reserve	Very low	Medium	N/A	Very low	Medium	N/A	Medium	High
North Reserve	Low	Medium	N/A	Very low	High	Very low	High	High
Paratea Flora & Fauna Reserve	Low	Medium	N/A	Low	High	N/A	High	High
Seaford Wetlands	Very low	Low	Very low	Low	High	N/A	High	High
Stevens Reserve	Very low	Medium	N/A	Very low	High	N/A	High	High
Stringybark Bushland Reserve	Low	Medium	N/A	Very low	High	Very low	High	High
Studio Park	Low	Medium	N/A	Low	High	Low	High	High
Upper Sweetwater Creek Reserve	Very low	Medium	Low	Medium	Medium	Medium	Medium	High

Table 3 - Summary of risk assessment for Group 2 'Moderate priority' reserves. Shaded cells are those determining the group the reserve is in.

Note - Shaded cells are those determining the group the from to 2013 Strategy.
Note – N/A indicates this risk does not occur for this reserve.

Group 2
MODERATE PRIORITY

	Risk 1					Risk 2	Risk 3	2013 priority
	Users	Dwellings	Special life risk	Infrastructure	Environment	Downstream	Environment	
18R Marcus Road	Very low	Low	N/A	Low	Low	Very low	Low	Moderate
Austins Reserve	Low	Low	Very low	Low	Low	Very low	Low	Moderate
Baxter Park	Low	Very low	N/A	Very low	High	Very low	High	Moderate
Belvedere Bushland Reserve	Low	Very low	N/A	Very low	Medium	Very low	Medium	Moderate
Casuarina Reserve	Very low	Low	N/A	Very low	Low	N/A	Low	Moderate
Escarpment Bushland Reserve	Very low	Very low	N/A	Low	Medium	Very low	Low	Moderate
Flame Robin Reserve	Very low	Low	N/A	Very low	Medium	Low	High	Moderate
Frankston Foreshore	Low	Low	N/A	Low	High	Low	High	Moderate
Jubilee Park	Very low	Low	N/A	Low	Low	N/A	Very low	Low
Langwarrin Equestrian Reserve	Very low	Low	N/A	Very low	Low	Very low	Low	Moderate
Lloyd Park	Very low	Low	N/A	Very low	High	N/A	High	Low
Monique Bushland Reserve	Very low	Low	N/A	Very low	Medium	Low	Medium	Moderate
Olivers Hill Foreshore	Very low	Low	N/A	Very low	Low	N/A	Low	N/A
Overport Park	Very low	Low	N/A	Very low	Low	Low	Low	Low
Park Valley Reserve	Very low	Low	N/A	Very low	Medium	Low	Medium	Moderate
Rinella Reserve	Very low	Low	N/A	Very low	Low	Low	Low	Moderate
Robinsons Bushland Reserve	Very low	Very low	Very low	Very low	Medium	Low	Medium	N/A
Seaford Foreshore	Low	Low	N/A	Low	High	Low	High	Moderate
Serenity Reserve (assessed as part of Langwarrin Equestrian Reserve)	Very low	Low	N/A	Very low	Low	Very low	Low	Moderate
Southgateway Reserve	Very low	Low	N/A	Very low	Medium	Very low	Medium	Moderate
Swampy Rise Wildlife Reserve	Very low	Very low	N/A	Very low	Medium	Low	Medium	N/A
Tangenong Creek Reserve	Very low	Very low	N/A	Very low	Medium	Very low	Low	Moderate
Wallace Reserve	Very low	Low	N/A	Very low	Low	N/A	Very low	Moderate
Witternberg Reserve/Robinsons Park	Very low	Very low	Very low	Very low	Medium	Low	Medium	Moderate
Yuille Street Reserve	Very low	Low	N/A	Very low	Low	Very low	Very low	N/A

Table 4 - Summary of risk assessment for Group 3 'Low priority' reserves.

Group 3 **LOW PRIORITY**	Risk 1					Risk 2	Risk 3	2013 priority
	Users	Dwellings	Special life risk	Infrastructure	Environment	Downstream	Environment	
Armstrongs Reserve	Very low	Very Low	Very low	Very low	Low	N/A	Very low	Low
Banjo Rise Nature Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	Low
Bonacci Reserve	Very low	Very Low	N/A	Low	Low	N/A	Low	N/A
Carrum Woods Nature Reserve	Very low	Very Low	N/A	Very low	Low	Very Low	Very low	Low
Cell 3 (Pines Flora & Fauna Reserve)	Low	Very low	N/A	Very low	Low	Very low	Very low	Low
Centenary Park Golf Course	Very low	Very low	N/A	Low	Medium	Very low	Low	Low
Clifton Grove Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Colemans Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	N/A
Cotoneaster Reserve	Very low	Very Low	Very low	Very low	Low	Very Low	Very low	Low
Derinya Reserve	Very low	Very low	N/A	Very low	Low	Low	Low	Low
Esplanade Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	N/A
Franciscan Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Gumnut Bushland Reserve	Very low	Very low	Very low	Low	Medium	N/A	Low	Low
Hafey Wetlands	Very low	Very low	N/A	Very low	Medium	Very Low	Medium	N/A
Illawong Reserve	Very low	Very Low	Very low	Very low	Low	Very Low	Very low	Low
Kooluna Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Lawson Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Low	Low
Mulgra Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Nepean Gateway Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	N/A
Oakwood Reserve	Very low	Very Low	N/A	Low	Low	Very Low	Very low	Low
Outlook Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Pobblebonk Wetlands Reserve	Very low	Very low	N/A	Low	High	Very low	Medium	Low
Raphael Reserve	Very low	Very Low	Very low	Low	Low	N/A	Very low	Low
Shaxton Circle	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Solferino Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	N/A
Songlark Link Conservation Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	N/A
Stotts Bushland Reserve	Very low	Very low	N/A	Very low	Low	Very low	Very low	N/A
Wattlewood Bushland Reserve	Very low	Very Low	N/A	Very low	Low	Very Low	Very low	N/A
Wilton Bushland Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	Low

1.5 Risk controls and treatments

1.5.1 Strategic initiatives

Strategic initiatives are those that underpin fire management across the Frankston City natural reserve estate as a whole, rather than specific reserves or groups of reserves.

Planned burning

The Frankston City natural reserve estate has an active prescribed burning program, planned and delivered by Frankston City Council. Fire regime is an important part of the natural processes of native ecosystems, and both long term fire exclusion and too frequent and/or too intense fires can have deleterious effects. The use of planned fire as a management tool, to achieve both bushfire safety and ecological health objectives, is a central tenet of the *Metropolitan Region Bushfire Management Strategy*. Cultural burning is also an emerging priority.

It is recommended that Frankston City Council maintain the long-term, ecologically-based planned burning program within their natural reserves.

Private bushland

There are large tracts of private bushland in the east of the municipality, particularly around Langwarrin and Langwarrin South. These areas are important for biodiversity conservation (Frankston City Council 2021) but also critical to the potential spread and impact of a large bushfire within and beyond the municipality.

Strategic fuel management of private land has traditionally been difficult due to the fragmented ownership and lack of an effective legislative lever. The Joint Fuel Management Program has increased the capacity to engage with landowners and conduct planned burning on private land, which can be an important complement to the management of Frankston City's natural reserves.

Critical infrastructure

Critical state or regional infrastructure is located within or adjacent to several Frankston City natural reserves, the temporary or permanent loss of service could impact large numbers of people. The vulnerability of telecommunications, power or water infrastructure to radiant heat is often not known, making it difficult to determine what vegetation management or other works are required.

Important community infrastructure located within or adjacent to Group 1 or 2 natural reserves, should be identified and assessed through the Victorian Fire Risk Register, with consideration of the criticality of the asset, potential consequence of a service interruption due to bushfire, and the vulnerability of the asset to the fire severity credible within the reserve, to determine the need for fire protection works by Frankston City Council or the infrastructure manager.

1.5.2 Treatment toolbox

The Strategy provides a comprehensive 'treatment toolbox', with guidance on which group(s) of reserves each treatment may be relevant to. It is not expected that all the treatments in the toolbox would be implemented in every reserve. In some cases, they may not be appropriate or comparable controls may be being implemented by other organisations.

To show how management of Frankston City natural reserves contributes to broader fire management, the existing controls (to be maintained) and potential treatments (to be considered for implementation on a reserve-by-reserve basis) are organised according to the 'approaches' outlined in the *Metropolitan Bushfire Management Strategy 2020* (see Table 5).

Table 5 – Applicability of Metropolitan Bushfire Management Strategy approaches to natural reserves.

Approach (as per *Metropolitan Bushfire Management Strategy 2020*)	Applicable when…
Reduce bushfire ignitions through prevention activities	… use of the reserve increases the potential for an ignition within the reserve that could develop in size and intensity and damage assets adjacent to the reserve and/or beyond the reserve boundary.
Increase the effectiveness of fire suppression	… fire suppression vehicles may need to move through and/or work within the reserve.
Reduce bushfire spread and severity	… a bushfire within the reserve could develop in size and intensity and damage assets adjacent to and/or beyond the reserve boundary.
Reduce the physical effects of bushfire in inhabited areas	… buildings and people within or adjacent to the reserve could be threatened by a fire burning within the reserve.
Reduce the social effects of bushfires on communities	… bushfire within the reserve could damage or destroy critical infrastructure relied upon by the broader community.
Reduce the impact from fire management actions	… the reserve contains high biodiversity values, biophysical features or cultural values that could be degraded by inappropriate fire management activities (assessed as reserves rated Very High or High conservation score in *Natural Reserves Service Priority Matrix* (Frankston City Council 2021a) or with rare and threatened flora or fauna listed in the Flora and Fauna Guarantee Act or Environmental Protection and Biodiversity Conservation Act).

1.5.3 Treatment strategy

<u>Group 1 reserves</u>

The following controls/treatments are recommended for Group 1 reserves:

- Develop or review the formal, detailed Fire Management Plans (FMPs) as they become due (recommended review cycle for FMPs is 5 years for reserves experiencing significant change within or adjacent to the reserve and 10 years for reserves experiencing little change).
- Undertake detailed assessment of potential fire behaviour and requirement for fuel management (e.g. perimeter APZs) when the FMP is reviewed.

- Maintain APZs to the standard and distance specified in the FMP.
- Establish processes to ensure re-vegetation activities take account of the FMP, in particular the role of APZs and other low threat areas in protecting adjacent buildings.
- Monitor fuel hazard on a 5-year schedule or to inform any planned burning.
- Work with volunteer groups and adjacent residents to promote bushfire prevention and preparedness.
- Liaise with CFA and FRV to ensure they are familiar with the reserves, including access, water supplies, APZs and ecological values.
- Undertake Fire Patrols on days of elevated FDR to discourage deliberate or accidental ignitions and to facilitate early detection of fires.
- Discourage use of reserves on days of Total Fire Ban and Extreme or Catastrophic FDR – consider signage and closure.
- Advocate for adjacent facilities, with particularly vulnerable populations, to prepare for a fire within the reserve, e.g. schools, pre-schools, aged care etc.
- Continue the use of planned burning as an ecological management tool if required to maintain the health of vegetation.

Group 2 reserves

The following controls/treatments are recommended for Group 2 reserves:

- Maintain brief Fire Management Statements (FMSs) that describe and map existing bushfire risk controls, i.e. APZs, access, water supplies etc.
- Maintain APZs to the standard and distance specified in the FMS.
- Assess the requirement for any additional APZs (e.g. up to 6 m wide where there is hazardous vegetation within 10 m of a building).
- Establish processes to ensure re-vegetation activities take account of the FMS, in particular the role of APZs and other low threat areas in protecting adjacent buildings.
- Suport multi-agency community education using existing bushfire safety resources.
- Undertake Fire Patrols on days of elevated FDR on high use reserves to discourage deliberate or accidental ignitions and to facilitate early detection of fires.
- Discourage use of reserves on days of Total Fire Ban and Extreme or Catastrophic FDR – consider signage and closure.
- Advocate for adjacent facilities, with particularly vulnerable populations, to prepare for a fire within the reserve, e.g. schools, pre-schools, aged care etc.
- Continue the use of planned burning as an ecological management tool if required to maintain the health of vegetation.

Group 3 reserves

The following controls/treatments are recommended for Group 3 reserves:

- Maintain 3 m wide APZs and/or managed parkland between bushland and any dwellings or important community infrastructure within 10 m of the reserve boundary.
- Weed management.
- Support multi-agency community education using existing bushfire safety resources.

- Continue the use of planned burning as an ecological management tool if required to maintain the health of vegetation.

All reserves (as applicable)

The following controls/treatments are recommended for all reserves:

- Regulate use of fire by reserve users, e.g. prohibit lighting of fires in the reserves by the public.
- Maintain mandated clearance distances around power lines.
- Regulate machinery use and hot works during the Fire Danger Period.
- Undertake post-fire rehabilitation as required.

The current risk ratings are dependent on the maintenance of the risk controls currently in place; a reduction in fire protection works or significant re-vegetation may change the risk profile of some reserves. The decision to implement additional risk treatments or enhance existing controls should be based on a cost-benefit analysis and Frankston City Council's comfort with the level of assessed risk. Fire management decisions need also to recognise the biodiversity/conservation value of the natural reserves and the requirements of applicable environmental legislation such as the Flora and Fauna Guarantee Act.

1.5.4 Documentation

It is recommended that the current practice of maintaining detailed Fire Management Plans for Group 1 reserves and succinct Fire Management Statements that document the fire protection controls in place for each Group 2 reserve, or cluster of adjacent reserves, be continued. The Fire Management Statement would inform broader management plans for these reserves by identifying existing APZs that protect adjacent properties and other areas unsuitable for re-vegetation.

It is also recommended that a process be formalised to ensure re-vegetation and other environmental enhancement works, which could affect fire hazard in natural reserves, take into account the need to maintain low threat setbacks or APZs immediately adjacent to dwellings and other applicable built assets. In Group 1 reserves this process may take the form of establishing an interim APZ that is refined and comfirmed during the 5-yearly review of the FMP, which is expected to occur before the reestablishing vegetation becomes a significant bushfire hazard. In Group 2 and 3 reserves, an APZ of up to 6 m or 3 m respectively will be established, depending on the setback of the building from the reserve boundary, and the area beyond the APZ revegetated.

Section A
Introduction, Context and Methodology

2 Introduction

2.1 The task

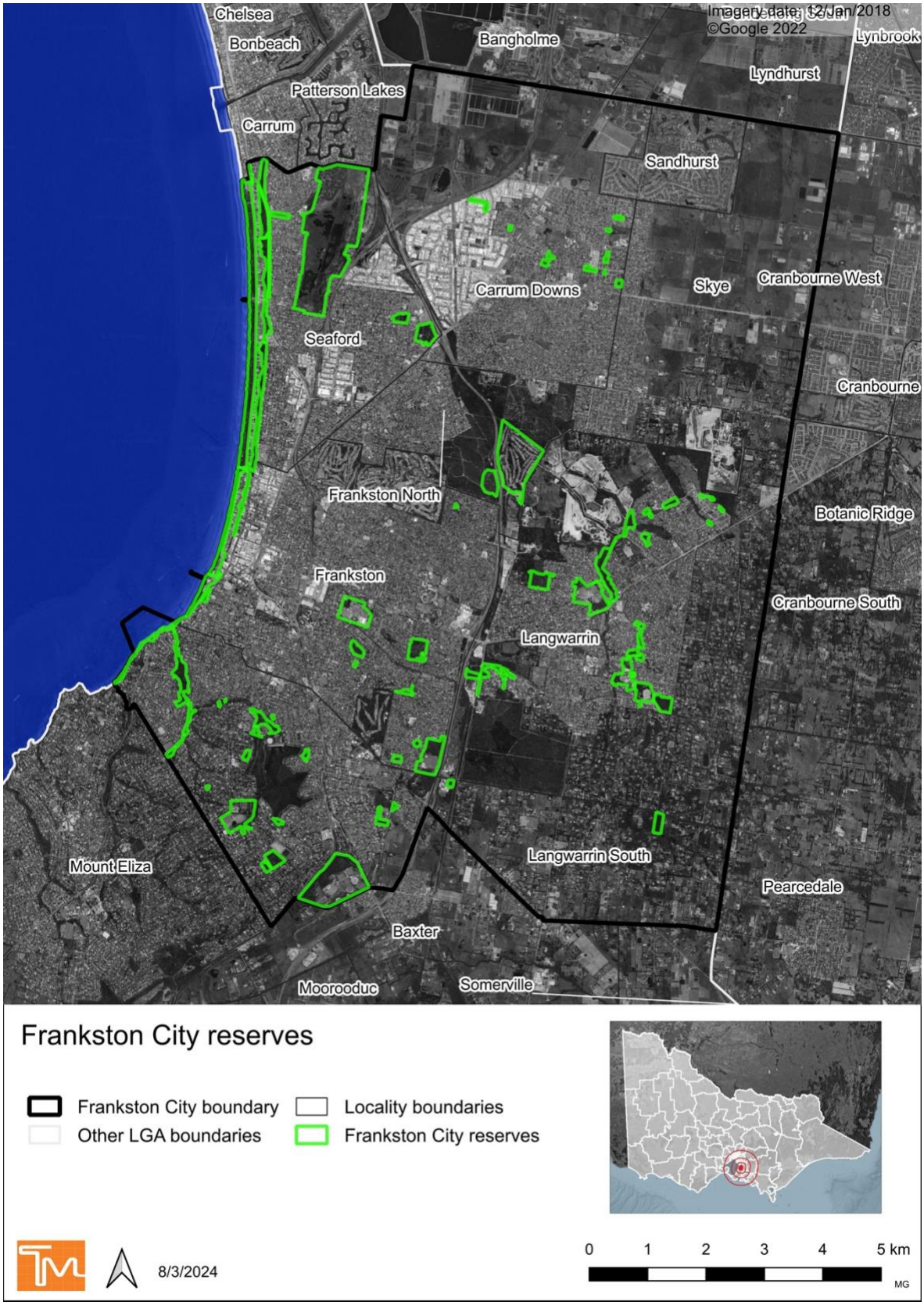
Terramatrix were commissioned by Frankston City Council to update the 2013 *Natural Reserves Bushfire Management Strategy* (the Strategy) that provides a framework for managing fire risk in natural reserves within the Frankston LGA. The Strategy aims to provide a consistent approach to fire management in natural reserves across the municipality, to meet public safety, environmental care, community and organisational expectations.

The reserves considered by the Strategy are listed in Table 6 and shown in Map 1.

Table 6 - Reserves included in the Strategy.

Name	Location
Carrum Downs	
Banjo Rise Nature Reserve	Banjo Boulevard, Carrum Downs
Carrum Woods Nature Reserve	Carrum Woods Drive, Carrum Downs
Clifton Grove Reserve	Clifton Park Drive, Carrum Downs
Colemans Reserve	Colemans Road, Carrum Downs
Oakwood Reserve	Oakwood Drive, Carrum Downs
Solferino Reserve	Crimson Crescent, Carrum Downs
Songlark Link Conservation Reserve	Songlark Crescent, Carrum Downs
Wattlewood Bushland Reserve	William Road, Carrum Downs
Wilton Bushland Reserve	McCormicks Road, Carrum Downs
Frankston	
Bunarong Park	Wattle Tree Lane, Frankston
Esplanade Reserve	Esplanade, Frankston
Franciscan Reserve	Franciscan Avenue, Frankston
Frankston Foreshore	Gould Street, Frankston
Jubilee Park	Hillcrest Road, Frankston
Kananook Creek Reserve	Gould Street, Frankston
Kooluna Reserve	Naroo Place, Frankston
Outlook Reserve	Heatherhill Road, Frankston
Raphael Reserve	Franciscan Avenue, Frankston
Shaxton Circle	Shaxton Circle, Frankston
Wallace Reserve	Wallace Avenue, Frankston
Witternberg Reserve & Robinsons Park	Robinsons Road, Frankston
Frankston North	
Cell 3 Pines Flora & Fauna Reserve	Excelsior Drive, Frankston North
Centenary Park Golf Course	Centenary Park Drive, Frankston North
Frankston South	
18R Marcus Road Reserve	Marcus Road, Frankston South
Baxter Park	Frankston-Flinders Road, Frankston South

Name	Location
Casuarina Reserve	Casuarina Drive, Frankston South
Derinya Reserve	Derinya Drive, Frankston South
Escarpment Bushland Reserve	Stotts Lane, Frankston South
Lawson Reserve	Culcairn Drive, Frankston South
Lower Sweetwater Creek Reserve	Fenton Crescent, Frankston South
Mulgra Reserve	Mulgra Street, Frankston South
Olivers Hill Foreshore	Nepean Highway, Frankston South
Overport Park	Overport Road, Frankston South
Paratea Flora & Fauna Reserve	Paratea Avenue, Frankston South
Rinella Reserve	Rinella Court, Frankston South
Stotts Bushland reserve	Stotts Lane, Frankston South
Tangenong Creek Reserve	Baden Powell Drive, Frankston South
Upper Sweetwater Creek Reserve	Caladenia Circuit, Frankston South
Yuille Street Reserve	Woolston Drive, Frankston South
Langwarrin	
Boggy Creek Link	Apple Berry Avenue, Langwarrin
Bonacci Reserve	Bonacci Place, Langwarrin
Cotoneaster Reserve	Gum Nut Drive, Langwarrin
Flame Robin Reserve	North Road, Langwarrin
Gumnut Bushland Reserve	Potts Road, Langwarrin
Hafey Wetlands	Hafey Way, Langwarrin
Illawong Reserve	Cotoneaster Way, Langwarrin
Langwarrin Equestrian Reserve	Cozy Valley Road, Langwarrin
Lexton Reserve	Lexton Drive, Langwarrin
Lloyd Park	Cranbourne-Frankston Road, Langwarrin
Monique Bushland Reserve	Monique Drive, Langwarrin
North Reserve	North Road, Langwarrin
Park Valley Reserve	Park Valley Crescent, Langwarrin
Pobblebonk Wetlands Reserve	McClelland Drive, Langwarrin
Serenity Reserve	Serenity Drive, Langwarrin
Southgateway reserve	Southgateway, Langwarrin
Stevens Reserve	Stevens Road, Langwarrin
Stringybark Bushland Reserve	Centre Road, Langwarrin
Studio Park	Poplar Grove, Langwarrin
Langwarrin South	
Robinsons Bushland Reserve (130R)	Robinsons Road, Langwarrin South
Swampy Rise Wildlife Reserve	Robinsons Road, Langwarrin South
Seaford	
Armstrongs Reserve	Railway Parade, Seaford
Austins Reserve	Austin Road, Seaford
Belvedere Bushland Reserve	Ti-Tree Crescent, Seaford
Nepean Gateway Reserve	Nepean Highway, Seaford
Seaford Foreshore	Nepean Highway, Seaford
Seaford Wetlands	Austin Road, Seaford



Map 1 - Location of Frankston City Council reserves considered in the Strategy.

2.2 The Strategy

2.2.1 Objectives

The objectives of the Strategy are to:

- Provide a consistent risk-based approach to fire management across the Frankston City natural reserves.
- Document a suite of fire management treatments that will achieve the Frankston City Council's legislative fire management obligations, whilst minimising any adverse environmental impact.

The Strategy uses a consistent risk-based methodology to develop a best practice approach to fire management in natural reserves. This is achieved by conducting a high-level assessment of the risk to the community from a bushfire within each natural reserve. Based on this high-level assessment, each reserve is then assigned to a group (1-3) based on their physical and risk characteristics and the assessed priority for fire management. Each group then has a suite of treatment options commensurate to the priority level and risk characteristics of the reserve.

2.2.2 Scope

The Strategy considers risks to the local community from a bushfire within a natural reserve managed by Frankston City Council, in terms of possible impacts on people, buildings, infrastructure and environmental values.

Bushfire is defined as 'Unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective' (AFAC 2012). In this Strategy, the term is used to describe any unplanned fire, i.e. a fire of any size and with any level of potential to do harm.

For this Strategy, a natural reserve is defined as an area of Council-managed land which contains vegetation that occurred naturally in the municipality prior to European settlement.

The Strategy considers locally ignited bushfires that start within a natural reserve; landscape scale bushfires that may burn into the reserve; and the potential for bushfires to burn out from a reserve into the wider landscape.

Bushfires are considered occurring under a Fire Danger Rating (FDR) of Catastrophic. This rating is equivalent to the old forest fire danger index (FFDI) of 100 or grassland fire danger index (GFDI) of 130 that are the fire weather assumptions used in the Victorian land use planning and building regulations for bushfire.

The Strategy assigns each reserve to a group (1-3) based on their physical and risk characteristics and assessed priority for fire management. Each group has a consistent set of management actions, commensurate with the priority level.

The management actions applied to each group aim to reduce the impact of fire on people, property and the environment to an acceptable level, rather than focussing on the hazard alone. This approach is consistent with the hazard mitigation principles set out in the State Emergency Management Plan – Bushfire Sub-Plan (EMV 2023).

The Strategy is intended to act as a resource to assist Frankston City Council make high quality decisions about fire management in the reserves they manage. It should be recognised that there are many considerations, other than bushfire, when making reserve management decisions, for example biodiversity conservation, land/soil stability, amenity value etc. The relative priority given to fire management should reflect the assessed level of risk.

The Strategy does not constitute a fire management plan for each of the reserves, nor is it a works plan. These documents are to be developed or reviewed separately where required; but should be underpinned and guided by the assessment and information in this Strategy.

2.2.3 Stakeholders and communication

Consultation with key stakeholders is critical to ensuring the Strategy reflects the needs and objectives of Council and addresses any ongoing issues around fire management.

The Strategy was developed with Frankston City Council, in particular representatives from the Natural reserves team, Emergency Management team and Municipal Fire Prevention Officer.

Stakeholders external to Frankston City Council that have been, or who will be, consulted regarding the Strategy include:

- Country Fire Authority (CFA).
- Fire Rescue Victoria (FRV).
- Forest Fire Management Victoria (FFMV).
- Parks Victoria (PV).
- Frankston Municipal Emergency Management Planning Committee (Frankston MEMPC).

Terramatrix recommend Frankston City Council have the Strategy endorsed by the Frankston MEMPC prior to it being officially adopted.

Other stakeholders who, although not involved in the Strategy, may be impacted by it, include:

- Service providers (electricity, gas, water, communications, transport, etc.).
- Adjacent and nearby landholders and land managers.
- Volunteer groups for reserves (where they exist).
- Reserve users including sporting groups.
- Wider Frankston community.

It is recommended that Frankston City Council consider involving them in reserve fire management, particularly when developing individual reserve management plans.

2.2.4 Information sources

The *Natural Reserves Bushfire Management Strategy 2023* was informed by:

- Review of existing documentation, including 2013 Strategy.
- Discussion with relevant Frankston City staff.
- Site inspection of natural reserves covered by the Strategy.

Documents reviewed included:

State

- *Victorian State Emergency Management Plan – Bushfire Sub-Plan* (EMV 2023)

Regional

- *Metropolitan Bushfire Management Strategy 2020* (DELWP 2020)
- *Regional Bushfire Planning Assessment – Melbourne Metropolitan Region* (DPCD 2012)
- *Joint Fuel Management Program* (FFMV 2023)

Municipal

- *Community Vision 2040* (Frankston City Council no date a)
- *Greening Our Future – Frankston City's Environment Strategy 2014-2024* (Frankston City Council no date b)
- *Frankston's Biodiversity Policy* (Frankston City Council 2018)
- *Frankston's Biodiversity – A Discussion Paper* (Frankston City Council no date c)
- *Biodiversity Action Plan 2021-2036* (Frankston City Council 2021 b)
- *Frankston's Urban Forest Policy* (Frankston City Council no date d)
- *Urban Forest Action Plan 2020-2040* (Frankston City Council no date e)
- *Climate Change Impacts and Adaptation Plan – Preparing for a changed climate* (Frankston City Council 2011)
- *Municipal Emergency Management Plan* (FMEMPC 2022)
- *Frankston City Council Natural Reserves Bushfire Management Works Study* (Ecotide 2015)
- *Natural Reserves within Frankston City* (Frankston City Council 2017).

Reserve

- *Bunarong Park – Proposed Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2010 a)
- *Fire Prevention and Preparedness – Bunarong Park Reserve* (Frankston City Council no date f)
- *Kananook Creek Reserve Fire Management Zones Audit* (Practical Ecology 2015 a)
- *Fire Prevention and Preparedness – Kananook Creek Reserve* (Frankston City Council no date g)
- *Fire Prevention and Preparedness – Lexton, Little Boggy Creek and Stevens Reserves* (Frankston City Council no date h)
- *Lexton Bushland Reserve and Little Boggy Creek Reserve – Natural Reserves Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2012 a)

- *Lower Sweetwater Creek Reserve – Proposed Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2010 b)
- *Fire Prevention and Preparedness – Lower Sweetwater Creek Reserve* (Frankston City Council no date i)
- *Upper Sweetwater Creek Reserve – Proposed Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2010 c)
- *Fire Prevention and Preparedness – Upper Sweetwater Creek Reserve* (Frankston City Council no date j)
- *Monique Reserve Fire Management Zones* (Practical Ecology 2016 a)
- *Fire Prevention and Preparedness – Monique, Park Valley and South Gateway Reserves* (Frankston City Council no date k)
- *Paratea Reserve – Proposed Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2010 d)
- *Fire Prevention and Preparedness – Paratea Reserve* (Frankston City Council no date l)
- *Seaford Wetlands Fire Management Plan* (Terramatrix 2013 a)
- *Fire Prevention and Preparedness – Seaford Wetlands* (Frankston City Council no date m)
- *Stringybark/North Road Reserve Interim Fire Management Plan* (Terramatrix 2013 b)
- *Fire Prevention and Preparedness – Stringybark Reserves* (Frankston City Council no date n)
- *Studio Park – Proposed Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2010 e)
- *Studio Park Fire Management Zones Audit* (Practical Ecology 2015 b)
- *Fire Prevention and Preparedness – Studio Park Reserve* (Frankston City Council no date o)
- *Belvedere Bushland Reserve – Natural Reserves Fire Management Zones* (Terramatrix and Indigenous Design Land Management 2012 b)
- *Fire Management Plan Boggy Creek Link Reserve* (Practical Ecology 2021)
- *Fire Management Plan Flame Robin and Acacia Heath Estate Reserves* (Terramatrix 2019)
- *Frankston and Seaford Foreshore Fire Management Plan* (Terramatrix 2014)
- *Fire Management Plan & Ecological Assessment – Swampy Rise* (Practical Ecology 2020)
- *Park Valley Reserve Fire Management Zones* (Practical Ecology 2016 b)
- *South Gateway Reserve Fire Management Zones* (Practical Ecology 2015 c)

2.2.5 Structure and outputs

The Strategy provides the legislative context, an overview of the elements of bushfire hazard and risk in the Frankston LGA, a high-level risk assessment and a ‘toolbox’ of fire management actions relevant to natural reserves, and appendices that support the risk assessment methodology.

3 Fire management planning context

3.1 Legislation

Note - Statutory requirements may change and Frankston City Council should access the source documents rather than rely on this Strategy to be an authoritative source. This Strategy is not an audit of legislative or regulatory compliance.

3.1.1 Country Fire Authority Act, 1958

The Country Fire Authority (CFA) Act 1958 is the principal fire prevention legislation applying to the country area of Victoria (see Map 2). The CFA has a general duty of taking, superintending and enforcing all necessary steps for the prevention and suppression of fires within the country area of Victoria (CFA Act s.20).

Frankston City Council has statutory responsibilities for bushfire prevention under the CFA Act, 1958: '…it is the duty of every municipal council and public authority to take all practicable steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from –

- Any land vested in it or under its control or management; and
- Any road under its care and management' (CFA Act s.43(1)).

The CFA Act requires Council to appoint a Municipal Fire Prevention Officer (MFPO) (CFA Act s.96A).

Section 41 states that the MFPO can serve a fire prevention notice (FPN) on the owner or occupier of land within the municipal district of the Council. This excludes public authorities (a municipal council is not considered a public authority under the Act). An FPN may be served if the MFPO forms the opinion that:

- It is necessary, or may become necessary, to do so to protect life or property from the threat of fire; and
- There is no procedure under any other Act or regulation made under any Act that is more appropriate in the circumstances to address that threat (CFA Act s.41(2)).

The CFA Act also empowers CFA brigades to undertake fire prevention works, including planned burning, at the request of the owner or occupier of land (CFA Act s.42(1)(a)) or a municipal council or public authority that owns or manages land (CFA Act s.42(1)(c)).

3.1.2 Fire Rescue Victoria Act, 1958

The Fire Rescue Victoria (FRV) Act 1958 is the principal fire prevention legislation applying to the Fire Rescue Victoria fire district (see Map 2). One of the core functions of FRV is to provide for fire suppression and fire prevention services in the FRV fire district (FRV Act s.7(1)(a)).

The fire prevention provisions of the FRV Act are broadly consistent with those of the CFA Act.

Frankston City Council has statutory responsibilities for bushfire prevention under the FRV Act, 1958:

'…it is the duty of every municipal council and public authority to take all practicable steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from –

- Any land vested in it or under its control or management; and
- Any road under its care and management' (FRV Act s.5(1)).

The FRV Act also requires Council to appoint a Municipal Fire Prevention Officer (MFPO) (FRV Act s.5A).

Section 87 states that the MFPO can serve a fire prevention notice (FPN) on the owner or occupier of land within the municipal district of the Council. This excludes public authorities (a municipal council is not considered a public authority under the Act). An FPN may be served if the MFPO forms the opinion that:

- It is necessary, or may become necessary, to do so to protect life or property from the threat of fire; and
- There is no procedure under any other Act or regulation made under any Act that is more appropriate in the circumstances to address that threat (FRV Act s.87(2)).

The FPN will specify what steps the owner or occupier of the property are to take to remove or minimise the threat of fire.

3.1.3 Forests Act, 1958

DEECA are the control agency for bushfire in State forest, national parks, and protected public land declared under Sections 62(1) or (1A) of the Forests Act, 1958, which includes certain land managed by Parks Victoria.

Section 62(2) requires the Secretary of the Department (through the Chief Fire Officer) to carry out proper and sufficient work in State forests, national parks and on protected public land for the immediate prevention and suppression of fire; and for the planned prevention of fire. These services are delivered by Forest Fire Management Victoria (FFMV), comprising staff from DEECA, Parks Victoria, Melbourne Water and VicForests, in partnership with the other fire agencies.

3.1.4 Emergency Management Act, 2013

The *Emergency Management* (EM) *Act* 2013 defines most of Victoria's emergency management structure, establishes governance arrangements and an emergency management planning framework at State, regional and municipal levels (EM Act s.5).

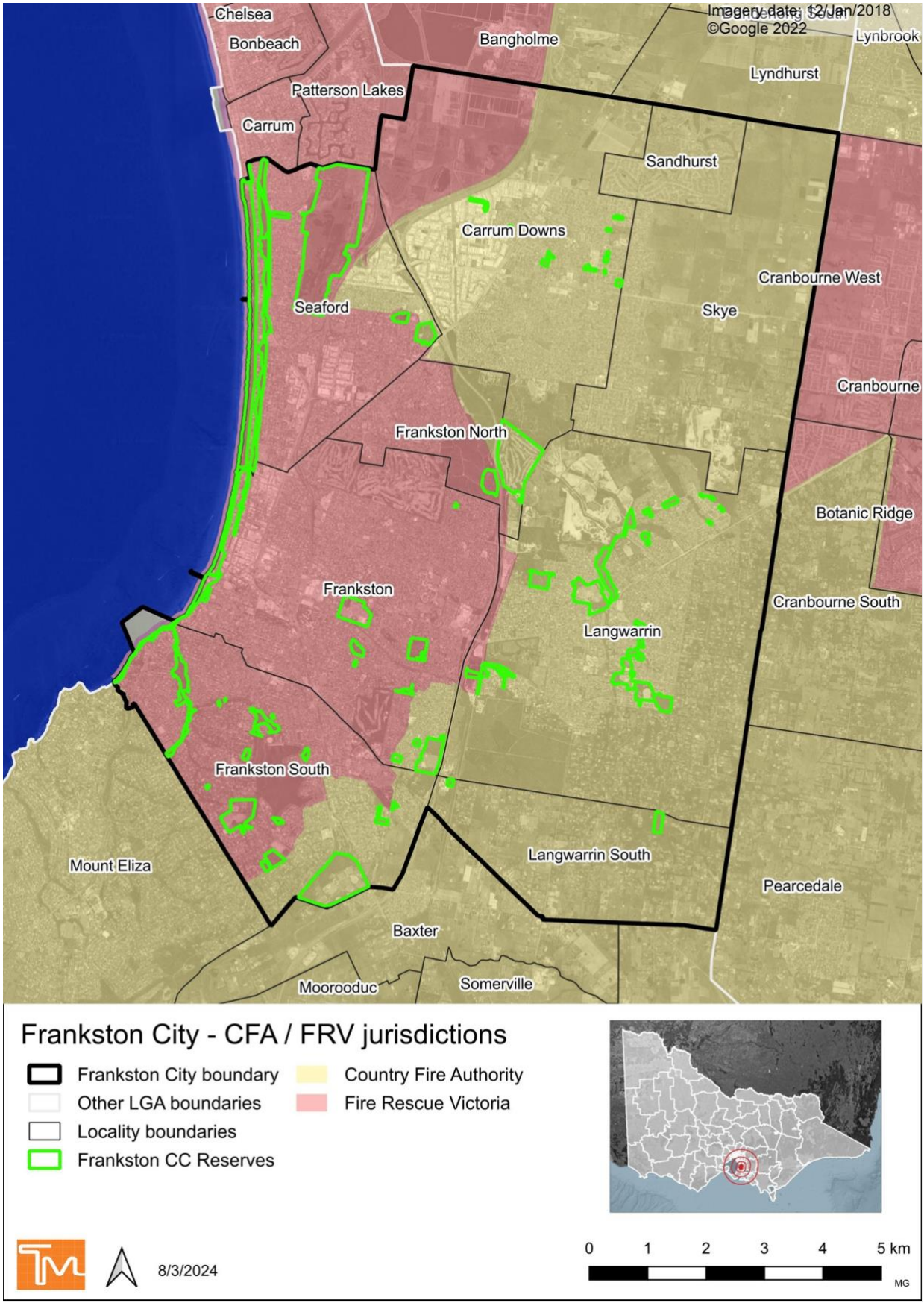
The Act requires the preparation of the State Emergency Management Plan, which provides for an integrated and comprehensive approach to emergency management across the phases of mitigation, planning, preparedness, response and recovery (EMV 2023a).

