BUILDING IN BUSHFIRE PRONE AREAS

SUBMISSIONS OF COUNSEL ASSISTING

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1 INTRODUCTION

1.1 The Commission’s terms of reference direct attention to the preparation and planning by governments and households for bushfires, including current laws, policies and strategies for the prevention and management of bushfire threats and risks. This includes the ways in which we as a community build in areas at risk of bushfire. Further, the Commission is specifically requested to make recommendations in relation to the fireproofing of houses and other buildings, including the materials used in construction.

1.2 Research on how buildings ignite and burn during bushfires is one of the two strands of research that contributed to the development of the Stay or Go policy. Surveys of houses destroyed in bushfires, in particular in the Otway Ranges and at Mount Macedon on Ash Wednesday in 1983, and in the Sydney metropolitan area in the 1994 NSW fires, indicated that, if houses were attended, losses were significantly reduced.\(^1\) There is an interrelationship between the ability of occupants to actively defend their home against a bushfire and the capacity of the home to withstand bushfire attack.

1.3 This learning has been encapsulated in the catchphrase “People save houses, houses save people”, which is central to the Stay or Go policy. Those who decide to stay and defend their home are advised by the CFA to take shelter inside the house during the passage of the main fire front.\(^2\) The conventional wisdom prior to 7 February 2009 was that a well prepared house will provide protection from radiant heat while the fire front passes, until the occupants can safely emerge from the house to patrol their

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\(^1\) Exhibit 9 – Building in a Fire-Prone Environment: Research on Building Survival in Two Major Bushfires (TEN.001.001.0102) at 0106 and 0108

\(^2\) Exhibit 9 – Living in the Bush - Bushfire Survival Plan Workbook - Second Edition 2008 (TEN.001.001.0004) at 0035
property and put out embers and spot fires. However, if the house ignites and is consumed by fire before the fire front has passed, the occupants are at grave risk.

1.4 More than 2000 houses were destroyed by fire on Black Saturday. While the preliminary findings of the Bushfire CRC’s survey of houses destroyed in the fires are consistent with earlier findings that people save houses, the Commission has heard many accounts of people who tried to defend a well prepared house and failed. Of the 173 people who died on Black Saturday, 113 died in some 52 houses. A number of these people died attempting to save their well prepared homes.

1.5 The continued pursuit of the Stay or Go policy requires close attention to be given to what can be done to maximise the capacity of buildings to provide safe shelter from a bushfire. This is in large part the preserve of building regulation, specifically the regulation of building in bushfire prone areas. And although the protection of life is the Commission’s primary focus, the personal, social and economic costs of the widespread destruction of homes by the Black Saturday fires are also important considerations. Measures that increase the chances of building survival in bushfires can reduce those costs as well.

1.6 It is important to recognise that the regulation of building in bushfire prone areas is but one of the range of measures available to mitigate bushfire risk. Other significant measures include land use planning, fuel management and emergency management, all of which will be the subject of evidence before the Commission next year. While these submissions necessarily focus on building regulation, we do not suggest that the Commission should consider building in isolation from other bushfire risk measures. To the contrary, a closer integration of all bushfire risk mitigation measures will be a consistent theme in these and later submissions of Counsel Assisting.

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3 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [267]
4 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0193-0194.
6 Exhibit 49 – Statement of O’Halloran, Attachment 1 (WIT.3010.001.0007). Please note pages 0008-0012 are subject to suppression order ORD.0004.001.0001.
7 Exhibit 380 – Statement of Lynch (WIT.094.001.0001) [5]-[13], [22]; Hollowood T10648:3-T10649:8, T10649:14-T10651:12, T10654:1-T10654:4 (D & C Lynch). Please note this evidence is subject to suppression order ORD.0015.001.0001. The Commission’s inquiry into circumstances of each of the fire-related deaths is ongoing.


2 BUILDING SURVIVAL

2.1 In his report prepared for the Commission, Justin Leonard of CSIRO outlined the development of the current understanding of building performance in bushfires. Research on building performance is based on three main approaches: post bushfire surveys, experimental work, and risk modelling. Of these three approaches, post bushfire surveys conducted since 1944 have contributed greatly to the scientific understanding of how and why buildings are destroyed by bushfires.

2.2 Significant post bushfire surveys include the initial survey conducted by George Barrow of CSIR after the 1944 Beaumaris fires; surveys conducted in Macedon and the Otway Ranges after the Ash Wednesday 1983 fires; a survey of houses lost in and around Sydney after the January 1994 fires; and the survey of building damage in Duffy after the Canberra 2003 fires. Two major themes that have emerged from post bushfire surveys are:

(a) the great majority of houses damaged or destroyed by bushfires were ignited by wind-borne embers, rather than by direct flame contact or radiant heat;

(b) the presence of people able to carry out firefighting activities greatly enhanced the likelihood of a building's survival.

2.3 The insights provided by post bushfire surveys have been enhanced by experimental studies, which typically focus on the performance of specific building components that may be subject to bushfire attack, such as timber, windows and window shutters, and water tanks. The results of these two forms of empirical research have informed the risk and vulnerability models described in Mr Leonard's report, including the Wilson House Survival Meter and the House Ignition Likelihood Index developed by Kevin Tolhurst and Kelly Howlett.

2.4 Mr Leonard outlined the various ways in which buildings are damaged or destroyed during bushfires. These are:

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8 Exhibit 175 – Leonard Report (TEN.066.001.0001)
9 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0011
10 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0011-0015
11 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0011-0015, summarised in Table 1 at 0012
14 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0015-0017
15 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0017-0018; Exhibit 135- Tolhurst Report (EXP.003.005.0001)
16 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0019-0027
(a) ember attack;
(b) radiant heat;
(c) direct flame contact – both from low level flame spread and from the main fire front;
(d) convective heat; and
(e) wind.

2.5 While these attack mechanisms are described separately below, it is important to note that in practice a building will often be subjected to more than one attack mechanism, which may combine “synergistically” to ignite and burn the building.\textsuperscript{17} For example, high winds may lift roof tiles, allowing embers to enter the roof cavity; or radiant heat may break windows, allowing embers and flames to enter the building and ignite its contents.

2.6 In bushfires, once a building ignites, in the absence of human intervention, it is most likely that it will burn to the ground. Once an internal structure fire has developed, the additional fuel load provided by the combustible elements of the building and its contents will usually result in the complete destruction of the building. Buildings partially damaged by bushfires are rare, and are mostly the result of firefighting by occupants or fire brigades. For this reason, research into building performance in bushfires – and building standards in bushfire prone areas – has focussed on those factors that contribute to the initial ignition of the building.\textsuperscript{18}

\textit{Ember attack}

2.7 Ember attack is the main cause of ignition and loss of buildings during a bushfire; it persists for the longest time, and affects areas that are not reached by the main fire front.\textsuperscript{19} Embers can ignite a building in any of the following ways:\textsuperscript{20}

- Arriving and remaining on horizontal or near horizontal surfaces adjacent to, below or on top of combustible elements;
- Arriving at a non-horizontal combustible surface that is rough or textured so that it supports the lodgement of the fine fuel element;
- Arriving at a combustible surface that is already giving off ignitable gases causing these gases to ignite;
- Arriving and accumulating near a small gap and igniting, causing flame entrainment through this small gap;

\textsuperscript{17} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0019-0020, 0027
\textsuperscript{18} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0019
\textsuperscript{19} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0029
\textsuperscript{20} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0014
Arriving at a gap, vent or screen that does not allow the ember to pass. If the ember is glowing or flaming, the ember may continue to burn or glow until it has reduced in size so that it passes through;

Arriving at one of the conditions listed above via gaps and/or openings, arriving in an internal cavity or the occupied region of a building; and

Arriving at an element that is either near or attached to the building and meeting one of the above conditions, causing element ignition and exposure of ember, flame, radiant heat, and/or convective heat.

2.8 Mr Leonard described the factors affecting the duration, spread and intensity of ember attack as follows: 21

It is understood that ember attack can be prevalent before the fire front impacts, is always present during the fire front impact, and is always present for a period after the fire front has passed. Ember attack can also be a major issue for buildings that do not experience close interactions with a fire front (Leonard and Blanchi 2005). For example, houses were lost at a distance up to 700 m from continuous vegetation in the Canberra 2003 bushfire event.

Embers may be produced by vegetation of the type that supports fire front spread but can also be produced from the fuel load or elements within an urban setting. Vegetation, mulch beds, houses and many other elements within an urban environment can be effective sources. Hence under severe fire weather conditions, bushfire effects can be experienced deep within urban areas. The more severe the fire weather and persistent the wind conditions, the deeper the effects may be felt (Leonard & Blanchi 2005).

For buildings close to continuous vegetation, the time immediately after the fire front impacts on the urban edge is generally the most intense period of ember attack. The persistence of ember development depends on the prevailing winds that follow the fire event and the nature of the fuels that are still burning in the many hours after the fire front. Forests containing significant heavy fuels, in particular old fallen trees and stumps, can burn for days after the fire event, producing embers throughout this period. Buildings and other combustible urban elements that become fully involved in fire can provide a significant source of embers for many hours after the fire front has passed.

2.9 The intensity of ember attack depends upon proximity to the source of the embers, the type of vegetation producing the embers, how open and exposed the location is to

21 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0029
ember attack, and the duration and strength of the wind bearing the embers. The hotter, drier and windier it is, the more embers that can be expected.

2.10 Buildings may ignite due to ember attack either:

(a) because embers enter into the building envelope and ignite its contents; or
(b) through ignition of the building envelope itself.

In the former case, the probability of ignition is influenced by the intensity of the ember attack, the number and size of gaps through which embers may enter, and the presence of combustible material behind the gaps. In the latter case, the likelihood of ignition depends on the presence on the building’s exterior of places where embers can accumulate, and the combustibility of its external elements.

Radiant heat

2.11 The mechanisms by which radiant heat can ignite a building were also described by Mr Leonard:

Radiant heat can come from the fire front and/or from any number of combustible elements surrounding a building or even come from the combustible elements of the building itself. Radiant heat energy causes the heating of elements on, around and within buildings, which may result in:

- The structural failure of a component of a building, by melting or cracking;
- Ignition of a building component due to heating to the point that it gives off ignitable gases that are then readily ignited by the embers present - this is referred to as piloted ignition;
- Heating a building component to the point that gases spontaneously ignite - this is referred to as auto-ignition or non-piloted ignition; and
- Rapid moisture loss from the surface of the material which significantly increases its ignitability and/or ability to support flame spread, leading to one of the above outcomes.

2.12 The larger and hotter the fire, the more likely it is that radiant heat from the fire will ignite a building in its path. Factors that reduce the severity of radiant heat

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22 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0029-0030
23 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0030
24 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0030-0031
25 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0031-0032
26 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0022
27 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0033
exposure are the distance between the fire and the building, and the presence of effective shielding between the fire and the building. Exposure is the distance between the fire and the building, and the presence of effective shielding between the fire and the building. The vulnerability of a building to ignition by radiant heat depends upon the design of the building and the materials used in its construction. A building may be sited and oriented so as to minimise its exposure to radiant heat. Glass in windows and doors is particularly vulnerable to radiant heat, with plain glass breaking at around 12 kWm².

Flame

2.13 Buildings may be ignited by direct flame contact from the main fire front, or by flames from other sources. Examples of the ways in which flames may ignite a building are:

- Ignition of fine debris accumulated against buildings which then burns against the building facade, or heats the facade element to the point at which the framing element behind the facade ignites;
- Flame front impact from the consumption of fine fuels as a bushfire front moves through vegetated areas, causing building facade ignition, flame entrainment into building cavities, breakage of window elements, and elements to break or burn; and
- Flame impact from adjacent elements to the building, typically timber decking, adjacent buildings, fencing, stored materials, motor vehicles, boats, rubbish bins, wood heaps etc.

2.14 Flame contact is a more short distance phenomenon than ember attack or radiant heat. Siting a building close to vegetation and up a slope increases the risk of direct flame contact from the main fire front. Buildings are also vulnerable to flames from fine fuels that grow or have accumulated close to a structure, and from heavier fuels such as wood piles, fences or decks next to the building.

2.15 The combustibility of external building elements is critical to a building’s vulnerability to ignition by direct flame contact.
Convective heat

2.16 Convective heat is a term for the effect that hot gases have on other objects. Hot ambient air from a bushfire may interact with elements of a building, predisposing it to ignition by another mechanism.\textsuperscript{37} For example:\textsuperscript{38}

- The heating and drying of building elements in the many hours of hot dry winds prior to the fire arrival;
- The scorching of forest canopy from lower level flame spread;
- The heating of building elements that are above or beside flames provided by other building elements, such as nearby combustible objects like decking, fencing, stored material, adjacent buildings etc. These are typically open floors, building facades, doors, windows, eaves and decking; and
- Heating and drying of timber elements by hot ambient winds and flame based convective heat causing shrinkage to the timber elements resulting in the expansion or creation of gaps in the building facade.

Wind

2.17 The strong winds that are a defining feature of extreme fire weather can cause significant damage on their own, as well as increasing the likelihood of a building being ignited by embers, radiant heat or direct flame.\textsuperscript{39} Wind can contribute to bushfire damage in the following ways:\textsuperscript{40}

- Dislodgment of critical building components which enclose combustible internal building component or furnishings;
- Air pressure difference between the inside and outside of the building that causes flame to be driven through small gaps in the building envelope;
- An increased rate at which moisture is lost from building components;
- Loss of wall components; and
- Loss of roof or roofing components.

2.18 The vulnerability of a building to wind damage is affected by its siting and by surrounding vegetation.\textsuperscript{41} A building on a hill will experience higher winds than a building on the flat, while buildings surrounded by forest will be less exposed to wind

\textsuperscript{37} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0026
\textsuperscript{38} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0026-0027
\textsuperscript{39} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0025
\textsuperscript{40} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0025
\textsuperscript{41} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0036
than buildings in a cleared area. The degree to which a building is designed and constructed to withstand high wind loads will also affect its vulnerability.

**Explosion**

2.19 A number of witnesses reported seeing buildings explode during the fires on 7 February 2009. These observations do not fit neatly with the accepted scientific understanding of the ways in which buildings ignite and burn in a bushfire. Asked to comment on whether buildings can explode during a bushfire, Mr Leonard said:

*During a bushfire, the local flame intensity and duration exposes a range of elements that have the potential to explode, such as gas bottles, paint tins, aerosol cans, etc. The explosion of these elements is sometimes mistakenly identified as a building explosion when in fact the building was already in an advanced stage of fire development.*

*It may be technically possible for a building to explode, however it must first be filled with combustible gases and later detonated, meaning that the building or an isolated region of the building would be untenable prior to the explosion. As yet survey teams have not identified clear evidence of a building that has exploded during the intense phase of bushfire exposure without first developing as a structural fire (Ramsay 1986, 1995).*

Apart from the possibility of the building filling with combustible gas from an unusual failure of gas supply infrastructure, CSIRO is not aware of any plausible theory being discussed by scientists that would explain how a building may explode during the passage of a fire front due to the fire effects that the main fire front imposes.

2.20 In discussion, Mr Leonard acknowledged that a lay person who observed a house being totally consumed by fire within minutes, with windows exploding from the inside and with flames erupting out of the windows, might describe that as an explosion. However, he distinguished such a rapid loss of the integrity of the building envelope from an explosion in the technical sense, because it did not involve a rapid build up of pressure inside the house. Researchers have investigated a number of instances in which houses were reported to have “just exploded”, and in each case have found that the house ignited some time before the actual explosion and

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42 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0036
43 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0036-0037
44 Exhibit 17 – Statement of Spooner (WIT.011.001.0001) [26]; Spooner T485:1-T485:21; Exhibit 224 – Statement of Cowdery (WIT.081.001.0001) [33]; Cowdery T6865:20-T6865:24; Barber T3351:20-T3351:29; Exhibit 357 – Statement of Malcolm (WIT.3004.017.0251) [44], [50]; Malcolm T8707:3-T8707:5
45 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0027
46 Leonard T5519:24-T5520:2
subsequently detonated some substance, such as fuel, gas or paint, that was inside the burning house.\textsuperscript{47} No studies have confirmed a case of a house exploding due to external exposure to a bushfire.\textsuperscript{48}

2.21 Many witnesses reported gas bottles venting or even exploding.\textsuperscript{49} One described a gas bottle outside the house venting into the house through the gas range in the kitchen, closely followed by an explosion outside the house caused by gas venting from the bottle.\textsuperscript{50} Mr Leonard confirmed that researchers had found evidence of “catastrophic rupture” of gas bottles, when dislocation of gas bottles had prevented the venting valve from working effectively.\textsuperscript{51} It seems likely that a number of observations of houses exploding are associated with the venting of gas bottles in or near those houses.\textsuperscript{52}

**Fire weather**

2.22 There is a clear relationship between the severity of fire weather conditions and building loss due to bushfires. A recent study by Blanchi et al found that most building losses occurred under very intense fire weather conditions, where the FFDI exceeded 100.\textsuperscript{53}

2.23 The reasons why this is so are readily understood. The FFDI is calculated by reference to wind speed, temperature, humidity and drought factor.\textsuperscript{54} Each of these factors influences the severity of a bushfire, as well as the vulnerability of buildings to ignition by the bushfire attack mechanisms discussed above.\textsuperscript{55} Hot, dry, windy weather dries out timber used in a building in the same way that it dries out the bush, and that timber is more easily ignited by, for example, a wind borne ember. As Mr Leonard observes.\textsuperscript{56}

\textsuperscript{47} Leonard T5520:25-T5521:16
\textsuperscript{48} Leonard T5521:17-T5521:27
\textsuperscript{49} Exhibit 103 – Statement of Barber (WIT.046.001.0001) at [30]; Barber T3351:29-T3351:31; Hull T1187:26-T1187:31; Exhibit 189 – Statement of Baruta (WIT.070.001.0001) [33]; Baruta T5988:15-T5988:17; Exhibit 73 – Statement of McCulloch (WIT.043.001.0001) [29]; McCulloch T2456:18-T2456:20
\textsuperscript{50} Exhibit 362 – Statement of Glenn (WIT.066.001.0001) [21], Glenn T8816:17-T8817:11
\textsuperscript{51} Leonard T5521:28-T5522:30
\textsuperscript{52} A conclusion supported by Dr Tolhurst: Tolhurst T1076:3-T1076:23.
\textsuperscript{53} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0038 and Figure 6, citing Blanchi R., Lucas C., Leonard J., Finkele K. (forthcoming), *Meteorological conditions and wildfire related house loss in Australia* (review International Journal of Wildland fire)
\textsuperscript{54} Exhibit 3 – Statement of Rees (WIT.004.001.0001) [237]
\textsuperscript{55} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0039-0040
\textsuperscript{56} Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0040
From an overall risk perspective, fire weather affects both the intensity of fire exposure to the building and the vulnerability of the building to these effects. It is no surprise then that building loss likelihood is a characteristic function of fire weather intensity.

**Building survival in the 2009 Victorian bushfires**

2.24 In the weeks after Black Saturday, the Bushfire CRC surveyed 1065 houses in the areas affected by the Bunyip, Churchill, Kilmore East, Maiden Gully (Bendigo) and Murrindindi fires.57 The field survey was complemented by remote sensing data of key fire affected regions.58 The preliminary findings of this survey are set out in Chapter 3 – Building and Land Use Planning of the CRC’s Interim Report.59 Justin Leonard, the lead author of this chapter, outlined the research team’s methodology and its preliminary findings in his evidence to the Commission.60

2.25 In relation to the impact of the different bushfire attack mechanisms on 7 February 2009, significant findings of the Bushfire CRC were:

(a) 13% of houses surveyed were damaged by both fire and wind; 24% by fire only, and 33% by fire with the effect of wind unknown.61

(b) 19% of houses surveyed were damaged by embers only, 33% by a combination of embers and radiant heat, 5% predominantly by radiant heat and 13% by flame contact from the bush. In comparison with the Eyre Peninsula 2005 fires and the Canberra 2003 fires, this represented a much lower proportion of houses damaged by embers only, and a higher proportion of houses damaged by direct flame contact.62

2.26 Characteristics of house design and material that were found to have had a significant impact on house performance were:

(a) brick structures performed significantly better than did cellulose cement, timber or mud brick structures;63

(b) there was a strong correlation between the observation of overhanging trees and house loss.64

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57 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0133
58 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0146-161
59 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R), Chapter 3 commencing at 0117
60 Leonard T5942.1-T5968.10
61 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0170-0172
62 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0173-0174
63 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0181-182
64 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0189-0192
(c) there was a strong correlation between house destruction and lack of active water defence, confirming previous findings as to the positive influence of human intervention on house survival;\(^{65}\)

(d) there was a higher rate of house survival where water supply was sourced on the property and was gravity fed, with accounts of failure of both mains water and water pumps;\(^{66}\)

(e) concrete water tanks performed best, followed by steel tanks, with both polyethylene and fibreglass tanks performing poorly;\(^{67}\) and

(f) the raw data revealed that a much lower proportion of houses with sprinkler systems fitted were destroyed, although the data does not identify whether the sprinklers were activated nor what other bushfire protection measures were in place.\(^{68}\)

2.27 Some findings of particular significance for the Commission’s consideration of land use planning are:

(a) 59% of all structures surveyed that were damaged or destroyed by fire were not in an area subject to a WMO,\(^ {69}\) indicating that the existence of a WMO was a poor predictor of vulnerability to bushfire risk;

(b) the distance between a structure and forest is a good indicator of the likelihood of damage by fire (although not the degree of damage), with a clear trend towards total loss as the distance approaches zero\(^ {70}\) - emphasising the importance of defendable space; and

(c) in the largest sample region, house loss occurred at distances of up to 150 metres from forest, with over 20% of house loss at more than 100 metres from forest\(^ {71}\) – suggesting a need to review the currently accepted 100 metre buffer between houses and vegetation.\(^ {72}\)

2.28 The Building Commission also conducted an analysis of the 2,131 houses destroyed by the Black Saturday fires. The Building Commission’s interim analysis found.\(^ {73}\)

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\(^{65}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0193-0194

\(^{66}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0194-0195

\(^{67}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0196

\(^{68}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0199

\(^{69}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0202-0203

\(^{70}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0204-0216

\(^{71}\) Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0209, 0217

\(^{72}\) A 1999 study by Ahern and Chladi found that 85% of house loss occurs within 100 metres of continuous vegetation: see Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0203

of the 2,131 houses destroyed, only 177 were required to be built to AS 3959-1991 – Construction of Buildings in Bushfire Prone Areas or AS 3959-1999 – Construction of Buildings in Bushfire Prone Areas;

(b) a further 53 houses were renovated in or after 1994, and may have been required to comply with AS 3959;

(c) 87% or 1,849 of the houses destroyed were not required to be built to any bushfire building standard.

These figures demonstrate the reality that regulation of building in bushfire prone areas only has prospective effect. A high proportion of houses subject to bushfire risk were built before there was any minimum requirement for bushfire protection measures in the construction of houses. This emphasises the importance of measures such as the installation of bunkers, bushfire sprinklers and retrofitting, as discussed below.74

2.29 The information gathered by the Building Commission thus far has not enabled it to form any conclusions about the effectiveness of AS 3959 in preventing the destruction of houses.75

2.30 There is evidence before the Commission of two other surveys of building survival after the Black Saturday fires. The first is the observations of a post fire audit conducted by the Latrobe City Council of houses destroyed by the Delburn and Churchill fires.76 Chris Watson, Latrobe’s Municipal Building Surveyor, summarised the main observations as follows:77

* shielding saved houses. Shielding such as concrete water tanks and European deciduous trees could provide sufficient shielding from the fire front and radiant heat so as to save houses from destruction;
* vegetation separation and clearance theories were contradicted in certain instances in the fire. There are examples where a house surrounded by vegetation survived the fire, whereas a new house with an excess of 90 metres of clearing was destroyed;
* outbuildings compromised house fire resistance;
* services and connections failed. Even pipes that were buried two feet underground melted;
* retaining walls burned and caused extreme hazards to houses;
* gas cylinders exploded;

74 Arnel T5221:1-T5221:23
75 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [276]-[279]
76 Exhibit 183 - Statement of Watson (WIT.4001.001.0001) [7]-[11], Annexure 2 (WIT.4001.001.0012); Watson T5802:9-T5803:18, T5811:23-T5824:9
77 Exhibit 183 - Statement of Watson (WIT.4001.001.0001) [10]
water tanks and fittings to tanks were destroyed;
- the safety barriers to swimming pools burned; and
- alloys and glass in buildings, infrastructure and appliances melted as fire temperature reached 1,500-2,000 C.

2.31 John Bennett, a resident of Kinglake West, conducted his own survey of 104 houses in Kinglake West, Pheasant Creek, Kinglake and Flowerdale. His key observations were: 

(a) 71% of brick houses surveyed were destroyed, as compared to 63% of houses made of other materials;
(b) houses which were defended by residents had a far greater chance of survival than those which were not defended; and
(c) the part of a house which most commonly caught fire first was the eaves.

2.32 All of these observations of building performance during the February 2009 bushfires adds to the current state of knowledge of how and why buildings ignite and burn in bushfires.

3 REGULATORY FRAMEWORK

3.1 As at 7 February 2009, building in bushfire prone areas of Victoria was regulated by:

(a) the Building Act 1993 (Vic) (the Act);
(b) the Building Regulations 2006 (Vic) (the Regulations);
(c) the Building Code of Australia (the BCA); and


The Act and Regulations

3.3 The Act regulates building work and building standards in Victoria. Building work, defined as “work for or in connection with the construction, demolition or removal of...

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78 Exhibit 200 – Statement of Bennett (WIT.078.001.0001) [27]-[38]; Bennett T6280:4 –T6284:27.
79 An observation that contradicts the finding in the Bushfire CRC interim report, that brick houses performed significantly better than others.
80 Building Act 1993 (Vic.), s. 1
a building”, is controlled by a system of building and occupancy permits issued by municipal or private building surveyors, in accordance with the Act and the Regulations. Building standards are established by regulations made under the Act, and may incorporate by reference the BCA or any other document.

3.4 The Act is administered by the Building Commission, which is responsible for monitoring and enforcing compliance with the Act and the Regulations, participating on behalf of Victoria in the development of national building standards, and monitoring developments relevant to the regulation of building standards in Victoria. The Building Commission is constituted by a Commissioner, currently Mr Tony Arnel.

3.5 In his witness statements to this Commission, Mr Arnel explained the various authorities established by the Act and their responsibilities within the Victorian regulatory framework, and the processes by which building permits are sought and issued and through which building work is controlled under the Act.

3.6 Regulation 109 of the Regulations adopts the BCA, as modified by Part 1 of the Regulations.

3.7 On 11 March 2009, the Interim Regulations inserted regulation 114 into Part 1 of the Regulations, which modifies the application of the BCA in relation to bushfire construction requirements. The effect of this amendment was to apply AS 3959-2009 in Victoria, before it was referenced nationally in the BCA from 1 May 2010. From 11 March 2009, AS 3959-2009 applies to all new building work on residential buildings in Victoria. As explained by Mr Arnel, the primary policy consideration underpinning the early adoption of AS 3959-2009 in Victoria was to expedite a more stringent set of bushfire construction requirements for new homes in Victoria, given the ferocity and devastating consequences of the bushfires on 7 February 2009.

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81 Building Act 1993 (Vic.), ss 1, 3, Parts 3 and 5; Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [11]-[14]
82 Building Act 1993 (Vic.), s. 7
83 Building Act 1993 (Vic.), s. 9; Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [15]
84 Building Act 1993 (Vic.), s. 196
85 Building Act 1993 (Vic.), s. 194
86 Exhibit 168 – Statement of Arnel (WIT.3000.002.0001); Exhibit 169 – Statement of Arnel (WIT.3000.002.0220)
87 Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [41]-[84]
88 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [159]-[172], [173]-[186]
89 Building Regulations 2006 (Vic.), reg. 109; Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [16]
90 Building Amendment (Bushfire Construction) Interim Regulations 2009 (Vic.), reg. 4; Building Regulations 2006 (Vic.), reg. 114
91 Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [148]-[149]
92 Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [151]
93 Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [142]
Another important consideration was the desirability of having those more stringent requirements in place for the rebuilding of the 2,000 houses destroyed by the fires.\textsuperscript{94}

3.8 Regulations for the designation of bushfire prone areas by councils were first introduced in Victoria in 1994.\textsuperscript{95} Designation of a bushfire prone area by a council has the effect that the bushfire provisions of the BCA apply to building work within the bushfire prone area.\textsuperscript{96}

3.9 As at 7 February 2009, the relevant provision was contained in Part 8 of the Regulations, which makes provision for building work in various designated special areas.\textsuperscript{97} Until 11 March 2009, councils could designate bushfire prone areas under regulation 804 of the Regulations, which was in the following terms:

\begin{enumerate}
\item For the purposes of these Regulations, a council, after consultation with the chief officer, may determine that areas within its municipal district are designated bushfire prone areas.
\item If a building is to be constructed in a designated bushfire prone area and—
\begin{enumerate}
\item a planning permit is required for the construction of the building; and
\item a site assessment for the purpose of determining bushfire risk to the building has been considered as part of the application for the planning permit—
\end{enumerate}
the relevant building surveyor may accept that site assessment for the purpose of determining the construction requirements that are applicable to the building due to the building being in a designated bushfire prone area.
\end{enumerate}

3.10 Councils are obliged to prepare maps for all designated special areas, including, until 11 March 2009, designated bushfire prone areas, and to provide these maps to the Building Commission.\textsuperscript{98}

\textsuperscript{94} Arnel T5185:11
\textsuperscript{95} Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [100], Annexure A (WIT.3000.002.0052)
\textsuperscript{96} Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [96], [99]; Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [269]
\textsuperscript{97} Other special designated areas under Part 8 of the \textit{Building Regulations 2006} (Vic.) are flood areas (reg. 802), termite risk areas (reg. 803) and alpine areas (reg. 805)
\textsuperscript{98} \textit{Building Regulations 2006} (Vic.), reg. 807
3.11 On 11 March 2009 the Interim Regulations revoked regulation 804 and, in effect, designated the whole of Victoria to be a bushfire prone area.\textsuperscript{99} This is an interim arrangement that applies for 12 months.\textsuperscript{100} The policy considerations underlying this arrangement are discussed at paragraph 5.2 below.