Under the State Emergency Management Plan, municipal councils have a role in 'landscape fuel management, including legislative requirements' (EMV 2023a, Table).

Section 59 of the EM Act requires a municipal council to appoint a Municipal Emergency Planning Committee comprising relevant council staff, representatives of response and recovery agencies and local community groups involved in emergency management issues (EM Act s.59(A)(1)). The municipal council is to prepare and maintain a municipal emergency management plan (MEMP) (EM Act s.59D; s.60ADB(1)) that provides for the mitigation of emergencies, response to emergencies, recovery from emergencies and specifies the roles and responsibilities of agencies in relation to emergency management (EM Act s.60AE).

3.1.5 Summary Offences Act, 1966

Section 11 of the *Summary Offences Act* 1966 regulates the lighting of fires in the open air at times other than during the declared Fire Danger Period or on Total Fire Ban days.



Map 2 – Coverage of Frankston LGA by CFA and FRV.

3.1.6 Environmental protection legislation

Council planning and undertaking fire management activities must also be cognisant of applicable environmental legislation. These Acts may include:

- *Planning and Environment Act* 1987.
- *Environment Protection and Biodiversity Conservation Act* 1999 (Federal Act).
- *Flora and Fauna Guarantee Act* 1988.
- *Wildlife Act* 1975.
- *Catchment and Land Protection Act* 1994.
- *Environment Protection Act* 1970.

Fire managers should strive to limit detrimental environmental impacts by applying the principles of *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) of avoid, minimise, offset. When planning fire prevention activities, avoid damage wherever possible. If damage cannot be avoided, then the effects should be minimised through appropriate planning and management of the fire prevention activity.

The purpose of Clause 52.17 *Native Vegetation* of the Frankston Planning Scheme is 'to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'. A permit is required to remove, destroy or lop native vegetation, including dead vegetation. Several exemptions relevant to fire management in reserves are provided, including: 'Native vegetation that is to be removed, destroyed or lopped to the minimum extent necessary to carry out the following fire protection activities:

- Fire fighting;
- Planned burning;
- Making or maintenance of a fuel break or firefighting access track (or any combination thereof) that does not exceed a combined width of 6 metres;
- Making a strategic fuelbreak up to 40 metres wide by, or on behalf of, a public authority in accordance with a strategic fuelbreak plan approved by the Secretary to the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the Conservation, Forests and Lands Act 1987);
- In accordance with a fire prevention notice issued under either:
    - Section 65 of the *Forests Act* 1958; or
    - Section 41 of the *Country Fire Authority Act* 1958.
- Keeping native vegetation clear of, or minimising the risk of bushfire ignition from, an electric line in accordance with a code of practice prepared under Part 8 of the *Electricity Safety Act* 1998;
- Minimising the risk to life and property from bushfire on a roadside of a public road managed by the relevant responsible road authority, and carried out by or on behalf of that authority, in accordance with the written agreement of the Secretary to the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the *Conservation, Forests and Lands Act* 1987). In this exemption, roadside, road, public road and responsible road authority have the same meanings as in Section 3 of the *Road Management Act* 2004.'

Emergency works do not require a permit where the native vegetation presents an immediate risk to personal injury or damage to property and only that part of the vegetation is removed; or by or on behalf of a public authority or municipal council to create emergency access or to enable emergency works.

The exemptions do not apply to vegetation protected by legal agreement or covenant, such as those established under Section 173 of the *Planning and Environment Act* 1987, Section 69 of the *Conservation, Forests and Lands Act* 1987 or a covenant applied under Section 3A of the *Victorian Conservation Trust Act* 1972. Even if the exemption applies to the proposed works, a permit or approval may still be required under other legislation (for example the *Flora and Fauna Guarantee Act* 1988 and the *Environmental Protection and Biodiversity Act* 1987).

Whilst the planning provisions provide circumstances under which native vegetation can be removed without a permit, it is recommended that Frankston City Council consult their planning department to determine whether a planning permit is required, particularly for new or enhanced works, under the Frankston Planning Scheme or other State or Federal legislation.

3.2 Links to broader strategy

3.2.1 State Emergency Management Plan – Bushfire Sub-Plan

The Bushfire Sub-Plan acknowledges bushfire as a 'State significant risk' and outlines the arrangements for managing bushfires in Victoria (EMV 2023 b). The guiding principles are relevant to bushfire management across the State:

'Leadership

The EMC and the fire services are accountable, on behalf of the Victorian Government, for leading other agencies, the community and individuals to make appropriate arrangements to reduce the impact and consequence of bushfire.

Protection of human life

As per the State Emergency Management Priorities, the protection and preservation of human life and relief of suffering, which includes the lives of both community members and emergency services personnel, takes priority above all other considerations in bushfire management.

Responsibility for building resilience

Bushfires are inevitable and not all bushfires are preventable. All levels and sectors of society share responsibility, within their sphere oof influence, for building a more resilient community and environment that can prevent, respond to and recover from bushfire.

Community involvement
Community involvement is essential to ensure bushfire management approaches are inclusive, integrated, and comprehensive across diverse communities and landscapes.

A seamless approach
The fire agencies work together with EM sector partners, using resources efficiently and effectively, to provide the community with a seamless approach to all aspects of bushfire management.

Risk-driven
Plans and priorities for bushfire management should aim to ensure a measurable reduction in the impact and consequences of bushfire.

Learning and knowledge
Local knowledge, experience, and operational and scientific evidence are all integral to the ongoing improvement of bushfire management policy and practice' (EMV 2023 b).

These principles are reflected in the Natural Reserves Bushfire Management Strategy.

Councils are listed as being responsible for fire hazard mitigation on Council managed land, as well as regulating fire hazards on private land, being the responsible authority for the municipal planning scheme, and supporting fire response and recovery.

3.2.2 Metropolitan Bushfire Management Strategy 2020

The *Metropolitan Bushfire Management Strategy 2020* identifies and quantifies the risk from bushfire to values and assets across the landscape; and, to the extent possible, considers future trends. It sets objectives and documents an approach to managing the risk, primarily by establishing landscape zones that focus fuel management activities to deliver bushfire risk reduction and ecological outcomes (DELWP 2020).

The *Metropolitan Bushfire Management Strategy 2020* supports the Victorian Preparedness Goal of: 'A safer and more resilient community that has the capabilities to withstand, plan for, respond to and recover from emergencies that pose the greatest risk' (DELWP 2020).

Strategic objectives have been established by the *Code of Practice for Fire Management on Public Land* (DELWP 2022):

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

The Metropolitan region objectives are:

Human life, communities and economies

- To minimise the loss of human life, houses and properties.
- To minimise disruption to essential services and critical infrastructure.
- To minimise the social impacts of bushfires and fire management actions.
- To increase community understanding and ownership of bushfire risk management.

Cultural heritage

- To minimise the impacts of bushfires and fire management actions on cultural heritage.

Biodiversity and ecosystem resilience

- To maximise the persistence of ecological communities and species.
- To minimise declines in threatened species and communities.
- To minimise declines in plant and animal populations including threatened species and communities from bushfires and fire management actions.
- To avoid declines in carbon storage.
- To maximise water yield and quality.

An output of the 2020 Strategy is the identification of Bushfire Risk Engagement Areas (BREA), which are parts of the landscape where managing fuel will be most effective in reducing bushfire risk (DELWP 2020). There are small BREAs associated with public land in the north and south of the municipality.

The *Natural Reserves Bushfire Management Strategy* supports the achievement of the Metropolitan bushfire management objectives in the context of the Frankston City natural reserves.

3.2.3 Living Melbourne: Our Metropolitan Urban Forest

This is a strategy to achieve a greener, more liveable Melbourne through the enhancement of an urban forest comprising all the trees, shrubs, grasses, soil and water on public and private land across metropolitan Melbourne (The Nature Conservancy and Resilient Melbourne 2019). The urban forest cleans the air, reduces damaging urban heating and provides valuable habitat for flora and fauna (The Nature Conservancy and Resilient Melbourne 2019).

The strategy has been endorsed by 32 metropolitan councils, state government agencies, non-government and community organisations, including Frankston City Council.

The strategy articulates the vision that ‘our thriving communities are resilient, connected through nature’ and that ‘our urban forest protects human health, nurtures abundant nature, and strengthens natural infrastructure’. Six actions are recommended to achieve a range of beneficial outcomes including:

- Reduced habitat fragmentation.
- Increased habitat connectivity and created corridors.

- Increased public access to open space and shade.
- Reduced heat exposure and the harm it causes.
- Increased the percentage of public and private land that has canopy cover.
- Created cooler urban landscapes.
- Improved soil moisture, water quality and flood management through water-sensitive urban design (The Nature Conservancy and Resilient Melbourne 2019).

The strategy recognises that urban forests need to be managed to reduce risks such as fire and that there are diverse community attitudes to trees and vegetation and Councils need to manage community feedback on real or perceived risks (The Nature Conservancy and Resilient Melbourne 2019).

Frankston City have an Urban Forest Policy and Action Plan 2020-2040 (see Section 3.3.6).

3.3 Municipal strategy, plans and arrangements

3.3.1 Community Vision 2040

The Frankston City Community Vision 2040 is the community's long-term vision and aspirations for the future of the municipality. The community vision is 'Frankston City 2040 is the place on the bay to learn, live, work and play in a vibrant, safe and culturally inclusive community. Our City is clean, green and environmentally responsible' (Frankston City Council no date a).

Frankston's estate of natural reserves contributes to achieving:

- Theme 1 Healthy families and communities – which recognises the importance of access to green space to health and wellbeing.
- Theme 3 Natural environment and climate action – which undertakes to protect and enhance environmental values.

Relevant key priorities include:

- Commitment to greening Frankston City through native tree planting to double tree canopy by 2040.
- Increasing and enhancing open green space.
- Creating more green spaces in urban areas (Frankston City Council no date a).

3.3.2 Biodiversity Policy

The policy provides a framework for making decisions about the management of biodiversity assets within the municipality to increase healthy ecosystem coverage, quality and connectivity (Frankston City Council 2018). It describes the following principles:

- Protect and enhance biodiversity assets.
- Avoid, minimise and mitigate adverse impact to biodiversity assets.
- Protect threatened species.
- Enhance connectivity.
- Encourage replanting.
- Community consultation, education and engagement.

- Management practices that maintain the values of the natural reserves (Frankston City Council 2018).

3.3.3 Greening Our Future – Frankston City's Environment Strategy 2014-2024

The Strategy provides an overarching framework for preserving and protecting the environment of the City of Frankston.

The Strategy recognises the importance of Council managed parks and reserves to the amount of public open space in the municipality and identifies the opportunity to improve the amenity of open spaces through planting of native vegetation and to improve connectivity between open spaces. It also recognises bushfire protection as a cause of native vegetation loss (Frankston City Council no date b).

3.3.4 Climate Change Impacts and Adaptation Plan

The 2011 *Climate Change Adaptation Plan* (Frankston City Council 2011) states that the City of Frankston has 35.5 sq. km of bushfire prone land and acknowledges that 84%[2] of housing stock was constructed prior to the requirement to construct dwellings and certain other classes of buildings in bushfire prone areas to resist bushfire attack.

The *Climate Change Adaptation Plan* identifies the risk of more frequent bushfires (risk # 3.03) and rates this risk as High by 2015, High by 2030 and Extreme by 2070. Up to 14,000 people are potentially exposed, especially in the Langwarrin, Langwarrin South and Frankston South areas (Frankston City Council 2011). Climate induced changes to plant and animal species will affect biodiversity in natural reserves.

Fire Management Plans for natural reserves are identified as reducing the risk from bushfire, but increased pressure to remove vegetation from public land is anticipated. The increased emergency response demands on staff and resultant health and safety risks is also identified (Frankston City Council 2011).

3.3.5 Biodiversity Action Plan 2021-2036

The Frankston LGA contains approximately 1,900 ha of native vegetation, 60% of which is on publicly owned or managed land (Frankston City Council 2021 b). Frankston City natural reserves are home to 81 indigenous species, including 36 State listed fauna species and 8 listed flora species across multiple natural reserves.

Fauna species records were clustered around seven main areas:

- Edithvale-Seaford Wetland.
- The Pines Flora and Fauna Reserve.
- Langwarrin Flora and Fauna Reserve.
- Frankston Nature Conservation Reserve.

[2] It is not known if this is 84% of all dwellings in the municipality or of just those in a BPA.

- Boggy Creek.
- Kananook Creek.
- Langwarrin woodlands (predominantly private land).

Four priority habitat corridors connect major areas of bushland. These are:

- Corridor 1 – The Pines Flora and Fauna reserve to Royal Botanic Gardens Cranbourne.
- Corridor 2 – The Pines Flora and Fauna reserve to Langwarrin Flora and Fauna Reserve.
- Subsidiary Corridor 1 – The Pines Flora and Fauna reserve to Corridor 1 via Studio Park.
- Subsidiary Corridor 2 – Corridor 1 to the Langwarrin Woodlands.

Opportunities are identified to connect Frankston corridors to those in Mornington Peninsula Shire to the south.

The Biodiversity Action Plan includes conducting fire management works in natural reserves, including:

- Species selection and arrangement in revegetation programs.
- Maintenance practices in retaining habitat logs.
- Manual fuel reduction programs in high risk areas.
- Maintenance of fire breaks and management vehicle access tracks.
- Community and interagency liaison to share the responsibility for fire risk reduction across boundaries and prescribed burning programs (Frankston City Council 2021 b).

Planned burning is undertaken where there is an ecological benefit and is a critical element in protecting and enhancing Frankston's biodiversity assets and there may be some opportunity for cultural burning (Frankston City Council 2021 b).

3.3.6 Urban Forest Policy

Frankston City aim to have a resilient, healthy, and diverse urban forest providing benefits for the entire community. The policy provides a framework for making decisions about the management of all trees within the municipality. It covers tree preservation, tree removal and replanting, tree planting and selection, tree asset management and community consultation, education and engagement (Frankston City Council no date d).

3.3.7 Urban Forest Action Plan 2020 – 2040

This is a 20-year plan that applies to all trees within the municipality (Frankston City Council no date e). Of relevance to the natural reserve estate is an expectation that they may be sites for the planting of additional trees.

Potential increase in bushfire risk through re-vegetation is not mentioned in the Action Plan and no consideration is given to identifying appropriate sites to ensure to ensure bushfire risk is not increased. The planting of additional trees within natural reserves should be informed by the Fire Management Plans or Fire Management Statements and trees located so that they do not compromise fire protection measures, such as APZs or access tracks.

3.3.8 Roles and responsibilities

Frankston City Council has statutory responsibilities for emergency management and fire management within the LGA.

Key positions with responsibility for bushfire risk management planning for the City of Frankston reserves are:

- Coordinator Parks & Vegetation
- Emergency Management Officer.
- Municipal Fire Prevention Officer.

Work that contributes to fire management of Frankston reserves is undertaken by:

- Staff.
- Contractors.
- Volunteers.
- Other agencies – e.g. CFA, FRV, PV, FFMV, adjacent councils.

All Frankston City staff, contractors and volunteers have a role in implementing fire risk management controls applicable to their role and the work they undertake.

3.4 Fire management objectives

Strategic objectives for the *Natural Reserves Bushfire Management Strategy* are drawn from the *Code of Practice for Fire Management on Public Land* to ensure consistency across land tenure:

- To minimise the impact of major bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment. Human life will be afforded priority over all other considerations.
- To maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage and forest products (DELWP 2022).

The *Natural Reserves Bushfire Management Strategy* documents how relevant objectives from the *Metropolitan Bushfire Management Strategy 2020* will be applied in the context of the Frankston bushland reserves. In particular:

Human life, communities and economies

- To minimise the loss of human life, houses and properties.
- To minimise disruption to essential services and critical infrastructure.
- To minimise the social impacts of bushfires and fire management actions.
- To increase community understanding and ownership of bushfire risk management.

Cultural heritage

- To minimise the impacts of bushfires and fire management actions on cultural heritage.

Biodiversity and ecosystem resilience

- To maximise the persistence of ecological communities and species.
- To minimise declines in threatened species and communities.
- To minimise declines in plant and animal populations including threatened species and communities from bushfires and fire management actions.

To do this, the *Natural Reserves Bushfire Management Strategy* provides:

- A consistent risk-based approach to fire management planning across the Frankston natural reserves.
- An assessment of fire risk in the natural reserves.
- A suite of fire management treatments, commensurate to the varying level of risk across the bushland reserves
- A schedule for review and evaluation of fire risk management and the Strategy.

3.5 Bushfire risk assessment process

3.5.1 Objectives and scope of risk assessment

The objective is to assess risk to the Frankston City Council and community from the hazard of bushfire, so mitigation efforts can be determined and documented, and to demonstrate to key stakeholders that bushfire risk is being appropriately managed.

The scope of the bushfire risk assessment is:

- An external bushfire threatening or impacting a Frankston City natural reserve.
- A bushfire that starts within a Frankston City natural reserve.
- The impact that fire management works may have on the environmental values within the reserves.

The impact that unplanned fire may have on assets and other values within, adjacent to and beyond the boundary of natural reserves is assessed. The analysis considers the impact of a fire starting within a reserve, and of an established fire burning through the reserve if credible given the nature of that reserve.

The analysis is done in the context of a Catastrophic FDR under the new Australian Fire Danger Rating System. This is broadly analogous to the FFDI of 100 used in the Victorian planning and building controls for bushfire. It should be noted that some of the consequences described, such as burning of fire sensitive vegetation, could occur at much lower FDR; and that all consequences may be greater if a fire occurred under more extreme conditions.

3.5.2 Summary of process

The *Natural Reserves Bushfire Management Strategy* incorporates risk assessment and treatment planning undertaken in accordance with the process in the *National Emergency Risk Assessment Guidelines* (NERAG) (Attorney-General's Department 2015). NERAG provides a method to assess emergency related risks in an Australian context, which aligns with the international standard for risk management AS/NZS ISO 31000-2009.

The key steps of the risk assessment process are shown in Figure 1, with a brief description of each step provided in Table 7.

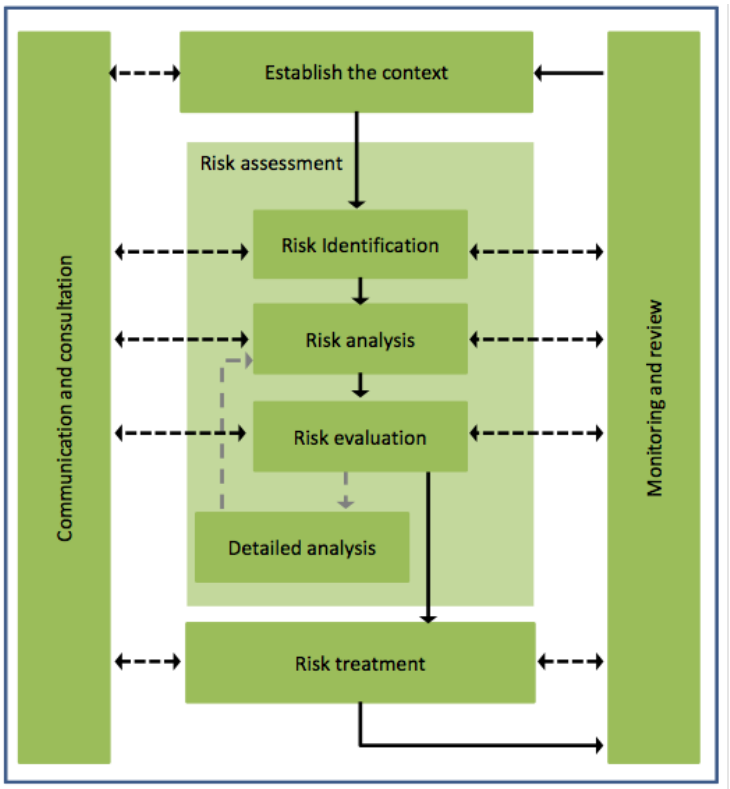


Figure 1 - The emergency-related risk management process. Source: NERAG (Attorney-General's Department 2015).

Table 7 - Key steps of the risk assessment process.

Establish the context	Sets the basic parameters within which bushfire risks associated with Frankston City natural reserves will be managed. Treatments were confined to those that could be reasonably implemented by Frankston City Council.
Identify risks	Sources of bushfire risk, possible causes, past events and potential consequences were identified by Terramatrix, and validated by Frankston City Council.
Analyse risks	The credible worst-case consequence and the associated likelihood for four impact categories (People, Assets/Economy, Environment and Public Administration) were determined to provide a risk rating. The risk rating was based on controls that currently exist and the level of confidence in the information used to support the risk rating process.
Evaluate risks	The assessment considered which risks require treatment, based on the level of risk and risk tolerability.
Treat risks	Treatments were defined for each source of risk, including continuation of existing risk controls.

This *Natural Reserves Bushfire Management Strategy* is structured around the risk management process.

3.5.3 Risk criteria

Risk criteria assist in deciding which risks need to be treated. Risk criteria comprise:

- Impact category.
- Consequence level.
- Likelihood level.
- Risk level.
- Confidence level.

The risk criteria used in this risk assessment are taken from the NERAG. Details of the risk criteria are provided in Appendix C.

The risk assessment uses four impact categories:

- People.
- Assets/Economy.
- Environment.
- Public administration.

The 'People' impact category describes death and injuries as a direct result of the emergency event, in this case a bushfire directly involving a Frankston City natural reserve.

The 'Assets/Economy' impact category focuses on the estimated cost of asset and revenue loss due to a bushfire in a Frankston City natural reserve.

The 'Environment' impact category describes damage to biodiversity and/or air and water quality as a result of a bushfire in a Frankston City natural reserve and of fire prevention works.

The 'Public administration' impact category focuses on the impact of a bushfire on the delivery of core functions of the Frankston City Council.

Likelihood is based on the probability of both the bushfire occurring and the estimated consequences occurring as a result of the event, given the risk controls currently in place. Current controls targeting the sources of risk were identified, and a risk rating assigned based on the residual risk.

3.5.4 Level of existing controls

A qualitative assessment of the efficacy of existing controls was used to determine the control strength and expediency. Controls were considered as a cluster working in concert to mitigate the consequence and/or likelihood of the risk, rather than assessed individually. As it is difficult to confidently assess the success of controls without a detailed evaluation process, the level of control is based on professional opinion and experience.

The NERAG (Attorney-General's Department 2015) criteria were used to assess the level of existing controls. The assessment considers the frequency, level of resourcing and expertise with which the control is implemented, as well as how effective the controls are at mitigating the risk. Details are provided in Appendix B.

3.5.5 Outputs

The risk assessment process provides:

- A documented risk context.
- A register of identified bushfire risks.
- An analysis of each risk that has determined the level of risk in terms of its likelihood, consequence, and confidence.
- An evaluation that assigns each risk a priority.
- A schedule of prioritised risks recommended for further treatment or monitoring.

4 Biophysical context

4.1 Location

Frankston is a predominantly urban municipality on the south-eastern outskirts of Melbourne, with major business activity centres and coastal suburbs. To the north are the mainly urban areas of the City of Kingston and the City of Greater Dandenong; whilst to the east is the City of Casey and to the south Mornington Peninsula Shire, both of which contain more rural residential areas and agriculture.

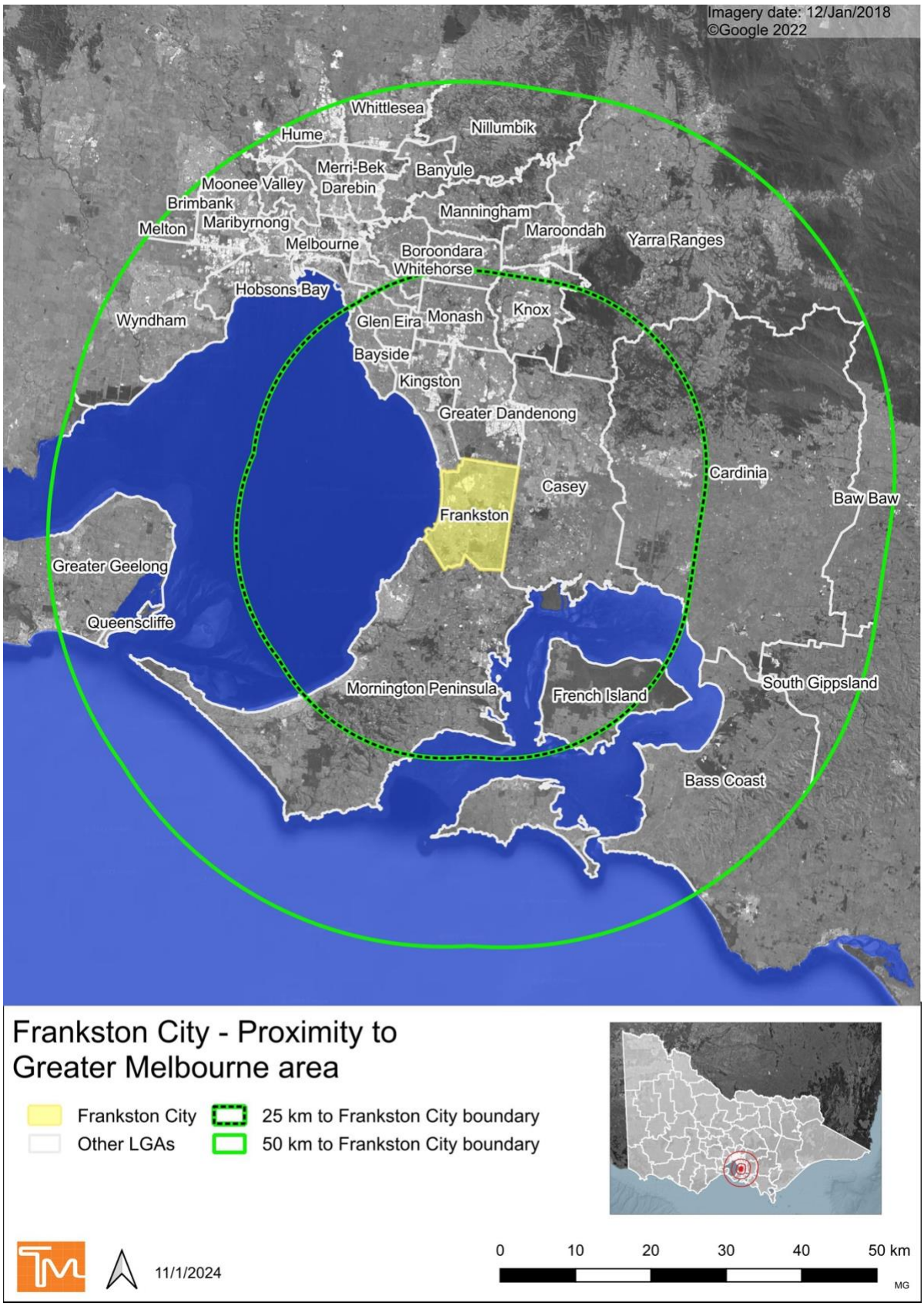
4.2 Demographics

The estimated resident population of the municipality in 2023 is 143,903 and is forecast to grow to 161,660 by 2041, which is more than 12% growth (forecast.id online). Frankston City has a slightly higher proportion of older people ('retirees' 60-69 years, 'seniors' 70-84 years and elderly 85 years or more) than Greater Melbourne as a whole (forecast.id online).

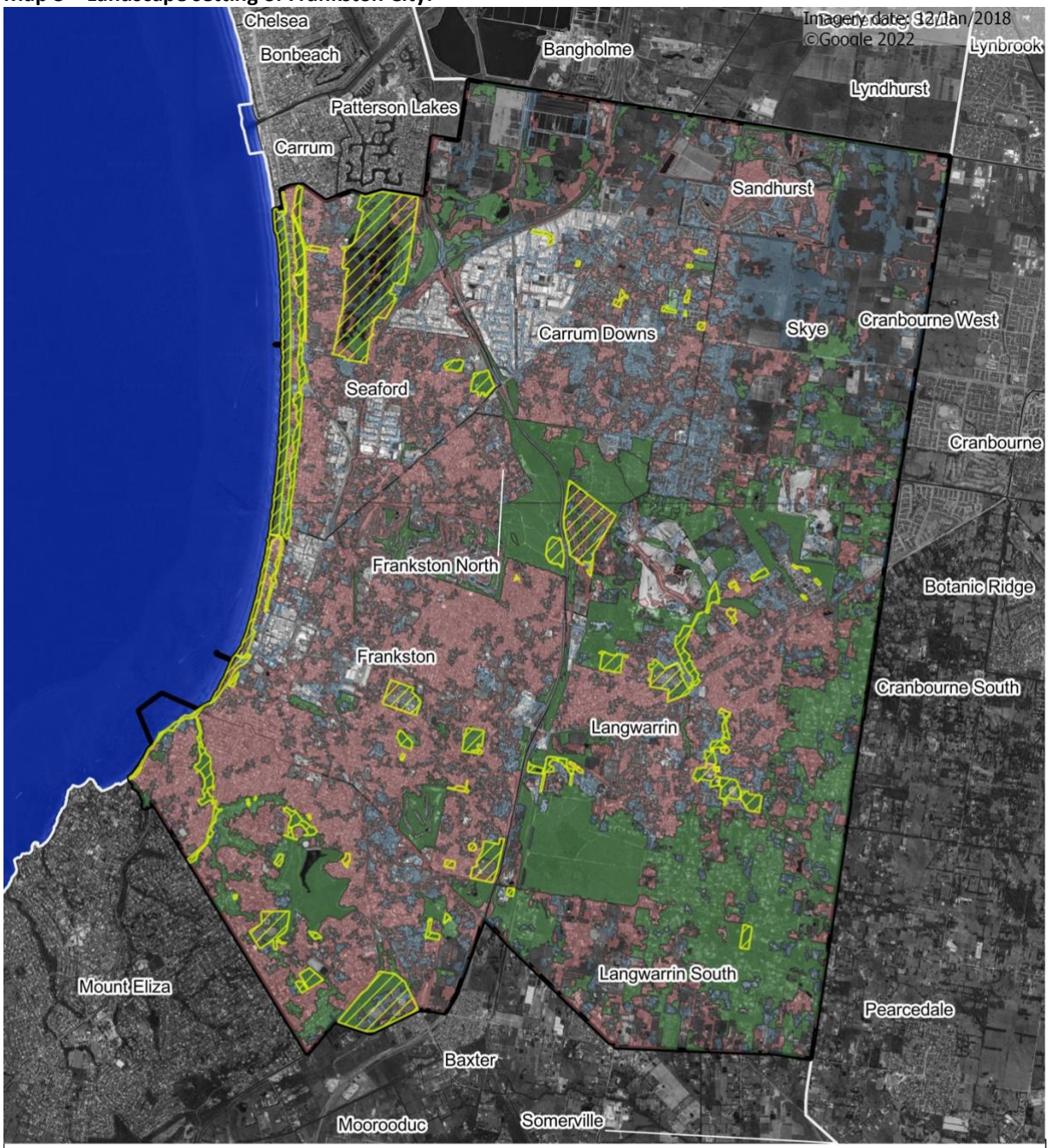
4.3 Topography

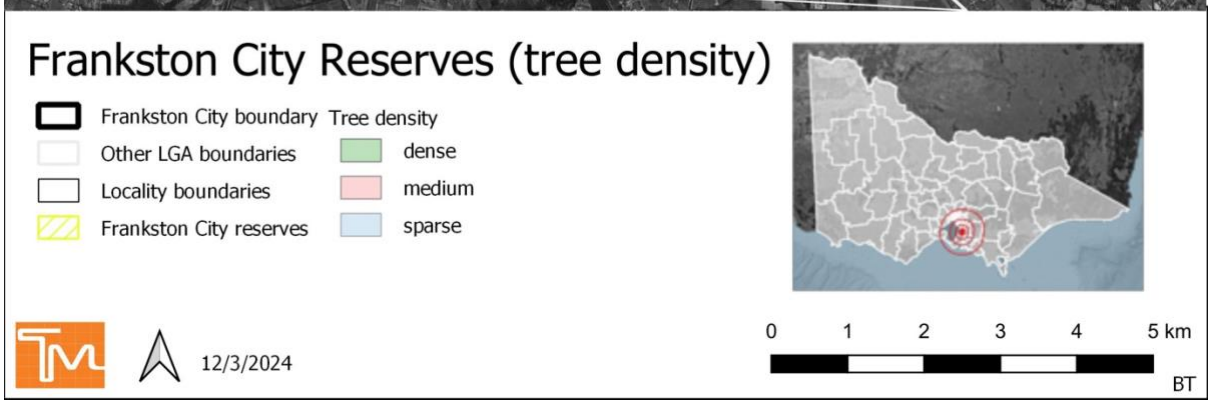
Frankston City is situated at the top of the Mornington Peninsula on the eastern shore of Port Philip Bay. The topography comprises a coastal dune system and stretches of cliff, such as Olivers Hill, (55 m ASL) in the west, giving way to a more undulating landscape with small hills in the east and south.

Seaford Wetlands is a major feature in the north of the municipality, whilst Kananook Creek, Boggy Creek and Sweetwater Creek and their tributaries drain into Port Philp Bay.


Imagery date: 12/Jan/2018
©Google 2022
Whittlesea
Nillumbik
Hume
Merri-Bek
Banyule
Moonee Valley
Darebin
Brimbank
Manningham
Melton
Maribyrnong
Maroondah
Yarra Ranges
Melbourne
Boroondara
Whitehorse
Hobsons Bay
Wyndham
Glen Eira
Monash
Knox
Bayside
Kingston
Greater Dandenong
Cardinia
Casey
Baw Baw
Frankston
Greater Geelong
Queenscliffe
Mornington Peninsula
French Island
South Gippsland
Bass Coast
Frankston City - Proximity to Greater Melbourne area
Frankston City
Other LGAs
25 km to Frankston City boundary
50 km to Frankston City boundary
11/1/2024
0
10
20
30
40
50 km
MG

Map 3 – Landscape setting of Frankston City.





Map 4 - Remnant tree cover in Frankston City.

4.4 Natural reserves

A key characteristic of Frankston City is the large areas of open space and the mix of urban and rural living. The municipality contains approximately 1,900 ha of remnant native vegetation, spread across both private and public land (Frankston City Council 2021 b). Frankston City manages 67 natural reserves of varying size, containing important remnants of the native vegetation that existed before urban development occurred, including an average of 81 indigenous species of flora and a diverse fauna (Frankston City Council 2021 b). The reserves range from small residential-lot sized reserves, through linear creek and foreshore reserves, to larger areas of bushland, in places contiguous to public land managed by Parks Victoria, totalling hundreds of hectares in area.

The natural reserves are valued for a multitude of reasons, including biodiversity conservation, recreation and amenity (Frankston City Council 2017); however, they can also pose a bushfire risk and fire management in these areas is an important responsibility of the land manager.

Of the 67 Council-managed natural reserves that are the subject of this Strategy, 51 are in the BPA and, of these, 32 are in the higher hazard areas covered by the BMO. The remaining 16 natural reserves are in an essentially urban setting that is not a BPA (see Map 7).