3.12 Further interim regulations were made on 1 September 2009, prescribing requirements for water supply for fire-fighting purposes and access for emergency vehicles for the construction of houses destroyed in the February 2009 bushfires.\textsuperscript{101} These regulations filled a gap left by the suspension of the requirement to obtain a planning permit to rebuild a house destroyed on a site covered by a Wildfire Management Overlay, in Amendment VC54 to the Victoria Planning Provisions.\textsuperscript{102} This amendment had the possibly unintended effect that those houses could be rebuilt without the standard requirements for a firefighting water supply and emergency vehicle access – a situation rectified by the further interim regulations.\textsuperscript{103}

\textit{The Building Code of Australia}

3.13 The BCA is “a uniform set of technical provisions for the design and construction of all new buildings, other structures and new building work throughout Australia, whilst allowing for variations in climate and geological or geographical conditions.”\textsuperscript{104} The maintenance and development of the BCA is the responsibility of the Australian Building Codes Board (ABCB).\textsuperscript{105} The General Manager of the ABCB, Mr Ivan Donaldson, described in his statement and evidence to the Commission the establishment, structure and role of the ABCB and the BCA within the Australian building regulatory framework.\textsuperscript{106}

3.14 The ABCB is a body established by agreement between the Commonwealth, State and Territory Governments.\textsuperscript{107} The most recent Intergovernmental Agreement (the IGA) was signed in 2006.\textsuperscript{108} The ABCB comprises representatives of the eight State and Territory Governments, the Commonwealth Government and the Australian Local Government Association, with four industry representatives and an independent Chairperson.\textsuperscript{109} The Building Commissioner, Mr Arnel, represents Victoria on the

\footnotesize{\textsuperscript{99} Building Amendment (Bushfire Construction) Interim Regulations 2009 (Vic.), regulations 4, 6 and 7  
\textsuperscript{100} Building Amendment (Bushfire Construction) Interim Regulations 2009 (Vic.), regulations 3(2) and 9  
\textsuperscript{101} Building Amendment (Bushfire Construction) Further Interim Regulations 2009 (Vic)  
\textsuperscript{102} Exhibit 164 – Victoria Planning Provisions Amendment VC54 (TEN.061.001.0010)  
\textsuperscript{103} Andreou T6418:16-T6418:26  
\textsuperscript{104} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [25]  
\textsuperscript{105} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [15]  
\textsuperscript{106} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001); Donaldson T5581:3-T5637:7  
\textsuperscript{107} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [7]  
\textsuperscript{108} Exhibit 177 – Statement of Donaldson, Annexure 4 (WIT.6001.002.0229)  
\textsuperscript{109} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [17]; Annexure 7 (WIT.6001.002.0365)
ABCB.\textsuperscript{110} It reports to the Building Ministers Forum, a forum of Commonwealth, State and Territory Ministers responsible for building regulation.\textsuperscript{111}

3.15 The BCA itself is a “performance based” code, which sets out the performance requirements that buildings in Australia must attain, and ways in which those performance requirements may be met\textsuperscript{112}. The performance based BCA has a hierarchy, starting with an Objective, underpinned by Functional Statements, Performance Requirements and Building Solutions.\textsuperscript{113} Two types of Building Solutions meet the Performance Requirements:\textsuperscript{114}

(a) Deemed-to-Satisfy or DTS Provisions – detailed technical descriptions of how the building is to be constructed and equipped; or
(b) Alternative Solutions – a specially designed solution that can be demonstrated to meet the Performance Requirements.\textsuperscript{115}

3.16 The BCA is given effect by legislation in each State and Territory.\textsuperscript{116} In Victoria, the BCA is “called up” by regulation 109 of the Regulations. The BCA is amended annually, in about February or March, and in most cases the revised BCA is automatically adopted by the legislation in each jurisdiction on 1 May of each year.\textsuperscript{117}

3.17 The BCA classifies buildings into various classes, which in general terms are as follows:\textsuperscript{118}

(a) Class 1a – a house;
(b) Class 1b – a small boarding house, guest house, hostel etc;
(c) Class 2 – an apartment building or block of flats;
(d) Class 3 – a hotel, motel or other residential building in which numbers of unrelated persons are accommodated, such as the residential part of a school, aged care facility or prison;
(e) Class 4 – a single dwelling (such as a caretaker’s flat) in a Class 5, 6, 7, 8, or 9 building;
(f) Class 5 – an office or other commercial building;

\textsuperscript{110} Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [1]; Arnel TS170:30-TS171:4
\textsuperscript{111} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [8]-[9]. A helpful diagram of the ABCB’s governance model is at [12]
\textsuperscript{112} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [26]
\textsuperscript{113} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [27]. A helpful diagram of the hierarchy of Guidance Levels and Compliance Levels is at [28]
\textsuperscript{114} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [27]
\textsuperscript{115} The methods which can be applied to develop an alternative solution are described at [30] in Mr Donaldson’s statement (WIT.6001.002.0001)
\textsuperscript{116} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [32]
\textsuperscript{117} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [33]
\textsuperscript{118} Exhibit 179 – Statement Harding, Attachment 1 (WIT.7503.001.0025); Arnel TS165:20-TS166:29
(g) Class 6 – a shop, restaurant or showroom;
(h) Class 7 – a carpark or a warehouse;
(i) Class 8 – a factory or other industrial building;
(j) Class 9a – a health care building;
(k) Class 9b – an assembly building, including a school or a hospital;
(l) Class 9c – an aged care building;
(m) Class 10a – a shed, garage, etc; and
(n) Class 10b – a structure such as a fence or swimming pool.

3.18 The BCA is produced in two volumes. Volume One applies to Class 2 to 9 buildings, and Volume Two applies to Class 1 and 10 buildings.  

3.19 The BCA makes specific provision for the construction of buildings in bushfire prone areas. In the 2009 edition of the BCA, the relevant provisions are set out in Volume One in parts A1.1 and G5, and in Volume Two in parts 1.1.1, O2.3, F2.3.4, P2.3.4 and Part 3.7.4. Focussing on Volume Two, which applies to houses, the relevant provisions are as follows:

(a) In part 1.1.1, “designated bushfire prone area” is defined to mean “land which has been designated under a power in legislation as being subject, or likely to be subject, to bushfires”;  
(b) In Part 2.3 – Fire Safety Objective O2.3 is:

The Objective is to –

(a) safeguard the occupants from illness or injury –

(i) by alerting them of a fire in the building so that they may safely evacuate; and
(ii) caused by fire from heating appliances installed within the building; and
(iii) in alpine areas, from an emergency while evacuating the building; and

(b) avoid the spread of fire; and

(c) protect a building from the effects of a bushfire.

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119 Exhibit 177 – Statement of Donaldson, Annexure 12 (WIT.6001.002.0416) (annexure provided in web based form with limited access).
120 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [38], Annexure 16 (WIT.6001.002.0455)
(c) In Part F.2.3.4 – Bushfire areas, the Functional Statement is:

A Class 1 building constructed in a designated bushfire prone area is to provide resistance to bushfires in order to reduce the danger to life and reduce the risk of the loss of the building.

(d) In Part P.2.3.4 – Bushfire areas, the Performance Requirement is:

A Class 1 building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.

(e) In Part 3.7.4 – Bushfire Areas, clause 3.7.4.0 provides:

Performance Requirement P.2.3.4 is satisfied for a Class 1 building located in a designated bushfire prone area if it is constructed in accordance with AS 3959 – Construction of buildings in bushfire prone areas.

Mr Donaldson provided the Commission with a helpful diagrammatic representation of these provisions.\textsuperscript{121}

3.20 Similar provisions are found in Volume One of the BCA, in relation to Class 2 and 3 buildings.\textsuperscript{122} The BCA does not at present contain specific requirements for the construction of Class 4 to 10 buildings in designated bushfire prone areas.

3.21 AS 3959 is prescribed by the BCA as the deemed-to-satisfy solution for construction of Class 1, 2 and 3 buildings – that is, houses, apartments and other residential buildings – in designated bushfire prone areas. This referencing of AS 3959 as the deemed-to-satisfy solution is highly significant, because most domestic construction is done in accordance with a deemed-to-satisfy solution rather than an alternative solution.\textsuperscript{123} While alternative solutions that comply with the performance requirement for bushfire areas are always possible, these are not the norm in domestic construction. The development and content of AS 3959 is discussed in detail below.

3.22 It is for the purposes of these provisions of the BCA that the Regulations make provision for the designation of bushfire prone areas in Victoria. The provisions of the BCA in relation to bushfire areas only apply to buildings constructed in a designated bushfire prone area, namely land designated pursuant to legislation to be subject, or likely to be subject, to bushfires.

\textsuperscript{121} Exhibit 177 – Statement of Donaldson, Annexure 13 (WIT.6001.002.0417)
\textsuperscript{122} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [38], Annexure 16 (WIT.6001.002.0455)
\textsuperscript{123} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [27]; McLennan T5697:30-T5698:14
3.23 While the BCA is given legal effect by the Regulations, and by equivalent legislation in other jurisdictions, it is not freely available. Access to the BCA is available online and in hard copy, at a cost.\textsuperscript{124} About two-thirds of the ABCB’s operating budget is funded by sales of the BCA.\textsuperscript{125} Although successive reviews of the ABCB have recommended that the ABCB be funded to a sufficient level to enable a minimum level of free access to the BCA, including free on-line access, the Australian Governments have not revised the ABCB’s funding model.\textsuperscript{126}

3.24 The BCA is a national code and the IGA commits the States and Territories to achieving national consistency in building regulations. However, the IGA acknowledges that States and Territories may vary the application of the BCA within a given jurisdiction because of geographical, geological or climatic factors in that jurisdiction.\textsuperscript{127} As at 7 February 2009, two States – New South Wales and South Australia – had varied the application of the bushfire provisions of the BCA.\textsuperscript{128} Since 7 February 2009, Victoria has put in place some interim measures that vary the application of the BCA.\textsuperscript{129}

3.25 New South Wales has varied the application of the bushfire provisions of the BCA in two important ways.\textsuperscript{130} First, it adopted a more rigorous threat analysis methodology than that contained in AS 3959-1999, referenced in the 2008 version of the BCA. In New South Wales, the category of bushfire attack for a site must be determined in accordance with Appendix 3 of Planning for Bushfire Protection 2006.\textsuperscript{131} This site assessment methodology is similar to that ultimately included in AS 3959-2009, with two critical differences:\textsuperscript{132}

(a) any site for which the likely radiant heat level is assessed at more than 29 kW/m\textsuperscript{2} is in the Flame Zone category;\textsuperscript{133}

\textsuperscript{124} Donaldson T5594:4-T5594:31. The ABCB also supplies copies of the BCA to local councils and to public libraries at no cost.

\textsuperscript{125} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [14]; Donaldson T5586:14-T5587:17

\textsuperscript{126} Exhibit 161 - Reform of Building Regulation, Productivity Commission Research Report, 17 November (TEN.062.001.0001); Exhibit 177 – Statement of Donaldson, Annexure 5 (WIT.6001.002.0250), Annexure 6 (WIT.6001.002.0353); Donaldson T5595:1-T5596:14

\textsuperscript{127} Exhibit 177 – Statement of Donaldson, Annexure 4 (WIT.6001.002.0229) at 0233-0234, Recital C

\textsuperscript{128} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [43]-[47] (NSW) and [48]-[50] (SA), Annexure 16 (WIT.6001.002.455) at 0465-0468.

\textsuperscript{129} These are discussed at paragraph 3.7 above.

\textsuperscript{130} Exhibit 177 – Statement of Ivan Donaldson (WIT.6001.002.0001) [43]-[47]; Exhibit 167 – BRC Research - Building and Planning in Bushfire Prone Areas - Regulation and Policy in Other States and Territories (TEN.065.001.0001) at 0030-0031, Appendix One (TEN.065.001.0038) at 0050-0060

\textsuperscript{131} Exhibit 167 – Planning for Bush Fire Protection 2006, Appendix 3 (TEN.063.001.0112) at 0114

\textsuperscript{132} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [44]; Orr T5914:10-T5916:3

\textsuperscript{133} As distinct from the 40 kW/m2 threshold found in AS 3959-2009
(b) there are no deemed-to-satisfy construction solutions in the Flame Zone and construction in the Flame Zone can only proceed on the basis of a satisfactory performance based assessment of the proposed building.

3.26 A further variation in New South Wales is the prescription of bushfire construction standards for certain Class 4 and Class 9 buildings, known as “special fire protection purpose buildings” such as schools, child care centres, hospitals and retirement villages. Special fire protection purpose buildings are those in which occupants may be more vulnerable to bushfire attack for reasons of age, illness or infirmity and present organisational difficulties for evacuation and management. As stated above, at present the BCA does not prescribe construction standards for these types of buildings in bushfire prone areas.

3.27 South Australia has also varied its application of the bushfire provisions of the BCA. In relation to the assessment of categories of bushfire attack for a site, South Australia prescribes the medium bushfire attack category for areas identified as medium bushfire risk areas in South Australian Development Plans, and applies the site assessment methodology in AS 3959-1999 to areas identified as high bushfire risk areas. This has the effect of prescribing a minimum construction level for all sites in medium bushfire risk areas. South Australia has also prescribed some construction requirements for flooring systems, external walls and roofing systems for medium, high and extreme bushfire attack categories, in addition to those prescribed in AS 3959-1999.

3.28 Before moving to AS 3959, there is one aspect of the BCA’s bushfire provisions that sits uneasily with the learning about how and why buildings ignite and burn in bushfires. The relevant performance requirement is that a building constructed in a designated bushfire prone area must be “designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.” This performance requirement makes no reference to the evidence that most houses are lost in bushfires due to ember attack, which occurs before the arrival of the fire front, and during and after its passage, and may affect areas not reached by the main fire front. As has previously been submitted, the single most important set of measures that can be taken to prevent a house from igniting due to a bushfire are those designed to prevent ignition

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134 Defined in full in Rural Fires Act 1997 (NSW), s 1008
135 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [45]; Orr T5915:18-T5916:27
136 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [45]
137 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [48]-[50]; Annexure 16 (WIT.6001.002.0455) at 0465-0468; Exhibit 167 – BRC Research - Building and Planning in Bushfire Prone Areas - Regulation and Policy in Other States and Territories (TEN.065.001.0001) at 0031, Appendix Four (TEN.065.001.0080) at 0089-0090
138 The mapping of bushfire risk areas in South Australia is discussed at paragraph 5.12 below
139 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [51]
140 See paragraphs 2.2, 2.7 and 2.8 above
by embers.\textsuperscript{141} While the resistance of buildings to radiant heat and direct flame contact is of great importance in the areas of highest risk, resistance to ignition by embers is critical to the survival of all buildings in bushfire prone areas. The relevant performance requirements in the BCA should be amended to include resistance to ember attack.

**Proposed recommendation 1:** The ABCB amend the Performance Requirement in Part G5 of Volumes One and Two of the BCA to read “A building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes and from ember attack.”

**AS 3959**

3.29 The BCA references AS 3959 as the deemed to satisfy solution for construction of Class 1, 2 and 3 buildings in designated bushfire prone areas. It is in AS 3959 that the technical requirements for construction in bushfire prone areas are to be found.