Many of the reserves occur along waterways, with the corridors of riparian vegetation broken up by the road network, sporting grounds or private residential properties into individual reserves. In several places, the Frankston reserves are part of a larger complex of vegetation managed by Parks Victoria and/or private landholders.

Fire management of the Frankston reserves is well established, including planned burning, perimeter APZs and other fuel management where appropriate to protect key assets, emergency service access, water supplies, and visitor signage, supported by active engagement with neighbouring residents.

4.5 Native flora and fauna

A range of State and Nationally significant flora, fauna and ecological communities listed as threatened under *the Victorian Flora and Fauna Guarantee Act* 1988 and the *Commonwealth Environmental Protection and Biodiversity Conservation Act* 1999 have been identified within Frankston City. These include 144 identified indigenous plant species, 37 of which are Regionally significant and 2 rare in Victoria, and 36 State listed fauna species across 14 natural reserves.

All of Frankston is in the Gippsland Plain bioregion. DELWP mapping of 2005 EVCs and Frankston City Council data and DEECA mapping show that the most widespread EVCs are Heathy Woodland (EVC 48) and Grassy Woodland (EVC 175), which are found in many of the natural reserves across the municipality.

There are smaller areas of Plains Grassy Wetland (EVC 125), mainly in the Seaford Wetlands, and Sand Heathland (EVC 6) and Damp Sands Herb-rich Woodland (EVC 3) are found in reserves in the

north and east of the municipality. Lowland Forest (EVC 16) is confined to Witternberg Reserve and Robinsons Park.

Gully Woodland (EVC 902) is found in Lower Sweetwater Creek Nature Reserve, whilst Swamp Scrub (EVC 53), Riparian Scrub (EVC 191) and Swampy Riparian Woodland (EVC 83) also occur in reserves along creeks and drainage lines.

Coast Banksia Woodland (EVC 2), Coast Banksia Woodland / Swamp Scrub Mosaic (EVC 904), Coast Banksia Woodland / Coastal Dune Scrub Mosaic (EVC 921), Coastal Dune Scrub / Coastal Dune Grassland Mosaic (EVC 1) and Coastal Headland Scrub (EVC 161) occur along the Port Phillip Bay foreshore and Kananook Creek.

Each of these EVCs are described below. Where the bioregional benchmark does not include a vegetation mosaic, the component EVCs have been included instead.

Coast Banksia Woodland (EVC 2)
Benchmark canopy cover: 15%
Canopy character species: Coast Banksia, Rough-barked Manna Gum

'Restricted to near coastal localities on secondary or tertiary dunes behind Coastal Dune Scrub. Usually dominated by a woodland overstorey of Coast Banksia *Banksia integrifolia* to 15 m tall over a medium shrub layer. The understorey consists of a number of herbs and sedges, including scramblers' (DSE 2004).

Damp Sands Herb-rich Woodland (EVC 3)
Benchmark canopy cover: 15%
Canopy character species: Rough-barked Manna Gum

'A low, grassy or bracken-dominated eucalypt forest or open woodland to 15 m tall with a large shrub layer and ground layer rich in herbs, grasses, and orchids. Occurs mainly on flat or undulating areas on moderately fertile, relatively well-drained, deep sandy or loamy topsoils over heavier subsoils (duplex soils)' (DSE 2004).

Sand Heathland (EVC 6)
Benchmark canopy cover: 0%
Canopy character species: N/A

'Treeless heathland (or with occasional emergent mallee-form eucalypts and/or Banksias) occurring on deep infertile sands. Consists of a low, dense heathy shrub layer and a number of sedges and sedge-like species. Grasses and herbs are notably absent or infrequent' (DSE 2004).

Lowland Forest (EVC 16)
Benchmark canopy cover: 30%
Canopy character species: Messmate Stringybark, Narrow-leaf Peppermint, Yertchuk

'Eucalypt forest to 20 m tall on relatively fertile, moderately well-drained soils in areas of relatively high rainfall. Characterised by the diversity of life forms and species in the understorey including a range of shrubs, grasses and herbs' (DSE 2004).

Heathy Woodland (EVC 48)
Benchmark canopy cover: 10%
Canopy character species: Jimmy's Shining Peppermint, Messmate Stringybark, Narrow-leaf Peppermint, Rough-barked Manna Gum, Saw Banksia

'Spans a variety of geologies but is generally associated with nutrient-poor soils including deep uniform sands (aeolian or outwash) and tertiary sand/clay which has been altered to form quartz. Eucalypt-dominated low woodland to 10 m tall lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs except where frequent fire has reduced this to a dense cover of bracken. Geophytes and annuals can be quite common but the ground cover is normally fairly sparse' (DSE 2004).

Swamp Scrub (EVC 53)
Benchmark canopy cover: 50%
Canopy character species: Woolly Tea-tree, Swamp Paperbark

'Closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. The EVC is dominated by Swamp Paperbark *Melaleuca ericifoli*a (or sometimes Woolly tea-tree *Leptospermum lanigerum*) which often forms a dense thicket, out-competing other species. Occasional emergent eucalypts may be present. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy/herbaceous ground layer' (DSE 2004).

Swampy Riparian Woodland
Benchmark canopy cover: 20%
Canopy character species: Swamp Gum, Narrow-leaf Peppermint

'Woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levees in combination with large tussock grasses and sedges in the ground layer' (DSE 2004).

Plains Grassy Wetland (EVC 125)
Benchmark canopy cover: 0%
Canopy character species: N/A

'This EVC is usually treeless, but in some instances can include sparse River Red Gum *Eucalyptus camaldulensis* or Swamp Gum *Eucalyptus ovata*. A sparse shrub component may also be present. The characteristic ground cover is dominated by grasses and small sedges and herbs. The vegetation

is typically species-rich on the outer verges but is usually species-poor in the wetter central areas' (DSE 2004).

Plains Grassland (EVC 132)
Benchmark canopy cover: 0%
Canopy character species: N/A

'Treeless vegetation dominated by largely grass and herb life forms. Shrubs and trees may be also occasionally present' (DSE 2004).

Coastal Dune Scrub (EVC 160)
Benchmark canopy cover: 0%
Canopy character species: N/A

'Closed scrub to 5 m tall with occasional emergent occurring on secondary dunes along ocean and bay beaches and lake shores. Occupies siliceous and calcareous sands that are subject to high levels of saltspray and continuous disturbance from onshore winds' (DSE 2004).

Coastal Headland Scrub (EVC 161)
Benchmark canopy cover: 15%
Canopy character species: Coast Banksia, Rough-barked Manna Gum

'Scrub or low shrubland to 2 m tall on steep, rocky coastal headlands often associated with cliffs exposed to the stresses of extreme salt-laden winds and salt spray from the south west. Occurs on shallow sands along rocky sections of the coast' (DSE 2004).

Grassy Woodland (EVC 175)
Benchmark canopy cover: 15%
Canopy character species: Narrow-leaf Peppermint, Drooping Sheoak

'A variable open eucalypt woodland to 15 m tall or occasionally Sheoak woodland to 10 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies' (DSE 2004).

Riparian Scrub (EVC 191)
Benchmark canopy cover: 60%
Canopy character species: Scented Paperbark, Prickly Tea-tree

'A dense shrubland to 6 m tall with occasional eucalypt emergent growing on waterlogged substrates often with a peaty surface horizon. Emergent eucalypts may be occasionally present. The understorey is often species-poor and consists typically of sedges tolerant of seasonal waterlogging. Occurs along creeks and minor stream tributaries of the lowland plains' (DSE 2004).

Gully Woodland (EVC 902)
Benchmark canopy cover: 20%
Canopy character species: Manna Gum, Swamp Gum

'Woodland or open forest to 20 m tall occurring along moderately steep gullies. Soils are mostly colluvial deposits of sands and silts. Characterised by a medium dense small tree and shrub layer above a grassy/sedgy understorey, often rich in herbs within the inter-tussock spaces' (DSE 2004).

Coastal Dune Grassland (EVC 879)
Benchmark canopy cover: 0%
Canopy character species: N/A

'Consists of grasses and halophytes (succulents) that colonise the foredunes of ocean beaches. Soils are siliceous sands that have a very low humus content' (DSE 2004).

4.6 Bushfire weather and climate

4.6.1 Fire Danger Index and Ratings

The City of Frankston is in the Temperate Zone, which is characterised by having four seasons Summer, Autumn, Winter and Spring. Summers are generally warm and dry, with temperatures often ranging from 20°C to 30°C, while winters are mild and relatively wet with temperature in the 10°C to 15°C range. The climate is similar to that of wider Melbourne, but generally slightly cooler. Elevated fire weather in the Melbourne region is more likely during summer (December to February), although may also occur in late Spring or early Autumn.

The Australian Fire Danger Rating System (AFDRS) was introduced in September 2022 and is used across Australia. The AFDRS calculates, forecasts and reports fire danger using vegetation, fuel and weather data to calculate a Fire Behaviour Index (FBI), which is used to determine Fire Danger Ratings (FDR) (EMV 2023) that describe the potential level of danger should a bushfire start (AFAC 2023). The AFDRS uses finer-grained data, updated science, and fire behaviour prediction models for eight different vegetation types (as opposed to just forest and grassland under the previous McArthur fire danger index) (AFAC 2023). The four FDRs (Moderate, High, Extreme and Catastrophic) represent step-changes in fire behaviour in terms of fire intensity, flame height, rate of spread, and spotting (AFAC 2023). They are used to inform fire service operations resourcing and by the community to understand fire danger and undertake appropriate preparedness activities.

The FBI (and FDR) are also important inputs to treatment planning, and the conditions under which fire management controls are expected to be effective. The weather conditions selected for analysing potential fire behaviour and impact, determines both the potential severity of a bushfire event and the return interval (likelihood) of those weather conditions occurring. Higher FBIs occur less frequently; but if a bushfire were to occur on such a day, it would potentially be more severe.

The nationally adopted ratings and associated potential fire behaviour characteristics for Forest are shown in Table 8.

Table 8 - Fire Danger Ratings - Forest.

Fire Danger Rating	Fire Behaviour Index	Indicative fire behaviour and fire weather	Fire suppression and containment	Potential for impact
Catastrophic	100 +	Fire likely to quickly transition to crowning. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times. Rate of spread: >2 km /hr can be expected and possibly >3 km/hr Max flame height: > 30 m (approx. double forest height) Spotting potential: High ember density in short and medium range with possible long distance spotting occurring 20-30 km ahead of the main fire front.	Fire control of developed fires is extremely difficult and unlikely until conditions ease. Focus will be based on defensive strategies, ensuring firefighter and community preparedness and safety, Offensive strategies could position crews in danger, however safe opportunities may exist for direct, indirect or parallel attack on the rear and flanks. Important initial attack opportunities may exist for new ignitions. Conditions on the fireground are likely to be extremely windy and smoky, limiting visibility and restricting aviation operations. Conditions are likely to impact performance and effectiveness of aerial resources with a high probability that some aircraft will be unable to operate due to high winds and limited visibility. Systems such as communications will be heavily challenged with a likelihood of difficulties and outages.	70% of house loss has occurred under these conditions. Limited visibility due to smoke and dust. Very high risk to the community related to inappropriate pre-considered plans, inadequate sheltering. Very high likelihood of pasture/crop/ stock loss together with loss of rural assets such as fencing, machinery and buildings. Very high risk of long term economic and environmental impacts. Extremely strong winds are likely to impact infrastructure (e.g. power lines) with falling trees increasing the likelihood of new ignitions as well as causing road obstructions and power outages.
Extreme	50 - 100	Fires likely to quickly transition to crowning. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times. Rate of spread: 0.7-3 km/hr	Control of developed fires is extremely difficult and unlikely until conditions ease. Suppression will be largely based on defensive strategies, ensuring firefighter and community preparedness and safety. Offensive strategies could position crews in danger, however safe opportunities may	24% of house loss has occurred under these conditions. Limited visibility due to smoke and dust. High risk to the community related to inappropriate pre-considered plans, inadequate sheltering.

Fire Danger Rating	Fire Behaviour Index	Indicative fire behaviour and fire weather	Fire suppression and containment	Potential for impact
		Max flame height: 11 m – approx. double forest height Spotting potential: High ember density in short and medium range with possible long distance spotting up to 12 km.	exist for direct, indirect or parallel attack on the rear and flanks. Important initial attack opportunities may exist for new ignitions.	High likelihood of pasture/crop/stock loss together with loss of rural assets such as fencing, machinery and buildings. Increased risk of long term economic and environmental impacts. Strong winds are likely to impact infrastructure (e.g. power lines) with falling trees increasing the likelihood of new ignitions as well as causing road obstructions and power outages.
High	24 - 49	Rapidly spreading fires with potential for development into large burn areas within burning period. Fires typically involving most fuel layers. Short-range spotting is prevalent, with possibility of medium range and occasional long-range distance spotting. Rate of spread: 0.3-1 km/hr Max flame height: 7-14 m Spotting potential: Short and medium distance spotting occurring with increasing frequency with possible long distance spotting up to 4 km.	Both ground and aerial resources using offensive strategies likely to be unsuccessful during the peak period of the day, with focus largely centred on the rear and flanks. Suppression increasingly focussed on defensive strategies. Fire control is likely to be difficult and require increased resourcing. Increased risk to firefighter safety.	6% of house loss has occurred under these conditions. Increased potential for pasture/crop/stock losses as well as rural assets such as fencing, machinery and buildings.
Moderate	12 - 23	Actively spreading fires typically involving surface, near-surface, elevated and bark fuel layers and occasionally canopy fuels. Low-moderate spotting frequency, isolated medium range spotting can occur.	Fires generally becoming more complex and require more resources to control. Combinations of direct, indirect or parallel attack may be necessary for fire control.	Unattended or poorly prepared houses and infrastructure may be at risk.

Fire Danger Rating	Fire Behaviour Index	Indicative fire behaviour and fire weather	Fire suppression and containment	Potential for impact
		Rate of spread: 60-600 m/hr Max flame height: 2-8 m Spotting potential: Short distance spotting occurring with increasing frequency with possible medium distance spotting up to 2 km.		
No rating	6 – 11	Slow spreading fires, typically involving surface and near-surface fuels and sometimes bark and elevated fuels. Spotting is sporadic and limited to short distances. Rate of spread: 20-110 m/hr Max flame height: <4 m Spotting potential: Limited, up to 400 m	Fire control mostly simple with sufficient resources and becoming more complex at higher intensities. Offensive, direct attack techniques on head-fire or flanks largely successful in fire control. Delayed containment sometimes possible with suitable conditions. Fires may be allowed to spread within an extended (time and area) containment objective.	Community losses are unlikely however unattended or poorly prepared houses and infrastructure may be at risk.
	0 - 5	Fires are difficult to ignite and sustain. Fires are generally unlikely to spread and likely to self-extinguish. Rate of spread: 0-40 m/hr Max flame height: <1 m Spotting potential: Very limited and likely <150 m	Fire control relatively simple. Delayed containment possible with suitable conditions. Head-fire readily suppressed with offensive, direct attack techniques. Initial attack success is typically very high. Small fires that may be allowed to spread within an extended (time and area) containment objective.	Community losses are unlikely.

For this assessment, bushfire risk is considered for a Catastrophic FDR. This is consistent with the fire weather assumptions used for assessing building construction levels for dwellings in Victoria's designated BPAs and under the BMO.

4.6.2 Climate change

Since the 1950s there has been an increase in the length of the fire season and an increase in extreme fire weather in southern and eastern Australia, (CSIRO/BOM 2022). The trend of a longer fire season and increased number of elevated fire weather days is projected to continue. Climate change is contributing to these changes in fire weather, including increases in temperature, reduced relative humidity and associated reductions to fuel moisture content (CSIRO/BOM 2022).

The latest climate projections for the Southern Slopes (Victoria West) sub-cluster, that the Frankston municipality is in, state that there is a 'very high confidence' level that average temperatures in all seasons will continue to increase, with more hot days and warm spells combined with a decline in rainfall in winter and spring. Changes to summer and autumn rainfall are also possible, but there is less confidence in the prediction (CSIRO/BOM 2023).

Victoria's Climate Science Report 2019 also highlighted that different climate or weather extremes occur simultaneously and have compounding effects, such as long-term drought, short-term heat wave and extreme fire weather resulting in catastrophic bushfires (DELWP 2019a).

Relevant projected climate change impacts for City of Frankston presented in the 2011 *Climate Change Impacts and Adaptation Plan* (Frankston City Council 2011) are detailed in Table 9.

Table 9 – Projected climate change impacts for the City of Frankston (Frankston City Council 2011[3]).

Climate variable	Indicative change	
Temperature	**2030**	**2070**
Average annual temperature	↑ 0.5-1.3°C	↑ 1.3-3.5°C
Days per year > 30°C (20 current)	↑ 3-6	↑ 6-25
Days per year > 40°C (0 current)	↑ 1-2	↑ 2-5
Rainfall	**2030**	**2070**
Average annual rainfall	↓ 0-8%	↓ 0-23%
Catchment stream flows	↓ 25%	↓ > 50%
Droughts		
Fire weather[4]	**2030**	**2070**
No. of very high and extreme forest fire risk days (~12 days current)	↑ 1-2	↑ 5-7
No. of very high and extreme grass fire risk days (~ 95 days current)	↑ 7-15	↑ 9-30

[3] Note these projections are dated, with Frankston City Council (2011) citing SEECA (2008).

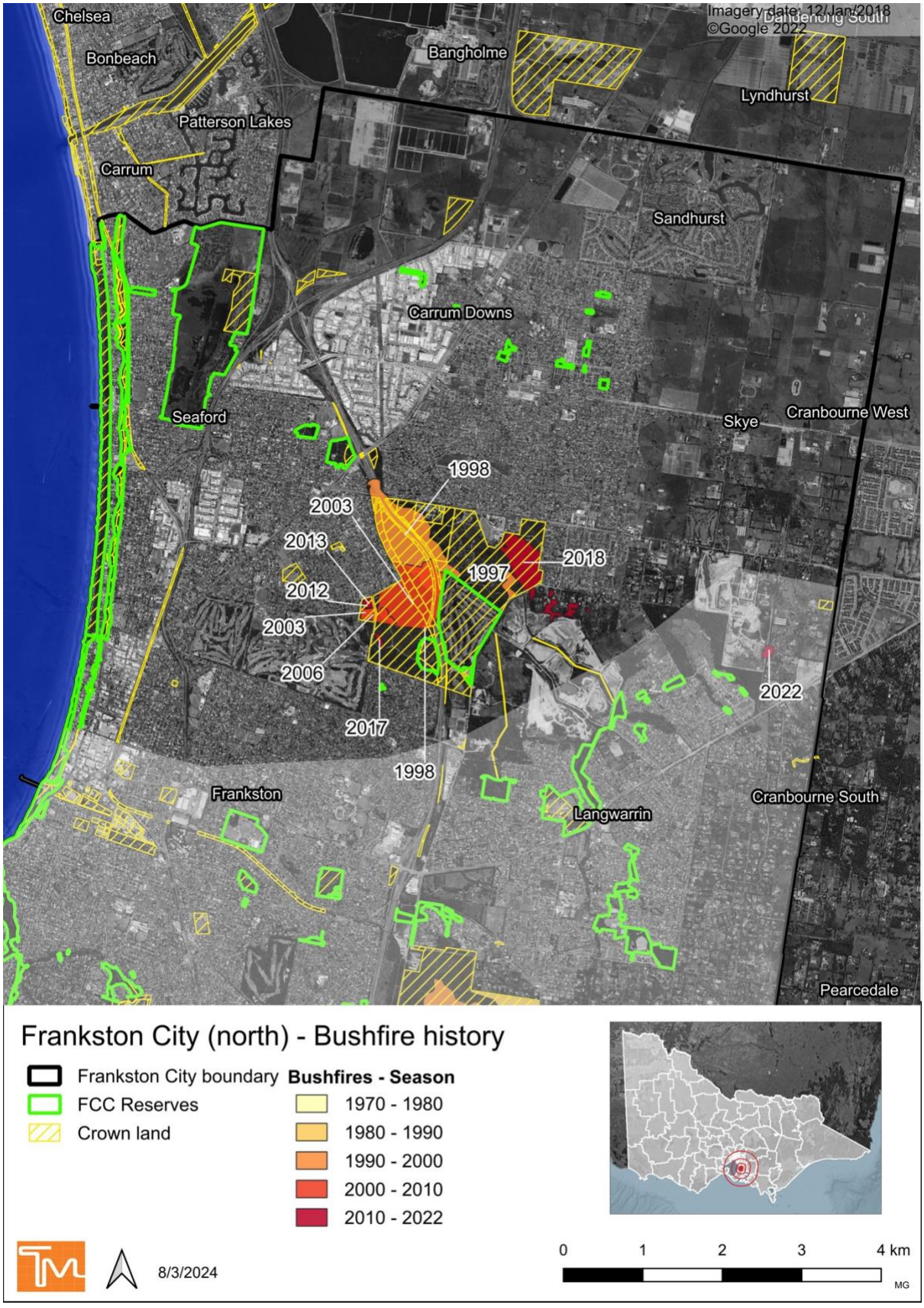
[4] The FDR system was changed in September 2022 and these ratings do not directly correlate with the current AFDRS.

4.7 Bushfire history

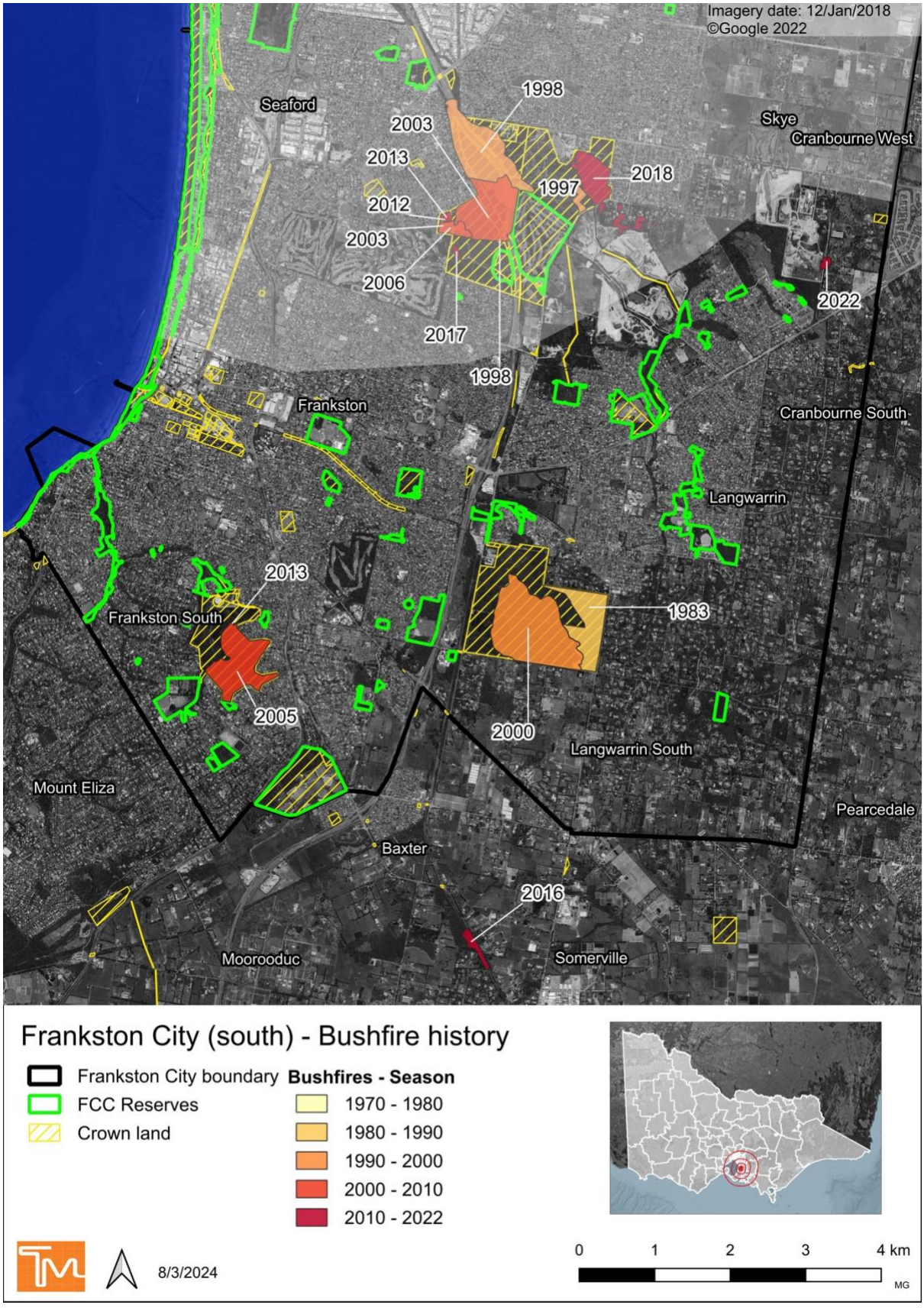
A summary of significant fires and their impact are shown in Table 10, Map 5 and Map 6. Note a comprehensive fire data set for Frankston City is not available. Historically there have been several significant fires that have impacted the wider bayside and Mornington Peninsula areas, however the level of impact specifically within the Frankston City is often not known. There is more information about more recent fires, which shows that fires are frequent (as is expected in heavily populated areas) but the damage to life and property has been minimal.

Table 10 - Fire history in the Frankston area.

Date	Description	Life loss	Property loss
February 1898	Red Tuesday. Fire spread across the Mornington Peninsula, reaching Hastings. Thousands of acres of grassland burnt.	11	Thousands of livestock
January – February 1944	Large grassfires across Victoria, including the Mornington Peninsula, Somerville, and Langwarrin. More than a million acres burnt in total.	15-20 (location in Victorian not known)	> 500 homes across Victoria
January 1997	Fires at Mount Martha, Langwarrin, and Arthurs Seat.	0	2 houses (none in City of Frankston)
1997	Studio Park, Langwarrin substantially burnt out.	0	0
January 1998	Langwarrin Flora & Fauna Reserve and Pines Flora and Fauna Reserve. Approx. 70 ha.	0	2 sheds
1998	Reserve running parallel to rail line and Nepean Highway was burnt.	0	0
January 2009	Bypass reserve between Ballarto Road and Frankston-Dandenong Road, Carrum Downs burnt.	0	1 house damaged (ember)
January 2009	Boggy Creek Link (then managed by Melbourne Water).	0	0
December 2016	Pines Flora and Fauna Reserve, approx. 2 ha.	0	0
January 2018	Blue Wren Rise, Carrum Downs. Suspected arson. Approx. 30 ha.	0	1 house damaged (ember)
January 2022	Lyppards Road, Langwarrin < 2 ha.	0	0



Map 5 – History of significant bushfires in Frankston City – northern section.



Map 6 – History of significant bushfires in Frankston City – southern section.

4.8 Credible bushfire scenarios

Frankston's position, with its northern and western sides protected by the metropolitan area and Port Philip Bay respectively, means there is relatively little opportunity for an established fire to burn into the municipality. Whilst the Bangholme area to the north-east retains grasslands it is not considered credible for a large bushfire to spread into the municipality from this direction.

The only part of the City of Frankston with the potential to carry a bushfire of significant size is the south-east corner in the Langwarrin – Baxter area. Under extreme fire danger conditions there is potential for a fire that starts in this part of the municipality to grow rapidly and impact on dozens of properties within the first few hours. There is potential for fire spread beyond Frankston City into the Mornington Peninsula and Casey municipalities.

There is also a significant complex of bushland reserves, vegetated creek gullies and water industry reserves of various sizes throughout the municipality. These are managed by several different land management agencies, the most important of which are Frankston City Council, Parks Victoria and Melbourne Water. Some reserves are relatively small and not contiguous to large areas of bushland. In these reserves, bushfires will not have sufficient space to develop fully and fire behaviour, even under elevated fire danger conditions, will not be extreme.

In other larger reserves, the combination of steep slopes and fire prone vegetation running up to and between residential streets can produce short, sharp but locally severe and damaging fires.

There is also potential for fires originating in the reserves on the eastern or southern edge of the municipality to spread beyond the municipal boundaries through the more rural areas of Langwarrin, Baxter, Mt Eliza, and Moorooduc and grow to a more considerable size.

Fire response within Frankston City is provided by the Country Fire Authority (CFA), Fire Rescue Victoria (FRV) and Forest Fire Management Victoria (FFMV) (the public land firefighting agency that includes Parks Victoria). Melbourne has a first-rate fire service, and a rapid and well-resourced response can be expected to a fire in a bushland reserve under most circumstances and most ignitions should be able to be suppressed whilst relatively small. The likelihood of successful first attack on a fire lessens under elevated fire weather and/or in remote or inaccessible locations.

In reserves adjacent to urban areas, if a fire does develop, then asset protection around the edge of the reserve is likely to be effective in minimising property loss. Firefighting would be assisted by good access to the perimeter and/or within a reserve, asset protection zones along the reserve boundary adjacent to buildings, and the reticulated fire hydrants in surrounding streets.

The larger reserves or those that are part of a larger bushland complex, such as Upper Sweetwater Creek Reserve, Studio Park, and Seaford Wetlands, could support fire behaviour severe enough to threaten adjacent assets.

4.9 Bushfire risk and hazard assessments

In this section, the findings of other bushfire risk or hazard assessments relevant to the Frankston City LGA are presented.

4.9.1 Municipal Emergency Management Plan (MEMP)

The MEMP states that bushfires are normally fast and short duration (<24 hours) with occasional impact on property and infrastructure and rates the risk as 'High' (FMEMEPC 2022).

The presence of natural reserves is noted with the comment that they are often subject to fires, but typically the impact of these fires is localised and does not require the MEMP to be activated. The *2013 Natural Reserves Bushfire Management Strategy* and associated Fire Management Plans and Statements for individual reserves are listed as a risk control (FMEMPC 2022).

The Victorian Fire Risk Register – Bushfire (VFRR-B) lists assets at risk from bushfire within the municipality. The risk ratings for assets close to nominated reserves are presented in Table 11.

Table 11 – Bushfire risk ratings for residential areas and vulnerable use buildings close to Frankston natural reserves (n.b. only sites rated Medium or above included) (from Frankston City Council 2023).

Asset name	Asset location	Adjacent natural reserve	VFRR risk rating
Human Settlement - Residential			
Studio Park urban surrounds	Sycamore Street and surrounds, Langwarrin	• Studio Park	High
Bunarong Park urban surrounds	Willow Road and surrounds, Frankston	• Bunarong Park	High
Belvedere Reserve urban surrounds	Centenary Street and surrounds, Seaford	• Belvedere Bushland Reserve	Very High
Escarpment Reserve and Brahma Kumaris urban surrounds	Escarpment Drive and surrounds, Frankston South	• Escarpment Bushland Reserve • Stotts Bushland Reserve	High
Seaford Foreshore	Nepean Highway, Seaford	• Seaford Foreshore	High
North Road Reserve urban surrounds	Aqueduct Road and surrounds, Langwarrin	• North Reserve • Stringybark Bushland Reserve	Very high
Lower Sweetwater Creek and Tangenong Creek urban surrounds	Baden Powell Drive and surrounds, Frankston South	• Lower Sweetwater Creek Nature Reserve • Tangenong Creek Reserve	High
Kananook Creek urban surrounds	Kananook Avenue and surrounds, Frankston	• Kananook Creek Reserve	Very high
Paratea Reserve urban surrounds	Paratea Avenue and surrounds, Frankston South	• Paratea Flora and Fauna Reserve	Medium
Little Boggy Creek and Lexton Drive urban surrounds	Stevens Road and surrounds, Langwarrin	• Little Boggy Creek Reserve • Lexton Reserve • Stevens Reserve	High

Asset name	Asset location	Adjacent natural reserve	VFRR risk rating
Seaford Wetlands urban surrounds	Old Wells Road and surrounds, Seaford	• Seaford Wetlands	High
Frankston Nature Conservation Reserve urban surrounds	Rinella Court, Frankston South	• Rinella Reserve	High
Upper Sweetwater Reserve	Caladenia Circuit and surrounds, Frankston South	• Upper Sweetwater Creek Reserve	High
Heath Estate (Stage 1 and 2)	Black Wallaby Drive and surrounds, Langwarrin	• Flame Robin Reserve	Very high
Centenary Park Golf Club urban surrounds	Centenary Park Drive and surrounds, Frankston North	• Centenary Park Golf Course	Medium
Human Settlement – Special Fire Protection			
Seaford North Primary School	Halifax Street, Seaford	• Seaford Wetlands	High
Brahma Kumaris Eaja Yoga Centres Inc.	85 Stotts Lane, Frankston South	• Escarpment Bushland Reserve • Stotts Bushland Reserve	Very high
Paratea Kindergarten	1/12R Paratea Avenue, Frankston South	• Paratea Flora and Fauna Reserve	Very high
Seaford Surf Life Saving Club	10N Nepean Highway, Seaford	• Seaford Foreshore	High
Economic - Infrastructure			
Baden Powell Sewerage Pumping Station	Baden Powell Drive, Frankston South	• Lower Sweetwater Creek Nature Reserve	Very high
Wedge Court Sewerage Pumping Station	Wedge Court, Seaford	• Seaford Wetlands	Extreme
Poplar Grove Sewerage Pumping Station	Poplar Grove, Langwarrin	• Studio Park	High
Dandenong-Frankston Road	Dandenong-Frankston Road, Seaford	• Belvedere Bushland Reserve	High
Cranbourne-Frankston Road	Cranbourne-Frankston Road, Langwarrin	• Boggy Creek Link • Lloyd Park	Medium
Frankston Freeway	Frankston Freeway, Seaford	• Seaford Wetlands	Very high
Frankston-Flinders Road	Frankston-Flinders Road, Baxter	• Baxter Park	Very high
Moorooduc Highway	Moorooduc Highway, Baxter	• Baxter Park	Very high
Peninsula Link	Peninsula Link, Frankston	• Cell 3 (Pines Flora and Fauna Reserve) • Centenary Park Golf Course • Pobblebonk Wetlands Reserve • Witternberg Reserve & Robinsons Park	High
Frankston Metro Rail Line	Langwarrin and Baxter	• Robinsons Bushland Reserve	High

Asset name	Asset location	Adjacent natural reserve	VFRR risk rating
Cultural Heritage			
McClelland Gallery and Sculpture Park	390 McLelland Drive, Langwarrin	• Studio Park	Very high
Round House	581 Nepean Highway, Frankston South	• Lower Sweetwater Creek Nature Reserve	Very high
Stokesay	289 Nepean Highway, Seaford	• Seaford Foreshore • Kananook Creek Reserve	Very high
Westerfield	72-118 Robinsons Road, Frankston South	• Witternberg Reserve & Robinsons Park	Medium

4.9.2 Bushfire hazard mapping

DEECA Bushfire Hazard Level (BHL) mapping is used in Victoria to determine which land should be designated as a BPA under the Building Regulations, and which should also be covered by the BMO under the Victoria Planning Provisions. The BHL mapping provides a consistent landscape scale view of bushfire hazard, based on modelling of potential bushfire behaviour under pre-determined fire weather conditions and taking into account the vegetation/fuel types present and the terrain of an area.

BHL 1 are areas of moderate bushfire hazard, where head fire intensity has been modelled to be between 4,000 kW/m^2 and 30,000 kW/m^2. This level of hazard informs designation as a Bushfire Prone Area (BPA) in the building system (DELWP 2019b). BPA generally comprises BHL 1 areas of forest, woodland, scrub, shrubland, mallee, rainforest or unmanaged grassland between 2 and 4 ha in size (plus a 60 m ember buffer around unmanaged grassland and 150 m ember buffer around other vegetation types), where there is potential for bushfire behaviour such as crown fire, grassfire and ember attack.

BHL 2 is where the most significant bushfire hazard occurs, with head fire intensity modelled to be 30,000 kW/m^2 or more. These areas are within the BPA and also covered by the BMO (DELWP 2019b). Land that is covered by the BMO generally comprises BHL 2 areas of forest, woodland, scrub, shrubland, mallee or rainforest more than 4 ha in size (plus a 300 m ember buffer), where there is potential for bushfire behaviour such as crown fire, extreme levels of radiant heat and extreme ember attack.

Land that is not in the designated BPA comprises areas where the type, extent (less than 2 ha), configuration and/or management of vegetation means there is low potential for bushfires.

The mapped coverage of the BPA and BMO is shown on Map 7. The more rural areas on the northern, eastern and southern edges of the municipality are in a designated BPA, as is a large swathe of land encompassing the quarries and public land that runs from Frankston North to Langwarrin through the centre of the municipality.

Higher hazard areas (i.e. larger patches of treed vegetation) and the immediately surrounding urban areas are covered by the BMO. This includes the central swathe described above, much of the south-eastern corner of the municipality, and smaller patches elsewhere in the municipality typically associated with natural reserves.