3.30 AS 3959 is a technical standard developed by Standards Australia, one of many such standards referenced in the BCA,\textsuperscript{142} and one of the approximately 7,000 standards developed by Standards Australia.\textsuperscript{143}

3.31 Standards Australia is a not-for-profit public company limited by guarantee, with its own constitution.\textsuperscript{144} The history and organisation of Standards Australia was described in detail in the statement of its Chief Executive Officer, John Tucker.\textsuperscript{145} The principal activity of Standards Australia is the preparation and maintenance of standards at national and international levels, and promoting the general adoption of standards.\textsuperscript{146} Its members include Commonwealth and State Government departments and statutory bodies, professional, trade and industry associations, consumer organisations, trade unions, research organisations and educational institutions.\textsuperscript{147}

3.32 While Standards Australia is separate from and independent of government, it is recognised by the Commonwealth Government as the peak non-government

\textsuperscript{141} Building in Bushfire Prone Areas – Interim Recommendations – Submissions of Counsel Assisting (SUBM.200.001.0001) [42]

\textsuperscript{142} Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [31]; Exhibit 177 – Statement of Donaldson, Annexure 12 (WIT.6001.002.0416) (annexure provided in web based form with limited access), Volume Two Part 1.4 pp. 39-48 (sets out a table of referenced standards in the BCA)

\textsuperscript{143} Tucker T5303:14-T5303:22

\textsuperscript{144} Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [7]-[8], Exhibit JDT-2 (WIT.7501.001.0031)

\textsuperscript{145} Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [5]-[12], [15]-[41]

\textsuperscript{146} Exhibit 171 - Statement of, Exhibit JDT-2 (WIT.7501.001.0031) at 0036

\textsuperscript{147} Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [9], Exhibit JDT-4 (WIT.7501.001.0080)
standards body in Australia, through a memorandum of understanding with the Commonwealth.\textsuperscript{148} It has also had a series of memoranda of understanding with the ABCB, most recently in 2005.\textsuperscript{149} The 2005 memorandum of understanding between Standards Australia and the ABCB described the role of Australian Standards in the BCA as follows:\textsuperscript{150}

The BCA references some Australian Standards in full or in part and legislative status in the building regulatory field is only given to the full Australian Standards or those parts of Australian Standards which are referenced in the BCA. The ABCB will not reference any standard or part of a standard in the BCA which does not fully accord with the ABCB's Protocol for the Development of BCA Referenced Documents. Primary, referenced standards will be drafted in accordance with the consensus process of SA with the addition of the special milestone review needs in Clause 4. Such a process meets the needs of the ABCB publication, Protocol for the Development of BCA Referenced Documents.

Australian Standards are prepared to have clearly identifiable outcomes and, wherever possible, contain quantitative performance based criteria that specify outcomes rather than inputs or other prescriptive requirements. Australian Standards can also contain detailed technical specifications that offer "deemed to satisfy" solutions to the quantitative performance based criteria.

3.33 The 2005 memorandum of understanding between Standards Australia and the ABCB lapsed in 2008.\textsuperscript{151} Shortly after that, Standards Australia adopted a new business model with far reaching consequences for its standards development work and its relationship with the ABCB.\textsuperscript{152} Mr Donaldson told the Commission that the ABCB’s administration was “actively engaged in working through the new operating environment with Standards Australia at the moment.”\textsuperscript{153} Although there is no memorandum of understanding currently in place, Standards Australia and the ABCB have an ongoing relationship which is likely to be formalised again in the future.\textsuperscript{154}

3.34 Standards are developed by Standards Australia in accordance with its Standardization Guide, extracts of which were attached to Mr Tucker’s statement. Standardization

\textsuperscript{148} Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [8], Exhibit JDT-5 (WIT.7501.001.0083)
\textsuperscript{149} Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [42], Exhibit JDT-31 (WIT.7501.002.0101), Exhibit JDT-32 (WIT.7501.002.0109) and Exhibit JDT-33 (WIT.7501.002.0117)
\textsuperscript{150} Exhibit 171 – Statement of Tucker, Exhibit JDT-33 (WIT.7501.002.0117) at 0119
\textsuperscript{151} Donaldson T5590:17-T5590:23
\textsuperscript{152} Discussed in paragraph 3.43 below
\textsuperscript{153} Donaldson T5590:28-T5591:28
\textsuperscript{154} Donaldson T5590:24-T5592:18
Guide SG-001 – Preparing Standards, explains the principles of transparency and consensus that underpin the development of standards by Standards Australia:  

There are two key processes, transparency and consensus, that provide standards their authority and widespread acceptance. Consensus is usually taken to mean general agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests, arrived at by a process that takes into account the views of all parties concerned while reconciling any conflicting arguments. The other key Standards preparation process is known transparency. This means that notification and all information on current work programs and proposals is available to all interested parties. Transparency also includes the concepts of openness, participation on a non-discriminatory basis, and impartiality.

3.35 The process by which standards are developed by Standards Australia, and the structure within which that occurs, are set out in Standardization Guide SG-001 – Preparing Standards. The content of a standard is the responsibility of a technical committee, which in the case of AS 3959 is Technical Committee FP-020. Members of technical committees participate on a voluntary basis. The annual value of their in kind contribution to the activities of Standards Australia has been estimated at $80 million.  

3.36 The members of technical committees are selected by Standards Australia to ensure balanced participation by those interests that will be significantly affected by the standard. The membership of FP-020 from time to time is set out in the statement of Barry Eadie, its Chair since 2001. In 2009, the committee comprised representatives of AFAC, the ABCB, the Australian Institute of Architects, the Australian Institute of Building Surveyors, the Australian Steel Institute, the Australian Window Association, CSIRO, Engineers Australia, Fire Protection Association Australia, Housing Industry Association, Master Builders Australia, Plastics and Chemicals Industries Association, Property Council Australia, Think Brick Australia, Timber Preservers Association of Australia, Wood Council Australia and Bodycote Warringtonfire (testing interests). An examination of the evolution of FP-020’s constitution since 1991 reveals two significant changes: first, a wider range of industry interests is represented on the committee than was the case in 1991 and 1999; second, fire agencies are not represented directly on the committee, but are represented solely through AFAC.

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155 Exhibit 171 – Statement of Tucker, Exhibit JDT-15 (WIT.7501.001.0112)
156 Tucker T5282:6-T5282:10
157 Exhibit 171 – Statement of Tucker, Exhibit JDT-15 (WIT.7501.001.0112) at 0115-0116, clause 6; Tucker T5273.28-T5274.23; Eadie T5370:5-T5371:5
158 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [23]-[24], [31], [45], [134]
159 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [134]
160 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [23]-[24], [31], [45], [134]; Eadie T5369:27-T5370:4
3.37 Technical committees develop standards under the oversight of the Standards Development Committee, which makes the ultimate decision to publish a standard. The Standards Development Committee also has a responsibility to arbitrate where consensus cannot be achieved by a technical committee because of sustained objection by a major sector.161

3.38 The principle of consensus is central to the standards development process. It involves stakeholders coming together, expressing their views and their differences, and seeking to find a workable agreement that they are committed to implement.162 It is from consensus that standards developed by a non-government body such as Standards Australia derive their authority.163

3.39 Consensus is given practical content in Standardization Guide SG-001 – Preparing Standards, in clause 7.4.164

Prior to the publication of a document as a Standard, the responsible technical committee, through a formal ballot of committee members, is required to approve the content of the Standard. As part of their responsibilities in accepting a position on the committee, committee members are obliged to submit votes at the ballot stage on behalf of their nominating organization, either in the affirmative or in the negative. All negative votes are required to be accompanied by technical reasons for the vote. Only when consensus has been achieved can the document proceed to become a Standard.

Where a committee member casts a negative vote, the committee is obliged to give thorough consideration to the reasons for the negative vote and to attempt to find a resolution that is acceptable to the committee as a whole. Note that committee members are voting on behalf of their nominating organization and not acting as individuals.

Consensus is achieved when the majority of interests involved with the subject of the Standard have collectively accepted the content of the document and have voted affirmatively.

Consensus has been achieved if:

- A minimum 67% of those eligible to vote have voted affirmatively, and

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161 Exhibit 171 – Statement of Tucker, Exhibit JDT-15 (WIT.7501.001.0112) at 0115-0116, clause 6; Tucker T5271:30-T5272:11
162 Tucker T5271:4-T5271:12, T5272:26-T5272:29
163 Tucker T5272:16-T5272:29
164 Exhibit 171 – Statement of Tucker, Exhibit JDT-15 (WIT.7501.001.0112) at 0120-0121; Tucker T5271:13-T5271:29
• A minimum 80% of votes received are affirmative, and
• No major interest involved with the subject of the Standard has collectively maintained a negative vote.

While a unanimous affirmative vote is a desirable outcome, consensus can be deemed to have been achieved by use of this formula where there are one or more outstanding negative votes that do not represent sustained objection by a major sector.

3.40 While consensus based standards development has definite advantages for the legitimacy and implementation of the resulting standards, it is a process that cannot guarantee an outcome within a given timeframe.\(^\text{165}\) As discussed in the following section of these submissions, the review of AS 3959-1999 by FP-020 took an inordinately long time. It commenced in 2001 and was only brought to a conclusion in the aftermath of the Black Saturday fires.

3.41 In its 2006 Review of Standard Setting and Laboratory Accreditation (2006 review), the Productivity Commission undertook a thorough review of the Commonwealth Government’s relationship with Standards Australia.\(^\text{166}\) It made a number of recommendations for improvements in the standards development process, including, at recommendation 8.6:\(^\text{167}\)

Standards Australia should continue to improve the efficiency and timeliness of standards development, including by:

• making greater use of independent experts to prepare early drafts of Australian Standards;
• reducing face-to-face meetings, including through better use of technology;
• increasing use of partnering arrangements; and
• improving project management.

This and many of the other recommendations made by the Productivity Commission in 2006 appear in the current memorandum of understanding between Standards Australian and the Commonwealth.\(^\text{168}\)

3.42 Another issue canvassed in the Productivity Commission’s 2006 review was that of free or low-cost access to Australian Standards made mandatory by regulation.\(^\text{169}\) The Productivity Commission recommended that the Australian Government and other

\(^\text{165}\) Tucker T5272:30-T5272:27
\(^\text{166}\) Exhibit 171 – Statement of Tucker, Exhibit JDT-26 (WIT.7501.002.0038)
\(^\text{167}\) Exhibit 171 – Statement of Tucker, Exhibit JDT-26 (WIT.7501.002.0038) at 0072
\(^\text{168}\) Exhibit 171 – Statement of Tucker, Exhibit JDT-26 (WIT.7501.002.0038) at 0089
\(^\text{169}\) Exhibit 171 – Statement of Tucker, Exhibit JDT-26 (WIT.7501.002.0038) at 0071, Recommendation 7.3
governments should fund free or low-cost access to such standards. Standards Australia owns the copyright in standards it develops. At present that copyright is the subject of an exclusive licence given to Standards Australia’s publisher, SAI Global Ltd, under a 15 year publishing and licensing agreement between the two companies. Standards Australia receives royalties under the agreement but otherwise has no input into the pricing or sale of standards published by SAI Global Ltd. Like most Australian Standards, AS 3959 is available from SAI Global Ltd at a cost. The cost of access to this standard is of concern, with evidence before the Commission that the cost of access has an adverse impact on compliance.

3.43 Standards Australia adopted a new business model in October 2008. The new business model involves improved efficiencies and greater project management of standards development. It also offers a choice of development pathways, ranging from development drive at committee level, to development in collaboration with stakeholders, to development driven and resourced by Standards Australia. The development of AS 3959 has to date proceeded under the Standards Australia Driven Pathway. Mr Tucker told the Commission that revision of AS 3959 as contemplated in the preface to the 2009 edition will continue to occur on the Standards Australia Driven Pathway. This pathway is, however, being phased out and future development and revision of AS 3959 is likely to occur under the Collaborative Pathway, which would involve stakeholders (such as the ABCB) and Standards Australia jointly driving and resourcing the project through a negotiated sharing of responsibility.

3.44 These submissions have set out in some detail the complex regulatory framework that applies to building in bushfire prone areas. In part this is done to demonstrate that development of the technical content of the construction requirements for buildings in bushfire prone areas was largely left to a technical committee of a non-government organisation, comprised of volunteers, working within a consensus decision making model that did not require them to complete their review within a given timeframe. As will be seen in the next section of the submissions, this framework did not deliver timely regulation of the construction of buildings in bushfire prone areas.

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170 Tucker TS289:16-TS290:25
171 Tucker TS290:26-TS291:23
172 Exhibit 180 - Statement of McLennan (WIT.068.001.0001) [59]-[67].
173 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [31], Exhibit JDT-27 (WIT.7501.002.0078), Exhibit JDT-28 (WIT.7501.002.0082)
174 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [32]
175 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [33]
176 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [34]
177 Tucker TS358:13-TS358:27
178 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [33], [35]
4 AS 3959 - CONSTRUCTION OF BUILDINGS IN BUSHFIRE PRONE AREAS

4.1 AS 3959 was first published by Standards Australia in 1991.\(^{179}\) AS 3959-1991 set out a single, prescriptive set of construction requirements for improving the performance of buildings subject to ember attack. It did not contain a site assessment methodology and did not address other bushfire attack mechanisms such as radiant heat and direct flame contact. The emphasis on ember attack in AS 3959-1991 was guided by the research that indicated that approximately 90% of building loss or damage in bushfires was caused by ember attack.\(^{180}\)

4.2 AS 3959-1991 came into effect in Victoria in June 1992, but was not able to be applied until after July 1994, when regulations for the designation of bushfire prone areas by councils were first enacted.\(^{181}\) This early edition of AS 3959 was not widely accepted by the building industry.\(^{182}\)

4.3 In 1994 the technical committee met again to commence revising AS 3959, at the request of the ABCB and due to demand for a revised standard.\(^{183}\) A new edition of AS-3959 was published in December 1999.\(^{184}\)

4.4 Unlike the 1991 edition, AS 3959-1999 contained a site assessment methodology for determining the category of bushfire attack for a site.\(^{185}\) AS 3959-1999 originally contained three categories of bushfire attack: low, medium and high.\(^{186}\) A further category of extreme was included by an amendment in December 2000.\(^{187}\)

4.5 AS 3959-1999, as amended in 2000, contained three levels of construction requirements corresponding to the levels of bushfire attack. No construction requirements were prescribed for the “low” category, on that basis that no such requirements were warranted. The correspondence of bushfire attack category and

\(^{179}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [22]-[24], Exhibit BFE-2 (WIT.7502.001.0038)

\(^{180}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [25]-[28]

\(^{181}\) Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [269]

\(^{182}\) Exhibit 179 – Statement Harding (WIT.7503.001.0001) [46]

\(^{183}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [30]. At that time the technical committee was known as BD/64, Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [22], [30]

\(^{184}\) Exhibit 172 – Statement of Eadie, Exhibit BFE-3 (WIT.7502.001.0053)

\(^{185}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [33], Exhibit BFE-3 (WIT.7502.001.0053) at 0061-0063.

\(^{186}\) Mr Eadie provided a detailed comparison of AS 3959-1991 and AS 3959-1999: Exhibit BFE-13 (WIT.7502.001.0261)

\(^{187}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [37], Exhibit BFE-4 (WIT.7502.001.0090). A second amendment in June 2001 inserted a definition of fire retardant timber: Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [38], Exhibit BFE-5 (WIT.7502.001.0095)
Construction level is set out in the table below.\(^{188}\)

<table>
<thead>
<tr>
<th>Category of bushfire attack</th>
<th>Levels of construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>Medium</td>
<td>Level 1</td>
</tr>
<tr>
<td>High</td>
<td>Level 2</td>
</tr>
<tr>
<td>Extreme</td>
<td>Level 3</td>
</tr>
</tbody>
</table>

Construction requirements in each level were prescribed for flooring systems, sub-floor supports, external walls, windows, external doors, vents and weepholes, roofs, eaves, fascias, gutters and downpipes, verandahs and decks, and service pipes.\(^{189}\)

4.6 Both the site assessment methodology and the construction requirements in AS 3959-1999 addressed the three principal bushfire attack mechanisms: burning debris (ember attack), radiant heat and flame.\(^{190}\)

4.7 The introduction of the “extreme” category of bushfire attack in 2000 was a significant development, and a precursor to the main point of disagreement among members of FP-020 about the publication of AS 3959-2009. As originally published, AS 3959-1999 stated that extreme levels of bushfire attack were outside the scope of the standard, and that there were therefore no corresponding construction requirements.\(^{191}\) A note advised:\(^{192}\)

> Where the category of bushfire attack is extreme, specific design and construction requirements should be provided to meet the performance requirements of the BCA.

The 2000 amendment extended the scope of the standard to the “extreme” category of bushfire attack, and prescribed a deemed-to-satisfy solution for construction on a site assessed as “extreme”.\(^{193}\)

\(^{188}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [35]-[37]
\(^{189}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [33], Exhibit BFE-3 (WIT.7502.001.0053) at 0064-0076
\(^{190}\) Exhibit 172 – Statement of Eadie, Exhibit BFE-3 (WIT.7502.001.0053) at 0060, clause 1.5.2, and 0064, clause 3.2
\(^{191}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [33], Exhibit BFE-3 (WIT.7502.001.0053) at 0061, clause 2.1
\(^{192}\) Exhibit 172 – Statement of Eadie, Exhibit BFE-3 (WIT.7502.001.0053) at 0061, clause 2.1, Note 1
\(^{193}\) Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [37], Exhibit BFE-4 (WIT.7502.001.0090)
Revision of AS 3959-1999

4.8 FP-020 commenced a full revision of AS 3959-1999 in late 2001. Barry Eadie was appointed as Chair of FP-020 in September 2001. In his statement to the Commission, Mr Eadie set out in detail the deliberations of FP-020 from the time of his appointment until April 2009.

4.9 The revision of AS 3959-1999 was given some urgency by the Canberra bushfires in January 2003. Mr Donaldson of the ABCB attended a meeting of FP-020 in February 2003, to advise the committee that the ABCB expected an early resolution of the revision of AS 3959.

4.10 In March 2003 Standards Australia issued a public consultation draft of a revised AS 3959. The ABCB commissioned a preliminary impact assessment of the draft, which was completed in April 2003, and concluded that it had a higher net benefit than did the existing edition. At that time the ABCB anticipated that a new edition of AS 3959 would be published in September 2003.

4.11 Over 490 comments were received on the public comment draft. The committee reviewed those comments at its meeting on 14 and 15 May 2003. In June 2003 the committee requested the preparation of a second pre-ballot draft, which was done.

4.12 However, at its September 2003 meeting, FP-020 resolved not to proceed to ballot but to produce a further public consultation draft. This was a hotly contested decision. One long term member of FP-020 described the meetings of the committee as being “subject to robust and passionate debate”, and it appears that this was true of its meeting on 4 and 5 September 2003. Whether to include deemed-

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194 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [39]
195 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [39]-[134]
196 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55(a)]; Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [54], Exhibit BFE-18 (WIT.7502.001.0304); Eadie T5383:31-T5384:7
197 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [55]; Eadie T5384:8-T5384:9
198 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55][f]); Annexure 22 (WIT.6001.002.0515)
199 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55][f]
200 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [60]; Eadie T5384:10
201 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [62], Exhibit BFE-21 (WIT.7502.002.0104), Exhibit BFE-22 (WIT.7502.002.0108)
202 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [63]-[64], Exhibit BFE-23 (WIT.7502.002.0169), Eadie T5384:13-T5384:15
203 Eadie T5384:16
204 Exhibit 174 – Statement of Chladil (WIT.7506.001.0001) [23]
to-satisfy provisions for the extreme and flame zone categories was a major topic of
discussion.\textsuperscript{205}

4.13 Two other decisions taken at the September 2003 meeting of FP-020 were to:

(a) add Paul England, a fire safety engineer with Warrington Fire Research, to the
committee’s membership, to represent testing interests and to assist the
committee to decide whether to include extreme and flame zone categories in
the new edition based on acceptable testing methodology,\textsuperscript{206} and
(b) form four sub-committees to address specific issues.\textsuperscript{207}

4.14 Sub-committees were duly formed to look at assessment methodology, user aids,
construction, and materials testing and research.\textsuperscript{208} These sub-committees met at
various times during 2004.\textsuperscript{209}

4.15 In January 2005 the report of the COAG’s National Inquiry on Bushfire Mitigation and
Management was publicly released.\textsuperscript{210} Members of FP-020 were advised in January
2005 of recommendation 6.2 of the COAG inquiry that:\textsuperscript{211}

\begin{quote}
The Inquiry recommends that the review of the Building Code of Australia, with
particular reference to the Construction of Buildings in Bushfire Prone Areas
Standard – to deal with resistance to natural hazards, including bushfires – be
completed by the Australian Building Codes Board as a matter of priority.
\end{quote}

In April 2005 the Chairman of the ABCB wrote to State and Territory Ministers about
progress of the revision of AS 3959, and advised that the new standard could be
referenced in the BCA from May 2006.\textsuperscript{212}

4.16 Standards Australia released a second public comment draft of AS 3959 for comment
in February 2005.\textsuperscript{213} The public comments received comprised 191 pages from 40

\textsuperscript{205} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [64]; Exhibit BFE-23 (WIT.7502.002.0169), in particular at
0177-0178, item 10.2
\textsuperscript{206} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [65]
\textsuperscript{207} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [64]
\textsuperscript{208} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [66]; Eadie T5384:17-T5384:31
\textsuperscript{209} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [67]-[75], [79]; Eadie T5385:1
\textsuperscript{210} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55(k)]; Exhibit 142 – COAG, National Inquiry on
Bushfire Mitigation and Management (TEN.049.001.0001)
\textsuperscript{211} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [144]-[146], Exhibit BFE-37 (WIT.7502.003.0062), Exhibit
BFE-87 (WIT.7502.006.0151); Eadie T5385:2-T5385:7; Exhibit 142 – COAG, National Inquiry on Bushfire Mitigation
and Management (TEN.049.001.0001) at 0025
\textsuperscript{212} Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55(n)], Annexure 24 (WIT.6001.002.0550)
\textsuperscript{213} Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [81]; Eadie T5385:10-T5385:11

4.17 A further pre-ballot draft of the revised standard was circulated to members of FP-020 in October 2006. This draft did not proceed to ballot because of disagreement among committee members about the flame temperature to be used for the purposes of the site assessment methodology.

4.18 In April 2007 the ABCB convened a workshop attended by members of FP-020 and representatives of State and Territory building regulators, in an attempt to resolve the matters over which the committee was deadlocked. At that workshop the ABCB advised that the final decision on flame temperature would be made by regulators, based on policy considerations and the level of stringency required. This resolved one of the issues on which members of FP-020 had been unable to reach consensus.

4.19 The ABCB workshop was discussed at a meeting of FP-020 in late May 2007. At that meeting, the ABCB’s representative on FP-020 advised that, if a category of “flame zone” was to be included in the new edition, the ABCB required a deemed-to-satisfy construction solution for that category.

4.20 In August 2007 Standards Australia published two standards for testing the performance of building materials subjected to simulated bushfire attack: AS 1530.8.1 – Tests on elements of construction for buildings exposed to simulated bushfire attack – radiant heat and small flaming sources (AS 1530.8.1); and AS 1530.8.2 – Tests on elements of construction for buildings exposed to simulated bushfire attack – large flaming sources (AS 1530.8.2). These two testing standards had been developed by another of Standards Australia’s technical committees, FP-018. They are extensively referenced in the 2009 edition of AS 3959.

214 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [85]
215 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [85], [90]-[92], [94], [97], [100]; Eadie T5385:12-T5386:5
216 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [105], Exhibit BFE-61 (WIT.7502.004.0071); Eadie T5386:6
217 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [106]-[107], Exhibit BFE-62 (WIT.7502.004.0155), Exhibit BFE-63 (WIT.7502.004.0166); Eadie T5386:7-T5386:11
218 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55(t)], Annexure 25 (WIT.6001.002.0553); Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [110], Exhibit BFE-66 (WIT.7502.004.0174)
219 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [110]; Eadie T5386:20-T5386:26
220 Eadie T5386:25-T5386:26
221 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [112]; Exhibit BFE-67 (WIT.7502.004.0182)
222 Exhibit 177 – Statement of Donaldson, Annexure 36 (WIT.6001.002.0813)
223 Exhibit 177 – Statement of Donaldson, Annexure 37 (WIT.6001.002.0863)
4.21 In January 2008 a further pre-ballot draft was circulated to members of FP-020. A draft revised standard was provided to the ABCB in March 2008, which enabled the ABCB to prepare a regulatory impact statement (RIS). The Consultation RIS was prepared by KPMG by September 2008, and was released on 19 November 2008 for public comment, closing on 12 December 2008. A number of submissions were received in response to the Consultation RIS, including from AFAC and CSIRO. The CFA also made a submission which, inexplicably, was not received by the ABCB and therefore not considered in the Final RIS.

4.22 The Consultation RIS included modelling of the value of estimated annual house losses for each of the options. According to this modelling the potential losses for Option 3 (1090 K) were an order of magnitude less than those for Option 1 (1000 K). The range of potential losses were as follows:

(a) for Option 1 (1000 K) – from $46.976 million to $140.91 million;
(b) for Option 2 (910 K) – from $174.24 million to $522.72 million; and
(c) for Option 3 (1090 K) – from $4.08 million to $12.23 million.

AFAC’s submission also drew attention to the modelling done by the NSW RFS.
4.24 This was where things stood on 7 February 2009. In the aftermath of the Black Saturday fires, both the ABCB and Standards Australia moved to finalise the publication of the new edition of AS 3959 with considerably more urgency than had previously been evident.

Publication and adoption of AS 3959-2009

4.25 The RIS was finalised during February 2009 and publicly released on 6 March 2009.232 The Final RIS concluded that a flame temperature of 1000 K was the preferred option. The basis for this conclusion was a difference in the estimated annual construction costs for Option 1 (1000 K) and Option 3 (1090 K) of around $30 million. No quantitative assessment of the relative benefits of the three options was attempted in the Final RIS; these benefits were said to be difficult to quantify.233 However, no reference was made in the Final RIS to the modelling set out in the submission from the NSW RFS, which did quantify the benefits of the respective models and indicated that the benefits of Option 3 (1090 K) was far greater than the other two options. This is regrettable, particularly in light of industry criticism of the ABCB’s subsequent decision to adopt the more stringent option of a flame temperature of 1090 K.234

4.26 In the weeks following 7 February there were numerous communications between the Building Commission in Victoria, the ABCB and Standards Australia in which the progress of the revised edition of AS 3959 was discussed.235 It is fair to say that considerable pressure was brought to bear on Standards Australia to publish the revised standard, and to do so quickly.236 Standards Australia initially proposed to publish an interim standard that could be adopted in Victoria, but ultimately, at the request of the Victorian Government, proceeded to finalise the fully revised edition for publication.237

4.27 A special meeting of FP-020 was held on 25 February 2009, to finalise the pre-ballot draft.238 Mr Tucker attended that meeting and addressed it, in an attempt to encourage the committee to reach consensus and finalise the standard.239 Some but not all of the issues of disagreement were resolved at the meeting. The principal issue

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232 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [55(cc)], Annexure 31 (WIT.6001.002.0697)
233 Exhibit 177 – Statement of Donaldson, Annexure 31 (WIT.6001.002.0697); Donaldson T5615:6-T5615:31
234 Donaldson T5616:10-T5616:19; Exhibit 179 – Statement of Harding (WIT.7503.001.0001) [84]
235 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [101]-[106]
236 Tucker T5309:10-T5310:6
237 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [101]-[105]; Tucker T5310:7-T5311:13
238 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [107], Exhibit JDT-87 (WIT.7501.005.0121)
239 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [107], Exhibit JDT-87 (WIT.7501.005.0121); Tucker T5311:21-T5312:5
that remained unresolved was the inclusion of the Bushfire Attack Level (BAL) BAL-FZ, or Flame Zone together with deemed-to-satisfy construction solutions for BAL-FZ.

4.28 The ballot draft of AS 3959-2009 was circulated to members of FP-020 on 27 February 2009. The ballot closed on 4 March 2009. At the close of the ballot, 20 votes had been received, of which five were negative. The representatives of AFAC, CSIRO and the Fire Protection Association of Australia (FPAA) voted against publication and gave reasons for their negative votes. Of concern to all of them was the inclusion of deemed-to-satisfy solutions for BAL-FZ. The comment submitted by Mark Chladil, the AFAC representative on FP-020, with his negative vote is illustrative:

**Summary**

While the Ballot Draft contains much which is supported by AFAC (and other members of FP-020) it is still unsuitable for publication. AFAC submits there should be no measures provided as deemed to satisfy solutions for the Bushfire Attack Level of Flame Zone (BAL-FZ).

**Concerns**

1. Homes should not be built in the Flame Zone. The focus of community life and most people’s greatest single investment should not be allowed in places of extreme hazard. Homes are not permitted in flood zones or on landslips and there are no deemed to satisfy provisions for such areas. A process which normalises the placement of people in extreme hazard cannot be supported.

2. All buildings in bushfire prone areas should be provided with defensible space. The occupants and fire fighters must be able to defend buildings and move around the site. Defensible space will be absent if higher BAL levels are required and conversely where defensible space is provided then the BAL is reduced as are the construction responses.

3. Providing any deemed to satisfy solution implies the resultant safety level is equivalent to that of lower hazard areas. This equivalence cannot be demonstrated.

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240 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [111]-[112], Exhibit JDT-88 (WIT.7501.005.0131), Exhibit JDT-89 (WIT.7501.005.0134); Exhibit 188 – Statement of Orr (WIT.060.001.0001) [30], Attachment 2 (WIT.060.001.0019)

241 Exhibit 171 – Statement of Tucker, Exhibit JDT-89 (WIT.7501.005.0134). The comments supporting the negative votes of the CSIRO representative are at Exhibit 171 – Statement of Tucker, Exhibit JDT-88 (WIT.7501.005.0131) and those of the FPAA representatives are at Exhibit 188 – Statement of Orr, Attachment 2 (WIT.060.001.0019)
4. There is substantial equivalence between BAL-FZ and BAL-40 and it is likely there is no substantive benefit from retaining both levels within the Standard.

5. The research basis of much of the science and testing is not sufficiently advanced to show the higher levels of construction will perform to their specified levels and that the tests (ie AS 1530 Part 8) appropriately simulate bushfire attack.

4.29 The ballot had not achieved consensus, according to Standards Australia’s definition of that term. While the FPAA subsequently agreed to publication, the continued opposition of both CSIRO and AFAC had to be considered by the Standards Development Committee (SDC). The SDC met on 5 March 2009 and resolved to publish the standard, notwithstanding the continued opposition of two major interests. After discussion with the ABCB, the SDC agreed to include the following notation in the preface to AS 3959-2009:

Construction in Flame Zone

Whilst the majority of the Committee support the full Standard, unanimity was not reached on aspects related to BAL-FZ Flame Zone. The Committee will be asked to review this Standard, including Flame Zone construction, in light of relevant outcomes of the Victorian Royal Commission into the February 2009 bushfires.