4.9.3 Regional Bushfire Planning Assessment

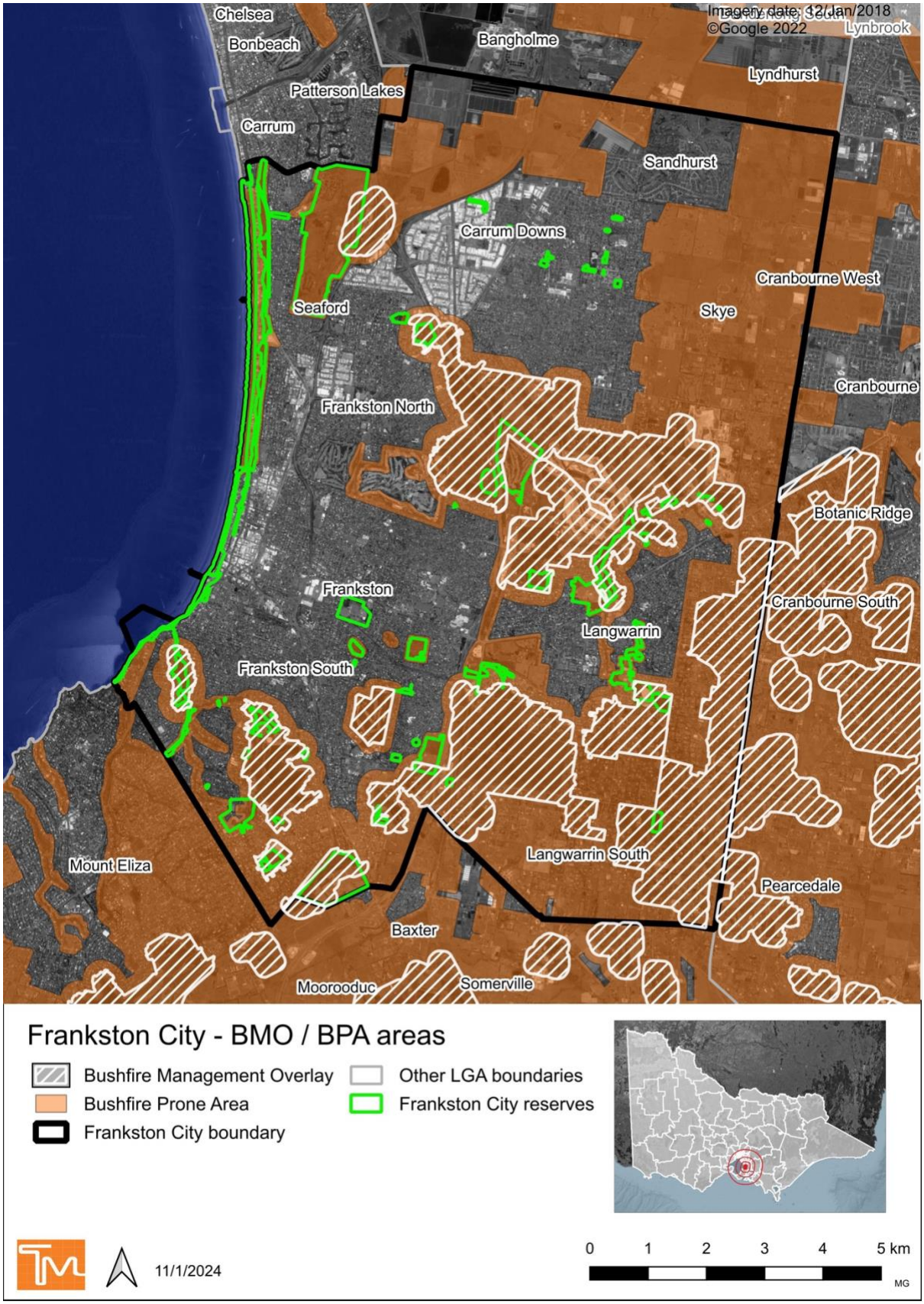
Regional Bushfire Planning Assessments (RBPA) were conducted across Victoria following the 2009 Black Saturday bushfires. The RBPA provides information about areas where a range of land use planning matters intersect with a bushfire hazard, to be used in strategic land use and settlement planning.

The Melbourne Metropolitan Region comprises 31 municipalities, including Frankston City. The RBPA identifies that whilst the municipality is predominantly suburban, there are areas of public open space and non-urban areas in the north and east of the municipality (DPCD 2012). It states, 'The predominant urban bushfire interface occurs with existing reserves including Pines Flora and Fauna Reserve, Langwarrin Flora and Fauna Reserve, Frankston Reservoir and Sweetwater Creek' (DPCD 2012).

Identified areas of interest relevant to City of Frankston reserves are shown in Table 12.

Table 12 – Areas of bushfire planning interest relevant to Frankston natural reserves (DPCD 2012).

Identified Area Code	Location	Identified Area Description
20-001	Frankston North / Langwarrin	Urban bushfire hazard interface with existing residential areas surrounding The Pines Flora and Fauna reserve and Langwarrin Quarry.
20-002	Langwarrin / Langwarrin South	Presence of medium-size lots in a location where remnant vegetation patches generate bushfire hazard. Includes vegetation of high and very high conservation significance.
20-003	Langwarrin South	Urban bushfire hazard interface associated with existing residential areas surrounding the Langwarrin Flora and Fauna Reserve.
20-004	Frankston South	Urban bushfire hazard interface with remnant bushland vegetation.
20-005	Frankston South	Urban bushfire hazard interface with existing small lots and residential areas surrounding Frankston reservoir ad along Sweetwater Creek. Includes isolated patches of vegetation of high and very high conservation significance.
20-006	Frankston	Linear coastal vegetation and creek vegetation located around small residential lots.



Map 7 - BPA and BMO coverage in City of Frankston LGA and surrounds.

4.9.4 Metropolitan Bushfire Management Strategy 2020

Frankston City is covered by the *Metropolitan Bushfire Management Strategy 2020*. No areas of the municipality are mentioned specifically in the Strategy, but it presents modelled bushfire risk to dwellings[5] (see Figure 2) that shows small areas around the larger bushland reserves are rated as 'High risk – Top 20%' or 'Intermediate risk – Top 40%' risk' relative to the Metropolitan region as a whole, with larger areas of higher risk in the east of the municipality (DELWP 2020).

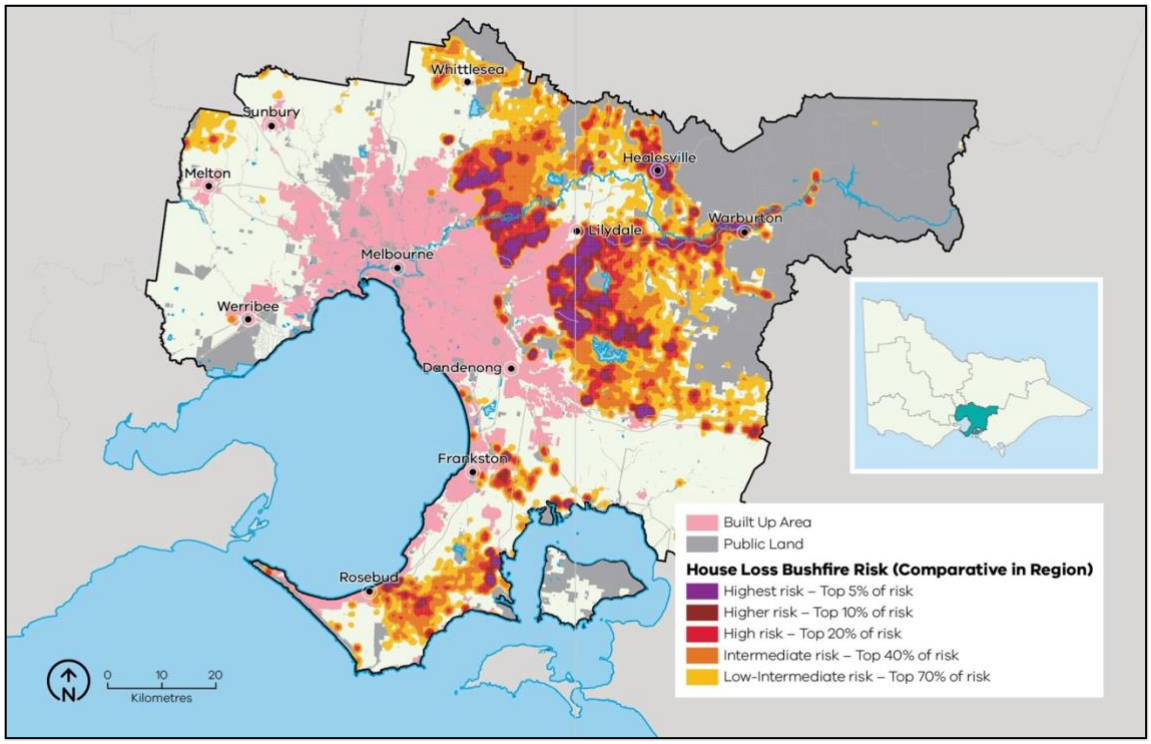


Figure 2 - Modelled bushfire risk to dwellings, Metropolitan Region (DELWP 2020).

4.9.5 FRV risk identification

No part of Frankston City is listed on the FRV's 'Areas of grassfire risk in Melbourne's metropolitan area' (FRV online[6]).

4.9.6 Bushfire-at-risk Register

The Department of Education and Training maintain a register of educational facilities where the bushfire hazard is considered sufficient to warrant enhanced planning and precautions, such as proactive closure of the facility on days of Catastrophic FDR.

Facilities that are on the register in the immediate vicinity of a Frankston bushland reserve are listed in Table 13.

[5] Model assumes dwellings will be destroyed if impacted by a bushfire with an intensity in excess of 10,000 kW/m or if ember density exceeds 2.5 embers per square metre modelled under an FFDI 130 (DELWP 2020).

[6] We assume this online resource may not have been updated since the re-alignment of the FRV-CFA boundary.

Table 13 - Educational facilities on the Bushfire-at-risk Register close to a Frankston City natural reserve (DET 2023).

Facility	Suburb	Adjacent bushland reserve
Paratea Preschool	Frankston South	Paratea Flora & Fauna Reserve
Woodlands Primary School & TeamKids	Langwarrin	Illawong Reserve
		Cotoneaster Reserve
		Gumnut Reserve
Bayside Christian College & Camp Australia	Langwarrin South	Robinsons Bushland Reserve (130R)

4.9.7 Electricity Safety Act

Frankston City Council are responsible for managing trees on public land to ensure the stipulated clearance is maintained from power lines in areas declared under Section 81 of the *Electricity Safety Act (1998)*.

Section B
Risk Assessment, Priority Groupings, and Treatment Strategy

5 Risk identification and assessment

5.1 Risk identification

Risk identification is the identification of the sources of risk (i.e. the bushfire hazard), possible fire emergency events and their potential consequences for Frankston City Council and community. The risks identified form the basis for the fire risk analysis in Section 5.2.

5.1.1 Sources of risk

For each risk description, sources of risk were identified through consideration of factors affecting hazard, exposure and vulnerability, in the context of the Frankston City natural reserves.

The risk identification process involved meeting with Frankston City Council staff to discuss the natural reserves, an inspection of selected reserves and surrounding landscape, review of previous management plans and assessments, and consideration of the consequences of bushfires that have occurred in similar settings.

5.1.2 Risk descriptions

The identified risks are articulated as risk descriptions for the purpose of the subsequent risk analysis. A risk description is a structured statement linking the source of risk to a consequence. Three key risk descriptions have been generated for fire in Frankston City natural reserves. These are:

1. There is potential that during the Fire Danger Period a bushfire (either a local ignition or a large established fire in the wider landscape) burning in a Frankston City natural reserve will cause injury or loss of life to users or neighbours, economic loss through damage to Council assets or adjacent private property and/or environmental damage through adverse impact on flora, fauna, soil, water or air quality.

2. There is potential that during the Fire Danger Period an accidental or deliberate ignition will result in an unplanned fire starting in a Frankston City natural reserve that will spread beyond the reserve boundaries and cause injury or loss of life, economic loss through damage to critical infrastructure and/or private property and/or environmental damage through adverse impact on flora, fauna, soil, water or air quality.

3. There is potential that fire management in a Frankston City natural reserve will cause environmental damage through vegetation removal, soil disturbance or an inappropriate fire regime that will adversely affect flora or fauna.

5.1.3 Existing risk controls

Bushfire risk management has been central to the management of natural reserves in Frankston City for many years. Frankston City Council have identified key risks and put in place well-established and regularly implemented bushfire risk controls. The controls aim to mitigate the three risks identified above as far as reasonably practicable, by preventing fires from occurring; limiting their spread and impact; and safeguarding reserve users, neighbours and the wider community from their effects.

The existing controls are summarised in Table 14 and Table 15 and discussed in more detail in Section 6.

It is important to recognise that major areas of bushland close to or contiguous with the Frankston City reserves, in particular the Pines Flora and Fauna Reserve, Langwarrin Flora and Fauna Reserve, and Frankston Nature Conservation Reserve, are managed for bushfire safety by Parks Victoria. This management complements works undertaken by Frankston City Council.

Most of the Parks Victoria land within the municipality is zoned Land Management Zone (LMZ) where '*Planned burning will focus on maintaining and improving ecosystem resilience, and fuel management will also be undertaken for risk reduction*' (DSE 2022).

There are also areas of more intensively managed Asset Protection Zone (APZ) and Bushfire Moderation Zone (BMZ) adjacent to residential areas that abut The Pines Flora and Fauna Reserve and Langwarrin Flora and Fauna Reserve, as well as areas of mechanical fuel management undertaken in line with the Joint Fuel Management Program (see Figure 3 and Figure 4).

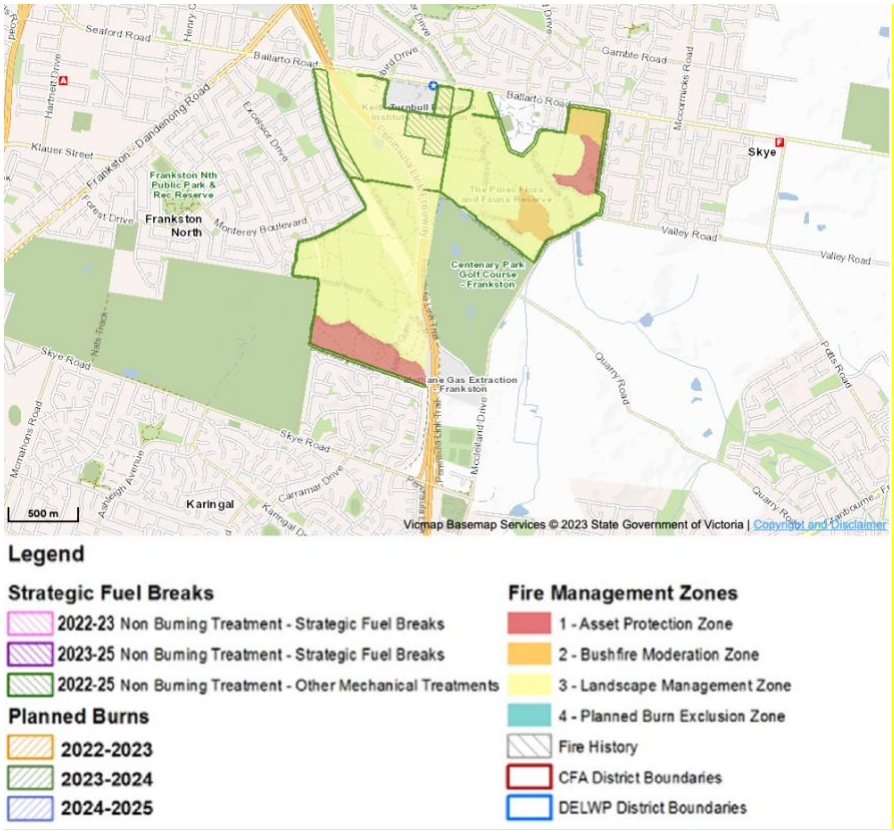


Figure 3 – Fire Management Zones and mechanical works on public land - north (FFMV 2023).

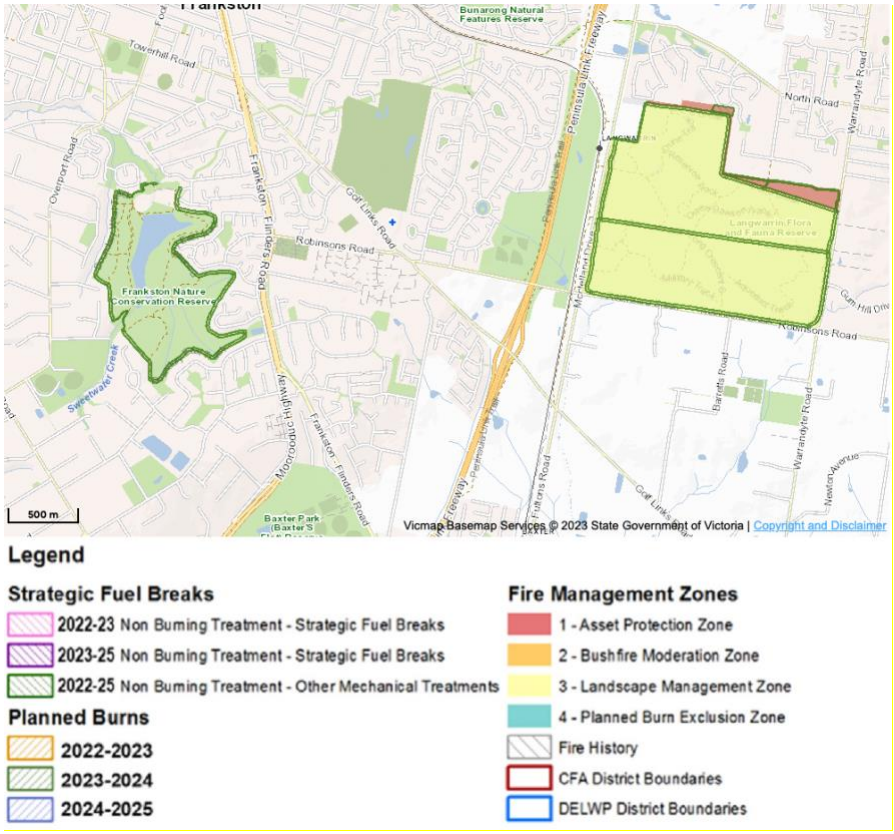


Figure 4 – Fire Management Zones and mechanical works on public land - south (FFMV 2023).

Table 14 - Bushfire risk management controls currently in place for a fire starting within a natural reserve and an established bushfire burning into a reserve.

Strategy	Risk addressed	Controls
Reduce bushfire ignitions through prevention activities	• Risk #1 'Fire in reserve' • Risk # 2 'Fire that starts & spreads beyond reserve'	• Restrict access to reserves • Regulations on camp fires and BBQs • Patrols on TFBs • Power line clearance and maintenance • Regulation of machinery use • Regulation of hot works
Increase the effectiveness of fire suppression	• Risk # 1 'Fire in reserve' • Risk # 2'Fire that starts & spreads beyond reserve'	• Access for emergency service vehicles • Water supplies for fire fighting • Annual familiarisation tours (selected reserves)
Reduce bushfire spread and severity	• Risk # 1 'Fire in reserve' • Risk # 2'Fire that starts & spreads beyond reserve'	• Mechanical fuel management – weeds or to improve vegetation structure in LMZ • Planned burning
Reducing the physical effects of bushfires in inhabited areas	• Risk # 1 'Fire in reserve' • Risk # 2'Fire that starts & spreads beyond reserve'	• Fire safety education • Asset Protection Zones • Mechanical fuel management • Management of coarse woody debris • Community engagement • Planning and building controls • Staff support processes • Community recovery activities
Reduce the social effects of bushfires on communities	• Risk # 1 'Fire in reserve' • Risk # 2'Fire that starts & spreads beyond reserve'	• Asset Protection Zones • Site and infrastructure recovery

Table 15 - Risk management controls currently in place for fire management activities having negative impacts.

Control strategy	Risk addressed	Controls
Reduce the impact from fire management actions	• Risk # 3 'Fire management causes environmental damage'	• Integrated planning for fire management and biodiversity • Planned burning for ecosystem health • Weed management • Fire recovery works • Provision of adequate formal access • Annual familiarisation tours (selected reserves)

5.2 Risk analysis

This section summarises the results of risk analysis and the subsequent risk ratings determined for the Frankston City natural reserves. The analysis included consideration of the context, potential fire scenarios and the level of controls already in place.

5.2.1 Maximum foreseeable consequence

The maximum foreseeable consequence, under the extreme fire weather conditions of a Catastrophic FDR, was determined. This varies with the circumstances of each reserve and is determined by the potential severity of the hazard, the exposure of assets and their vulnerability to fire.

In this section, each of the consequence categories are explored in relation to three groupings of reserves, each of which has distinct risk characteristics (see Table 16). Characteristics considered include:

- Landscape setting – whether in BPA or covered by BMO, whether contiguous to bushland or grassland.
- Potential for fire development – size of reserve, area and connectivity of combustible vegetation, type of vegetation, slope and aspect, fire run length, run direction, fire history.
- Exposure – buildings and significant infrastructure within 100 m, environmental values.

Consequences can be either:

- 'Direct' - directly caused by a fire burning within a Frankston City natural reserve and limited to assets within or adjacent to the reserve; or
- 'Indirect' - caused by a fire that began in a Frankston City natural reserve that became a large fire with consequences well beyond the reserve boundary.

On a day of elevated FDR, an ignition in a Group 1 or Group 2 reserve could result in a bushfire of sufficient intensity to endanger reserve users and assets within or adjacent to the reserve. If fire can spread significantly beyond the reserve, it could have 'Moderate' consequences for other parties across all impact categories.

Table 16 - Characteristics of reserve groupings.

Grouping	Risk characteristics	Physical characteristics
Group 1	**High priority for fire management.** Moderate sized reserve or part of a larger bushland area with potential for high intensity bushfire to impact on adjacent assets and, in some cases, for significant spread and impact well beyond the reserve boundaries. Size of reserve makes egress from it less easy. Significant built assets adjacent to the reserve and downwind under typical severe fire weather.	Some or all of: • Patches of hazardous vegetation greater than 7 ha (inc. any contiguous bushland). • Orientation conducive for fire run under severe conditions (e.g. north-west to south-east (Long 2006)) with run length greater than 700 m. • Steep slopes. • Strong connectivity to other bushland. • Many dwellings credibly exposed (> 10) and or special life risk building downwind of reserve. • Significant infrastructure asset exposed.
Group 2	**Moderate priority for fire management.** Small to medium sized reserve with some potential for bushfire development, but threat is restricted to immediately adjacent assets. Easy egress for reserve users into adjacent low threat urban area. Alternatively, a reserve where the level of use increases the chance of accidental ignitions and there is high potential for spread and impact well beyond the reserve boundaries under typical severe fire weather.	Some or all of: • Patches of hazardous vegetation between 4 ha and 7 ha (inc. any contiguous bushland). • Orientation conducive for fire run under severe conditions (e.g. north-west to south-east (Long 2006)) but run length less than 700 m. • Gentle slopes. • Some connectivity to other bushland. • Some dwellings credibly exposed (< 10). • Special life risk building or critical infrastructure with limited exposure, e.g. upwind of reserve.
Group 3	**Low priority for fire management.** Very small reserve or small patch(es) of native vegetation within a larger reserve that is isolated from other areas of bushland. Very limited potential for bushfire development, with threat largely restricted to individual combustible elements close to individual adjacent buildings. Few built assets directly exposed under credible fire scenario, and low level of use or easy egress for reserve users into adjacent low threat urban area.	Some or all of: • Vegetation that can be classified as 'low threat' under AS 3959 (Standards Australia 2020). • Patches of hazardous vegetation less than 4 ha. • Patches of hazardous vegetation isolated from other patches by at least 100 m. • Linear reserves less than 50 m wide. • Low connectivity with other bushland. • Larger areas of vegetation with less than 2 adjacent homes or other built assets.

'People' consequence category

There are several possible scenarios in which people may be injured or lose their lives in a fire in a natural reserve, including:

1. Being caught in the open or in a vehicle by the fire front and being affected by radiant heat, smoke irritation and/or burning embers.
2. Sheltering in a building which ignites and becomes untenable at the same time as conditions outside the house are lethal, or failing to leave the building before it becomes untenable.
3. Accidents such as being struck by falling timber, trips and falls, or motor vehicle collisions.

In Group 1 reserves, there is potential for severe fire behaviour within the reserve, and it is considered credible that serious injuries or even a fatality could occur, although in most cases the relatively small size of the reserve makes this unlikely.

A fire that starts in a Group 2 reserve is unlikely to harm people within or immediately adjacent to the reserve. But a fire that starts in a reserve that is contiguous to fire prone private or public land in the east of the municipality could, under Severe or higher fire weather conditions, have 'downstream' impacts if the fire is able to spread and develop in intensity prior to impacting residential areas downwind. This scenario is also applicable to some Group 1 reserves.

In Group 3 reserves, the maximum credible consequence under even the extreme test fire weather scenario was rated as insignificant. This is due largely to the small patch size of the hazardous vegetation in most reserves that:

- Precludes large high intensity fires under even extreme weather conditions.
- Greatly assists safe retreat from a fire to either large open areas within a reserve or into an urban area incapable of sustaining fire spread.

'Assets/Economic' consequence category

The main direct economic impact of bushfire within a reserve is damage to adjacent buildings. The mechanisms of bushfire attack on a building are well understood to comprise a combination of sparks and embers, direct flame contact and radiant heat. Extremely strong winds may cause structural damage to the building making ignition by embers easier and compromising its ability to effectively shelter occupants.

Ember attack is statistically the most common mechanism of house ignition during bushfire. Its impact extends much further from the unmanaged vegetation than does flame contact and radiant heat, and it continues to pose a risk many hours after the fire front has passed. Embers start small fires on or near the structure that get larger over time and, in the absence of effective suppression, will spread to destroy the building.

Arguably, however, it is flame contact and radiant heat ignition that poses the greatest threat to human survival. These mechanisms can result in rapid involvement of the entire building and, by definition, cause the house to ignite during the passage of the fire front.

Houses and other built assets can be ignited by direct flame contact and/or radiant heat in two quite different circumstances:

1. Flames and radiant heat as the high intensity fire front impacts.
2. Localised flame contact from fuel close to the building such as garden vegetation, outdoor furniture etc. which may be ignited by embers or low intensity fire spreading through a garden setting.

Many of the reserves (in all Groups) have an intensively managed Asset Protection Zone (APZ) along the perimeter adjacent to private property. One of the benefits of an APZ is to reduce the likelihood of ignition by direct flame contact and/or radiant heat by providing separation between the buildings and the vegetation generating the flames. Combined with the setback of houses on private property, this was considered sufficient in most cases to mitigate the risk.

Only at the Group 1 reserves, where there is potential for severe fire behaviour including ember attack, is the loss of multiple dwellings adjacent to the reserve considered credible. This is more likely if an established bushfire can burn into the Frankston City reserve, than if the fire starts within the reserve with inherently less time and space to develop in intensity.

Several Group 2 and 3 reserves do, however, have houses built right on the property boundary and within a few metres of native vegetation. In such cases even a small fire could cause damage, although it is considered unlikely that any houses would be destroyed given the level of fire suppression that is probable. It is more likely that damage is limited to fences, garden sheds and/or damage to dwellings etc. It is important to recognise that protection of adjacent assets is a shared responsibility between the owner of the assets and the reserve manager and that works within the reserve may not be the most effective or appropriate risk mitigation measures. Under the Victorian building regulations, new houses in the BPA should be built to a BAL construction standard commensurate with their proximity to bushland.

Fire in some reserves could disrupt the Frankston Freeway, Peninsula Link, Nepean Highway, busy arterial roads or the Frankston and Stony Point railway line. Temporary closure of these transport routes is credible for short periods of time but would have insignificant consequences.

Critical high voltage electricity transmission lines run through the municipality, including through or adjacent to Frankston City natural reserves (e.g. Pobblebonk or Swampy Rise) or could be potentially compromised by a fire that started in a reserve and spread beyond its boundaries (e.g. Flame Robin) (see Map 8). There is limited information about the vulnerability of this infrastructure to bushfire (e.g. to radiant heat) but it is probable that a developing fire in or near these reserves would result in a temporary disruption to power supply due to smoke or physical fire damage. Water industry infrastructure is also found in some reserves.

‘Environment’ consequence category

Many of the reserves contain valuable remnant native vegetation, comprised of typically small areas of both fire tolerant and fire sensitive EVCs. A number of reserves contain flora or fauna of Regional or State significance (see Appendix D).

There is a program of planned burning in many of the larger reserves to achieve ecological outcomes. Planned burning is only conducted if Frankston City Council consider there will be no detrimental impact on environmental values.

Some of the reserves contain riparian vegetation, which is more vulnerable to unplanned fire. Under the extreme test fire weather conditions, it is feasible for a large percentage of the relatively small areas within a reserve to be burnt. The Frankston City riparian reserves are predominantly linear or isolated from each other. It is considered unlikely that large or multiple areas of fire sensitive vegetation within Frankston City reserves could be impacted in one event, although a deliberate campaign of arson across multiple reserves could result in a wider impact.

The environmental consequence of unplanned fire in bushland reserves was considered to be minor as reserves have not experienced recent high intensity fire that would make a single bushfire particularly damaging to native vegetation. Impacts on wildlife, however, might be greater as there is less opportunity for movement of animals between reserves in an urban area, which would hinder re-colonisation of burnt areas. The program of planned burning can be adapted to account for the occurrence of unplanned fires. Fire behaviour in Group 3 and smaller Group 2 reserves is unlikely to be intense enough to do fatal damage to healthy trees.

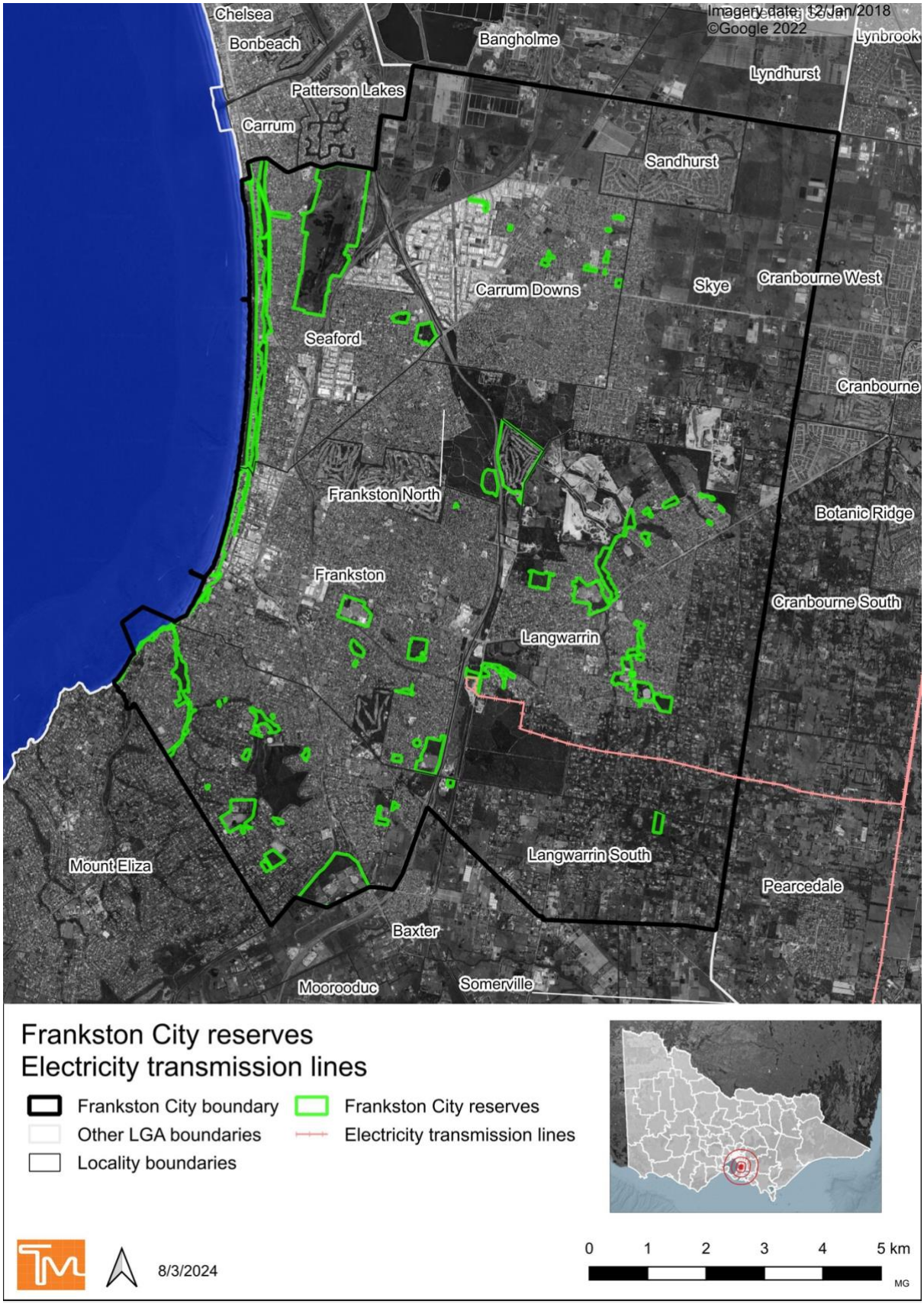
Fire management works can cause environmental damage through clearing of native vegetation (with associated loss of habitat) and/or soil disturbance. Use of planned burning as a fuel management technique can alter fire regimes with long term effects on flora and fauna, similarly fire exclusion can have long term deleterious effects on some vegetation types.

‘Public administration’ consequence category

The ‘Public administration’ consequence category focuses on the impact of a bushfire on the delivery of core functions of the Frankston City Council.

There are no credible bushfire scenarios for a fire confined to within a Frankston natural reserve that would have more than a minor and temporary affect on the delivery of core functions across the municipality. Emergency management and recovery requirements are likely to be within the capacity of standard mutual aid arrangements.

It should be recognised, however, that a major bushfire, whether involving a natural reserve or not, could require a substantial and long term recovery process that would have a significant impact on Council business.



Map 8 - Electricity transmission lines.

5.2.2 Risk rating

The likelihood of the credible worst-case consequences described above for the four impact categories (People, Assets/Economy, Environment and Public Administration) was determined to provide a risk rating. The risk rating is based on controls that currently exist and the level of confidence in the information used to support the risk rating process.

Preliminary risk ratings for individual reserves are summarised in Table 17, Table 18 and Table 19, with greater detail in Appendix A.

Group 2 **MODERATE PRIORITY**	Risk 1					
	Users	Dwellings	Special life risk	Infrastructure	Environment	D
18R Marcus Road	Very low	Low	N/A	Low	Low	
Austins Reserve	Low	Low	Very low	Low	Low	
Baxter Park	Low	Very low	N/A	Very low	High	
Belvedere Bushland Reserve	Low	Very low	N/A	Very low	Medium	
Casuarina Reserve	Very low	Low	N/A	Very low	Low	
Escarpment Bushland Reserve	Very low	Very low	N/A	Low	Medium	
Flame Robin Reserve	Very low	Low	N/A	Very low	Medium	
Frankston Foreshore	Low	Low	N/A	Low	High	
Jubilee Park	Very low	Low	N/A	Low	Low	
Langwarrin Equestrian Reserve	Very low	Low	N/A	Very low	Low	
Lloyd Park	Very low	Low	N/A	Very low	High	
Monique Bushland Reserve	Very low	Low	N/A	Very low	Medium	
Olivers Hill Foreshore	Very low	Low	N/A	Very low	Low	
Overport Park	Very low	Low	N/A	Very low	Low	
Park Valley Reserve	Very low	Low	N/A	Very low	Medium	
Rinella Reserve	Very low	Low	N/A	Very low	Low	
Robinsons Bushland Reserve	Very low	Very low	Very low	Very low	Medium	
Seaford Foreshore	Low	Low	N/A	Low	High	
Serenity Reserve (assessed as part of Langwarrin Equestrian Reserve)	Very low	Low	N/A	Very low	Low	
Southgateway Reserve	Very low	Low	N/A	Very low	Medium	
Swampy Rise Wildlife Reserve	Very low	Very low	N/A	Very low	Medium	
Tangenong Creek Reserve	Very low	Very low	N/A	Very low	Medium	
Wallace Reserve	Very low	Low	N/A	Very low	Low	
Witternberg Reserve/Robinsons Park	Very low	Very low	Very low	Very low	Medium	
Yuille Street Reserve	Very low	Low	N/A	Very low	Low	

Table 17 - Summary of risk assessment for Group 1 'High priority' reserves.

Note - Shaded cells are those determining the group the reserve is in.
Note – N/A indicates this risk does not occur for this reserve.