4.30 The ABCB also met on 5 March 2009. It accepted the recommendation of Mr Donaldson to adopt the higher flame temperature of 1090 K, despite the conclusion of the Final RIS that the preferred option was 1000 K. It also resolved to reference the new standard in the BCA.

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242 Exhibit 188 – Statement of Orr (WIT.060.001.0001) [31]-[32]. This agreement was conditional on the inclusion in the published standard of comments noting the FPAA’s reservations
243 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [113]-[115], Exhibit JDT-90 (WIT.7501.005.0139)
244 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [117]-[119], Exhibit JDT-91 (WIT.7501.005.0142), Exhibit JDT-92 (WIT.7501.005.0145); Tucker T5314:26-T5315:25
245 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [117]-[119]; Tucker T5315:26-T5317:10; Donaldson T5624:20-T5626:24
246 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [77], Annexure 33 (WIT.6001.002.0802), Annexure 34 (WIT.6001.002.0809); Exhibit 481 – Minutes of ABCB meeting held 5 March 2009 (TEN.126.001.0008)
4.31 AS 3959-2009 was finally published on 10 March 2009. It was adopted in Victoria on 11 March 2009, with the making of the Interim Regulations. It was not included in the 2009 edition of the BCA, but will be referenced in the 2010 edition of the BCA.

4.32 The lengthy history of the revision of AS 3959-1999 and the eventual publication of AS 3959-2009 reflects very poorly on both Standards Australia and building regulators, in particular the ABCB. It is scandalous that regulation of a matter of public safety should have been allowed to drift for nearly eight years, and for five years after the COAG Inquiry recommended that it be completed as a matter of priority. It is unacceptable that resolution of difficult and important policy issues, such as the level of stringency required of the standard, and whether deemed-to-satisfy solutions should be prescribed for the Flame Zone, be left to a technical committee of volunteers, who must try to reach consensus and who are unaccountable for the timeliness of their decision-making.

4.33 Responsibility for this failure of regulation is diffuse. In part it rests with Standards Australia’s failure to actively manage the revision of the standard. Based on Mr Tucker’s evidence, the Commission can be satisfied that this failing has been addressed by the adoption by Standards Australia of its new business model, with its emphasis on project management and timely outcomes. No recommendation is proposed in relation to Standards Australia’s internal management of the development and maintenance of bushfire related standards.

4.34 Responsibility also rests in part with Australia’s building regulators, who come together as the ABCB, who were prepared to leave the technical content of the BCA’s performance requirements for bushfire areas to a non-government body such as Standards Australia. Building regulators did not contribute substantial resources to the revision of the standard, and did not define with any precision the scope of the standard that FP-020 was required to produce. When, belatedly in April 2007, the ABCB advised FP-020 that the final decision on flame temperature was a policy matter that would be decided by the regulators, the committee was able to move forward and produce a near to final draft of the standard relatively quickly. It is regrettable that regulators did not also take responsibility for resolving the issue of deemed-to-satisfy solutions in the Flame Zone at an earlier time.

4.35 Perhaps some responsibility also rests with the allocation of rather modest resources to the ABCB by the Australian governments who are parties to the IGA. Mr

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247 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [123]
248 Other than the participation of Mr Newhouse of the ABCB as a member of FP-020
249 Donaldson T5610:23-T5612:2, but cf T5618:12-T5619:15; Chladil T5437:24-T5437:30
250 See paragraph 3.23 above, and Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [14]; Donaldson T5586:14-T5587:17
Donaldson acknowledged that a greater commitment of resources and people earlier in the process would have assisted the implementation of the ABCB’s strategy.\textsuperscript{251} He did not go so far as to say that the ABCB did not have the necessary resources, but the evidence suggests that has been an issue for the ABCB and, if the current funding model continues, will be an issue in the future.

4.36 Given the very substantial investment of time and effort in AS 3959-2009, and the fact that Standards Australia owns the copyright in the standard, it is inevitable that the ABCB and Standards Australia will continue to work together as AS 3959 is further revised and other bushfire related standards are developed (as well as in relation to the large number of other standards referenced in the BCA). In these circumstances the Standards Australia collaborative development pathway, under which stakeholders and Standards Australia jointly drive and resource the project through a negotiated sharing of responsibility, is the optimal development path for this future work.

4.37 With greater commitment of public resources to the ongoing review and development of AS 3959 and other bushfire related standards that may be referenced in the BCA should come free access to those standards. The broader issue of free or low cost access to Australian Standards made mandatory by regulation has already been the subject of recommendations by the Productivity Commission.\textsuperscript{252} This Commission should recommend that bushfire related standards made mandatory by legislation be freely available.

\textbf{Proposed recommendation 2:} The ABCB work with Standards Australia for the ongoing review and development of AS 3959 – Construction of buildings in bushfire prone areas, and other bushfire related standards referenced in the BCA, using the Standards Australia collaborative development pathway. Future project proposals for the revision and development of bushfire related standards by Standards Australia should specify:

- the scope of the project, including matters of regulatory policy that are beyond the scope of the project;
- the deadline for completion of the project;
- a detailed project plan, with dates for the completion of the various stages of the project \textit{(milestones)}; and
- the fallback mechanism for finalisation of each stage of the project if consensus cannot be achieved by the relevant milestone dates set out in the project plan.

\textbf{Proposed recommendation 3:} The ABCB negotiate with Standards Australia and SAI Global Ltd an arrangement for free on-line access to:

\textsuperscript{251} Donaldson T5617:31-T5618:4
\textsuperscript{252} See paragraph 3.42 above
• AS 3959-2009—Construction of buildings in bushfire prone areas;
• the other Australian Standards referenced in AS 3959-2009; and
• any other bushfire related Australian Standards referenced in the BCA.

**AS 3959-2009**

4.38 Happily, the 2009 edition of AS 3959 contained many significant improvements on the 1999 edition. The major differences between the two editions are:

(a) AS 3959-2009 now specifies six bushfire attack levels or BALs, compared to the former four categories of bushfire attack;
(b) AS 3959-2009 contains two scientifically based methodologies for assessing bushfire attack—a simplified method and a detailed method—compared with the observation based approach set out in the 1999 edition;
(c) the 2009 edition recognises the variations in bushfire risk across Australia, with different FDI values specified for each State and Territory, and for distinct regions within Victoria and New South Wales;
(d) AS 3959-2009 references two new testing standards—AS 1530.8.1 and AS 1530.8.2—designed to test the capacity of materials to withstand specified levels of radiant heat over a specified time, in simulated bushfire conditions;
(e) the 2009 edition contains five levels of construction, compared with the previous three; and
(f) the structure of the 2009 edition is easier to follow than the earlier edition, as the levels of construction for each BAL are set out separately, rather than cumulatively under construction elements.

4.39 Table 3.1 of AS 3959-2009 summarises the Bushfire Attack Levels, their characteristics and specifies the corresponding construction section for each BAL. While the BALs are named according to the radiant heat flux thresholds for each BAL—so, for example, BAL-19 has a radiant heat flux threshold of between 12.5 kW/m² and 19 kW/m²—the descriptions of the predicted bushfire attack for each BAL include the full range of bushfire attack mechanisms. Ember attack is predicted for each BAL from BAL-12.5 to BAL-FZ.

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253 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [135]-[139], Exhibit BFE-84 (WIT.7502.006.0076); Eadie T5371:15-T5373:21; Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [137]-[140]
The simplified process for determining the BAL of a site is set out in clause 2.2 of the standard:254

(a) Step one involves determining the relevant Fire Danger Index, which for most of Victoria is 100;255
(b) Step two involves determining the classified vegetation type(s), using Table 2.3 and the illustrations set out in Figure 2.3
(c) Step three requires determination of the distance of the site from the classified vegetation;
(d) Step four requires determination of the effective slope under the classified vegetation;
(e) Step five is to determine the BAL using the table for region’s FDI; and
(f) Step six is to determine the appropriate construction requirements for the BAL.

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254 Exhibit 172 – Statement of Eadie, Exhibit BFE-6 (WIT.7502.001.0098) at 0113
255 The FDI for Victorian alpine areas is 50
4.41 The construction requirements for each BAL above BAL-LOW prescribe some general requirements, and specific requirements for each of the following building elements: subfloor supports; floors; external walls; external windows and doors; roofs; verandas and decks; and water and gas supply pipes.

4.42 By far the most controversial aspect of AS 3959-2009 was the inclusion of deemed-to-satisfy construction solutions for BAL-FZ, the Flame Zone. At this BAL, the predicted radiant heat flux exposure threshold is greater than 40 kW/m², and the predicted bushfire attack is direct exposure to flames from fire front in addition to heat flux and ember attack. The construction solutions prescribed for BAL-FZ are set out in Section 9 of AS 3959-2009.

4.43 Two features of Section 9 are particularly significant. The first is that, although a minimum setback distance of 10 metres from the classified vegetation is specified, clause 9.1 goes on to provide:

In circumstances where the 10 m setback distance cannot be achieved, those elements of the building that are less than 10 m from the classified vegetation shall comply with AS 1530.8.2.

The effect of this qualification is that AS 3959-2009 prescribes a construction solution for a building that is surrounded by vegetation that is very close or even adjacent to the building.

4.44 The second feature of significance, which follows from the first, is the very heavy reliance in Section 9 on the testing standard AS 1530.8.2. Clause 9.1 specifies that any element of construction or system that satisfies the AS 1530.8.2 test criteria may be used in lieu of the requirements set out in the rest of Section 9. Compliance with AS 1530.8.2 is specified for each of the major construction elements, although in many cases this is one of several alternatives specified. Several witnesses expressed concerns about AS 1530.8.2, which are discussed in paragraphs 4.63 to 4.69 below.

4.45 Overall, the Commission can be satisfied that the 2009 edition of AS 3959 represents an improved level of protection for buildings in bushfire prone areas than that

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256 Including veranda and attached carport roofs, penetrations, eaves, fascias, gables, gutters and downpipes
257 Verandas, decks, steps, ramps and landings
258 Exhibit 172 – Statement of Eadie, Exhibit BFE-7 (WIT.7502.001.0211) at 0211-0216, sections 3 to 9; Eadie TS379.7-TS379.18
259 Exhibit 172 – Statement of Eadie, Exhibit BFE-7 (WIT.7502.001.0211) at 0132, Table 3.1
260 Exhibit 172 – Statement of Eadie, Exhibit BFE-7 (WIT.7502.001.0211) 0173-0179
261 Exhibit 177 – Statement of Donaldson, Annexure 37 (WIT.6001.002.0863)
afforded by AS 3959-1999.\textsuperscript{262} However, there is evidence before the Commission of some very significant reservations about aspects of AS 3959-2009, which are discussed in the following sections.

**Deemed-to-satisfy solutions in BAL-FZ – the Flame Zone**

4.46 There was a sharp division in views as to whether buildings regulations for bushfire prone areas should prescribe deemed-to-satisfy construction solutions in the Flame Zone, or BAL-FZ. As discussed above, a site assessed as BAL-FZ is predicted to be exposed to direct flame contact from a bushfire, as well as radiant heat flux in excess of 40 kW/m\(^2\) and ember attack. It is the highest risk category of bushfire attack. At present, the deemed-to-satisfy solutions set out in Section 9 of AS 3959-2009 are prescribed for BAL-FZ in Victoria.

4.47 The argument for prescription of deemed-to-satisfy solutions was put by Mr Donaldson as follows:\textsuperscript{263}

*The reasons for adopting a view that deemed-to-satisfy provisions should be provided in flame zone situations is to create a greater level of certainty for designers and constructors. The absence of any guidance in relation to those areas leaves one open to uncertainty and potentially higher compliance and construction costs.*

Although the solutions prescribed for BAL-FZ are onerous and expensive, the ABCB considered that to be preferable to making no provision, and leaving it to decision making on a case by case basis.\textsuperscript{264}

4.48 Mr Arnel also favoured prescription of deemed-to-satisfy solutions in the Flame Zone.\textsuperscript{265} Other than relying on the advice of Paul England of Exova Warringtonfire,\textsuperscript{266} Mr Arnel did not articulate the reasons for his position. In his report, Mr England points out that AS 3959-1999 already contained deemed-to-satisfy solutions for all categories of bushfire attack, and advised that the construction requirements for BAL-FZ in AS 3959-2009 represented a substantial improvement on those for the extreme category in AS 3959-1999.\textsuperscript{267} Mr England did not address the question of whether, as a matter of regulatory policy, deemed-to-satisfy solutions should be prescribed at all for the highest risk sites.

\textsuperscript{262} Exhibit 169 – Statement of Arnel, Annexure Q (WIT.3000.002.0375); Exhibit 177 – Statement of Donaldson, Annexure 39 (WIT.6001.002.0900); cf Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0051-0053

\textsuperscript{263} Donaldson T5628:22-T5628:28

\textsuperscript{264} Donaldson T5629:3-T5629:11

\textsuperscript{265} Arnel T5198:27-T5199:1, T5199:23-T5200:2

\textsuperscript{266} Exhibit 169 – Statement of Arnel, Annexure Q (WIT.3000.002.0375)

\textsuperscript{267} Exhibit 169 – Statement of Arnel, Annexure Q (WIT.3000.002.0375) at 0385-0390
4.49 Witnesses from the Housing Industry Association (HIA) and the Master Builders Association Victoria (MBAV) supported the inclusion of deemed-to-satisfy solutions for BAL-FZ. Mike Harding, HIA’s National Manager, Codes and Standards put the argument as follows:268

In respect to the inclusion of construction standards for building within the flame zone, HIA also supported the Standard incorporating these provisions. It is imperative that building regulations include specific guidance on the methods of construction, whether through performance criteria or acceptable construction practices. This allows a building designer to be aware of all relevant requirements in the design of a building.

Building regulations are founded on the principle that if a construction problem is capable of quantification, then a solution to the problem should be available as a minimum response. This principle is currently applied to matters such as wind levels, soil classifications, steel corrosion effects and fire events of all natures.

There has been some argument put that construction requirements in the flame zone should not be provided, and hence that the relevant fire authority would be required to be consulted on all occasions and presumably have some authority to dictate the minimum level of construction for a building.

HIA does not consider this approach to building regulations is appropriate, as it would leave a property owner in an unknown situation in terms of their design. The potential construction requirements provided by a fire authority on an ad hoc basis would not provide a level of consistency in application across jurisdictions nor be subject to regulatory scrutiny, and it could be argued would not pass the test of delivering a net cost benefit, as building regulations are required to do. This approach would also not ensure an appropriate avenue for appeal was provided to a property owner.

4.50 Brian Welch, the Executive Director of the MBAV, told the Commission that the MBAV supported the general principle of deemed to comply.269

4.51 Geoff Woolcock, Managing Director of MBA Building Services Pty Ltd, and an experienced building surveyor, explained why building surveyors prefer the prescription of deemed-to-satisfy solutions:270

... we are looking for simple solutions that can be quantified and costed and assessed by reference to a deemed-to-satisfy solution. ... It speeds up the process and gives us

268 Exhibit 179 – Statement of Harding (WIT.7503.001.0001) [91]–[95]; Harding T5658:11–T5659:1
269 Welch T5772:23–T5773:4
270 Woolcock T5782:7–T5782:20
surety of what we are approving. Without that, we have to refer it to experts and await the outcome of their analysis which could take quite some time and delay the whole process of approval.