Group 1	Risk 1					Risk 2	Risk 3	2013 priority
HIGH PRIORITY	Users	Dwellings	Special life risk	Infrastructure	Environment	Downstream	Environment	
Boggy Creek Link	Very low	Medium	N/A	Low	Low	N/A	Low	N/A
Bunarong Park	Low	Medium	N/A	Low	High	N/A	High	High
Kananook Creek Reserve	Very Low	Medium	Low	Low	Medium	N/A	Medium	High
Lexton Reserve	Very low	Medium	N/A	Very low	High	N/A	High	High
Little Boggy Creek Reserve	Very low	Medium	N/A	Very low	High	N/A	High	High
Lower Sweetwater Creek Nature Reserve	Very low	Medium	N/A	Very low	Medium	N/A	Medium	High
North Reserve	Low	Medium	N/A	Very low	High	Very low	High	High
Paratea Flora & Fauna Reserve	Low	Medium	N/A	Low	High	N/A	High	High
Seaford Wetlands	Very low	Low	Very low	Low	High	N/A	High	High
Stevens Reserve	Very low	Medium	N/A	Very low	High	N/A	High	High
Stringybark Bushland Reserve	Low	Medium	N/A	Very low	High	Very low	High	High
Studio Park	Low	Medium	N/A	Low	High	Low	High	High
Upper Sweetwater Creek Reserve	Very low	Medium	Low	Medium	Medium	Medium	Medium	High

Table 18 - Summary of risk assessment for Group 2 'Moderate priority' reserves. Shaded cells are those determining the group the reserve is in.

Note - Shaded cells are those determining the group the reserve is in.
Note – N/A indicates this risk does not occur for this reserve.

Group 2 MODERATE PRIORITY	Risk 1					Risk 2	Risk 3	2013 priority
	Users	Dwellings	Special life risk	Infrastructure	Environment	Downstream	Environment	
18R Marcus Road	Very low	Low	N/A	Low	Low	Very low	Low	Moderate
Austins Reserve	Low	Low	Very low	Low	Low	Very low	Low	Moderate
Baxter Park	Low	Very low	N/A	Very low	High	Very low	High	Moderate
Belvedere Bushland Reserve	Low	Very low	N/A	Very low	Medium	Very low	Medium	Moderate
Casuarina Reserve	Very low	Low	N/A	Very low	Low	N/A	Low	Moderate
Escarpment Bushland Reserve	Very low	Very low	N/A	Low	Medium	Very low	Low	Moderate
Flame Robin Reserve	Very low	Low	N/A	Very low	Medium	Low	High	Moderate
Frankston Foreshore	Low	Low	N/A	Low	High	Low	High	Moderate
Jubilee Park	Very low	Low	N/A	Low	Low	N/A	Very low	Low
Langwarrin Equestrian Reserve	Very low	Low	N/A	Very low	Low	Very low	Low	Moderate
Lloyd Park	Very low	Low	N/A	Very low	High	N/A	High	Low
Monique Bushland Reserve	Very low	Low	N/A	Very low	Medium	Low	Medium	Moderate
Olivers Hill Foreshore	Very low	Low	N/A	Very low	Low	N/A	Low	N/A
Overport Park	Very low	Low	N/A	Very low	Low	Low	Low	Low
Park Valley Reserve	Very low	Low	N/A	Very low	Medium	Low	Medium	Moderate
Rinella Reserve	Very low	Low	N/A	Very low	Low	Low	Low	Moderate
Robinsons Bushland Reserve	Very low	Very low	Very low	Very low	Medium	Low	Medium	N/A
Seaford Foreshore	Low	Low	N/A	Low	High	Low	High	Moderate
Serenity Reserve (assessed as part of Langwarrin Equestrian Reserve)	Very low	Low	N/A	Very low	Low	Very low	Low	Moderate
Southgateway Reserve	Very low	Low	N/A	Very low	Medium	Very low	Medium	Moderate
Swampy Rise Wildlife Reserve	Very low	Very low	N/A	Very low	Medium	Low	Medium	N/A
Tangenong Creek Reserve	Very low	Very low	N/A	Very low	Medium	Very low	Low	Moderate
Wallace Reserve	Very low	Low	N/A	Very low	Low	N/A	Very low	Moderate
Witternberg Reserve/Robinsons Park	Very low	Very low	Very low	Very low	Medium	Low	Medium	Moderate
Yuille Street Reserve	Very low	Low	N/A	Very low	Low	Very low	Very low	N/A

Table 19 - Summary of risk assessment for Group 3 'Low priority' reserves.

Note – N/A indicates this risk does not occur for this reserve.

Group 3 **LOW PRIORITY**	Risk 1					Risk 2	Risk 3	2013 priority
	Users	Dwellings	Special life risk	Infrastructure	Environment	Downstream	Environment	
Armstrongs Reserve	Very low	Very Low	Very low	Very low	Low	N/A	Very low	Low
Banjo Rise Nature Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	Low
Bonacci Reserve	Very low	Very Low	N/A	Low	Low	N/A	Low	N/A
Carrum Woods Nature Reserve	Very low	Very Low	N/A	Very low	Low	Very Low	Very low	Low
Cell 3 (Pines Flora & Fauna Reserve)	Low	Very low	N/A	Very low	Low	Very low	Very low	Low
Centenary Park Golf Course	Very low	Very low	N/A	Low	Medium	Very low	Low	Low
Clifton Grove Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Colemans Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	N/A
Cotoneaster Reserve	Very low	Very Low	Very low	Very low	Low	Very Low	Very low	Low
Derinya Reserve	Very low	Very low	N/A	Very low	Low	Low	Low	Low
Esplanade Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	N/A
Franciscan Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Gumnut Bushland Reserve	Very low	Very low	Very low	Low	Medium	N/A	Low	Low
Hafey Wetlands	Very low	Very low	N/A	Very low	Medium	Very Low	Medium	N/A
Illawong Reserve	Very low	Very Low	Very low	Very low	Low	Very Low	Very low	Low
Kooluna Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Lawson Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Low	Low
Mulgra Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Nepean Gateway Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	N/A
Oakwood Reserve	Very low	Very Low	N/A	Low	Low	Very Low	Very low	Low
Outlook Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Pobblebonk Wetlands Reserve	Very low	Very low	N/A	Low	High	Very low	Medium	Low
Raphael Reserve	Very low	Very Low	Very low	Low	Low	N/A	Very low	Low
Shaxton Circle	Very low	Very Low	N/A	Very low	Low	N/A	Very low	Low
Solferino Reserve	Very low	Very Low	N/A	Very low	Low	N/A	Very low	N/A
Songlark Link Conservation Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	N/A
Stotts Bushland Reserve	Very low	Very low	N/A	Very low	Low	Very low	Very low	N/A
Wattlewood Bushland Reserve	Very low	Very Low	N/A	Very low	Low	Very Low	Very low	N/A
Wilton Bushland Reserve	Very low	Very Low	N/A	Low	Low	N/A	Very low	Low

5.3 Risk evaluation

Risk evaluation determines whether the level of risk (the risk rating) is tolerable, or whether further mitigation measures are required.

5.3.1 Risk priority

The level of priority for additional treatment is determined by the level of risk and the confidence in the risk assessment.

Through evaluation of the supporting evidence, expert opinion and participant agreement, the level of confidence for the risk assessment was assessed as High. This reflects that the assessed likelihood, consequence or risk has only one level but there is some uncertainty in the assessment.

Based on a High level of confidence, the priority for further investigation and/or mitigation is provided in Table 20 (see Section 10.2.4 for more detail on priority levels).

Table 20 - Risk priority. N.b. Priority for action (where 1 is highest priority and 5 is lowest) is based on the consequence category with highest risk rating (excluding environment category).

Risk no.	Risk description	Reserve group	Priority for action	Priority description
1	There is potential that during the Fire Danger Period a bushfire (either a local ignition or a large established fire in the wider landscape) burning in a Frankston City natural reserve will cause injury or loss of life to users or neighbours, economic loss through damage to Council assets or adjacent private property and/or environmental damage through adverse impact on flora, fauna, soil, water or air quality.	1	3	Medium priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
		2	4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
		3	5	Broadly acceptable risk. No action required beyond monitoring of risk level and priority during monitoring and review phase.
2	There is potential that during the Fire Danger Period an accidental or deliberate ignition will result in an unplanned fire starting in a Frankston City natural reserve that will spread beyond the reserve boundaries and cause injury or loss of life, economic loss through damage to critical infrastructure and/or private property and/or environmental damage through adverse impact	1	4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
		2	4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.

Risk no.	Risk description	Reserve group	Priority for action	Priority description
	on flora, fauna, soil, water or air quality. Note – This risk does not apply to all reserves in any Group.	3	5	Broadly acceptable risk. No action required beyond monitoring of risk level and priority during monitoring and review phase.
3	There is potential that fire management in a Frankston City natural reserve will cause environmental damage through vegetation removal, soil disturbance or an inappropriate fire regime that will adversely affect flora or fauna.	1	2	High priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment should be formally informed of risks. Further investigations and treatment plans should be developed.
		2	3	Medium priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
		3	4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.

5.3.2 Decision point

It is considered that the 'direct' risk (Risk 1) to reserve users and immediate neighbours from bushfire in the Group 2 and 3 reserves is being mitigated to a level that is 'as low as reasonably practical'. None of the risks are rated higher than Low with existing controls in place and an inherent assumption that the controls are implemented and operate as intended. The risk assessment found only Low priority for additional investigation or risk treatment.

The Medium risk rating for bushfire within the Group 1 reserves is driven by the potential for Moderate consequences in the 'Assets/Economic' category due to the presence of dwellings, special life risk buildings and/or infrastructure close to and downwind of the reserves. It is recommended that:

- The adequacy of perimeter APZs to protect adjacent dwellings continue to be assessed periodically as reserve Fire Management Plans are reviewed.
- Adjacent schools, aged care facilities etc. have appropriate Bushfire Emergency Management Plans.
- Infrastructure providers assess the vulnerability of the electricity transmission lines, terminal stations and water infrastructure within or adjacent to the reserves.

The potential for downstream consequences from a fire that starts within some Group 1 or 2 reserves also poses a significant risk. Under the worst-case scenario, Moderate consequences in multiple impact categories could result. Consequence management in this scenario is beyond the

scope of reserve management and is reliant on broader fire protection, suppression and emergency management arrangements. Reserve management is, however, important role in reducing the likelihood of such a fire occurring. It is recommended that consideration be given to:

- Restricting/discouraging use of Group 1 and 2 reserves on days with an Extreme or Catastrophic FDR.
- On days with an Extreme or Catastrophic FDR, Council staff patrolling high use Group 1 and selected Group 2 reserves, to prevent unsafe behaviours and detect and report ignitions.

The High or Medium risk rating for damage by fire management works (mainly in Group 1 and 2 reserves) is due to the potential need for vegetation management to create or maintain APZs, the difficulty of providing an appropriate long-term fire regime in peri-urban bushland reserves, and the danger of fire suppression requiring the creation of additional access tracks or fire control lines in areas of very high biodiversity value.

The decision to implement additional risk treatments or enhance existing controls to address these risks should be based on a cost-benefit analysis and Frankston City Council's comfort with the level of assessed risk.

6 Treatment strategy

6.1 Strategic initiatives

Strategic initiatives are those that underpin fire management across the Frankston City natural reserve estate as a whole, rather than specific reserves or groups of reserves.

6.1.1 Planned burning

The Frankston City natural reserve estate has an active prescribed burning program, planned and delivered by Frankston City Council. Fire regime is an important part of the natural processes of native ecosystems, and both long term fire exclusion and too frequent and/or too intense fires can have deleterious effects. The use of planned fire as a management tool, to achieve both bushfire safety and ecological health objectives, is a central tenet of the *Metropolitan Region Bushfire Management Strategy* (DELWP 2020). Cultural burning is also an emerging priority (VTOCFKH no date).

Frankston City Council's planned burning approach prioritises burns in larger bushland reserves that have one or more of the following benefits:

- Reduce fuel loads adjacent to asset protection zones and private property.
- Create a mosaic of fuel loads throughout the reserve to reduce the intensity and rate of spread of bushfire.
- Provide different age classes, successional stages and habitat niches for flora and fauna.
- Reduce weed biomass and encourage competition from fire adapted indigenous flora.
- Stimulate germination, growth and flowering of indigenous flora.

Four types of planned burning is commonly conducted by Frankston City Council:

- *Ecological burns* – Frankston City Council's Natural Reserves are for the protection and enhancement of biodiversity values and as such ecological benefits of planned burning is typically the primary objective of all planned burn operations.
- *Cool mosaic patch burns* – This type of burning is applied at small scale, typically to encourage regeneration of high quality vegetation and is delivered throughout the year as a regular maintenance activity with minimal resources.
- *Fuel reduction burns* – Planned burns with the sole outcome of fuel reduction are very limited, due to short-term fuel reduction benefits in vegetation communities adapted to fire. This is most commonly used in degraded areas to control high biomass weeds.
- *Rough heap/pile burns* – Burning piles of weeds and woody material.

Frankston City Council only considers planned burning a suitable treatment if it will not result in detrimental impacts to environmental values. Determining areas suitable for prescribed burning requires detailed research and planning to ensure all aspects of risk reduction and conservation preservation are incorporated into the planning process. Frankston City Council's *'Planned Burn Decision Support Tool'* outlines the principals for determining priorities and objectives of any planned burn, taking into consideration:

- Fire ecology reports, age class assessments and fire regime prescriptions.
- Fire management plans and fuel hazard assessments.
- Flora and fauna surveys and potential impacts on significant/vulnerable flora and fauna.
- Desirable fire intensity and coverage, ensuring minimal tree loss, protection of habitat values, and no more than 10% of the reserve burnt within a 3 year interval with successful regeneration prior to undertaking further burns.
- Safe and effective burning operations including emergency access and egress, critical asset protection requirements and community impact.
- Resource constraints ensuring adequate funding for preparation, burn operations, ongoing maintenance and monitoring to ensure long term outcomes are achieved.

All staff planning and conducting burn operations are appropriately qualified and experienced in accordance with national standards and best practice principles.

It is recommended that Frankston City Council maintain the long-term, ecologically-based planned burning program within their natural reserves.

6.1.2 Private bushland

There are large tracts of private bushland in the east of the municipality, particularly around Langwarrin and Langwarrin South. These areas are important for biodiversity conservation (Frankston City Council 2021) but also critical to the potential spread and impact of a large bushfire within and beyond the municipality.

Strategic fuel management of private land has traditionally been difficult due to the fragmented ownership and lack of an effective legislative lever. The Joint Fuel Management Program has increased the capacity to engage with landowners and conduct planned burning on private land and is an important complement to the management of Frankston City's natural reserves.

6.1.3 Critical infrastructure

Critical state or regional water, electricity and telecommunications infrastructure is located within or adjacent to several Frankston City natural reserves (see Table 11 and Map 8), the temporary or permanent loss of service could impact large numbers of people. The vulnerability of telecommunications, power or water infrastructure to radiant heat is often not known, making it difficult to determine what vegetation management or other works are required.

Where important community infrastructure is located within or adjacent to a Group 1 or 2 natural reserve, it is recommended that Frankston City Council liaise with the infrastructure manager to confirm the criticality of the asset, potential consequence of a service interruption due to bushfire, the vulnerability of the asset to the fire severity credible within the reserve, and to determine the need for fire protection works by Frankston City Council or the infrastructure manager.

6.2 Principles of selecting an appropriate treatment regime for reserves

The decision about what treatments will be applied and where they will be applied, should be based upon the level of risk, the efficacy of a potential treatment in reducing the risk, how practical the treatment is to implement and the cost-benefit of the treatment.

In selecting a risk treatment, reserve managers should:

- Be clear about what risk the bushland reserve poses.
- Have assessed the level of risk, as it is important that the degree of treatment is commensurate to the risk.
- Ensure that the works being proposed address one or more of the risk factors present at that particular location.
- Consider what treatments in and beyond the bushland reserve may be most effective.
- Consider whether the potential benefits of the treatment justify the economic, environmental, and aesthetic costs of the works.
- Ensure that all appropriate permits and permissions have been obtained.
- Consider whether alternative treatments outside of the reserve, such as community education, emergency management arrangements etc. may be more appropriate.

It is not expected that all the treatments would be implemented in every reserve. In some cases, the suggested controls may not be appropriate, in others comparable controls may be being implemented by other organisations (for example CFA, FRV and FFMV deliver a range of community safety programs).

Individual risk controls and treatments are summarised in Section 7.

6.3 Treatment strategy by reserve

To show how management of Frankston City natural reserves contribute to broader fire management, the existing controls (to be maintained) and potential treatments (to be considered for implementation on a reserve-by-reserve basis) are organised according to the 'approaches' outlined in the *Metropolitan Bushfire Management Strategy 2020* (DELWP 2020).

The approaches in DELWP (2020) and their general applicability to Frankston City natural reserves are summarised in Table 21 and in relation to individual reserves in Table 22.

Table 21 – Applicability of DELWP (2020) fire management approaches to bushland reserves.

Approach (as per *Metropolitan Bushfire Management Strategy 2020*)	Applicable when…
Reduce bushfire ignitions through prevention activities	… use of the reserve increases the potential for an ignition within the reserve that could develop in size and intensity and damage assets adjacent to the reserve and/or beyond the reserve boundary.
Increase the effectiveness of fire suppression	… fire suppression vehicles may need to move through and/or work within the reserve.
Reduce bushfire spread and severity	… a bushfire within the reserve could develop in size and intensity and damage assets adjacent to and/or beyond the reserve boundary.
Reduce the physical effects of bushfire in inhabited areas	… buildings and people within or adjacent to the reserve could be threatened by a fire burning within the reserve.
Reduce the social effects of bushfires on communities	… bushfire within the reserve could damage or destroy critical infrastructure relied upon by the broader community.
Reduce the impact from fire management actions	… the reserve contains high biodiversity values, biophysical features or cultural values that could be degraded by inappropriate fire management activities (assessed as reserves rated Very High or High conservation scores in *Natural Reserves Service Priority Matrix* (Frankston City Council 2021)).

6.4 Recommended risk controls by reserve group

6.4.1 Group 1 reserves

The following controls/treatments are recommended for Group 1 reserves:

- Develop or review the formal, detailed Fire Management Plans (FMPs) as they become due (recommended review cycle for FMPs is 5 years for reserves experiencing significant change within or adjacent to the reserve and 10 years for reserves experiencing little change).
- Undertake detailed assessment of potential fire behaviour and requirement for fuel management (e.g. perimeter APZs) when the FMP is reviewed.
- Maintain APZs to standard and distance specified in FMP.
- Establish processes to ensure re-vegetation activities take account of the FMP, in particular the role of APZs and other low threat areas in protecting adjacent buildings.
- Monitor fuel hazard on a 5-year schedule or to inform any planned burning.
- Work with volunteer groups and adjacent residents to promote bushfire prevention and preparedness.
- Liaise with CFA and FRV to ensure they are familiar with the reserves, including access, water supplies, APZs and ecological values.
- Undertake Fire Patrols on days of elevated FDR to discourage deliberate or accidental ignitions and to facilitate early detection of fires.
- Discourage use of reserves on days of Total Fire Ban and Extreme or Catastrophic FDR – consider signage and closure.

- Advocate for adjacent facilities, with particularly vulnerable populations, to prepare for a fire within the reserve, e.g. schools, pre-schools, aged care etc.
- Continue the use of planned burning as an ecological management tool if required to maintain the health of vegetation.

6.4.2 Group 2 reserves

The following controls/treatments are recommended for Group 2 reserves:

- Maintain brief Fire Management Statements (FMSs) that describe and map existing bushfire risk controls, i.e. APZs, access, water supplies etc.
- Maintain APZs to agreed standard and distance specified in the FMS.
- Assess the requirement for any additional APZs (e.g. up to 6 m wide where there is hazardous vegetation within 10 m of a building).
- Establish processes to ensure re-vegetation activities take account of the FMS, in particular the role of APZs and other low threat areas in protecting adjacent buildings.
- Support multi-agency community education using existing bushfire safety resources.
- Undertake Fire Patrols on days of elevated FDR on high use reserves to discourage deliberate or accidental ignitions and to facilitate early detection of fires.
- Discourage use of reserves on days of Total Fire Ban and Extreme or Catastrophic FDR – consider signage and closure.
- Advocate for adjacent facilities, with particularly vulnerable populations, to prepare for a fire within the reserve, e.g. schools, pre-schools, aged care etc.
- Continue the use of planned burning as an ecological management tool if required to maintain the health of vegetation.

6.4.3 Group 3 reserves

The following controls/treatments are recommended for Group 3 reserves:

- Maintain 3 m wide APZs and/or managed parkland between bushland and any dwellings or important community infrastructure within 10 m of the reserve boundary.
- Weed management.
- Support multi-agency community education using existing bushfire safety resources.
- Continue the use of planned burning as an ecological management tool if required to maintain the health of vegetation.

6.4.4 All reserves as applicable

The following controls/treatments are recommended for all reserves:

- Regulate use of fire by reserve users.
- Maintain mandated clearance distances around power lines.
- Regulate machinery use and hot works during the Fire Danger Period.
- Undertake post-fire rehabilitation as required.

Table 22 – Applicability of treatment strategy by reserve (Group 1 reserves shaded red, Group 2 yellow, and Group 3 green).

Reserve	Fire management approach					
	Reduce bushfire ignitions through prevention activities	Increase the effectiveness of suppression	Reduce bushfire spread and severity	Reduce the physical effects of bushfires in inhabited areas	Reduce the social effects of bushfires on communities	Reduce the impact from fire management actions
18R Marcus Road Reserve	✗	✗	✗	✓	✓	✗
Armstrongs Reserve	✗	✗	✗	✗	✗	✗
Austins Reserve	✓	✓	✗	✓	✓	✗
Banjo Rise Nature Reserve	✗	✗	✗	✗	✓	✗
Baxter Park	✓	✓	✗	✗	✗	✓
Belvedere Bushland Reserve	✗	✓	✓	✓	✗	✓
Boggy Creek Link	✓	✓	✓	✓	✓	✗
Bonacci Reserve	✗	✗	✗	✓	✓	✗
Bunarong Park	✓	✓	✓	✓	✓	✓
Carrum Woods Nature Reserve	✗	✗	✗	✗	✗	✗
Casuarina Reserve	✗	✗	✗	✓	✗	✗
Cell 3 (Pines Flora & Fauna Reserve)	✗	✓	✗	✗	✗	✗
Centenary Park Golf Course	✗	✓	✗	✗	✓	✓
Clifton Grove Reserve	✗	✗	✗	✗	✗	✗
Colemans Reserve	✗	✗	✗	✗	✗	✗
Cotoneaster Reserve	✗	✗	✗	✗	✗	✗
Derinya Reserve	✗	✗	✗	✗	✗	✗
Escarpment Bushland Reserve	✗	✗	✗	✓	✓	✓

Reserve	Fire management approach					
	Reduce bushfire ignitions through prevention activities	Increase the effectiveness of suppression	Reduce bushfire spread and severity	Reduce the physical effects of bushfires in inhabited areas	Reduce the social effects of bushfires on communities	Reduce the impact from fire management actions
Esplanade Reserve	✗	✗	✗	✗	✓	✗
Flame Robin Reserve	✓	✗	✓	✓	✗	✓
Franciscan Reserve	✗	✓	✗	✗	✗	✗
Frankston Foreshore	✓	✗	✗	✓	✓	✓
Gumnut Bushland Reserve	✗	✗	✗	✗	✓	✓
Hafey Wetlands	✓	✓	✗	✗	✗	✓
Illawong Reserve	✗	✗	✗	✗	✗	✗
Jubilee Park	✗	✓	✗	✓	✓	✗
Kananook Creek Reserve	✓	✓	✗	✓	✓	✓
Kooluna Reserve	✗	✗	✗	✗	✗	✗
Langwarrin Equestrian Centre	✗	✓	✗	✓	✗	✗
Lawson Reserve	✗	✗	✗	✗	✗	✗
Lexton Reserve	✓	✓	✓	✓	✗	✓
Little Boggy Creek Reserve	✓	✓	✓	✓	✗	✓
Lloyd Park	✗	✓	✓	✓	✗	✓
Lower Sweetwater Creek Nature Reserve	✓	✓	✓	✓	✗	✓
Monique Bushland Reserve	✓	✓	✓	✓	✗	✓
Mulgra Reserve	✗	✗	✗	✗	✗	✗
Nepean Gateway Reserve	✗	✗	✗	✗	✗	✗
North Reserve	✓	✓	✓	✓	✗	✓

Reserve	Fire management approach					
	Reduce bushfire ignitions through prevention activities	Increase the effectiveness of suppression	Reduce bushfire spread and severity	Reduce the physical effects of bushfires in inhabited areas	Reduce the social effects of bushfires on communities	Reduce the impact from fire management actions
Oakwood Reserve	✗	✗	✗	✗	✓	✗
Olivers Hill Foreshore	✗	✗	✗	✓	✗	✗
Outlook Reserve	✗	✗	✗	✗	✗	✗
Overport Park	✓	✓	✓	✓	✗	✗
Paratea Flora & Fauna Reserve	✓	✓	✓	✓	✓	✓
Park Valley Reserve	✓	✓	✓	✓	✗	✓
Pobblebonk Wetlands Reserve	✗	✓	✗	✗	✓	✓
Raphael Reserve	✗	✗	✗	✗	✓	✗
Rinella Reserve	✗	✓	✓	✓	✗	✗
Robinsons Bushland Reserve	✓	✗	✓	✗	✗	✓
Seaford Foreshore	✓	✗	✓	✓	✓	✓
Seaford Wetlands	✓	✓	✓	✓	✗	✓
Serenity Reserve	✗	✗	✗	✓	✗	✗
Shaxton Circle	✗	✗	✗	✗	✗	✗
Solferino Reserve	✗	✗	✗	✗	✗	✗
Songlark Link Conservation Reserve	✗	✗	✗	✗	✓	✗
Southgateway Reserve	✗	✗	✓	✓	✗	✓
Stevens Reserve	✓	✓	✓	✓	✗	✓
Stotts Bushland reserve	✗	✗	✗	✗	✗	✗
Stringybark Bushland Reserve	✓	✓	✓	✓	✗	✓

Reserve	Fire management approach					
	Reduce bushfire ignitions through prevention activities	Increase the effectiveness of suppression	Reduce bushfire spread and severity	Reduce the physical effects of bushfires in inhabited areas	Reduce the social effects of bushfires on communities	Reduce the impact from fire management actions
Studio Park	✓	✓	✓	✓	✓	✓
Swampy Rise Wildlife Reserve	✓	✓	✓	✗	✗	✓
Tangenong Creek Reserve	✗	✗	✗	✗	✗	✓
Upper Sweetwater Creek Reserve	✓	✓	✓	✓	✓	✓
Wallace Reserve	✗	✗	✗	✓	✗	✗
Wattlewood Bushland Reserve	✗	✗	✗	✗	✗	✗
Wilton Bushland Reserve	✗	✗	✗	✗	✓	✗
Witternberg Reserve & Robinsons Park	✓	✓	✓	✗	✗	✓
Yuile Street Reserve	✗	✗	✗	✓	✗	✗

7 Description of risk controls and treatments

Sound risk management practice is to implement multiple controls to address the identified risk factors, as particular treatments/controls may fail under certain circumstances. In this section a 'toolbox' of risk controls and treatments is provided, along with descriptions of each.

7.1 Treatment toolbox

An extensive list of potential bushfire risk mitigation treatments, along with a summary of the efficacy of each, is provided in Table 23. This table also identifies which group of reserves this treatment may be relevant to.

Table 23 – Frankston natural reserves treatment toolbox.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce bushfire ignitions through prevention activities				
Regulate fire use through local laws	Medium – will reduce accidental ignitions, but unlikely to deter deliberate ignitions.	High – inc. enforcement via fire patrols in Group 1 and selected Group 2 reserves.	Ongoing, particularly throughout the Fire Danger Period.	Group 1, 2 & 3.
Regulate hot works	Medium – reduces but does not eliminate potential for ignition and spread.	High – minor change to work practices.	During Fire Danger Period.	Group 1, 2 & 3.
Regulate machinery use	Medium – reduces but does not eliminate potential for ignition and spread.	High – minor change to work practices.	During Fire Danger Period.	Group 1, 2 & 3.
Prevent unauthorised vehicular access	Medium – will deter entry, but not prevent it.	Low –cost to install, then maintenance as required.	Ongoing.	Group 1 & 2.
Vegetation management under power lines	Medium – there is a history of power line caused bushfires despite vegetation management.	High – existing requirement in accordance with a code of practice prepared under Part 8 of the Electricity Safety Act 1998.	During Fire Danger Period.	Group 1, 2 & 3 - where applicable.
Maintain minimal fuel area around public facilities (amenity mow)	High – will limit fire spread from these areas.	Medium – maintenance costs, but likely to be done for amenity anyway.	During Fire Danger Period.	Group 1 & 2.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce bushfire ignitions through prevention activities				
Community engagement programs	Medium – significant amount of information available, but difficult to engage all people.	High – partner with CFA & FRV, use existing materials.	Before and during the Fire Danger Period.	Group 1 – targeted engagement Group 2 – general.
Support VicPol and/or CFA & FRV arson reduction programs	Medium – may deter but unlikely to prevent deliberate ignition.	High – in response to suspicious fires.	Ongoing.	Group 1 & 2 and/or in response to suspicious fires.
Fire patrols	Medium – patrols may deter arson and increase detection.	Medium – requires staff commitment, including over time etc.	On days of elevated fire danger.	Group 1 & 2.
Reserve closure	Low – may deter entry, but not prevent it, particularly those with an intent to light a fire. Will also reduce likelihood of suspicious or unlawful behaviour being seen.	Low – impracticable to fence reserve.	Days with a FDR of Code Red.	Group 1 & 2.
Signage advising regulation of fire use and deterring use of reserve on high fire risk days	Medium – may reduce accidental ignitions, but unlikely to deter deliberate ignitions.	Medium – one off cost to install, then maintenance as required.	Ongoing.	Group 1 & Group 2 with high use.
Increase the effectiveness of fire suppression				
Provide fire fighter access to the reserve	High – but depends on presence of fire services.	High – if existing Low – if additional works required.	Ongoing.	Group 1 & larger Group 2.
Provide adequate water supply for fire fighters	High – as long as reticulated or static supply is available during a fire.	High – most reserves adjacent to reticulated water supplies. Medium – if additional static supply required.	Ongoing.	Group 1 & 2.
Ensure reserve is in CFA & FRV operational plan	High – will aid effective prioritisation of firefighting resources.	High – annual familiarisation tours and inter agency liaison in place.	Ongoing, update annually before the Fire Danger Period.	Group 1 & Group 2 with potential for downstream impacts.
Construct fire control lines (FCLs)	Low – efficacy reduced in treed settings.	Low - limited value in small reserves where firefighting is likely to occur on reserve boundary.	As required.	Group 1.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce bushfire spread and severity				
Bushfire Moderation Zones	High – planned burning in BMZ should temporarily reduce fire intensity and may facilitate effective suppression.	Low – extensive and regular fuel management required (including burning) which may be ecologically undesirable, limited applicability in small reserves.	Ongoing.	Group 1 and larger Group 2.
Landscape Management Zones	Moderate – planned burning in LMZ is unlikely to occur frequently enough to significantly influence fire intensity but may reduce spotting.	Low – considerable financial cost	Ongoing.	Group 1 & 2 (and others where appropriate to complement JFMP).
Planned burning	Medium – in forest vegetation the reduction in fuel hazard is short lived (with the exception of bark hazard). Burning in grass fuels is aimed at increasing the cover of native grasses, which may present a lower fuel threat than exotic species.	Medium - Frankston City Council budgeted program.	As per the recommended Tolerable Fire Interval.	Group 1. Group 2 & 3 – if appropriate to achieve defined ecological outcomes.
Reduce the physical effects of bushfires in inhabited areas				
Egress signage	Medium – will facilitate egress but is not designed for emergency evacuation.	Medium – one off cost to install, then maintenance as required.	Ongoing.	Group 1 and larger Group 2.
Reserve closure	Medium – may reduce the number of people exposed, but access cannot be prevented.	Low – impracticable to fence reserves.	Days with a FDR of Catastrophic.	Group 1 and larger Group 2.
Community engagement programs	Medium – large amount of information available, but difficult to engage all people.	High – partner with CFA & FRV, use existing materials.	Before and during the Fire Danger Period.	Group 1 – targeted engagement Group 2 & 3 – general.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce the physical effects of bushfires in inhabited areas				
Plans by vulnerable people and groups	High –plans will reduce the likelihood of exposure.	Medium – effort required to identify and engage with target group.	Ongoing.	Group 1 and downwind of Group 2.
Reduce the physical effects of bushfires in inhabited areas				
Shelter options	Variable – some reserves have ready egress to nearby low threat urban area, others more problematic.	High – self-directed or organised evacuation via standard emergency management arrangements.	Ongoing.	All Groups as required.
Support to affected people	Medium – may reduce long term impacts.	High – range of recovery and support services available.	As required.	All Groups as required.
Asset Protection Zones (mechanical)	Medium – will reduce risk of flame and radiant heat impact on adjacent properties if complemented by works on private property. Limited reduction in embers.	Medium – one off cost to install, then maintenance as required. Ecological impact of any additional vegetation removal.	During the Fire Danger Period.	Group 1 & 2 – as gauged from in-depth analysis.
Asset Protection Zones (planned burning)	Medium – fuel loads not reliably low enough for defendable space. May reduce ember attack.	Medium - Frankston City Council budgeted program.	During the Fire Danger Period.	Group 1 & 2 – as gauged from in-depth analysis.
Bark hazard fuel reduction	High - targeted bark hazard fuel reduction through planned burning or bark candling can significantly reduce ember production	Medium - Frankston City Council budgeted program.	As required, determined by a bark hazard assessment.	Group 1 & Group 2 with potential for downstream impacts.
Re-vegetation planning	High – consideration of the size and location of re-vegetation and APZs can avoid increasing level of bushfire attack on adjacent buildings.	High – can be included as a consideration in re-vegetation planning decisions.	Ongoing.	All Groups.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce the physical effects of bushfires in inhabited areas				
Low fuel garden design	High - vegetation management close to homes reduces flame, radiant heat and ember ignitions.	Low – hard to influence management of established private gardens. Could be linked to Gardens for Wildlife program.	Ongoing.	Group 1 & 2.
Target adjacent properties for hazard inspections around reserve	High – vegetation management close to homes reduces flame, radiant heat and ember ignitions	High – existing function of MFPO.	Before and during the Fire Danger Period.	Group 1 & 2.
Community engagement programs	Medium – significant amount of information available, but difficult to engage all people.	High – partner with CFA & FRV, use existing materials.	Before and during the Fire Danger Period.	Group 1 – targeted engagement. Group 2 & 3 – general.
Appropriate fences	Medium – masonry and sheet metal fences can act as a barrier to radiant heat and inhibit fire front progression. Paling fences can also block radiant heat, but if they ignite can carry fire towards building.	Low – hard to influence construction choices without local planning policy or incentive scheme.	Ongoing.	Group 1.
Housekeeping	Medium – will reduce the chance of fine fuel build up, ember ignitions and penetration into houses.	Medium – requires implementation by residents.	Ongoing, particularly during the Fire Danger Period.	Group 1.
Land use planning and building controls	High – appropriate application of bushfire principles in land use planning and building controls can reduce vulnerability of buildings.	Low/Moderate - depends on potential for further development adjacent to reserves.	Ongoing.	All Groups - in BPA/BMO.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce the social effects of bushfires on communities				
House construction standard (and retrofitting)	High – will reduce ember, radiant heat and flame impact, but must be complemented with fuel management and maintenance.	Low – can involve considerable cost and no regulatory trigger unless renovation in BPA/BMO.	Ongoing.	Group 1 & 2 - in BPA/BMO.
Asset Protection Zones for critical infrastructure	High – for buildings as will reduce the likelihood of excessive flame and radiant heat impact. Moderate – for electrical and water supply assets as vulnerability hard to quantify.	Medium – one off cost to install, then maintenance as required. Ecological impact of any additional vegetation removal.	During the Fire Danger Period.	Group 1 – as gauged from in-depth analysis. Group 2 & 3 – where required for critical infrastructure.
Increase fire resistance of infrastructure	High – will reduce radiant heat and flame impact, but must be complemented with fuel management.	Low/Moderate – potentially considerable cost depending on nature of asset.	Ongoing.	Group 1 & 2 - where applicable.
Plans for restoration	High – reserve infrastructure can be replaced.	Medium – recovery costs can be high, and some reserve infrastructure may not be replaced.	Ongoing.	Group 1 & 2 - where applicable.
Reduce the impact from fire management actions				
Integrated planning for fire management and biodiversity	High – increases the chance that fire management and biodiversity management objectives are met.	Medium – ready access to requisite expertise, but may be difficult to reconcile multiple objectives.	Ongoing.	Group 1, 2 & 3 – where significant conservation values.
Weed management	High – will improve reserve health and may reduce overall fuel hazard.	Medium – maintenance costs.	Ongoing.	Group 1, 2 & 3 – where significant conservation values.
Manage EVCs within TFI	High – fire regime important to EVC health.	Medium - Frankston City Council budgeted program.	Ongoing.	Group 1, 2 & 3 – where significant conservation values.
Pre-suppression plan with CFA, FRV & FFMV to minimise damage by suppression.	Medium – success will depend on location of fire and fire service's knowledge.	High – annual familiarisation tours and inter agency liaison in place at selected reserves.	Ongoing – updated annually before Fire Danger Period.	Group 1, 2 & 3 – where significant conservation values.