4.52 Another building surveyor who gave evidence to the Commission also supported the principle of including deemed-to-satisfy solutions for BAL-FZ. Stuart McLennan of the Australian Institute of Building Surveyors (AIBS), also an experienced building surveyor, set out in his statement his reasons for believing that a deemed-to-satisfy (or DTS) approach for sites assessed as BAL-FZ is appropriate:

In practice, DTS provisions provide a community benchmark sanctioned by government for acceptable levels of construction in areas of extreme bushfire risk. In turn, this informs designers, builders and building surveyors about what is reasonable.

In contrast, Alternative Solutions are assessed and approved by individual building surveyors. This has the potential to lead to inconsistent application of expertise and unknown outcomes for the community. DTS provisions go some way to providing Building Surveyors with a benchmark against which to measure Alternative Solutions.

4.53 In summary, the arguments for prescription of deemed-to-satisfy provisions for the Flame Zone are certainty, consistency, reduced compliance and construction costs, and provision of a benchmark for alternative solutions.

4.54 It should be noted at this point that, because of its heavy reliance on the testing standard AS 1530.8.2, Section 9 of AS 3959-2009 does not currently provide deemed-to-satisfy construction solutions for many construction elements. At present there is very limited availability of roofing and window systems that have met the testing criteria in AS 1530.8.2. Unless and until there are more products on the market that have been tested to AS 1530.8.2, it cannot be said that there are “readily accessible building solutions consisting of material commonly used by the industry” prescribed for BAL-FZ. For the time being, Section 9 of AS 3959-2009 does not provide the certainty, consistency and reduced compliance and construction costs desired by regulators and industry representatives.

4.55 Fire agencies and fire safety interests oppose the prescription of deemed-to-satisfy solutions for the Flame Zone. The comments submitted with AFAC’s vote against publication of AS 3959-2009 are set out at paragraph 4.28 above. Mark Chladil,

271 Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [69]-[71]; see also McLennan T5683:1-T5685:25
272 Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [85]-[90]; McLennan T5684:15-T5684:22, T5699:2-T5699:18
273 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [212]-[216]; Arnel T5194:23-T5195:27, T5197:20-T5198:8; Exhibit 185 – Statement of Woolcock (WIT.7505.001.0001) [20]; Woolcock T5777:20-T5779:9
274 Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [89]
AFAC’s representative on FP-020, explained the reasons for AFAC’s opposition as follows:

The Flame Zone is the area ahead of the bushfire front where radiation levels are expected to be greater than 40 kw/m² and where flame contact will occur. It is expected that a house in the flame zone will be licked by flames from the surrounding burning bush land. Building in this area leaves a house with minimal and inadequate defensible space, potentially leaving it severely compromised in the event of a bushfire. It is AFAC’s view that any home to be built in the Flame Zone requires an individual assessment and will need to be individually designed to the specific fire risks the property faces.

However, the 2009 Standard does not require an individual assessment or design. Rather, it introduces six Bushfire Attack Levels (BAL) that are matched to six sets of construction requirements that will determine which "deemed to satisfy" provisions a builder or designer will need to address to meet the requirements of the standard. While suitable in respect of many houses, AFAC believes "deemed to satisfy" provisions are an entirely inappropriate method for houses that are located within a Flame Zone.

The Standard attempts to provide a set of appropriate BAL matched to "deemed to satisfy" construction methods which will provide equivalent bushfire resistance for all buildings which are constructed in compliance with the Standard.

This approach implies that, so long as the "deemed to satisfy" provisions are met, the resultant safety level for a house built in the Flame Zone is equivalent to a house built in lower hazard areas. There is not, but there should be, a distinction between the bushfire resistance of a building and the safety level for the occupants. The Standard normalises (and perhaps encourages) the building of houses in areas of higher risk. This is an extremely dangerous approach. Even where "deemed to satisfy" provisions are met, the occupants of houses located in the Flame Zone are not as safe as those in lower hazard areas. Consequently, houses in the Flame Zone need site specific assessment and design rather than the 2009 Standard’s "deemed to satisfy" approach.

Mr Chladil pointed out that the BCA does not contained deemed-to-satisfy solutions for building on land slips or in flood ways, and queried why it should do so in the Flame Zone. He characterised the ABCB’s position that there should be deemed-to-satisfy

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275 Exhibit 174 – Statement of Chladil (WIT.7506.001.0001) [30]-[33]; Chladil T5443:4-T5445:22
276 Exhibit 174 – Statement of Chladil (WIT.7506.001.0001) [34]; Chladil T5486:6-T5486:30. Mr Donaldson agreed that the BCA did not contain deemed-to-satisfy solutions for building in flood ways or on land slips: Donaldson T5627:9-T5628:4, T5633:30-T5634:3. Note, however, Mr McLennan’s evidence that the BCA does contain deemed-to-satisfy solutions for flood prone areas: McLennan T5686:11-T5687:25
solutions for any place where a built solution was possible as “more ideological than practical or safe”. 277

4.56 The CFA is a member of AFAC. Geoff Spring, Acting Chief Executive Officer of the CFA and Andrew Andreou, the CFA’s Executive Manager of Community Infrastructure, told that Commission that the CFA supports the AFAC position that there should not be deemed-to-satisfy construction solutions in the Flame Zone. 278 The CFA wrote to the Building Commissioner in March 2009 expressing its support for AFAC’s recommendation that the BCA be varied to specifically exclude construction requirements for facilities within the Flame Zone. 279 Neither Mr Spring nor Mr Andreou was aware of a response to that letter, 280 and clearly the CFA’s advice was not heeded. However, the CFA and the Building Commission agreed in August 2009 to undertake a joint project to discuss the CFA’s issues with AS 3959-2009 and also to discuss how building controls and land use planning can interact to enable a holistic approach to building in bushfire prone areas. 281

4.57 While the FPAA ultimately agreed to the publication of AS 3959-2009, it retains concerns about the prescription of deemed-to-satisfy solutions for BAL-FZ. FPAA’s National President, Chris Orr, described this approach as simplistic or “paint by numbers”. 282

The provision of BAL-FZ as a deemed to satisfy construction level for the worst possible bushfire scenario will provide regulators with a simplistic approach to development issues. The reliance upon a construction standard to overcome planning issues is flawed. This is particularly the case where the standard does not address the performance requirements needed. In my opinion, a building constructed to AS3959-2009 BAL-FZ, as a deemed to satisfy solution without any consideration of any other fire safety element, would most definitely not have withstood the Black Saturday fires.

Mr Orr made the point that deemed-to-satisfy solutions are only useful as a benchmark in situations where it is possible to set a benchmark, which is not the case in the Flame Zone. 283

277 Exhibit 174 – Statement of Chladil (WIT.7506.001.0001) [34]
278 Exhibit 190 – Statement of Spring (WIT.3004.011.0228) [17]-[18], [25]-[26]; Spring T6002:6-T6002:9, T6003:9-T6003:19; Exhibit 207 – Statement of Andreou (WIT.3004.012.0065) [28], Andreou T6412:7-T6413:25
279 Exhibit 207 – Letter from CFA to T Arnel (CFA.001.023.0229); Andreou T6412:16-T6412:29
280 Spring T6003:18-T6003:19; Andreou T6413:26-T6413:28
281 Exhibit 190 – Statement of Spring (WIT.3004.011.0228) [18]-[20]; Spring T6003:31-T6006:14; Exhibit 207 – Statement of Andreou (WIT.3004.012.0065) [31]-[33]; Andreou T6418:27-T6419:18
282 Exhibit 188 – Statement of Orr (WIT.060.001.0001) [57]; Orr T5892:4-T5893:26
283 Orr T5892:21-T5893:11
4.58 The task for this Commission is to reconcile the competing policy perspectives of building regulators and industry bodies, and fire agencies and fire safety interests. The submission of Counsel Assisting the Commission is that the policy imperatives of certainty, consistency, reduced compliance and construction costs, and benchmarking alternative solutions, while important, do not outweigh the compelling safety arguments against prescribing deemed-to-satisfy building solutions in the Flame Zone. The aims of certainty, consistency, and reduced costs are only achieved imperfectly, if at all, by Section 9 of AS 3959-2009.284 Benchmarking alternative solutions is not appropriate or even readily achievable in the circumstances of high risk present when building in the Flame Zone.

4.59 If building is to be permitted on a site assessed to have the highest level of bushfire risk – which is another question altogether – then the building should be designed specifically for the particular risks on the site. This is the approach taken in New South Wales, and should also be the approach in Victoria. Certainty and consistency should not be promoted as overriding values. As the Commission remarked in relation to the Stay or Go policy, there should be a single overriding value – the protection of human life.285 The protection of that value requires – in construction in the Flame Zone, as much as in relation to other policies for managing bushfire risk and community safety – “flexibility and willingness to engage with complexity and diversity”.286 In the case of construction in the Flame Zone, this requires the development of performance based building solutions for each particular site.

4.60 Because this issue is one of regulatory policy and not standard setting, the recommendations proposed below are directed to the regulators and not to Standards Australia.287

Proposed recommendation 4: The ABCB amend the BCA to remove deemed-to-satisfy provisions for the construction of buildings in BAL-FZ, including by excluding Section 9 of AS 3959-2009 as a deemed-to-satisfy provision for BAL-FZ.

Proposed recommendation 5: The Victorian Government amend the Building Regulations to modify its adoption of AS 3959-2009 and the BCA, to remove deemed-to-satisfy provisions for the construction of buildings in BAL-FZ, including by excluding Section 9 of AS 3959-2009 as a deemed-to-satisfy provision for BAL-FZ.

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284 As discussed in paragraph 4.54 above
286 2009 Victorian Bushfires Royal Commission Interim Report at [7.105]
287 See the comments made at paragraphs 4.32 and 4.34 above
Other matters for review

4.61 Counsel Assisting have already made submissions as to the need for immediate revision of AS 3959-2009 to address: 288

(a) inclusion of unmanaged grassland in the vegetation types and classifications;
(b) use of sarking as a secondary ember protection measure; and
(c) increased ember protection measures at lower BALs, in particular in relation to subfloor requirements and materials prescribed for doors, windows and wall barriers.

4.62 These earlier submissions referred to the fact that ember attack is the predominant bushfire attack mechanism, and to the corresponding importance of measures to protect buildings from the risk of ignition by embers. 289 As discussed at paragraph 3.28 above, the importance of protecting a building against ignition by embers is not currently reflected in the Performance Requirement in the bushfire safety provisions of the BCA, and it should be. The objective of AS 3959-2009 is expressed in the same language as the BCA’s performance requirement for bushfire areas, and should be amended to include reference to ignition from ember attack. This reflects the amendment that is recommended to the BCA performance requirements, and will assisting in ensuring that ember protection measures remain a focus of FP-020’s work.

Proposed recommendation 6: Standards Australia amend AS 3959-2009 – Construction of buildings in bushfire prone areas, clause 1.2.1 – Objective of this Standard to read: “The objective of this Standard is to prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire while the fire front passes and from ember attack.”

4.63 There is one further area of major concern about the 2009 edition of the Standard, and that is its reliance on the testing standards AS 1530.8.1, 290 and AS 1530.8.2. 291 The heavy reliance on AS 1530.8.2 in respect of construction in the Flame Zone has been outlined at paragraph 4.44 above. AS 1530.8.1 is referenced extensively in Section 7 and Section 8 of AS 3959-2009, which prescribe the construction details for BAL-29 and BAL-40 respectively.

4.64 One of the reasons given for CSIRO’s negative vote in the February 2009 ballot was a reservation about the use of AS 1530.8.1 as the test method for determining the

288 Building in Bushfire Prone Areas – Interim Recommendations – Submissions of Counsel Assisting (SUBM.200.001.0001) [37]-[51]
289 Building in Bushfire Prone Areas – Interim Recommendations – Submissions of Counsel Assisting (SUBM.200.001.0001) [42]
290 Exhibit 177 – Statement of Donaldson, Annexure 36 (WIT.6001.002.0813)
291 Exhibit 177 – Statement of Donaldson, Annexure 37 (WIT.6001.002.0863)
performance of components under bushfire conditions. The reasons for this reservation were:

- No effective consideration of wind effects on the fire performance of the components. e.g. for evaluating the performance to resist wind blown embers and in determining whether claddings will continue to burn;
- Materials are recommended to be preconditioned at room temperature and humidity rather than at what might be expect under bushfire conditions. Moisture content of combustible elements are likely to be for higher than expected in a bushfire situation which is likely to result in less chance of ignition and lower flame spread and persistence in the test method; and
- The criteria for gaps should be consistent with the existing standard to ensure that ember entry and ignition is effectively addressed.

CSIRO’s reservation was shared by AFAC and by the FPAA representatives.

4.65 After the publication of AS 3959-2009, CSIRO wrote to the Premier of Victoria and to the Commonwealth Minister for Innovation, Industry, Science and Research, conveying its concerns with the new standard. The ABCB responded with a detailed response, addressing each of the items of concern listed by CSIRO. In relation to AS 1530.8.1, the ABCB’s response said only:

*CSIRO contributed to the development of this testing standard which was published in 2007.*

This response did not address the substance of CSIRO’s concern – that the testing standard did not sufficiently simulate bushfire conditions.

4.66 In his report prepared for the Commission, Justin Leonard of CSIRO explained CSIRO’s concerns about the reliance in AS 3959-2009 on both testing methods. In summary, his opinion was that neither AS 1530.8.1 nor AS 1530.8.2 sufficiently considered:

- wind effects;
- moisture content relevant to bushfire conditions; and
- effective requirements for gaps that mitigate ember entry.

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292 Exhibit 171 – Statement of Tucker, Exhibit JDT-88 (WIT.7501.005.0131)
293 Exhibit 171 – Statement of Tucker, Exhibit JDT-89 (WIT.7501.005.0134)
294 Exhibit 188 – Statement of Orr, Attachment 2 (WIT.060.001.0019)
295 Exhibit 171 – Statement of Tucker, Exhibit JDT-95 (WIT.7501.005.0163)
296 Exhibit 171 – Statement of Tucker, Exhibit JDT-96 (WIT.7501.005.0166)
297 Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0052-0053
In addition, he said, AS 1530.8.2 did not sufficiently consider significant differences between furnace exposure conditions and bushfire exposure conditions with regards to combustible elements. Mr Leonard elaborated on the basis for his opinion in part 8.3.5 of his report.\textsuperscript{298} He stated the essence of his concern as follows:\textsuperscript{299}

*Given that the test methods appear to be called up in the 2009 standard as a means of compliance, the way they are performed needs to be addressed to take into effect a more realistic account of the actual conditions that these building systems would experience in real bushfires.*

4.67 Mr Chladil also noted that the testing standards did not appropriately simulate bushfire conditions, specifically in relation to the effects of wind on the fire performance of building components and the actual ambient temperatures and humidities experienced during bushfires.\textsuperscript{300}

4.68 Mr Eadie freely acknowledged that the conditions specified in AS 1530.8.1 and AS 1530.8.2 did not simulate bushfire conditions, and were not designed to do so. He said that the tests in both standards were designed to be repeatable and to provide a reliable mechanism for comparing the performance of building elements at a very high level of fire intensity.\textsuperscript{301} Mr England, who was closely involved in the development of the testing standards, made the same point in his report prepared for the Building Commission: that the test methods were designed to achieve consistent ranking of the performance of building systems subjected to heat and flame, and that in order to achieve this it had been necessary to make some simplifications and to balance these with other criteria.\textsuperscript{302} He concluded:\textsuperscript{303}

*... despite the known limitations, AS 1530.8.1 and AS 1530.8.2 currently represent the most appropriate means to evaluate the performance of elements of construction to be used in bushfire prone areas and it is a significant improvement on previous subjective methods used to evaluate systems and determine prescriptive requirements.*

4.69 On the evidence before the Commission, the testing standards AS 1530.8.1 and AS 1530.8.2 do provide repeatable tests for comparing and ranking the performance of building elements subjected to radiant heat and direct flame contact. This is both necessary and desirable. However, AS 3959-2009 prescribes compliance with these tests as deemed-to-satisfy solutions for construction at higher BAL levels, most significantly in BAL-FZ. Given the use that is made of AS 1530.8.1 and AS 1530.8.2 in

\begin{itemize}
\item Exhibit 175 – Leonard Report (TEN.066.001.0001) at 0056-0058
\item Leonard T5936:16-T5936:21
\item Exhibit 174 – Statement of Chladil (WIT.7506.001.0001) [44]-[46]; Chladil T5449:21-T5451:15
\item Eadie T5380:10-T5381:27
\item Exhibit 169 – Statement of Arnel, Annexure Q (WIT.3000.002.0375) at 0390-0392; Arnel T5204:1-T5205:6
\item Exhibit 169 – Statement of Arnel, Annexure Q (WIT.3000.002.0375) at 0392
\end{itemize}
AS 3959-2009, it is vital that these testing standards are also a reliable predictor of the performance of building elements under actual bushfire conditions. Standards Australia, through its technical committee FP-018, should review both testing standards to ensure that they meet this objective. In doing so they should take into account the concerns expressed by the CSIRO, AFAC and FPAA representatives on FP-020 with their votes against publication of AS 3959-2009, and by Mr Leonard in his report to the Commission.