Treatment	Strength	Expediency	Suggested frequency	Relevant reserve groups
Reduce the impact from fire management actions				
Fire recovery works	Medium – efficacy will depend on vegetation type and extent of damage.	Medium – rehabilitation works may be costly.	As required.	Group 1, 2 & 3 – where significant conservation values.

7.2 Reduce bushfire ignitions through prevention activities

7.2.1 Regulation of fire use through local laws

There is a total prohibition on campfires in any natural reserve pursuatnt to Local Law clause 3.12 Open Air Burning and Chimneys, which states:

(a) In this clause 3.12, "in the open air" has the same meaning as that contained in Division 2 of Part III of the Country Fire Authority Act 1958.

(b) A person must not light a fire in the open air on any land within the municipality, including in an incinerator.

(c) The prohibition in subclause 3.12(b) does not apply to:

i) a barbecue, pizza oven or other properly constructed appliance while it is being used
for cooking food;

ii) a fire in a brazier or chimenea while it is being used for heating;

iii) a tool of trade while being used for the purpose for which it was designed;

iv) a fire lit during the course of duty by a member of a fire or emergency services agency; or

v) a person to whom Council or an Authorised Officer has granted a permit.

(d) A person who has lit or allowed a fire to remain alight contrary to the provisions of this clause 3.12 or any condition contained in the permit must extinguish the fire immediately on being directed to do so by Council or an Authorised Officer.

No BBQs are provided in Frankston City natural reserves.

Any unauthorised fire discovered will be immediately extinguished.

7.2.2 Regulate hot works

Hot works by Frankston City Council staff and contractors during the summer Fire Danger Period will demonstrate good practice by aligning with the applicable requirements of the CFA Act and Regulations (n.b. no equivalent provisions in the FRV Act).

The CFA Regulations (R111) prescribe the following activities to be high fire risk – welding, gas cutting, soldering, grinding, charring and the use of power operated abrasive cutting discs.

Frankston City Council will ensure that, in conducting or engaging in the conduct of a high-risk activity:

- A shield or guard of fire resistant material is placed or erected in such a way as to prevent the emission of sparks, hot metal or slag.
- The area for a radius of at least 1·5 m from the activity is clear of all flammable material or wetted down sufficiently to prevent the spread of fire.
- There is available for immediate use in the event of fire a reticulated water supply or an effective water spray pump of the knapsack pattern with a tank capacity of not less than 9 litres and fully charged with water.
- Cut-offs and electrode stubs from the activity are placed directly in a fire proof receptacle.

The need for appropriate permits should be included in the work contracts for external providers.

7.2.3 Regulate machinery use

Use by Frankston City Council staff and contractors of motor vehicles or other machinery with the potential to cause an ignition, e.g. use of vehicles in long dry grass or slashing of grass, during the summer Fire Danger Period, will demonstrate good practice by aligning with the applicable requirements of the CFA Act and Regulations (n.b. no equivalent provisions in the FRV Act).

Any tractor or self-propelled farm machine or traction engine or earth-moving, excavating or road-making machine propelled by or incorporating a heat engine will not be driven or operated in or within 9 m of any crop, grass, stubble, weeds, undergrowth or vegetation unless it is free from faults and mechanical defects which would tend to cause an outbreak of fire; is fitted with a spark arrester; and carries the prescribed fire suppression equipment during the Fire Danger Period.

The prescribed fire suppression equipment is:

- At least one water spray pump of the knapsack pattern that -
    - is in proper working order.
    - is fully charged with water.
    - has a tank capacity of not less than 9 L.
    - complies with AS 1687.

or

- At least one water (stored pressure) fire extinguisher that -
    - is in proper working order.
    - is fully charged with water and maintained at the correct pressure.
    - has a tank capacity of not less than 9 L.
    - complies with AS/NZS 1841.1.

The spark arrester will comply with AS 1019.

Mowing of grass etc. in Group 1 and 2 reserves should not occur near bushland on days of Total Fire Ban.

7.2.4 Prevent unauthorised vehicular access

Limiting access to reserves by certain users (e.g. drivers in cars or motorcyclists) and at certain times (e.g. Code Red days) can assist to limit the opportunities for accidental or malicious fire ignition. Fences, other barriers and gates and local laws and enforcement can assist.

7.2.5 Vegetation management under power lines

Vegetation is kept clear of power lines to minimise the risk of bushfire ignition in accordance with a code of practice prepared under Part 8 of the Electricity Safety Act 1998, as documented in the applicable Council plans.

7.2.6 Maintain minimal fuel area around public facilities (amenity mow)

All high use areas (e.g. around community facilities, playgrounds, picnic areas etc.) have the grass regularly mowed during the Fire Danger Period. This reduces the likelihood of accidental ignition (e.g. by cigarettes) and would reduce flame height of any fire that did start.

Many natural reserves have an internal network of minor, informal 'fire breaks' provided by tracks and paths, which may limit the spread of a fire ignited within a reserve under mild weather conditions.

7.2.7 Arson programs

Arson is a complicated action with a variety of motivations that can be malicious or not. Liaising with Police, CFA and FRV, as applicable, is recommended to assist with monitoring any arson activity and assisting with arson prevention programs.

7.2.8 Fire patrols

Official patrols within Group 1 and Group 2 reserves could be conducted by trained Frankston City Council staff on days of Total Fire Ban, when the FDR is Extreme or during periods of sustained high temperature. These patrols would identify and prevent any breaches of the fire restrictions and discourage any other unsafe or malicious behaviour.

It is envisaged that Frankston City Council staff who detect a small fire would immediately report it via 000 and then, if appropriately qualified and equipped, undertake first attack using water and firefighting equipment carried on their vehicle. First attack should only be undertaken if safe to do, and personnel should not put their safety at risk.

7.2.9 Reserve closure

Consideration should be given to the closure to the public of Group 1 and 2 reserves on days of Catastrophic FDR, to reduce the likelihood of an accidental ignition in the reserve. This would align with Parks Victoria parks and reserves that are zoned Public Fire Safety Zones and provide a consistent approach across adjacent reserves.

Signage advising against entry into the reserve on such days is recommended and the use of gates as a physical method of exclusion could also be considered where practicable. Group 1 and 2 reserves

that can be physically closed include Bunarong Park, Flame Robin Reserve, Lexton Reserve, North Reserve, Paratea Flora and Fauna Reserve, Stringybark Bushland Reserve, and Studio Park.

The procedures for closing the reserves should be documented, including assigning responsibility for reserve closure, monitoring fire weather forecasts, and the administrative procedures and physical actions for closing access.

Information about reserve closure should be provided on signs at major entrances to the Group 1 and 2 reserves, and at strategic points within the Group 1 reserves, as well as on the Council website and in pre-season publications, such as newsletters.

Fire patrols around Group 1 and 2 reserves could help implement this treatment.

7.2.10 Signage

Signage can be used to provide information related to fire restrictions and fire hazard, to increase public awareness of the fire risk present within the reserve.

Terramatrix recommends that the following information (text or symbols) be displayed at major locations in Group 1 and 2 reserves:

- No Fires – text or a symbol indicating that fires are not permitted in the reserves. Fires are prohibited in Frankston natural reserves via local laws.
- Patrols - indicate that the reserves are patrolled by Frankston City Council staff on days of elevated fire danger (if adopted as treatment in Group 1 and 2 reserves).
- No entry during days of Catastrophic FDR – to discourage any use of the reserves by the public during the most extreme bushfire conditions.
- Wayfinding including egress information.

7.3 Increase the effectiveness of fire suppression

7.3.1 Provide fire fighter access to the reserve

Providing access around and within a natural reserve will help to reduce the spread of fire by increasing the effectiveness of suppression efforts. Providing good information about existing access can also prevent environmental harm.

If access is inadequate or non-existent, the construction of a fuel break or fire fighting access track is exempt from requiring a vegetation clearing permit under clause 52.17 of the Victoria Planning Provisions.

It is recommended that, where practicable, the minimum standards for access tracks intended to be used by ‘heavy tankers’ be consistent with those set out for emergency vehicles in CFA guidelines (CFA 2022 c; CFA 2023), including:

- Minimum trafficable width of 3.5 m, with an additional 0.5 m horizontal clearance each side and 4 m vertical clearance.
- 15 T, all weather carrying capacity.

- Average grade no more than 1 in 7 (8.1°) with a maximum grade of 1 in 5 (11.3°) for no more than 50 m.
- The potential need for turning points and passing bays in larger reserves should be established in consultation with the relevant fire service during detailed reserve fire management planning.

If access is only intended for 'ultra light tankers' and Council slip-ons, then lesser standards may be acceptable. It is worth noting that DEECA/Parks Victoria have minimum design standards set out for the various forest road classes in the *Road Management Plan* (DELWP 2019c).

Given that each reserve is likely to be different in its specific requirements, it is advisable to liaise with CFA and FRV to determine their minimum access requirements.

7.3.2 Provide adequate water supply for fire fighters

Ensuring adequate water supplies around and within a natural reserve will help to reduce the spread of fire by increasing the effectiveness of suppression efforts.

The Frankston City natural reserves are in an area with a reticulated water supply, with hydrants regularly spaced through the urban area. Inspections of Group 1 and 2 reserves with CFA and/or FRV as applicable, provides an opportunity to identify any requirement for additional water supplies (such as dams or tanks and associated hard standing) to support fire fighting.

7.3.3 Ensure reserve is in CFA and FRV operational plans

A map of each Group 1 and 2 reserve should be given to CFA and FRV for operational purposes. Features such as APZs, fences and other barriers, gates, tracks, water sources etc. should be included. Liaise with CFA and FRV to provide information which best meets their needs. If areas of sensitive vegetation or waterways are present, these should be shown on the plan as areas to avoid, and information provided on how to minimise harm if they can't be avoided.

Representatives from CFA and FRV that may have a role in responding to a fire within a Frankston City natural reserve should be offered a briefing and inspection of Group 1 and selected Group 2 reserves prior to the Fire Danger Period each year. This will provide them with an appreciation of the layout of the major reserves, fire hazard reduction works in place, and allow identification and discussion of any fire management issues.

7.3.4 Construct fire control lines

A fire control line (FCL) is 'a natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire' (AFAC 2012).

Fire control lines (FCLs) can be an important tool in assisting fire brigades to limit the spread of bushfires by providing easy access and a safe working distance from a fire. Preparing a road or track as an FCL can, however, be costly, both financially and environmentally.

7.4 Reduce bushfire spread and severity

7.4.1 Fire Management Zoning

FMZs are areas of land where fire is used for specific asset, fuel and overall forest and park management objectives. Each of the FMZs differs in its intended fuel treatment aims and associated performance measures but multiple goals can be achieved when undertaking activities in each zone. For example, a burn undertaken primarily for land management purposes may also have asset protection results. FMZs describe fuel treatment aims in a particular area. The four FMZs utilised under the *Code of Practice for Fire Management on Public Land* are:

- Asset Protection Zone (APZ).
- Bushfire Moderation Zone (BMZ).
- Landscape Management Zone (LMZ).
- Planned Burning Exclusion Zone (PBEZ) (DELWP 2022).

This zoning can be useful for Council managed natural reserves.

Asset Protection Zones

Using intensive fuel treatment, the APZ aims to provide the highest level of localised protection to human life and property and key community assets. The goal of fuel treatment is to reduce radiant heat and ember attack in the event of a bushfire. Fuel treatment will be carried out in the APZ through a combination of planned burning and other methods such as mowing, slashing or vegetation removal. Achieving the objectives of this zone may have negative impacts on ecological values (DELWP 2022) but Frankston City Council seek to minimise these, with guidelines that require APZs to be managed for their conservation value whilst achieving the required fuel hazard rating.

Mechanical APZs are maintained around the perimeter of many Frankston City natural reserves to provide direct protection to adjacent buildings by maintaining fuel at a Moderate overall fuel hazard rating. APZs are discussed further in Section 7.5.7.

Bushfire Moderation Zones

The management in BMZs aims to reduce the speed and intensity of a bushfire, reduce the potential for spotting, and complement APZs in the protection of assets (DELWP 2022). In the BMZ, fire management objectives should be balanced with ecological management objectives and enable the protection of small patches of significant vegetation. Management prescriptions may include burning in ecologically acceptable timeframes, mechanical removal of fuels, and removal of woody weeds.

Due to the relatively small size of even the larger Frankston City natural reserves and their dispersed arrangement in the landscape, there is little potential to apply large strategic BMZs unless complemented by zoning of adjacent public or private bushland. Smaller BMZs are applied in places at Lower Sweetwater Creek Reserve and Bunarong Park where conservation value and terrain make APZs impracticable.

It is relevant to note that only very small areas in the Frankston LGA have been identified as a Bushfire Risk Engagement Area (BREA) under the *Metropolitan Region Bushfire Management Strategy 2020* (DELWP 2020) and most of the public land is LMZ (see below) with small areas of BMZ or APZ directly adjacent to residential areas.

Landscape Management Zone

The objective of the LMZ is to maintain or enhance ecological values (flora and fauna) through appropriate fire regimes. The priority within these zones is to provide a range of management regimes, including burning if appropriate, weed removal and ecological enhancement.

The designation of LMZs across selected Frankston natural reserves is considered appropriate to facilitate a program of planned burning at ecologically favourable season, intensity and frequency. Reserve level planning should identify areas where LMZs are appropriate.

Any fuel hazard reduction achieved through this process will enhance bushfire safety. It should be recognised, however, that planned burning in some EVCs can increase the fuel hazard of some elements for a period of time. For example, an increase in elevated fuel hazard in a long unburnt area can result as peas and wattles germinate from a soil-stored seed bank. Thinning of the shrub layer may be required in some locations, particularly close to assets on the reserve boundary.

Weed control will also likely be required following planned burning. This may need to include the physical removal of vegetative material from the reserve following treatment to avoid fuel build up. Some weeds (particularly woody weeds and vigorous climbers) that are sprayed, and left standing may pose an increased fuel hazard for a significant time after death.

Planned Burning Exclusion Zone

This zone excludes the use of planned burning, primarily in areas intolerant to fire, such as fire sensitive EVCs, adjacent to waterways or where disturbance is undesirable for broader management reasons.

Figure 5 - Risk mitigation and ecological outcomes for fire management zones (from DELWP 2022).

7.4.2 Planned burning

Planned burning is a multi-faceted tool that involves the use of fire under controlled conditions and can be described as the application of fire at specific intensities, seasonality and frequencies to achieve desired management outcomes (Tolhurst and Kelly 2003). In relation to natural reserve management, planned burning refers to fuel reduction burning, ecological burning and bark candling.

Fuel reduction burning (FRB) for asset protection aims to maintain large areas of native vegetation below a pre-determined fuel load/hazard threshold to reduce the risk of uncontrollable bushfire. The effectiveness of an FRB in providing direct protection to assets is dependent on its proximity to those assets (Gibbons *et al*. 2012; Driscoll *et al*. 2012), size and the frequency at which the area is burnt. To maintain fuels at low levels, short burning rotations are needed, which may be as frequent as 1 – 4 years as litter fuels re-accumulate quickly post burn (Ashton 1975; Attiwill and Guthrie 1978; Fox *et al.* 1979; Raison *et al.* 1986; Denham *et al.* 2009). It is also becoming clear that the effect of FRB on protecting assets diminishes under severe weather events (e.g. Extreme or greater FDR) as the effect of weather (wind speed, relative humidity and temperature) overrides the effect of topography and fuel load (Fernandes and Botelho 2003; Morrison *et al.* 1996). It is also important to note that high frequency FRB is likely to have negative consequences for biodiversity in some Australian ecosystems (Morrison *et al.* 1996). The effect of one-off FRBs may be short lived (except for bark fuel reduction) and FRB needs to be considered as part of a wider fuel management program, understanding that asset protection and biodiversity conservation may be in direct conflict in some circumstances (Morrison *et al.* 1996).

7.5 Reduce the physical effects of bushfires in inhabited areas

7.5.1 Egress signage

In larger reserves, with complex track networs and limited line-of-sight, signage can be used to provide clear egress information to aid reserve users to leave the reserve in the event of a fire.

7.5.2 Reserve closure

Closure (whether physical or administrative) of Group 1 and selected Group 2 reserves can reduce the likelihood of users being directly exposed to fire. The arrangements detailed at Section 7.2.9 are relevant to closure with the aim of reducing the impact of bushfire on people.

7.5.3 Community engagement programs

Community engagement and empowerment is a central tenant of good emergency management practice (Elsworth *et al.* 2010). It is well recognised that involving communities in building capacity and resilience can significantly reduce the impact of a bushfire.

The International Association for Public Participation (IAP2) provide significant resources to inform and support the development and implementation of appropriate community engagement programs. These resources are a useful starting point when developing a community engagement strategy and related programs. The IAP2 Public Participation Spectrum (IAP2 2004) details engagement from simply consulting with the public to involving, collaborating and empowering. The

spectrum shows that differing levels of participation are legitimate depending on the desired outcomes.

Potential community engagement actions are listed below. This list is by no means exhaustive. It is recognised that Frankston City Council are currently undertaking many of these actions.

- Include bushfire awareness information in newsletters, the local paper and the Frankston City Council website.
- Public display of summaries of reserve Bushfire Management Plans for Group 1 reserves.
- Provide pre-fire season information, including contacts to find further information, such as Fire Ready Victoria, Vic Emergency and fire agency web sites.
- Encourage good housekeeping adjacent to Group 1 and 2 reserves during the FDP by promoting green waste collection services. Consider increasing green waste collection services during high growth periods before and during the Fire Danger Period.
- Use volunteer groups to promote bushfire safety.
- Investigate and update bushfire information given to new residents living near or adjacent to a Group 1 reserve (owner occupiers and renters).
- Promote and distribute bushfire publications, such as the *Fire Ready Kit* (CFA 2022a).
- Promote fire agency websites.
- Working bees with residents.
- Participate in pre-fire season bushfire safety meetings if conducted by CFA and/or FRV (as applicable) for residents around Group 1 reserves.
- Advocate for vulnerable facilities (e.g. schools, aged care facilities etc.) adjacent to reserves to have appropriate Bushfire Emergency Management Plans in place.

The best community safety program will be designed with the outcomes and audience in mind. Terramatrix recommend continued engagement with neighbours near Group 1 reserves.

7.5.4 Plans by vulnerable people and groups

This is particularly important for vulnerable groups such as kindergartens, schools, childcare centres, aged care facilities and hospitals close to a bushland reserve. Frankston City Council should encourage organisations and institutions with responsibilities for vulnerable people, and who are adjacent to Group 1 or 2 reserves, to document Bushfire Emergency Management Plans.

Similarly, Frankston City Council may be aware of individual vulnerable residents (e.g. the elderly or people living with a disability, possibly already receiving specialist Council services) living adjacent to a Group 1 or 2 reserve, who may require assistance in preparing for, or responding to, a bushfire in the reserve.

7.5.5 Shelter options

In the western and central parts of the municipality, which are essentially urban, there is generally ready egress from streets adjacent to the natural reserves into a low(er) threat urban area. Residents would only need to retreat a couple of blocks away from the reserve to be safe from bushfire.

In the more rural eastern parts, however, shelter options are less clear cut and it is recognised that some people may be unable to evacuate safely or may be unwilling to leave their homes.

7.5.6 Support to affected people

Involvement in an emergency can be traumatic to those involved, including first responders or those involved in emergency management or recovery.

Support should be provided to anyone affected. In addition to Council's relief and recovery arrangements, assistance to impacted community members and Council staff can be sourced through:

- Red Cross – 03 9345 1800 (National office).
- Lifeline – 13 11 14.
- Beyond Blue – 1300 22 4636.

Debriefs provide a forum to discuss and review an emergency event. They form a vital part of recovery and should be used to discuss and review the effectiveness of fire risk management planning, from prevention to recovery. Depending on the scale and impact of the event, it may be advantageous for debriefs to be facilitated by a professional facilitator external to Frankston City Council.

The debrief should cover applicable themes, such as:

- Cause.
- Detection.
- Initial response.
- Access and water supply.
- Communications.
- Nature and extent of any losses.
- Visitor and neighbour management.
- Critical incident stress management.
- Rehabilitation.

7.5.7 Asset Protection Zones (mechanical)

The objective of the APZ is to prevent direct flame contact or radiant heat ignition of houses or other significant assets in, or adjacent to, the reserve, from vegetation burning within the reserve. The APZ will typically be in high use areas of the reserve or areas that abut houses or other valuable assets vulnerable to bushfire, such as electricity or water infrastructure.

In developing this Strategy, the potential exposure of assets adjacent to the reserves was considered. As fire management plans and statements for individual Group 1 and 2 reserves are written or reviewed, there will be an opportunity to check the adequacy or requirement for APZs across the natural reserves using a consistent approach, in line with the most relevant techniques for assessing and managing vegetation for dwelling protection.

For Group 2 reserves the approach for assessing the need for an APZ should be:

- Map hazardous vegetation and neighbouring dwellings and other significant buildings.
- Assess whether any classifiable vegetation is within 10 m of a dwelling or other significant building.
- If no, then no APZ is necessary.
- If yes, then consider forming an APZ of at least 6 m between the building and vegetation. There should also be consideration of the size of the patch of classifiable vegetation and the orientation of the hazard to the building. Assess if the APZ can double as access for emergency vehicles.
- If yes, but implementing an APZ is difficult, then consider other options from the Treatment Toolbox that might assist with reducing any potential fire impact on the structure.
- Implement the chosen treatment and document the decision.

For Group 1 reserves, the approach for assessing the need for an APZ should be more involved and use local conditions to predict potential fire behaviour. Currently, the most valid approach would be one consistent with that used for determining defendable space for new development under AS 3959-2018 (Standards Australia 2020) and the Bushfire Management Overlay (BMO). In areas where dwellings were constructed prior to the introduction of planning and building controls for bushfire protection, it is recommended the radiant heat threshold be set for each natural reserve based on the characteristics of the reserve, the BAL rating of adjacent dwellings, and any other protection measures applied.

It is recommended that, as a minimum, an APZ achieves an overall fuel hazard rating of Moderate. One way to achieve this is to manage vegetation broadly consistently with the following specifications:

- Grass maintained at less than 100 mm during the declared Fire Danger Period.
- Plants greater than 10 cm in height not within 3 m of a window or glass feature of the dwelling or significant building.
- Shrubs not be located under the canopy of trees.
- Individual and clumps of shrubs not exceeding 5 sq. m in area and separated horizontally by a distance at least as great as the diameter of the clump or twice the height of the shrub, whichever is the greater distance.
- Trees overhanging or touching any elements of the building.
- The canopy of trees separated from trees in the LMZ by at least 5 m and with no greater than 15% canopy cover in the APZ.
- There must be a clearance of at least 2 m between the lowest tree branches and ground level.

The APZ should be maintained to this standard throughout the Fire Danger Period.

As the APZ is not intended to protect assets from ember attack, the bark hazard is not included in the management regime. It would, however, be beneficial to remove the loose bark from trees in

areas close to assets where the bark hazard is Very High to Extreme. Mechanical treatment or bark candling are means of achieving this.

The effectiveness of APZs is heavily reliant on commensurate fuel management being undertaken on adjacent private land between the reserve and the building. In instances where there is garden between the reserve boundary and the house, the purpose of the APZ is to moderate the fire behaviour such that any vegetation management undertaken by residents on their property is effective. In instances where there is little or no vegetation management, the APZ may not prevent ignition of garden vegetation and the subsequent ignition of the house. The concept of shared responsibility is essential, where fuel management on both sides of the reserve boundary contributes to the requisite defendable space.

APZs immediately adjacent to reserve boundaries may have additional functions such as providing emergency access, a fire control line under moderate fire conditions, reducing the impact on private assets near the boundary such as fencing and sheds, and providing residents with a highly visible indicator that the reserve is being managed responsibly.

The fuel management required in the APZ may have significant impact on ecological, cultural and economic values. In such cases, the requisite fuel management should take precedence over other management objectives but should be undertaken in a manner that minimises negative impacts as far as possible without compromising the fuel management outcome.

7.5.8 Bark hazard fuel reduction

Bark candling is the application of controlled fire to the bole of trees for the purpose of reducing bark hazard (Vandenborn 2010). This reduction in bark hazard enhances the effectiveness of fuel breaks by reducing the impact of short distance spotting (Vandenborn 2010). This technique is used extensively as part of pre-burn preparation works and can also be applied to reduce potential ember attack on nearby buildings.

Empirical data for bark hazard re-accumulation in Victorian forest-types is scant, however some comparisons can be drawn from the results of 'Project Vesta' (Gould *et al.* 2007) for Jarrah (*Eucalyptus marginata*) forest in Western Australia. This forest is structurally similar to Messmate dominated (*E. obliqua*) forest types in Victoria, both being stringybark dry sclerophyll forests. Gould *et al*. (2007) demonstrate bark hazard remaining below the equivalent of a High bark hazard rating for approximately 5 years after the burn.

7.5.9 Re-vegetation planning

An important objective of the management of natural reserves is to increase the quality and extent of native vegetation. It is also likely to be a key component of Frankston City's contribution under the *Living Melbourne: Our Metropolitan Urban Forest* (The Nature Conservancy and Resilient Melbourne 2019).

This may lead to changes in the structure of vegetation and increases to the extent of native vegetation over time. With good planning, vegetation enhancement, especially the expansion of

vegetated areas, does not have to conflict with fire management objectives. It is possible to locate areas of re-vegetation in a manner that does not compromise APZs and other bushfire risk treatments.

Where re-vegetation works are being planned, an assessment should be made of whether the re-vegetation changes the bushfire risk, the management priority level or will necessitate additional fire protection works (such as APZs). APZs should be planned on the understanding that all natural reserves will be managed to restore their natural vegetation structure.

7.5.10 Low fuel garden design

The survivability of buildings, and those that occupy and shelter within them, can be significantly enhanced or endangered by the type of plants around the building (CFA 2022b). Gibbons *et al*. (2012) showed that the condition of vegetation within 40 m of the house was a major factor in determining its survivability on Black Saturday 2009.

The CFA publication *Landscaping for Bushfire* (CFA 2022b) is a good resource for residents living near a bushland reserve. The guide sets out clear principles for landscaping that will reduce the likelihood of bushfire impact. It also provides examples and lists appropriate plant species for a range of settings.

7.5.11 Fire hazard inspections

Frankston City Council can influence the management of vegetation on private land by engaging with landholders. In situations where standard community engagement does not result in fuel on adjacent private property being managed appropriately, the MFPO can issue a Fire Prevention Notice pursuant to Section 41 of the CFA Act 1958 or Section 87 of the FRV Act 1958 as applicable, if they consider the fuel presents an unacceptable fire hazard.

The Frankston City Council fire hazard inspection program is based on previous history, known hot spots and complaints.

7.5.12 Community engagement programs

The actions of residents can significantly reduce the vulnerability of their homes to bushfire. Refer to 7.5.3 for a description of community engagement programs.

7.5.13 Appropriate fences

Solid boundary fences have the potential to reduce the radiant heat impacting a house by acting as a flame and/or radiant heat shield. Providing a radiant heat shield between the burning vegetation and the house has the potential to reduce the required width of an APZ. Research by CSIRO into the performance of different types of fencing systems in bushfires (Leonard 2010) showed 'Colorbond' steel fencing to be the strongest performer under the test conditions, reducing the radiant heat behind the fence to below 5 kW/m^2. In addition, due to its non-combustibility, 'Colorbond' steel does not ignite and hence does not provide another source of fuel.

In the CSIRO experiments, treated pine also acted as an effective radiant heat shield. However, the testing showed the pine fences ignited easily, from both embers and direct flame contact, and as

such their integrity was compromised. Once ignited, these fences can contribute to the heat load on the dwelling. This occurred during the bushfire on 3rd January 2015 in Warringine Park (Coastal Section) at Hastings (Terramatrix 2015).

Wire mesh fences do not reduce radiant heat on the houses or prevent fire spread into gardens.

7.5.14 Housekeeping

Encourage good housekeeping adjacent to Group 1 and 2 reserves by promoting green waste collection services. Consider increasing green waste collection services during high growth periods before and during the Fire Danger Period.

Any build-up of leaf litter or combustible rubbish etc. around Frankston City buildings within Group 1, 2 or 3 natural reserves should be removed prior to the Fire Danger Period.

7.5.15 Land use planning and building controls

The Victoria Planning Provisions and Building Regulations require that all new dwellings within a BPA or covered by the BMO be built with the consideration of bushfire risk, including a BAL construction standard and defendable space commensurate to the level of bushfire hazard. Extensions and renovations of existing dwellings may also need to comply depending on their size.

This means that in a BMO or BPA most new development adjacent to a natural reserve will be required to respond appropriately to the level of hazard posed by the proximity of vegetation within the reserve, by building to the applicable BAL construction level and, under the BMO, providing defendable space within their property boundaries.

7.5.16 House construction standard (and retrofitting)

The Australian Standard 3959 (AS 3959-2018) (Standards Australia 2020) provides clear direction on how to construct buildings to withstand a range of bushfire attack levels (BALs). Many existing homes, however, were constructed prior to the introduction of building and planning controls for bushfire and are unlikely to meet any construction standard for bushfire.

The publication *A Guide to Retrofitting Your Home for Better Protection from a Bushfire* (CFA 2011) is a good resource for residents living adjacent to bushland reserves. Increasing the construction standard will reduce the likelihood of fire in a bushland reserve igniting an adjacent dwelling.

7.6 Reduce the social effects of bushfires on communities

7.6.1 Asset Protection Zones for critical infrastructure

APZs can reduce the fire intensity around critical infrastructure, however the vulnerability of telecommunications, power or water infrastructure to radiant heat is often not known, making it difficult to determine whether an APZ will be effective. Where critical community infrastructure is located within a Group 1 or 2 natural reserve, it is recommended that Frankston City Council liaise with the infrastructure manager to determine the need for fire protection works.

7.6.2 Increase fire resistance of infrastructure

Vulnerable elements, such as exposed wiring or telemetry, can sometimes be protected by simple radiant heat screening, such as with 'Colorbond' panels.

7.6.3 Plans for restoration

Utilities and other site infrastructure may be impacted by fire. A full stocktake of damage should be undertaken as soon as possible. The inspection may need to be carried out by a suitably qualified person or the utilities provider. This should include:

- Buildings on site.
- Above and below ground power lines and other infrastructure.
- Water tanks, storages and other infrastructure.
- Toilets blocks and sewerage systems.
- Communications infrastructure.
- Fences and gates.
- Roads, tracks and signage.

Any faults or damage identified should be referred to the appropriate person or organisation for action. Any action taken by Frankston City Council should be recorded.

Community recovery can be aided by the re-opening of parks and reserves once safe, and the replacement of damaged infrastructure. Checking that there is adequate insurance for buildings and other built elements will assist with reconstruction.

7.7 Reducing impact from fire management actions

7.7.1 Integrated planning for fire management and biodiversity

The environmental impact of any additional bushfire protection works requested should be carefully considered and given due weight in the decision-making process.

Equally, plans to re-vegetate an area or reduce the level of vegetation management currently occurring, should carefully consider any resultant increase in fire risk, particularly to adjacent dwellings or community infrastructure. Re-vegetation (see Section 7.5.9), especially if involving dense elevated fuel, should be avoided within 10 m of adjacent buildings (or within the calculated defendable space of buildings adjacent to Group 1 or 2 reserves) and in areas currently being managed as APZs.

7.7.2 Weed management

Many areas of bushland close to urban settlement are prone to invasion by exotic weeds. This is considered a major threat to biodiversity in some ecosystems (Paynter and Flanagan 2004). There is some evidence to suggest that a change in fire behaviour can be expected due to the differences in plant architecture, biomass and combustibility characteristics of the invasive species (Aires 2012; Simmons *et al.* 2006). It is logical that in many cases the removal of such weeds may result in a reduction in fire hazard, however the reverse may result if weeds of low flammability such as Ivy (*Hedera spp.*) or *Tradescantia* are removed and replaced by fire prone natives. APZs in Frankston

City natural reserves are designed based on the assumption that natural fuel loads may be present, so the replacement of lower flammability weeds should not compromise the effectiveness of the APZ.

Mechanical weed control/vegetation removal may be necessary to maintain defendable space created by APZs. It is important that vegetation cleared for fire management purposes is removed from the site or to a location (away from assets) where it does not pose a fire hazard.

Chemical herbicide for weed control will need careful follow up as the plant material is not removed from site, and fire hazard may increase for a period of time following the herbicide application until dead vegetation breaks down. Chemical weed control is typically undertaken during autumn, winter and early spring to avoid dry dead standing material during the Fire Danger Period.

In high value conservation areas, or where high value species are present, vegetation removal and maintenance may need to be undertaken by hand. This technique may also be appropriate in areas that are difficult to access. Although this is a resource intensive technique, it allows selective removal and can reduce the overall impact of the work.

7.7.3 Manage EVCs within Tolerable Fire Interval

Distinct from fuel reduction burning, ecological burning has clear management objectives of applying controlled fire for the health of a given ecosystem. Fire, or lack of fire, is an essential component of the ecology of Victoria's native vegetation communities and their constituent species, with vegetation communities displaying a wide range of adaptations to fire (Cheal 2010). The integration of ecology into fire management planning is based on knowledge of the life history or 'vital attributes' of the flora species within a community (Cheal 2010). Vital attributes are those attributes of a plant species that are vital to its role in a vegetation replacement sequence (Noble and Slatyer 1980).

From knowledge of plant vital attributes, the concept of 'tolerable fire intervals' (TFIs) has been developed. TFIs are burning parameters, set in years, and are expressed as a minimum and maximum TFI. The *shortest* TFI is set by those species that take the *longest* time to reach maturity and the *longest* TFI is set by those species with the *shortest* time to local extinction due to the absence of fire (Friend *et al*. 2003). It is clear that the shortest TFI for many communities is much higher than the < 4 year rotation that may be desirable for asset protection. While ecological burning may result in a temporary reduction in fuel loads, the purpose of ecological burning is biodiversity conservation rather than asset protection.

In grasslands, the use of fire to increase the dominance and extend the range of native temperate grass species (such as Kangaroo Grass (*Themeda australis*), Wallaby Grass species (*Austrodanthonia spp*.), Weeping Grass (*Microlaena stipoides*) and Red Leg Grass (*Bothriochloa macra*) is becoming more widespread, as is the incorporation of Traditional Ecological Knowledge into burning regimes to increase the cover and abundance of native perennial grasses (Foreman 2015).

Where native grasses are part of the natural vegetation structure, their promotion may lead to an overall reduction in fuel hazard as:

- Many native grass species actively grow during summer and may not cure to the same extent as exotic annual pasture species.
- Many native grass species have a patchy habit, have pronounced inter-tussock space, may be shorter and therefore have less biomass than exotic annual pasture species.

7.7.4 Pre-suppression planning

A map of each Group 1 and 2 reserve should be given to CFA and FRV for operational purposes. Features such as APZS, fences and other barriers, gates, tracks, water sources etc. should be included. Liaise with CFA and FRV to provide information which best meets their needs. If areas of sensitive vegetation or waterways are present, these should be shown on the plan as areas to avoid, and information provided on how to minimise harm if they can't be avoided.

7.7.5 Fire recovery works

The period following a fire is also crucial for preventing, or reducing, impacts on environmental values. Actions following fire should include assessing and documenting impacts; and developing and implementing recovery plans.

In the event of a significant bushfire impacting a natural reserve, a site rehabilitation plan may be required, with the scope of the plan determined by the scale of the event. The site rehabilitation plan may need to address:

- Assessment of fire damaged trees to ensure safety.
- Steps to restore ecological systems to minimise damage.
- The restoration of damage caused by suppression, such as the installation of fire breaks and temporary tracks.
- Steps to minimise erosion.
- Pest animal control.
- Weed control.

Weed invasion is a common post-fire impact. The *Post-fire Weeds Triage Manual: Black Saturday Victoria 2009 – Natural values fire recovery program* (Zimmer *et al.* 2012) can assist with prioritising actions to minimise weed problems. Consultation with field staff and ecologists may be worthwhile for managing impact to specific vegetation communities.

Soil erosion and reduction in water quality may occur. Land managers should implement soil stabilisation and drainage treatments as soon as possible after any impact is detected.

8 Monitoring and review

Systematic monitoring and evaluation ensure that actions and decisions are well documented for future reference; and supports evaluation of the efficiency and effectiveness of treatments. Key monitoring programs relevant to this *Natural Reserves Bushfire Management Strategy* are outlined below.

8.1 Treatment implementation records

Systematic record keeping will greatly assist in the evaluation of fire risk management of bushland reserves. Record should be kept of what works are planned, when they are undertaken, how they are maintained and any monitoring to assess requirement for additional work.

Any decisions regarding changed management practices should be documented, detailing the reasoning that underpins the change.

8.2 Fire and incident records

Records should be kept of any fires or fire-related incidents that occur in a natural reserve. Data collected should include:

- Name and details of people involved.
- Description of event or hazard (what happened, what caused it).
- Details of any injuries or damage.
- Results of any investigation and who conducted it.
- Measures taken to prevent recurrence, including tracking of mitigation actions.

The occurrence of fires in comparable reserves in other municipalities should be monitored as a source of information about potential sources of fire risk that may not have been identified in this Strategy.

8.3 Monitoring flora and fuel hazard

The fuel load/hazard of vegetation is dynamic and can decrease and increase for a variety of reasons. There is limited data available on fuel loads and fuel accumulation in native vegetation. Ongoing fuel hazard assessment within Group 1 reserves and any others in which planned burning or revegetation programs may occur will be a valuable resource for understanding the fuel dynamics and inform what fuel load is appropriate to use when determining APZ widths, the timing of planned burning and other fuel management treatments.

Fuel hazard assessment and an indicative fuel load can be obtained using the *Overall Fuel Hazard Guide* 4th Edition (Hines *et al.* 2010). To accurately measure fuel loads requires destructive fuel sampling, which although more accurate, is resource intensive and unlikely to be appropriate in small natural reserves.

In addition to fuel hazard, life-stage assessment for monitoring flora and community outcomes and planning prior to burning, could be undertaken. A key resource to ensure monitoring is consistent

with statewide protocols is the *Flora Monitoring for Planned Burning: a user's guide* (Cawson and Muir 2008).

8.4 Long term monitoring of climate change

There has been an increase in extreme fire weather across large parts of Australia since the 1950s, including in the length of the fire season and the number of days of elevated fire danger, which has led to larger and more frequent fires, especially in southern Australia (BOM and CSIRO 2022). Frankston City is in the Southern Slopes (Victoria West) sub-cluster. Climate projections have very high confidence that average temperatures will continue to increase in all seasons, with more hot days and warm spells. There is high confidence that rainfall in winter and spring will decrease, whilst changes to summer and autumn rainfall is less clear. There is high confidence that a harsher fire-weather climate will result (BOM and CSIRO, 2024).

Victoria's Climate Science Report 2019 highlighted that different climate or weather extremes occur simultaneously and have compounding effects, such as long term drought, short-term heat wave and extreme fire weather resulting in catastrophic bushfires (DELWP 2019a).

Changes to the frequency and severity of fire weather should be monitored and any implications for this Strategy identified.

8.5 Periodic review of the Bushland Reserves Fire Management Strategy

A desktop review of the *Natural Reserves Bushfire Management Strategy* by appropriate Frankston City Council staff will occur every 5 years, to ensure the Strategy reflects any changes in bushfire risk and/or the risk controls being implemented.

A full review of the Strategy should be undertaken every 10 years. This review may be undertaken by external consultants and should consider whether there have been any changes to the context, hazard, exposure or vulnerability to bushfire and/or risk treatments being implemented and will ensure the Strategy aligns with contemporary good practice.

Section C
References and Appendices

9 References

AFAC (2012) *Bushfire Glossary*. Australasian Fire and Emergency Service Authorities Council, Melbourne.

AFAC (2023) *Australian Fire Danger Rating System*. National Council for Fire and Emergency Services, East Melbourne. Available at <https://www.afac.com.au/initiative/afdrs>.

Attorney-General's Department (2015) *Practice Guide 10.1 - National Emergency Risk Assessment Guidelines.pdf*. Barton: Australian Institute of Disaster Resilience. Available from: https://www.aidr.org.au/media/1490/practice-guide-101-national-emergency-risk-assessment-guidelines.pdf

Aires FS (2012) *Effects of woody weeds on fuels in fire-prone ecosystems*. Bushfire Co-operative Research Centre. PhD Candidate Research Progress Report.

Ashton D (1975) Studies of litter in *Eucalyptus regnans* forests. *Australian Journal of Botany*. 23, 413 – 433

Attiwill PM, Guthrie HB and Leuning R (1978) Nutrient cycling in *Eucalyptus obliqua* forests I. Litter production and nutrient return. *Australian Journal of Botany*, 26, 79 – 91.

Catchment and Land Protection Act, 1994.

Cawson J and Muir A (2008) *Flora Monitoring Protocols for Planned Burning: A User's Guide*. Fire and Adaptive Management Report No. 74. Department of Sustainability and Environment, East Melbourne.

CFA (2011) *A Guide to Retrofitting your Home for Better Protection from Bushfire*. Country Fire Authority, East Burwood.

CFA (2022 a) *Fire Ready Kit.* Country Fire Authority, East Burwood.

CFA (2022 b) *Landscaping for bushfire: garden design and plant selection*. Country Fire Authority, East Burwood.

CFA (2022 c) *Your Guide to Farm Fire Safety*. Country Fire Authority, East Burwood.

CFA (2023) *Access Requirements (Bushfire Management Overlay)*. Country Fire Authority, East Burwood.

Cheal DC (2010) *Growth Stages and Tolerable Fire Intervals for Victoria's Native Vegetation Data Sets*. Department of Sustainability and Environment, East Melbourne.

Conservation, Forests and Lands Act, 1987.

Country Fire Authority Act, 1958

CSIRO/BOM (2022) *State of the Climate 2022.* CSIRO and the Bureau of Meteorology (BOM), Commonwealth of Australia. Available at <https://www.csiro.au/en/research/environmental-impacts/climate-change/State-of-the-Climate>.

CSIRO/BOM (2024) *Climate Change in Australia, Projections for Australia's NRM Regions* Online tool at <https://www.climatechangeinaustralia.gov.au/en/projections-tools/regional-climate-change-explorer/sub-clusters/>.

DELWP (2017) *Guidelines for the Removal, Destruction or Lopping of Native Vegetation*. Department of Environment, Land, Water and Planning, East Melbourne.

DELWP (2019 a) *Victoria's Climate Science Report 2019*. Department of Environment, Land, Water and Planning, East Melbourne.

DELWP (2019 b) *Bushfire Mapping Methodology and Criteria*. Fact Sheet. Department of Environment, Land, Water and Planning, East Melbourne.

DELWP (2019 c) *Road Management Plan*. Department of Environment, Land, Water and Planning, East Melbourne.

DELWP (2020) *Metropolitan Bushfire Management Strategy 2020*. Department of Environment, Land, Water and Planning, East Melbourne.

DELWP (2022) *Code of Practice for Fire Management on Public Land (2012) (amended 2022)*. Department of Sustainability and Environment, East Melbourne.

Denham AJ, Whelan RJ and Auldt TD (2009) Characterising the litter in postfire environments: Implications for seedling recruitment. *International Journal of Plant Science*, 170(1), 53-60.

DET (2023) *Bushfire At-Risk Register*. Department of Education and Training, Melbourne. Available at <https://www.education.vic.gov.au/about/programs/health/Pages/bushfirerisk.aspx?queryid=Central#startbarr>.

DPCD (2012) *Regional Bushfire Planning Assessment – Melbourne Metropolitan Region*. Department of Planning and Community Development, Melbourne.

Driscoll DA, Lindenmayer DB, Bennet AF, Bode A, Bradstock RA, Carey GJ, Clarke MF, Dexter N, Fensham R, Friend G, Gill AM, James S, Kay G, Keith DA, MacGregor C, Possingham HP, Russell-Smith J, Salt D, Watson JE, Williams D and York A (2010) Resolving conflicts in fire management using decision theory: asset protection vs biodiversity conservation. *Conservation Letters.* 3. 215 – 223.

DSE (2004) EVC/Bioregion Benchmark for Vegetation Quality Assessment - Gippsland Plain Bioregion. Department of Sustainability and Environment, East Melbourne. Available at <https://www.environment.vic.gov.au/__data/assets/pdf_file/0033/48696/GipP_EVCs_combined.pdf>.

Ecotide (2015) *Frankston City Council Natural Reserves Bushfire Management Works Study*. Ecotide, Marysville.

Electricity Safety Act, 1998.

Elsworth G, Gilbert J, Stevens K, Robinson P and Rowe C (2010) *Guidelines for the Development of Community Education, Awareness and Engagement Programs.* Australian Emergency Manual Series, Manual number 45. Attorney-General's Department, Canberra.

Emergency Management Act, 1986.

EMV (2023 a) *Victorian State Emergency Management Plan*. Emergency Management Victoria, Melbourne.

EMV (2023 b) *Victorian State Emergency Management Plan – Bushfire Sub-Plan*. Emergency Management Victoria, Melbourne.

Environment Protection Act, 1970.

Environment Protection and Biodiversity Conservation Act, 1999.

Fernandes PM and Botelho HS (2003) A review of prescribed burning effectiveness in fire hazard reduction. *International Journal of Wildland Fire*, 12, 117-128.

FMEMPC (2022) *Frankston City Municipal Emergency Management Plan*. Frankston Municipal Emergency Management Planning Committee, Frankston.

FFMV (2023) *Joint Fuel Management Program Interactive Map*. Available at <https://www.ffm.vic.gov.au/bushfire-fuel-and-risk-management/joint-fuel-management-program>.

Fire Rescue Victoria Act, 1958.

Flora and Fauna Guarantee Act, 1988.

Forecast.id (online) *Frankston City*. Available at <https://profile.id.com.au/frankston/population-header>.

Foreman PD (2015) *Using Fire as a Tool for Managing Native Grasses: An Indigenous Perspective.* Blue Devil Consulting, Castlemaine.

Forests Act, 1958.

Fox BJ, Fox MD and McKay GM (1979) Litter accumulation after fire in a Eucalypt forest. *Australian Journal of Botany*, 27, 157 – 165.

Frankston City Council (2011) *Climate Change Impacts and Adaptation Plan – Preparing for a changed climate*. Frankston City Council, Frankston.

Frankston City Council (2017) *Natural Reserves within Frankston City*. Frankston City Council, Frankston.

Frankston City Council (2018) *Frankston's Biodiversity Policy*. Frankston City Council, Frankston.

Frankston City Council (2021 a) *Natural Reserves Service Priority Matrix*. Frankston City Council, Frankston.

Frankston City Council (2021 b) *Biodiversity Action Plan 2021 - 2036*. Frankston City Council, Frankston.

Frankston City Council (2023) *Victorian Fire Risk Register 2023*. Frankston City Council, Frankston.

Frankston City Council (no date a) *Community Vision 2040*. Frankston City Council, Frankston.

Frankston City Council (no date b) *Greening Our Future – Frankston City's Environment Strategy 2014-2024*. Frankston City Council, Frankston.

Frankston City Council (no date c) *Frankston's Biodiversity – A Discussion Paper*. Frankston City Council, Frankston.

Frankston City Council (no date d) *Frankston's Urban Forest Policy*. Frankston City Council, Frankston.

Frankston City Council (no date e) *Urban Forest Action Plan 2020-2040*. Frankston City Council, Frankston.

Frankston City Council (no date f) *Fire Prevention and Preparedness – Bunarong Park Reserve*. Frankston City Council, Frankston.

Frankston City Council (no date g) *Fire Prevention and Preparedness – Kananook Creek Reserve*. Frankston City Council, Frankston.

Frankston City Council (no date h) *Fire Prevention and Preparedness – Lexton, Little Boggy Creek and Stevens Reserves*. Frankston City Council, Frankston.

Frankston City Council (no date i) *Fire Prevention and Preparedness – Lower Sweetwater Creek Reserve*. Frankston City Council, Frankston.

Frankston City Council (no date j) *Fire Prevention and Preparedness – Upper Sweetwater Creek Reserve*. Frankston City Council, Frankston.

Frankston City Council (no date k) *Fire Prevention and Preparedness – Monique, Park Valley and South Gateway Reserves*. Frankston City Council, Frankston.

Frankston City Council (no date l) *Fire Prevention and Preparedness – Paratea Reserve*. Frankston City Council, Frankston.

Frankston City Council (no date m) *Fire Prevention and Preparedness – Seaford Wetlands*. Frankston City Council, Frankston.

Frankston City Council (no date n) *Fire Prevention and Preparedness – Stringybark Reserves*. Frankston City Council, Frankston.

Frankston City Council (no date o) *Fire Prevention and Preparedness – Studio Park Reserve*. Frankston City Council, Frankston.

Friend G, Wayne A, Abbott I and Burrows N (2003) Relationships between mammals and fire in south-west Western Australian ecosystems: what we know and what we need to know. In *Fire in ecosystems of south-west Western Australia: impacts and management. Symposium proceedings (Volume I), Perth, Australia, 16-18 April 2002.* (pp. 363-380).

FRV (2023) *Areas of Grassfire Risk in Melbourne's metropolitan area.* Available at <https://www.frv.vic.gov.au/bush-and-grassfire-safety>.

Gibbons P, van Bommel L, Gill AM, Cary G, Driscoll DA, Bradstock RA, Knight E, Moritz MA, Stephens SL and Lindenmayer DB (2012) Land management practices associated with house loss in wildifres. *PLoS ONE* **7(1)**: e29212.doi10.1371/journal.pone.009212

Gould JS, McCaw WL, Cheney NP, Ellis PF, Knight IK and Sullivan AL (eds) (2007) *Project Vesta: fire in dry eucalypt forest: fuel structure, fuel dynamics and fire behaviour*. CSIRO Publishing, Perth.

Hines F, Tolhurst KG, Wilson AA and McCarthy GJ (2010) *Overall Fuel Hazard Assessment Guide*. Fire Management Branch, Department of Natural Resources and Environment, East Melbourne.

IAP2 (2004) *IAP2 Public Participation Spectrum*. International Association for Public Participation.

Leonard J (2010) Residential Boundary Fences in Bushfires: How do they perform? *Fire Note* 70. Bushfire CRC, East Melbourne.

Long M (2006) A climatology of extreme fire weather days in Victoria. *Australian Meteorological Magazine*, 55, 3-18, Melbourne.

Morrison DA, Buckney RT, Bewick BJ and Cary GJ (1996) Conservation conflicts over burning bush in south-eastern Australia. *Biological Conservation*, 76(2), 167-175.

Noble IR and Slatyer RO (1980) The use of vital attributes to predict successional changes in plant communities subject to recurrent disturbances. *Vegatio*,43(1-2), 5-21.

Paynter Q and Flanagan GJ (2004) Integrating herbicide and mechanical control treatments with fire and biological control to manage an invasive wetland shrub, Mimosa pigra. *Journal of Applied Ecology*, *41*(4), 615-629.

Planning and Environment Act, 1987.

Practical Ecology (2015 a) *Kananook Creek Reserve Fire Management Zones Audit*. Practical Ecology, Preston.

Practical Ecology (2015 b) *Studio Park Fire Management Zones Audit*. Practical Ecology, Preston.

Practical Ecology (2015 c) *South Gateway Reserve Fire Management Zones*. Practical Ecology, Preston.

Practical Ecology (2016 a) *Monique Reserve Fire Management Zones*. Practical Ecology, Preston.

Practical Ecology (2016 b) *Park Valley Reserve Fire Management Zones*. Practical Ecology, Preston.

Practical Ecology (2020) *Fire Management Plan and Ecological Assessment – Swampy Rise*. Practical Ecology, Preston.

Practical Ecology (2021) *Fire Management Plan Boggy Creek Link Reserve*. Practical Ecology, Preston.

Raison RJ, Woods PV and Khanna PK (1983) Dynamics of fine fuels in recurrently burnt eucalypt forests. *Australian Forestry,* 46 (4) 294-302.

SECCCA (2008) *Impacts of Climate Change on Settlements in the Western Port Region – People, Property and Places*. South East Council Climate Alliance. Available at <www.seccca.org.au>.

Simmons D, Adams R and Stoner J (2006) Fuels of the future: The challenge of new fuel types. *Life in a Fire-Prone Environment: Translating Science into Practice*. Bushfire Conference 2006 – Brisbane, 6-9 June 2006.

Standards Australia (2020) AS 3959-2018 *Construction of Buildings in Bushfire-Prone Areas.* Inc. Amendment 2. Standards Australia, Sydney.

Summary Offences Act, 1966.

Terramatrix (2013 a) *Seaford Wetlands Fire Management Plan*. Terramatrix, Collingwood.

Terramatrix (2013 b) *Stringybark/North Road Reserve Interim Fire Management Plan*. Terramatrix, Collingwood.

Terramatrix (2014) *Frankston and Seaford Foreshore Fire Management Plan*. Terramatrix, Collingwood.

Terramatrix (2019) *Fire Management Plan Flame Robin and Heath Estate Reserves*. Terramatrix, Collingwood.

Terramatrix (2015) *Hastings Bushfire Case Study – Warringine Park (Coastal Section) 3rd January 2015*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2010 a) *Bunarong Park – Proposed Fire Management Zones*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2010 b) *Lower Sweetwater Creek Reserve – Proposed Fire Management Zones*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2010 c) *Upper Sweetwater Creek Reserve – Proposed Fire Management Zones*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2010 d) *Paratea Reserve – Proposed Fire Management Zones*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2010 e) *Studio Park – Proposed Fire Management Zones*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2012 a) *Lexton Bushland Reserve and Little Boggy Creek Reserve – Natural Reserves Fire Management Zones*. Terramatrix, Collingwood.

Terramatrix and Indigenous Design (2012 b) *Belvedere Bushland Reserve – Natural Reserves Fire Management Zones*. Terramatrix, Collingwood.

The Nature Conservancy and Resilient Melbourne (2019) *Living Melbourne: Our Metropolitan Urban Forest*. The Nature Conservancy and Resilient Melbourne, Melbourne.

Tolhurst KG and Kelly N (2003) *Effects of repeated low-intensity fire on fuel dynamics in a mixed eucalypt foothill forest in south-eastern Australia*. Research report No. 59. Department of Sustainability and Environment, Melbourne.

Vandenborn S (2010) *Bark candling procedures – East Metropolitan Fire District*. Joint Procedure, Department of Sustainability and Environment and Parks Victoria.

Victorian Conservation Trust Act, 1972.

VTOCFKH (undated) *The Victorian Traditional Owner Cultural Fire Strategy*. The Victorian Traditional Owner Cultural Fire Knowledge Group, Melbourne.

Wildlife Act, 1975.

Zimmer H, Cheal D and Cross E (2012) *Post-fire Weeds Triage Manual: Black Saturday Victoria 2009 – Natural values fire recovery program*. Department of Sustainability and Environment, Heidelberg.

10 Appendices

10.1 Appendix A – Risk ratings for reserves

Table 24 – Frankston City natural reserves (1 of 11).

			18R Marcus Road Reserve	Armstrongs Reserve	Austins Reserve	Banjo Rise Nature Reserve	Baxter Park	Belvedere Bushland Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Yes	Very unlikely	No	No	Unlikely	Very unlikely
	Dwellings	Consequence:	Insignificant	Insignificant	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Unlikely	Extremely rare	Rare	Very rare	Rare	Rare
		Risk rating:	LOW (1C)	VERY LOW (1F)	LOW (2D)	VERY LOW (1E)	VERY LOW (1D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	Minor	Minor	N/A	N/A	N/A
		Likelihood:	N/A	Very rare	Very rare	N/A	N/A	N/A
		Risk rating:	N/A	VERY LOW (2E)	VERY LOW (2E)	N/A	N/A	N/A
	Infrastructure	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Minor	Insignificant
		Likelihood:	Unlikely	Rare	Unlikely	Unlikely	Very rare	Rare
		Risk rating:	LOW (1C)	VERY LOW (1D)	LOW (1C)	LOW (1C)	VERY LOW (2E)	VERY LOW (1D)
	Reserve users	Consequence:	Insignificant	Insignificant	Minor	Insignificant	Moderate	Minor
		Likelihood:	Very rare	Very rare	Rare	Very rare	Very rare	Rare
		Risk rating:	VERY LOW (1E)	VERY LOW (1E)	LOW (2D)	VERY LOW (1E)	LOW (3E)	LOW (2D)
	Public administration (Council services)	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Minor	Minor
		Likelihood:	Rare	Rare	Unlikely	Rare	Unlikely	Unlikely
		Risk rating:	VERY LOW (1D)	VERY LOW (1D)	LOW (1C)	VERY LOW (1D)	LOW (2C)	LOW (2C)
	Environment	Consequence:	Minor	Insignificant	Minor	Insignificant	Major	Moderate
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	LOW (2C)	LOW (1C)	LOW (2C)	LOW (1C)	HIGH (4C)	MEDIUM (3C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	Insignificant	N/A	Minor	N/A	Minor	Minor
		Likelihood:	Very rare	N/A	Very rare	N/A	Extremely rare	Very rare
		Risk rating:	VERY LOW (1E)	N/A	VERY LOW (2E)	N/A	VERY LOW (2F)	VERY LOW (2E)
Risk 3: Fire management impacts	Conservation score		Moderate	Low	Moderate	Low	Very high	High
	Priority for fire management works in reserve		Moderate	Low	Moderate	Low	Moderate	Moderate
	Environment	Consequence:	Minor	Insignificant	Minor	Insignificant	Major	Moderate
		Likelihood:	Rare	Very rare	Rare	Very rare	Rare	Rare
		Risk rating:	LOW (2D)	VERY LOW (1E)	LOW (2D)	VERY LOW (1E)	HIGH (4D)	MEDIUM (3D)

Table 25 – Frankston City natural reserves (2 of 11).

			Boggy Creek Link	Bonacci Reserve	Bunarong Park	Carrum Woods Nature Reserve	Casuarina Reserve	Cell 3 (Pines Flora & Fauna Reserve)
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Unlikely	Yes	No	Very unlikely	Yes	Yes
	Dwellings	Consequence:	Moderate	Insignificant	Moderate	Insignificant	Minor	Insignificant
		Likelihood:	Rare	Rare	Unlikely	Extremely rare	Rare	Rare
		Risk rating:	MEDIUM (3D)	VERY LOW (1D)	MEDIUM (3C)	VERY LOW (1F)	LOW (2D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	N/A	N/A	N/A
		Likelihood:	N/A	N/A	N/A	N/A	N/A	N/A
		Risk rating:	N/A	N/A	N/A	N/A	N/A	N/A
	Infrastructure	Consequence:	Moderate	Insignificant	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Very rare	Unlikely	Unlikely	Rare	Rare	Rare
		Risk rating:	LOW (3E)	LOW (1C)	LOW (2C)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)
	Reserve users	Consequence:	Minor	Insignificant	Moderate	Insignificant	Insignificant	Moderate
		Likelihood:	Very rare	Extremely rare	Very rare	Very rare	Extremely rare	Extremely rare
		Risk rating:	VERY LOW (2E)	VERY LOW (1F)	LOW (3E)	VERY LOW (1E)	VERY LOW (1F)	LOW (3F)
	Public administration (Council services)	Consequence:	Minor	Insignificant	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Unlikely	Rare	Unlikely	Rare	Unlikely	Rare
		Risk rating:	LOW (2C)	VERY LOW (1D)	LOW (2C)	VERY LOW (1D)	LOW (1C)	VERY LOW (1D)
	Environment	Consequence:	Minor	Insignificant	Major	Minor	Minor	Minor
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	LOW (2C)	LOW (1C)	HIGH (4C)	LOW (2C)	LOW (2C)	LOW (2C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	N/A	N/A	N/A	Minor	N/A	Minor
		Likelihood:	N/A	N/A	N/A	Very rare	N/A	Very rare
		Risk rating:	N/A	N/A	N/A	VERY LOW (2E)	N/A	VERY LOW (2E)
Risk 3: Fire management impacts	Conservation score		Moderate	Low	Very High	Moderate	Moderate	Moderate
	Priority for fire management works in reserve		High	Moderate	High	Low	Moderate	Low
	Environment	Consequence:	Minor	Insignificant	Major	Minor	Minor	Minor
		Likelihood:	Unlikely	Rare	Unlikely	Very rare	Rare	Very rare
		Risk rating:	LOW (2C)	VERY LOW (1D)	HIGH (4C)	VERY LOW (2E)	LOW (2D)	VERY LOW (2E)

Table 26 – Frankston City natural reserves (3 of 11).

			Centenary Park Golf Course	Clifton Grove Reserve	Colemans Reserve	Cotoneaster Reserve	Derinya Reserve	Escarpment Bushland Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Yes	No	Very unlikely	No	Very unlikely	Yes
	Dwellings	Consequence:	Insignificant	Insignificant	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Extremely rare	Extremely rare	Very rare	Very rare	Rare	Rare
		Risk rating:	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (2E)	VERY LOW (1E)	VERY LOW (1D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	Minor	N/A	N/A
		Likelihood:	N/A	N/A	N/A	Extremely rare	N/A	N/A
		Risk rating:	N/A	N/A	N/A	VERY LOW (2F)	N/A	N/A
	Infrastructure	Consequence:	Minor	Insignificant	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Very rare	Rare	Rare	Unlikely
		Risk rating:	LOW (2D)	VERY LOW (1D)	VERY LOW (2E)	VERY LOW (1D)	VERY LOW (1D)	LOW (1C)
	Reserve users	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Extremely rare	Very rare	Very rare	Extremely rare	Extremely rare	Extremely rare
		Risk rating:	VERY LOW (1F)	VERY LOW (1E)	VERY LOW (1E)	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (1F)
	Public administration (Council services)	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Rare	Rare	Rare	Rare
		Risk rating:	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)
	Environment	Consequence:	Moderate	Minor	Minor	Insignificant	Minor	Moderate
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	MEDIUM (3C)	LOW (2C)	LOW (2C)	LOW (1C)	LOW (2C)	MEDIUM (3C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	Minor	N/A	N/A	Minor	N/A	Minor
		Likelihood:	Very rare	N/A	N/A	Extremely rare	N/A	Extremely rare
		Risk rating:	VERY LOW (2E)	N/A	N/A	VERY LOW (2F)	N/A	VERY LOW (2F)
Risk 3: Fire management impacts	Conservation score		High	Moderate	Moderate	Low	Moderate	High
	Priority for fire management works in reserve		Low	Low	Low	Low	Moderate	Low
	Environment	Consequence:	Moderate	Minor	Minor	Insignificant	Minor	Moderate
		Likelihood:	Very rare	Very rare	Very rare	Very rare	Rare	Very rare
		Risk rating:	LOW (3F)	VERY LOW (2E)	VERY LOW (2E)	VERY LOW (1E)	LOW (2D)	LOW (3E)

Table 27 - Frankston City natural reserves (4 of 11).

			Esplanade Reserve	Flame Robin Reserve	Franciscan Reserve	Frankston Foreshore	Gumnut Bushland Reserve	Hafey Wetlands
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Very unlikely	Yes	No	No	Unlikely	Yes
	Dwellings	Consequence:	Insignificant	Minor	Insignificant	Minor	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Extremely rare	Rare	Very rare	Extremely rare
		Risk rating:	VERY LOW (1D)	LOW (2D)	VERY LOW (1F)	LOW (2D)	VERY LOW (1E)	VERY LOW (1F)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	N/A	Minor	N/A
		Likelihood:	N/A	N/A	N/A	N/A	Extremely rare	N/A
		Risk rating:	N/A	N/A	N/A	N/A	VERY LOW (2F)	N/A
	Infrastructure	Consequence:	Insignificant	Minor	Insignificant	Minor	Insignificant	Insignificant
		Likelihood:	Unlikely	Very rare	Rare	Rare	Unlikely	Rare
		Risk rating:	LOW (1C)	VERY LOW (2E)	VERY LOW (1D)	LOW (2D)	LOW (1C)	VERY LOW (1D)
	Reserve users	Consequence:	Insignificant	Insignificant	Insignificant	Minor	Insignificant	Insignificant
		Likelihood:	Extremely rare	Extremely rare	Extremely rare	Rare	Extremely rare	Extremely rare
		Risk rating:	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (1F)	LOW (2D)	VERY LOW (1F)	VERY LOW (1F)
	Public administration (Council services)	Consequence:	Insignificant	Minor	Insignificant	Minor	Insignificant	Insignificant
		Likelihood:	Rare	Unlikely	Rare	Unlikely	Rare	Unlikely
		Risk rating:	VERY LOW (1D)	LOW (2C)	VERY LOW (1D)	LOW (2C)	VERY LOW (1D)	LOW (1C)
	Environment	Consequence:	Minor	Major	Insignificant	Major	Moderate	Moderate
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	LOW (2C)	HIGH (4C)	LOW (1C)	HIGH (4C)	MEDIUM (3C)	MEDIUM (3C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	N/A	Minor	N/A	Minor	N/A	Minor
		Likelihood:	N/A	Rare	N/A	Rare	N/A	Very rare
		Risk rating:	N/A	LOW (2D)	N/A	LOW (2D)	N/A	VERY LOW (2E)
Risk 3: Fire management impacts	Conservation score		Moderate	Very high	Low	Very high	High	High
	Priority for fire management works in reserve		Low	High	Low	Moderate	Low	Moderate
	Environment	Consequence:	Minor	Major	Insignificant	Major	Moderate	Moderate
		Likelihood:	Very rare	Rare	Very rare	Rare	Very rare	Rare
		Risk rating:	VERY LOW (2E)	HIGH (4D)	VERY LOW (1E)	HIGH (4D)	LOW (3E)	MEDIUM (3D)

Table 28 - Frankston City natural reserves (5 of 11).

			Illawong Reserve	Jubilee Park	Kananook Creek Reserve	Kooluna Reserve	Langwarrin Equestrian Reserve	Lawson Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		No	No	No	No	Unlikely	Very unlikely
	Dwellings	Consequence:	Insignificant	Minor	Moderate	Insignificant	Minor	Insignificant
		Likelihood:	Very rare	Rare	Rare	Very rare	Rare	Rare
		Risk rating:	VERY LOW (1E)	LOW (2D)	MEDIUM (3D)	VERY LOW (1E)	LOW (2D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	Minor	N/A	Moderate	N/A	N/A	N/A
		Likelihood:	Extremely rare	N/A	Very rare	N/A	N/A	N/A
		Risk rating:	VERY LOW (2F)	N/A	LOW (3E)	N/A	N/A	N/A
	Infrastructure	Consequence:	Insignificant	Moderate	Moderate	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Very rare	Very rare	Rare	Rare	Rare
		Risk rating:	VERY LOW (1D)	LOW (3E)	LOW (3E)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)
	Reserve users	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Extremely rare	Extremely rare	Extremely rare	Extremely rare	Very rare	Extremely rare
		Risk rating:	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (1E)	VERY LOW (1F)
	Public administration (Council services)	Consequence:	Insignificant	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Unlikely	Unlikely	Rare	Unlikely	Rare
		Risk rating:	VERY LOW (1D)	LOW (2C)	LOW (1C)	VERY LOW (1D)	LOW (1C)	VERY LOW (1D)
	Environment	Consequence:	Insignificant	Insignificant	Moderate	Minor	Minor	Insignificant
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	LOW (1C)	LOW (1C)	MEDIUM (3C)	LOW (2C)	LOW (2C)	LOW (1C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	Minor	N/A	N/A	N/A	Minor	N/A
		Likelihood:	Extremely rare	N/A	N/A	N/A	Very rare	N/A
		Risk rating:	VERY LOW (2F)	N/A	N/A	N/A	VERY LOW (2E)	N/A
Risk 3: Fire management impacts	Conservation score		Low	Low	High	Low	Moderate	Low
	Priority for fire management works in reserve		Low	Moderate	Moderate	Low	Moderate	Low
	Environment	Consequence:	Insignificant	Insignificant	Moderate	Insignificant	Minor	Insignificant
		Likelihood:	Very rare	Very rare	Rare	Very rare	Rare	Very rare
		Risk rating:	VERY LOW (1E)	VERY LOW (1E)	MEDIUM (3D)	VERY LOW (1E)	LOW (2D)	VERY LOW (1E)

Table 29 - Frankston City natural reserves (6 of 11).

			Lexton Reserve	Little Boggy Creek Reserve	Lloyd Park	Lower Sweetwater Creek Nature Reserve	Monique Bushland Reserve	Mulgra Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Unlikely	Unlikely	No	No	Unlikely	No
	Dwellings	Consequence:	Moderate	Moderate	Minor	Moderate	Minor	Insignificant
		Likelihood:	Rare	Rare	Rare	Rare	Rare	Rare
		Risk rating:	MEDIUM (3D)	MEDIUM (3D)	LOW (2D)	MEDIUM (3D)	LOW (2D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	N/A	N/A	N/A
		Likelihood:	N/A	N/A	N/A	N/A	N/A	N/A
		Risk rating:	N/A	N/A	N/A	N/A	N/A	N/A
	Infrastructure	Consequence:	Insignificant	Insignificant	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Very rare	Rare	Rare	Rare
		Risk rating:	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (2E)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)
	Reserve users	Consequence:	Minor	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Very rare	Very rare	Very rare	Extremely rare	Very rare	Extremely rare
		Risk rating:	VERY LOW (2E)	VERY LOW (2E)	VERY LOW (1E)	VERY LOW (1F)	VERY LOW (1E)	VERY LOW (1F)
	Public administration (Council services)	Consequence:	Minor	Minor	Minor	Minor	Minor	Insignificant
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Rare
		Risk rating:	LOW (2C)	LOW (2C)	LOW (2C)	LOW (2C)	LOW (2C)	VERY LOW (1D)
	Environment	Consequence:	Major	Major	Major	Moderate	Moderate	Minor
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	HIGH (4C)	HIGH (4C)	HIGH (4C)	MEDIUM (3C)	MEDIUM (3C)	LOW (2C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	N/A	N/A	N/A	N/A	Minor	N/A
		Likelihood:	N/A	N/A	N/A	N/A	Rare	N/A
		Risk rating:	N/A	N/A	N/A	N/A	LOW (2D)	N/A
Risk 3: Fire management impacts	Conservation score		Very high	Very high	Very high	High	High	Moderate
	Priority for fire management works in reserve		High	High	Moderate	High	Moderate	Low
	Environment	Consequence:	Major	Major	Major	Moderate	Moderate	Minor
		Likelihood:	Unlikely	Unlikely	Rare	Unlikely	Rare	Very rare
		Risk rating:	HIGH (4C)	HIGH (4C)	HIGH (4D)	MEDIUM (3C)	MEDIUM (3D)	VERY LOW (2E)

Table 30 – Frankston City natural reserves (7 of 11).

			Nepean Gateway Reserve	North Reserve	Oakwood Reserve	Olivers Hill Foreshore	Outlook Reserve	Overport Park
Risk 1: Fire within the reserve	Can established fire burn into reserve?		No	Yes	No	No	No	Yes
	Dwellings	Consequence:	Insignificant	Moderate	Minor	Insignificant	Insignificant	Minor
		Likelihood:	Extremely rare	Rare	Very rare	Unlikely	Very rare	Rare
		Risk rating:	VERY LOW (1F)	MEDIUM (3D)	VERY LOW (2E)	LOW (1C)	VERY LOW (1E)	LOW (2D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	N/A	N/A	N/A
		Likelihood:	N/A	N/A	N/A	N/A	N/A	N/A
		Risk rating:	N/A	N/A	N/A	N/A	N/A	N/A
	Infrastructure	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Minor
		Likelihood:	Rare	Rare	Unlikely	Rare	Rare	Very rare
		Risk rating:	VERY LOW (1D)	VERY LOW (1D)	LOW (1C)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (2E)
	Reserve users	Consequence:	Insignificant	Moderate	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Extremely rare	Very rare	Very rare	Extremely rare	Extremely rare	Extremely rare
		Risk rating:	VERY LOW (1F)	LOW (3E)	VERY LOW (1E)	VERY LOW (1F)	VERY LOW (1F)	VERY LOW (1F)
	Public administration (Council services)	Consequence:	Insignificant	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Unlikely	Rare	Unlikely	Rare	Unlikely
		Risk rating:	VERY LOW (1D)	LOW (2C)	VERY LOW (1D)	LOW (1C)	VERY LOW (1D)	LOW (1C)
	Environment	Consequence:	Insignificant	Major	Minor	Minor	Minor	Minor
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	LOW (1C)	HIGH (4C)	LOW (2C)	LOW (2C)	LOW (2C)	LOW (2C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	N/A	Minor	Minor	N/A	N/A	Moderate
		Likelihood:	N/A	Very rare	Very rare	N/A	N/A	Very rare
		Risk rating:	N/A	VERY LOW (2E)	VERY LOW (2E)	N/A	N/A	LOW (3E)
Risk 3: Fire management impacts	Conservation score		Low	Very high	Moderate	Moderate	Moderate	Moderate
	Priority for fire management works in reserve		Low	High	Low	Low	Low	Moderate
	Environment	Consequence:	Insignificant	Major	Minor	Minor	Minor	Minor
		Likelihood:	Very rare	Unlikely	Very rare	Rare	Very rare	Rare
		Risk rating:	VERY LOW (1E)	HIGH (4C)	VERY LOW (2E)	LOW (2D)	VERY LOW (2E)	LOW (2D)

Table 31 – Frankston City natural reserves (8 of 11).

			Paratea Flora & Fauna Reserve	Park Valley Reserve	Pobblebonk Wetlands Reserve	Raphael Reserve	Rinella Reserve	Robinsons Bushland Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		No	Unlikely	Yes	No	Yes	Unlikely
	Dwellings	Consequence:	Moderate	Minor	Insignificant	Insignificant	Minor	Insignificant
		Likelihood:	Rare	Rare	Extremely rare	Extremely rare	Rare	Rare
		Risk rating:	MEDIUM (3D)	LOW (2D)	VERY LOW (1F)	VERY LOW (1F)	LOW (2D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	Minor	N/A	Minor
		Likelihood:	N/A	N/A	N/A	Extremely rare	N/A	Very rare
		Risk rating:	N/A	N/A	N/A	VERY LOW (2F)	N/A	VERY LOW (2E)
	Infrastructure	Consequence:	Moderate	Insignificant	Insignificant	Minor	Insignificant	Insignificant
		Likelihood:	Extremely rare	Rare	Unlikely	Unlikely	Rare	Rare
		Risk rating:	LOW (3F)	VERY LOW (1D)	LOW (1C)	LOW (2C)	VERY LOW (1D)	VERY LOW (1D)
	Reserve users	Consequence:	Moderate	Insignificant	Insignificant	Insignificant	Minor	Insignificant
		Likelihood:	Very rare	Very rare	Very rare	Extremely rare	Very rare	Very rare
		Risk rating:	LOW (3E)	VERY LOW (1E)	VERY LOW (1E)	VERY LOW (1F)	VERY LOW (2E)	VERY LOW (1E)
	Public administration (Council services)	Consequence:	Minor	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Unlikely	Unlikely	Rare	Rare	Unlikely	Unlikely
		Risk rating:	LOW (2C)	LOW (2C)	VERY LOW (1D)	VERY LOW (1D)	LOW (1C)	LOW (1C)
	Environment	Consequence:	Major	Moderate	Major	Minor	Minor	Moderate
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	HIGH (4C)	MEDIUM (3C)	HIGH (4C)	LOW (2C)	LOW (2C)	MEDIUM (3C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	N/A	Minor	Minor	N/A	Moderate	Minor
		Likelihood:	N/A	Rare	Extremely rare	N/A	Extremely rare	Rare
		Risk rating:	N/A	LOW (2D)	VERY LOW (2F)	N/A	LOW (3F)	LOW (2D)
Risk 3: Fire management impacts	Conservation score		Very high	High	Very high	Moderate	Moderate	High
	Priority for fire management works in reserve		High	Moderate	Low	Low	Moderate	Moderate
	Environment	Consequence:	Major	Moderate	Major	Minor	Minor	Moderate
		Likelihood:	Unlikely	Rare	Very rare	Very rare	Rare	Rare
		Risk rating:	HIGH (4C)	MEDIUM (3D)	MEDIUM (4E)	VERY LOW (2E)	LOW (2D)	MEDIUM (3D)

Table 32 - Frankston City natural reserves (9 of 11).

			Seaford Foreshore	Seaford Wetlands	Serenity Reserve	Shaxton Circle	Solferino Reserve	Songlark Link Conservation Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		No	Very unlikely	Unlikely	No	No	No
	Dwellings	Consequence:	Minor	Minor	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Rare	Extremely rare	Very rare	Very rare
		Risk rating:	LOW (2D)	LOW (2D)	LOW (2D)	VERY LOW (1F)	VERY LOW (1E)	VERY LOW (1E)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	Minor	N/A	N/A	N/A	N/A
		Likelihood:	N/A	Very rare	N/A	N/A	N/A	N/A
		Risk rating:	N/A	VERY LOW (2E)	N/A	N/A	N/A	N/A
	Infrastructure	Consequence:	Minor	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Rare	Rare	Rare	Unlikely
		Risk rating:	LOW (2D)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	LOW (1C)
	Reserve users	Consequence:	Minor	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Very rare	Extremely rare	Very rare	Very rare
		Risk rating:	LOW (2D)	LOW (2D)	VERY LOW (1E)	VERY LOW (1F)	VERY LOW (1E)	VERY LOW (1E)
	Public administration (Council services)	Consequence:	Minor	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Unlikely	Unlikely	Unlikely	Rare	Rare	Rare
		Risk rating:	LOW (2C)	LOW (2C)	LOW (1C)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)
	Environment	Consequence:	Major	Major	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	HIGH (4C)	HIGH (4C)	LOW (2C)	LOW (1C)	LOW (1C)	LOW (1C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	Minor	N/A	Minor	N/A	N/A	N/A
		Likelihood:	Rare	N/A	Very rare	N/A	N/A	N/A
		Risk rating:	LOW (2D)	N/A	VERY LOW (2E)	N/A	N/A	N/A
Risk 3: Fire management impacts	Conservation score		Very high	Very high	Moderate	Low	Low	Low
	Priority for fire management works in reserve		Moderate	High	Moderate	Low	Low	Low
	Environment	Consequence:	Major	Major	Minor	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Rare	Very rare	Very rare	Very rare
		Risk rating:	HIGH (4D)	HIGH (4D)	LOW (2D)	VERY LOW (1E)	VERY LOW (1E)	VERY LOW (1E)

Table 33 - Frankston City natural reserves (10 of 11).

			Southgateway Reserve	Stevens Reserve	Stotts Bushland Reserve	Stringybark Bushland Reserve	Studio Park	Swampy Rise Wildlife Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Very unlikely	Unlikely	Yes	Yes	Yes	Yes
	Dwellings	Consequence:	Minor	Moderate	Insignificant	Moderate	Moderate	Insignificant
		Likelihood:	Rare	Rare	Rare	Rare	Rare	Rare
		Risk rating:	LOW (2D)	MEDIUM (3D)	VERY LOW (1D)	MEDIUM (3D)	MEDIUM (3D)	VERY LOW (1D)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	N/A	N/A	N/A	N/A	N/A
		Likelihood:	N/A	N/A	N/A	N/A	N/A	N/A
		Risk rating:	N/A	N/A	N/A	N/A	N/A	N/A
	Infrastructure	Consequence:	Insignificant	Insignificant	Insignificant	Insignificant	Moderate	Insignificant
		Likelihood:	Rare	Rare	Rare	Rare	Very rare	Rare
		Risk rating:	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	VERY LOW (1D)	LOW (3E)	VERY LOW (1D)
	Reserve users	Consequence:	Insignificant	Minor	Insignificant	Moderate	Moderate	Minor
		Likelihood:	Rare	Very rare	Extremely rare	Very rare	Very rare	Very rare
		Risk rating:	VERY LOW (1D)	VERY LOW (2E)	VERY LOW (1F)	LOW (3E)	LOW (3E)	VERY LOW (2E)
	Public administration (Council services)	Consequence:	Minor	Minor	Insignificant	Minor	Minor	Minor
		Likelihood:	Unlikely	Unlikely	Rare	Unlikely	Unlikely	Unlikely
		Risk rating:	LOW (2C)	LOW (2C)	VERY LOW (1D)	LOW (2C)	LOW (2C)	LOW (2C)
	Environment	Consequence:	Moderate	Major	Insignificant	Major	Major	Moderate
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	MEDIUM (3C)	HIGH (4C)	LOW (1C)	HIGH (4C)	HIGH (4C)	MEDIUM (3C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	Minor	N/A	Minor	Minor	Moderate	Minor
		Likelihood:	Very rare	N/A	Very rare	Very rare	Very rare	Rare
		Risk rating:	VERY LOW (2E)	N/A	VERY LOW (2E)	VERY LOW (2E)	LOW (3E)	LOW (2D)
Risk 3: Fire management impacts	Conservation score		High	Very high	High	Very high	Very high	High
	Priority for fire management works in reserve		Moderate	High	Low	High	High	Moderate
	Environment	Consequence:	Moderate	Major	Insignificant	Major	Major	Moderate
		Likelihood:	Rare	Unlikely	Very rare	Unlikely	Unlikely	Rare
		Risk rating:	MEDIUM (3D)	HIGH (4C)	VERY LOW (1E)	HIGH (4C)	HIGH (4C)	MEDIUM (3D)

Table 34 - Frankston City natural reserves (11 of 11).

			Tangenong Creek Reserve	Upper Sweetwater Creek Reserve	Wallace Reserve	Wattlewood Bushland Reserve	Wilton Bushland Reserve	Witternberg Reserve & Robinsons Park	Yuille Street Reserve
Risk 1: Fire within the reserve	Can established fire burn into reserve?		Unlikely	Unlikely	No	No	No	Unlikely	Yes
	Dwellings	Consequence:	Insignificant	Moderate	Minor	Insignificant	Insignificant	Insignificant	Insignificant
		Likelihood:	Rare	Rare	Rare	Very rare	Very rare	Rare	Unlikely
		Risk rating:	VERY LOW (1D)	MEDIUM (3D)	LOW (2D)	VERY LOW (1E)	VERY LOW (1E)	VERY LOW (1D)	LOW (1C)
	Special life risk buildings (schools, aged care etc)	Consequence:	N/A	Moderate	N/A	N/A	N/A	Minor	N/A
		Likelihood:	N/A	Very rare	N/A	N/A	N/A	Extremely rare	N/A
		Risk rating:	N/A	LOW (3E)	N/A	N/A	N/A	VERY LOW (2F)	N/A
	Infrastructure	Consequence:	Insignificant	Moderate	Insignificant	Insignificant	Insignificant	Minor	Insignificant
		Likelihood:	Rare	Rare	Rare	Rare	Unlikely	Very rare	Rare
		Risk rating:	VERY LOW (1D)	MEDIUM (3D)	VERY LOW (1D)	VERY LOW (1D)	LOW (1C)	VERY LOW (2E)	VERY LOW (1D)
	Reserve users	Consequence:	Insignificant	Minor	Insignificant	Insignificant	Insignificant	Minor	Insignificant
		Likelihood:	Extremely rare	Very rare	Very rare	Very rare	Very rare	Very rare	Very rare
		Risk rating:	VERY LOW (1F)	VERY LOW (2E)	VERY LOW (1E)	VERY LOW (1E)	VERY LOW (1E)	VERY LOW (2E)	VERY LOW (1E)
	Public administration (Council services)	Consequence:	Insignificant	Minor	Minor	Insignificant	Insignificant	Minor	Insignificant
		Likelihood:	Rare	Unlikely	Unlikely	Rare	Rare	Unlikely	Rare
		Risk rating:	VERY LOW (1D)	LOW (2C)	LOW (2C)	VERY LOW (1D)	VERY LOW (1D)	LOW (2C)	VERY LOW (1D)
	Environment	Consequence:	Moderate	Moderate	Minor	Minor	Minor	Moderate	Insignificant
		Likelihood:	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
		Risk rating:	MEDIUM (3C)	MEDIUM (3C)	LOW (2C)	LOW (2C)	LOW (2C)	MEDIUM (3C)	LOW (1C)
Risk 2: Downstream risk from ignition in reserve	Combined impact categories	Consequence:	Insignificant	Moderate	N/A	N/A	N/A	Moderate	Insignificant
		Likelihood:	Very rare	Rare	N/A	N/A	N/A	Very rare	Rare
		Risk rating:	VERY LOW (1E)	MEDIUM (3D)	N/A	N/A	N/A	LOW (3E)	VERY LOW (1D)
Risk 3: Fire management impacts	Conservation score		High	High	Moderate	Moderate	Moderate	High	Low
	Priority for fire management works in reserve		Moderate	High	Moderate	Low	Low	Moderate	Low
	Environment	Consequence:	Moderate	Moderate	Minor	Minor	Minor	Moderate	Insignificant
		Likelihood:	Very rare	Unlikely	Rare	Very rare	Very rare	Rare	Rare
		Risk rating:	LOW (3E)	MEDIUM (3C)	LOW (D2)	VERY LOW (2E)	VERY LOW (2E)	MEDIUM (3D)	VERY LOW (1D)

10.2 Appendix C - Risk criteria

10.2.1 Level of controls

Table 35 - Qualitative descriptors of strength and expediency of existing controls (Source: NERAG (Attorney General's Department 2015)).

Level	Control strength	Control expediency
High	Control is highly effective in reducing the level of risk	• The control is frequently applied. • A procedure to apply the control is well understood and resourced. • The cost of applying the control is within current resources and budgets.
Medium	Control is effective in reducing the level of risk	• The control is infrequently applied and is outside the operators' everyday experience. • The use of the control has been foreseen and plans for its application have been prepared and tested. • Some extraordinary cost may be required to apply the control.
Low	Control has some effect in reducing the level of risk	• The control is applied rarely and operators may not have experience using it. • The use of the control may have been foreseen and plans for its application may have been considered, but it is not part of normal operational protocols and has not been tested. • Extraordinary cost is required to apply the control, which may be difficult to obtain.
Very Low	Control has almost no effect reducing the level of risk	• Application of the control is outside of the experience and planning of operators, with no effective procedures or plans for its operation. • It has not been foreseen that the control will ever be of need to be used. • The application of the control requires significant cost over and above existing resources, and the cost will most likely be objected to by a number of stakeholders.

Table 36 – Level of control (Source: NERAG (Attorney General's Department 2015)).

Control strength	Control expediency			
	Very Low	Low	Medium	High
High	Low	Medium	Medium	High
Medium	Low	Medium	Medium	Medium
Low	Very Low	Low	Medium	Medium
Very Low	Very Low	Very Low	Low	Low

10.2.2 Risk criteria

Consequence, likelihood, and risk level criteria adopted were those used in the NERAG, scaled for the Frankston City LGA.

Table 37 - Consequence level (Adapted from NERAG (Attorney General's Department 2015)).

Consequence	Category	People[‡‡]	Assets/Economy[§§]	Environment	Public Administration
Catastrophic	5	Deaths or critical injury greater than 0.01% of Frankston population – More than 14 people	More than 4% of FA ($938,808,000) Loss of more than 2,032 houses	Permanent destruction of environmental values of interest	Council unable to deliver core functions
Major	4	Deaths or critical injury greater than 0.001% of Frankston population – Between 1 and 14 people OR Serious injuries greater than 0.01% of population – More than 14 people	More than 0.4% of FA ($83,151,504) Loss of more than 117 houses	Severe damage to environmental values of interest	Council encounters severe reduction in delivery of core functions Need to divert significant amount of available resources to deliver core functions or seek external assistance
Moderate	3	Deaths or critical injury less than 0.0001% of Frankston population –1 person Serious injuries greater than 0.001% of population – 1 to 14 people	More than 0.04% of FA ($8,315,150) Loss of more than 12 houses	Significant damage to environmental values of interest	Council encounters significant reduction in delivery of core functions Need to divert some available resources to deliver core functions or seek external assistance
Minor	2	Serious injuries greater than 0.0001% of population – 1 person	More than 0.004% of FA ($831,515) Loss of more than 2 houses	Minor damage to environmental values of interest	Council encounters limited reduction in delivery of core functions
Insignificant	1	Minor injuries to any number of people	Loss less than 0.004% of FA ($831,515) Loss of less than 2 houses	Inconsequential damage to environmental values of interest	Council's delivery of core functions is unaffected or within normal parameters

[‡‡] Estimated resident population of Frankston City was 141,078.

[§§] The level of economic loss is based on a defined percentage loss of financial assets (FA) for Frankston City. The total value of assets was calculated as the forecast number of dwellings in Frankston in 2021 (Forecast.id online) x Estimated construction cost = (16,132 x $625,000) + (39,358 x $272,000) = $20,787,876,000. Construction cost based on 33.3% of dwellings being 4 or more bedrooms 250 sq m + 66.6% of dwellings being 3 bedroom 160 sq m in Melbourne in 2022.

Table 38 - Likelihood level (Source: NERAG (Attorney General's Department 2015)).

Likelihood	Category	Annual Exceedance Probability	Annual Return Interval (indicative)	Frequency (indicative)
Almost certain	A	63% per year or more	1 year or less	Once or more per year
Likely	B	10–63% per year	Between 1 and 10 years	Once per 10 years
Unlikely	C	1–10% per year	Between 10 and 100 years	Once per 100 years
Rare	D	0.1–1% per year	Between 101 and 1000 year	Once per 1000 years
Very rare	E	0.01–0.1% per year	Between 1001 and 10,000 years	Once per 10,000 years
Extremely rare	F	0.001–0.01% per year	10,001 years or more	Once per 100,000 years

Table 39 - Qualitative risk matrix (Source: NERAG (Attorney General's Department 2015)).

Likelihood level	Consequence level				
	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Almost certain (A)	Medium	Medium	High	Extreme	Extreme
Likely (B)	Low	Medium	High	Extreme	Extreme
Unlikely (C)	Low	Low	Medium	High	Extreme
Rare (D)	Very low	Low	Medium	High	High
Very rare (E)	Very low	Very low	Low	Medium	High
Extremely rare (F)	Very low	Very low	Low	Medium	High

10.2.3 Confidence level

Table 40 - Confidence level descriptions (Source: NERAG (Attorney General's Department 2015)).

Confidence level	Descriptor	Supporting evidence	Expertise	Participant agreement
Highest	Assessed likelihood, consequence or risk is easily assessed to one level, with almost no uncertainty.	Recent historical event of similar magnitude to that being assessed in the community of interest. or Quantitative modelling and analysis of highest quality and length of data relating directly to the affected community, used to derive results of direct relevance to the scenario being assessed.	Risk assessment team contains relevant and demonstrated technical expertise in the field being assessed, and experience in data and/or modelling of direct relevance to the scenario being assessed. and Technical expertise is highly influential in the decisions of the risk assessment team	Agreement among participants on the assessment of levels of likelihood, consequence or risk.
High	Assessed likelihood, consequence or risk has only one level, but with some uncertainty in the assessment.	Recent historical event of similar magnitude to that being assessed in a directly comparable community of interest. or Quantitative modelling and analysis uses sufficient quality and length of data to derive results of direct relevance to the event being assessed.	Risk assessment team contains relevant technical expertise in the field being assessed, and experience with data and/or modelling relating to the event being assessed. and Technical expertise is highly influential in the decisions of the risk assessment team.	Disagreement on only minor aspects, which have little effect on the assessment of levels of likelihood or consequence.

Confidence level	Descriptor	Supporting evidence	Expertise	Participant agreement
Moderate	Assessed likelihood, consequence or risk could be one of two levels, with significant uncertainty.	Historical event of similar magnitude to that being assessed in a comparable community of interest. or Quantitative modelling and analysis with reasonable extrapolation of data required to derive results of direct relevance to the event being assessed.	Risk assessment team contains relevant technical expertise in the field being assessed, and experience in data and/or modelling of relevance to the event being assessed. and Technical expertise is used by the risk assessment team.	Disagreement on significant issues, which would lead to different levels of likelihood or consequence depending on which argument was followed.
Low	Assessed likelihood, consequence or risk could be one of three or more levels, with major uncertainty.	Some comparable historical events through anecdotal information. or Quantitative modelling and analysis with extensive extrapolation of data required to derive results of relevance to the event being assessed.	Risk assessment team contains technical expertise related to the field being assessed. and Technical expertise is taken into account by the risk assessment team.	Disagreements on fundamental issues relating to the assessment of likelihood or consequence, which would lead to a range of rating levels.
Lowest	Assessed likelihood, consequence or risk could be one of four or more levels, with fundamental uncertainty.	No historical events or quantitative modelled results to support the levels.	No relevant technical expertise is available to the team for analysis.	Fundamental disagreement on levels of likelihood, consequence or risk, with little prospect of agreement.

10.2.4 Priority for action

Table 41 - Priority levels at high confidence (Source: NERAG (Attorney General's Department 2015)).

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	4	3	2	1	1
Likely	4	4	3	2	1
Unlikely	5	4	3	2	2
Rare	5	5	4	3	2
Very rare	5	5	4	3	3
Extremely rare	5	5	5	4	3

Table 42 – Priority action pathway (Source: NERAG (Attorney General's Department 2015)).

Priority	General descriptor: action pathway
1	Highest priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment must be formally informed of risks. Each risk must be examined, and any actions of further investigation and/or risk treatment to be documented, reported to and approved by that highest authority.
2	High priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment should be formally informed of risks. Further investigations and treatment plans should be developed.
3	Medium priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
4	Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.
5	Broadly acceptable risk. No action required beyond monitoring of risk level and priority during monitoring and review phase.

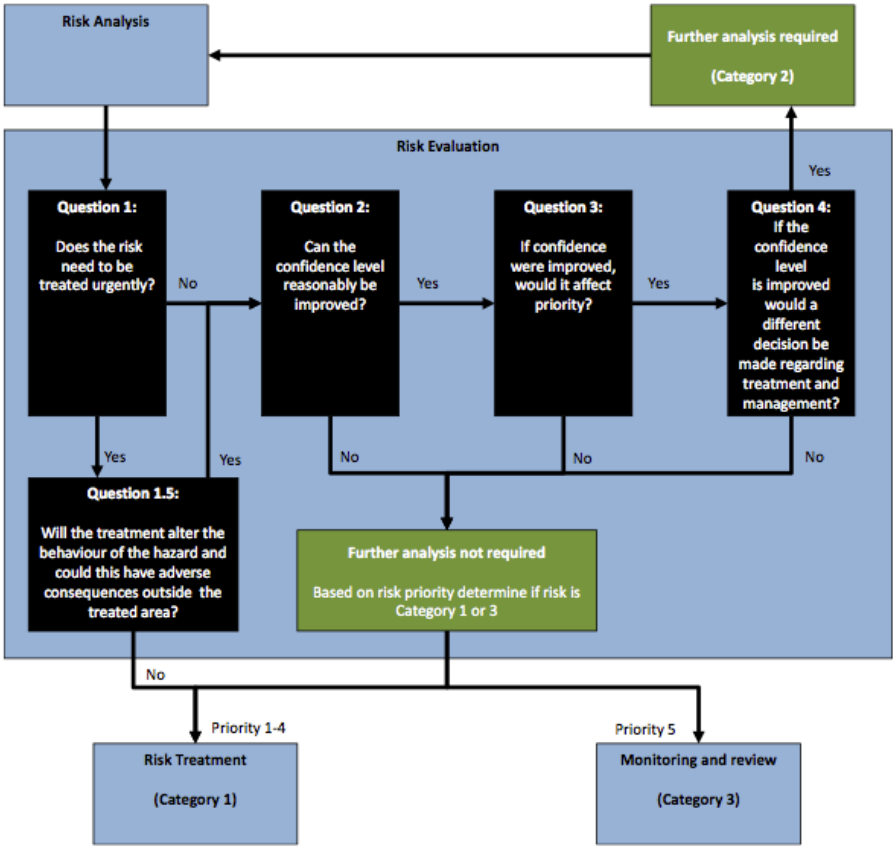


Figure 6 - Decision point questions (Source: NERAG (Attorney General's Department 2015)).

10.3 Appendix D –State listed flora and fauna

10.3.1 Fauna

Status:

- c – critically endangered in Victoria
- e – endangered in Victoria
- E – endangered in Australia
- f – listed under Flora and Fauna Gurantee Act
- n - near-threatened Victoria
- v – vulnerable in Victoria
- V – vulnerable in Australia

Table 43 - State listed fauna in Frankston City natural reserves.

State listed fauna species			
Scientific name	Common name	Status	Reserves
Alcedo azurea	Azure Kingfisher	n	Kananook Creek Reserve
Anas rhynchotis	Australasian Shoveller	v	Seaford Wetlands
Ardea alba	Great Egret	f v	Kananook Creek Reserve Seaford Wetlands
Aythya australis	Hardhead	v	Seaford Wetlands
Bizuria lobata	Musk Duck	v	Seaford Wetlands
Botaurus poiciloptilus	Australasian Bittern	f e	Seaford Wetlands
Calidris melaotos	Pectoral Sandpiper	n	Seaford Wetlands
Cereopsis novaehollandiae	Cape Barren Goose	n	Seaford Wetlands
Circus assimilis	Spotted Harrier	n	Seaford Wetlands
Egretta garzetta	Little Egret	f e	Seaford Wetlands
Egretta intermedia	Intermediate Egret	f c	Seaford Wetlands
Falco subniger	Black Falcon	v	Seaford Wetlands
Gallinago hardwickii	Latham's Snipe	n	Cell 3 Pines Flora & Fauna Reserve Pobblebonk Wetlands Reserve Seaford Wetlands
Haliaeetus leucogaster	White-breasted Sea-Eagle	f	Seaford Wetlands
Larus pacificus	Pacific Gull	n	Cell 3 Pines Flora & Fauna Reserve Seaford Foreshore Seaford Wetlands
Lathamus discolor	Swift Parrot	E f	Bunarong Park Cell 3 Pines Flora & Fauna Reserve
Limosa limosa	Black-tailed Godwit	v	Seaford Wetlands
Littoria raniformis	Growling Grass Frog	f V e	Pobblebonk Wetlands Reserve
Neophema chrysogaster	Orange-bellied Parrot	f E c	Seaford Wetlands
Ninox connivens	Barking Owl	f e	Outlook Reserve
Ninox strenua	Powerful Owl	v f	Outlook Reserve Wallace Reserve
Numenius madagascariensis	Eastern Curlew	n	Seaford Wetlands
Nycticorax caledonicus	Nankeen Night Heron	n	Lloyd Park

State listed fauna species			
Scientific name	Common name	Status	Reserves
			Pobblebonk Wetlands Reserve Seaford Wetlands
Oxyura australis	Blue-billed Duck	f e	Seaford Wetlands
Phalacrorax varius	Pied Cormorant	n	Frankston Foreshore Kananook Creek Reserve Seaford Foreshore Seaford Wetlands Wilton Bushland Reserve
Plegadis falcinellus	Glossy Ibis	n	Seaford Wetlands
Platelea regia	Royal Spoonbill	v	Kananook Creek Reserve Pobblebonk Wetlands Reserve Seaford Wetlands
Pluvialis fulva	Pacific Golden Plover	n	Seaford Wetlands
Pomatostomus temporalis	Grey-crowned Babbler	f e	Baxter Park
Porzana pusilla	Baillon's Crake	f v	Seaford Wetlands
Pseudophyrne semimarmorata	Southern Toadlet	v	Bunarong Park Cell 3 Pines Flora & Fauna Reserve Lexton Reserve Lloyd Park
Pteropus poliocephalus	Grey-headed Flying Fox	V f	Lloyd Park Studio Park
Railus pectoralis	Lewin's Rail	f v	Seaford Wetlands
Rostratula benghalensis	Painted Snipe	V c f	Seaford Wetlands
Sterna caspia	Caspian Tern	f n	Seaford Wetlands

10.3.2 Flora

Table 44 - State listed flora in Frankston City natural reserves.

State listed flora species			
Scientific name	Common name	Status	Reserves
Acacia uncifolia	Coast Wirildra	e	Lower Sweetwater Creek Reserve
Corybas diemenicus	Veined Helmet-orchid	e f	Casuarina Reserve Flame Robin Reserve Kananook Creek Reserve Paratea Flora & Fauna Reserve Studio Park
Corybas fimbriatus	Fringed Helmet-orchid	e f	Lexton Reserve
Euphrasia collina ssp. collina	Purple Eyebright	v	Bunarong Park
Geranium solanderi var. solanderi	Austral Crane's-bill	v	Flame Robin Reserve Lexton Reserve Kananook Creek Reserve Seaford Foreshore Seaford Wetlands
Glycine latrobeana	Clover Glycine	V v f	Upper Sweetwater Creek Reserve
Senecio quadridentatus	Cottony Fireweed	v	Baxter Park

State listed flora species			
Scientific name	Common name	Status	Reserves
			Belvedere Bushland Reserve Bunarong Park Casuarina Reserve Centenary Park Golf Course Gumnut Bushland Reserve Monique Bushland Reserve North Reserve Park Valley Reserve Seaford Foreshore Southgateway Reserve Stringybark Bushland Reserve Upper Sweetwater Creek Reserve Witternberg Reserve
Utricularia gibba	Floating Bladderword	f e	Flame Robin Reserve

10.4 Appendix E - Glossary

Term	Definition
Accelerating fire	A fire that has not yet reached a steady state rate of spread. The rate of spread, at a given part of the fire perimeter, is increasing.
Asset Protection Zone	Using intensive fuel treatment, the Asset Protection Zone (APZ) aims to provide the highest level of localised protection to human life and property and key community assets. The goal of fuel treatment is to reduce radiant heat and ember attack in the event of a bushfire. Fuel treatment will be carried out in the APZ through a combination of planned burning and other methods such as mowing, slashing or vegetation removal. Achieving the objectives of this zone may have negative ecological impacts.
Automatic Weather Station	The Bureau's standard AWSs use sensors to monitor temperature, humidity, wind speed and direction, pressure and rainfall. Various advanced sensors are available for specialised applications.
Bark candling	Ignition and flare-up of the bark on a tree, usually from the bottom to top.
Bark hazard	The degree of hazard posed by flammable bark on tree trunks and upper branches.
Bushfire Attack Level	AS 3959-2018 uses bushfire attack levels to determine the construction requirements for a building site based on the threat or risk of bushfire. AS 3959-2018 provides six levels of risk: BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, BAL-FZ. The levels are based on the potential exposure of the site to heat flux exposure thresholds, expressed as kW/m^2.
Bushfire Moderation Zone	This zone aims to reduce the speed and intensity of bushfires. This zone complements the APZ in that the use of planned burning in the BMZ is designed to protect nearby assets, particularly from ember spotting during a bushfire. Where practicable, the BMZ will aim to achieve ecological outcomes by seeking to manage for ecologically desirable fire regimes, provided bushfire protection objectives can still be met. This may include using other fuel management methods.
Community Information Guide	Community Information Guides (CIGs) - Bushfire have been developed for the most high risk bushfire locations this fire season. They contain important fire and emergency information to support residents before and during a fire. This includes Neighbourhood Safer Places (if available in the area), where people can shelter from fire as a last resort, and fire safety information for members of the local community.
Credible fire scenario	A potential bushfire event for a site, made with consideration of local topography, fuel and weather.
Crown fire (or crowning)	A fire ascending into the crowns of trees and spreading from crown to crown.
Current works	The reserve management works that are currently prescribed by the land manager for that reserve at the time of writing this document. Works may include vegetation management (mowing, weeding, pruning, thinning, spraying, etc.) and other maintenance (such as maintenance to tracks, fences, signs, gates, bollards, etc.).
Ecological burning	A form of prescribed burning. Treatment with fire of vegetation in nominated areas to achieve specified ecological objectives
Ecological Vegetation Community	Ecological Vegetation Classes (EVC) are the standard unit for classifying vegetation types in Victoria. EVCs are described through a combination of floristics, lifeforms and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities (i.e. lower level in the classification) that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.
Embers	Glowing particles cast from the fire (as 'showers' or 'storms').
Exposure	Extent to which an organisation and/or stakeholder is subject to an event.
Extreme fire behaviour	A level of bushfire behaviour characteristics that ordinarily precludes methods of direct suppression action. One or more of the following is usually involved: • high rates of spread • prolific crowning and/or spotting • presence of fire whirls • a strong convective column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.
Fire behaviour	The manner in which a fire reacts to the variables of fuel, weather and topography.

Term	Definition
Fire Behaviour Index (FBI)	The Fire Behaviour Index (FBI) is a simple numerical scale that can be used consistently across Australia, allowing users to make decisions that require finer detail than the four Fire Danger Rating categories allow. The FBI runs from 0 to 100 and beyond, with increasingly high values indicating increasingly dangerous fire behaviour and therefore fire danger risk. The FBI is split into step-up categories to support decision making for fire operations. Each step represents a transition in fire behaviour, such as a significant change in potential fire spread, suppression difficulty or the expected scale of impact to life and property.
Fire control line (or Fireline)	A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire.
Fire Danger Period	The Fire Danger Period (FDP) is when CFA restricts the use of fire in the community. This is to help prevent fires from starting. CFA declares the FDP for each municipality at different times in the lead up to the fire season. It depends on the amount of rain, grassland curing rate and other local conditions. The FDP may be declared as early as October in some municipalities, and typically remains in place until the fire danger lessens, which could be as late as May.
Fire intensity (Fireline intensity)	The rate of energy release per unit length of fire front usually expressed in kilowatts per metre (kW/m). The rate of energy release per unit length of firefront, defined by the equation I=H*w*r, where: I = fireline intensity (kW/m) H = heat yield of fuel (kJ/kg)-16,000 kJ/kg w = dry weight of fuel consumed(kg/m^2) (mean total less mean unburnt) r = forward rate of spread (m/s) The equation can be simplified to I = w r/2 where: I = fireline intensity (kW/m) w = dry weight of fuel consumed (t/ha) r = forward rate of spread (m/hr)
Fire Management Zone	FMZs are areas of land where fire is used for specific asset, fuel and overall forest and park management objectives. Each of the four FMZs differs in its intended fuel treatment aims and associated performance measures. Although the name of the zone indicates the primary purpose for that zone, it is recognised that multiple goals can be achieved when undertaking activities in a given zone. For example, a burn undertaken primarily for land management purposes may also have asset protection results. FMZs describe fuel treatment aims (with associated performance measures) in a particular area. The four Fire Management Zones are: • Asset Protection Zone; • Bushfire Moderation Zone; • Landscape Management Zone; • Planned Burning Exclusion Zone.
Fire run	1. A rapid advance of a fire front. It is characterised by a marked transition in intensity and rate of spread. 2. A length of ground over which a fire run occurs.
Flame length	The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity.
Forward rate of spread	The speed with which a head fire moves in a horizontal direction across the landscape.
Fuel	Any material such as grass, leaf litter and live vegetation which can be ignited and sustains a fire.
Fuel load	The oven dry weight of fuel per unit area. Commonly expressed as tonnes per hectare (t/ha).
Fully developed fire	A fire that has reached a steady-state forward rate of spread for the conditions under which it is burning.
Generalised extreme value analysis	A method used for quantifying the recurrence of extreme events such as elevated fire danger.
Hazard	A source of potential harm or a situation with potential to cause loss.
Landscape Management Zone	Within this zone, planned burning will be used for three broad aims: • Bushfire protection outcomes by reducing the overall fuel and bushfire hazard in the landscape • Ecological resilience through appropriate fire regimes

Term	Definition
	• Management of the land for particular values including forest regeneration and protection of water catchments at a landscape level. Other fuel reduction methods will be used within this zone as appropriate.
Neighbourhood Safer Places	Neighbourhood Safer Places (NSPs) are: • Locations that may provide some protection from direct flame and radiant heat, but they do not guarantee safety. • Not an alternative to planning to leave early or to stay and defend your property; they are a place of last resort if all other fire plans have failed. • An existing location and not a purpose-built, fire-proof structure.
Planned burning (prescribed burning, fuel reduction burning)	The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives, including fuel reduction and ecological outcomes.
Planned Burning Exclusion Zone	This zone excludes the use of planned burning primarily in areas intolerant to fire.
Radiant heat	One of three types of heat emitted from a fire. Radiant heat is transmitted by electromagnetic waves travelling directly outwards from the heat source.
Spot fires	1. Isolated fire started ahead of the main fire by sparks, embers or other ignited material, sometimes to a distance of several kilometres. 2. A very small fire that requires little time or effort to extinguish.
Steady-state (sometimes quasi steady-state)	A situation where the rate of change is zero over time. For fire spread the steady-state rate of spread is the maximum possible rate of spread given no change in fuel, topography and weather. This will be achieved after a period where the rate of spread is accelerating. Quasi steady-state refers to a fluctuating rate that approximates to zero over time.
Tolerable Fire Interval	Minimum and maximum tolerable fire intervals have been assigned to groups of ecological vegetation classes (EVCs). TFIs give fire managers information on the ecological adaption of EVC groups to fire, so that the frequency, severity and intensity of planned fires can be scheduled and conducted in ways that ensure the ecological sustainability of native vegetation communities and their constituent species.
'Urban' fuels	Buildings, vehicles and other structures such as retaining walls and fences that become involved in a bushfire once it penetrates an urban or peri-urban area. May burn for a long period of time and expose adjacent assets to significant radiant heat or flame contact.
Vulnerability	Intrinsic properties of something resulting in susceptibility to a risk source that can lead to an event with a consequence.