**Proposed recommendation 7:** Standards Australia, through its technical committee FP-018, review and amend AS 1530.8.1 – Tests on elements of construction for buildings exposed to simulated bushfire attack – radiant heat and small flaming sources and AS 1530.8.2 – Tests on elements of construction for buildings exposed to simulated bushfire attack – large flaming sources to ensure that, so far as possible, the testing methods prescribed in both standards provide a reliable predictor of the performance of construction elements under bushfire conditions.

## 5 DESIGNATION OF BUSHFIRE PRONE AREAS

### 5.1

The bushfire safety provisions of the BCA and AS 3959 only apply to building in designated bushfire prone areas. Until 11 March 2009, designation of bushfire prone areas was a matter for local councils. Since that date, the whole of Victoria has been designated as a bushfire prone area, an interim arrangement that is in place until 9 March 2010.304

### 5.2

Mr Arnel explained the policy considerations underlying the designation of the whole Victoria as a bushfire prone area:305

*One of the issues that is apparent when you look at where the fires occurred was that not all areas were designated bushfire prone and it seemed to me that one of the safest ways going forward was to in fact declare or effectively designate the whole of the State bushfire prone. So … people now have to in fact assess every project according to the Australian standard. For the most part they are going to be BAL-Low. We estimate that up to 80 per cent of new housing in Victoria, and there are about 40,000 houses built every year, will have a BAL-Low outcome. But the fail-safe device for the purposes of 12 months seemed to me to cover the whole of the State, minimum risk."

At the time he gave evidence in August 2009, Mr Arnel was of the view that the statewide application of AS 3959-2009 should continue beyond 10 March 2010, as it

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304 See the discussion at paragraphs 3.8 to 3.11 and 3.22 above.
305 Arnel TS187:19-TS188:1
would result in a more consistent and safer outcome for Victoria.\textsuperscript{306} He did not consider that it imposed an unnecessary regulatory burden.\textsuperscript{307} He acknowledged the need to assess the operation of the interim arrangements, and to have the best possible system in place from 10 March 2010.\textsuperscript{308}

5.3 There were a number of unsatisfactory features of the former system, in which councils were responsible for the mapping and designation of bushfire prone areas within a municipality. First among these was the lack of clear criteria for the designation of bushfire prone areas. Mr Arnel identified Appendix B of AS 3959-1999 as setting out how councils should go about designating bushfire prone areas.\textsuperscript{309} The process in this document is similar to, although not the same as, the CFA’s guidelines for mapping the Wildfire Management Overlay (WMO) and bushfire prone areas.\textsuperscript{310} Further, Appendix B of AS 3959-2999 refers to three bushfire zones – Low, Medium and High – which do not appear in the CFA’s guidelines.\textsuperscript{311}

5.4 A second concern was the limited powers of both the Building Commission and the CFA in relation to designation of bushfire prone areas. Both agencies were limited to advocacy and monitoring roles.\textsuperscript{312} This did not assist efforts at statewide co-ordination of bushfire risk assessment, such as the CFA’s ongoing project to align bushfire prone areas with the WMO.\textsuperscript{313}

5.5 Given the absence of clear criteria or direction, it is unsurprising that there should be some inconsistency between councils in the designation of bushfire prone areas. To illustrate, some councils included public land, such as land in State forests and national parks, in designated bushfire prone areas, while others apparently did not.\textsuperscript{314} In another example, land on one side of a municipal boundary was designated bushfire prone, while land on the other side was not.\textsuperscript{315}

\textsuperscript{306} Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [222]-[223]; Arnel T5188:19-T5188:30
\textsuperscript{307} Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [222]
\textsuperscript{308} Arnel T5190:2-T5190:19
\textsuperscript{309} Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [95], Annexure G (WIT.3000.002.0072) at 0101
\textsuperscript{310} Andreou T6427:4-T6429:3, Exhibit 291 CFA, Land Use Planning - Wildfire Management Overlay Mapping Process (CFA.001.026.0007)
\textsuperscript{311} Andreou T6428:26-T6428:29; Exhibit 291 CFA, Land Use Planning - Wildfire Management Overlay Mapping Process (CFA.001.026.0007)
\textsuperscript{312} Exhibit 168 – Statement of Arnel (WIT.3000.002.0001) [104]-[110]; Exhibit 207 – Statement of Andreou (WIT.3004.012.0065) [34]
\textsuperscript{313} Exhibit 190 – Statement of Spring (WIT.3004.011.0228) [28]-[31]; Exhibit 207 – Statement of Andreou (WIT.3004.012.0065) [36]-[39]
\textsuperscript{314} Compare the maps of designated bushfire prone areas for the City of Greater Bendigo – Exhibit 484 – Map of the City of Greater Bendigo Showing Bushfire Prone Areas, Wildfire Management Overlay Areas and Fire Affected Areas (MAV.001.001.0022)
\textsuperscript{315} Compare the maps of designated bushfire prone areas for the Shires of Nillumbik – Exhibit 484 - Map of Nillumbik Shire Showing Bushfire Prone Areas, Wildfire Management Overlay Areas and Fire Affected Areas
5.6 A further serious flaw in the former system is that designation of bushfire prone areas by councils was a poor predictor of where bushfires burned on 7 February 2009. Most starkly, neither Kinglake nor Marysville was in a designated bushfire prone area.  

5.7 It is significant that no witness called for responsibility for designation of bushfire prone areas to revert to councils after March 2010. At the same time, a number of witnesses were critical of the interim arrangement of effectively designating all of Victoria as a bushfire prone area, and did not want to see its continuation beyond March 2010. Stuart McLennan, of the AIBS explained his objections as follows:

*I do not support the designation of all of Victoria as a bushfire prone area. I believe such a designation is too simplistic, expensive and counter-productive.*

*I do however recognise that given the recent 2009 Victorian bushfire events there was a need to introduce interim legislation to provide direction for the rebuilding process.*

*I consider it misleading to consider all of Victoria as being bushfire prone and requiring a BAL assessment. This misrepresents the actual risk and potentially undermines the effectiveness of this important process. For example a person undertaking building work in the suburb of Carlton should not be required to conduct a BAL assessment.*

*I believe that the current approach needs to be modified and I am concerned that the Interim Regulations have introduced additional costs in carrying out building works.*

*There is a definite need for a scientific and measured approach to building in bushfire prone areas. The most effective means of achieving this would be via a mapping system similar to Wildfire Management Overlays and designated bushfire prone area mapping where areas of bushfire risk are identified. This should be done in a methodical manner with the risk throughout Victoria mapped on a regional basis. Areas of no risk should be excluded from compliance with the BAL site assessment requirements. This approach should be coordinated at state level with appropriate resources provided to conduct the mapping and also to manage the data base on an ongoing basis. People constructing in bushfire prone areas would then know when and where a BAL was required.*

5.8 Mr Harding of the HIA was critical of the additional regulatory burden imposed by the interim arrangement, which added cost but no real value to the building permit approval process for homes in existing suburban areas. The HIA also advocated the
mapping and designation of bushfire prone areas by a single authority, on the basis that it would give consistency across the State. Mr Woolcock of MBA Building Services also pointed to inconsistencies in BAL assessments under the current regime, as well as unnecessary costs. He said that the MBAV would also prefer to see bushfire prone area mapping done by a state based authority.

5.9 Chris Watson, the municipal building surveyor with Latrobe City Council, proffered the following suggestion:

*I do not believe that responsibility for the declaration of BPAs should revert to Councils. This responsibility should rest with the CFA, as the CFA is the agency with the relevant expertise in identifying fire risk. My suggestion, which is supported by the Municipal Association of Victoria, is that the designation and declaration of BPAs be done by the CFA at the State level in consultation with Councils who can provide local knowledge where appropriate. Alternatively, responsibility for the declaration of BPAs should rest with the Building Commission, as the peak statutory authority in this area, using both the CFA and Local Government to inform its designation process.*

5.10 While the CFA does not have a formal position as to whether it should be responsible for designating bushfire prone areas in future, Mr Andreou said it was his personal view that it made sense for a single agency to be responsible for mapping Victoria’s bushfire prone areas. He considered that the CFA was competent to undertake that task.

5.11 There are at least two States in which the designation of bushfire prone areas is driven more centrally than has been the case in Victoria: South Australia and New South Wales.

5.12 South Australia has a statewide system for designating Bushfire Protection Areas. These were designated between 2006 and 2007 by Ministerial amendments to the Development Plans of 39 councils, following a bushfire mapping process undertaken by the South Australian Government in consultation with councils, the Country Fire Service and the public. The mapping process had two stages: a strategic assessment, and a more detailed hazard assessment. Bushfire Protection Areas are divided into

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318 Exhibit 179 – Statement Harding (WIT.7503.001.0001) [96]-[101]; Harding T5664:8-T5664:29
319 Exhibit 185 – Statement of Woolcock (WIT.7505.001.0001) [52]-[56]; Woolcock T5790:16-T5792:16
320 Exhibit 183 - Statement of Watson (WIT.4001.001.0001) [22]; Watson T5832:8-T5834:2
321 Exhibit 207 – Statement of Andreou (WIT.3004.012.0065) [35]; Andreou T6420:28-T6421:8
322 Andreou T6420:19-T6420:27
three distinct levels of risk: General, Medium and High Bushfire Risk. Areas identified as Medium or High Bushfire Risk are designated as bushfire prone areas for the purposes of the application of the bushfire safety provisions of the BCA.

5.13 In New South Wales, bushfire prone land is land designated as such by the Commissioner of the NSW RFS, at the request of a council. The designation of land as bushfire prone land trigges the application of bushfire specific building and planning controls. While councils must request the designation of bushfire prone land, in practice the NSW RFS exerts considerable control through providing strict mapping guidelines and legislative power to certify bushfire prone land maps.324

5.14 It is the submission of Counsel Assisting that the mapping and designation of bushfire prone areas in Victoria should be the responsibility of a single, appropriately resourced agency. A single agency with the necessary expertise would be able to thoroughly and consistently assess and map the State’s bushfire risk, and to review and update maps regularly. This would be vastly preferable to the current arrangement, which does not permit risk assessment beyond the individual site and does not lend itself to the holistic management of bushfire risk in areas such as land use planning and emergency management. It would also remove the unnecessary regulatory burden involved in requiring BAL assessments for building work where there is plainly no bushfire risk.

5.15 The CFA already has expertise in this area and is one agency that might undertake this role. There may be other agencies within the Victorian government that can carry out this task. Consideration of which agency is most appropriate should wait until after the Commission has considered the related issue of whether the designation of bushfire prone areas for the purposes of building controls in bushfire prone areas should be integrated with the declaration of WMOs in planning schemes.

5.16 The interim arrangements should continue only for so long as it takes to complete the task of mapping the State’s bushfire risk. In the meantime, areas where there is clearly no bushfire risk should be excluded from the effective designation of the whole State as a bushfire prone area.325

**Proposed recommendation 8:** From March 2010, a single, appropriately resourced agency with expertise in mapping bushfire risk be responsible for the mapping and designation of bushfire prone areas in Victoria in consultation with councils and fire agencies. This agency should immediately commence the comprehensive mapping of Victoria’s bushfire risk, commencing

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324 Exhibit 167 – BRC Research - Building and Planning in Bushfire Prone Areas - Regulation and Policy in Other States and Territories , Appendix One – New South Wales (TEN.065.001.0038) at 0038-0042; Exhibit 167 – NSW Rural Fire Service, Guideline - Bush Fire Prone Land Mapping (TEN.063.001.0024)
325 Andreou T6421.18-T6421.25; Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [51]
with an initial strategic assessment, and proceeding to a detailed hazard assessment of each region, giving priority to the regions of highest bushfire risk. The agency should progressively designate bushfire prone areas for the purposes of the application of the bushfire safety provisions of the BCA and AS 3959-2009. The agency should review the mapping and designation of bushfire prone areas at least once every five years.

**Proposed recommendation 9:** The designation of the whole of Victoria as a bushfire prone area be progressively phased out from March 2010, as each stage of the mapping of Victoria’s bushfire risk is completed. Areas in which there is no bushfire risk should be excluded from the designation of bushfire prone areas as a matter of priority.

6  **BUSHFIRE BUNKERS**

6.1 The submissions of Counsel Assisting in relation to bushfire bunkers are set out in the submissions in relation to interim recommendations regarding building in bushfire prone areas, dated 28 September 2009.326

7  **BUSHFIRE SPRINKLERS**

7.1 One of the significant findings in the Bushfire CRC’s Interim Report was the strong positive influence of the presence of sprinkler systems on house survival.327 The Commission has heard a number of accounts from lay witnesses of the role played by sprinklers in the successful defence of a house.328

7.2 The installation of a sprinkler system is a most useful bushfire protection measure, and one of particular interest to the many householders whose houses were constructed before the advent of AS 3959. It is a bushfire safety measure recommended in the CFA’s workbook *Living in the Bush*.329 But sprinkler systems do

326 Building in Bushfire Prone Areas – Interim Recommendations – Submissions of Counsel Assisting (SUBM.200.001.0001)

327 Exhibit 126 - Bushfire CRC Interim Report (CRC.300.001.0001_R) at 0199. Note the preliminary nature of this finding and the possibility that other factors may have influenced house survival: Leonard T5956:28-T5957:16


329 Exhibit 9 – Living in the Bush - Bushfire Survival Plan Workbook - Second Edition 2008 (TEN.001.0001.0004) at 0025
fail during a fire, as several lay witnesses have attested, and the presence of a sprinkler system is no guarantee that a house or its occupants will survive a fire.

7.3 There is, however, no standard for bushfire sprinklers that might give guidance to householders in the design and installation of a workable sprinkler system. Mr Eadie told the Commission that bushfire sprinklers and sprayers were not within the scope of AS 3959, and were most likely to be addressed as a separate and specific Standards development project. Mr Eadie is the convenor of Standards Australia technical sub-committee FP-004-02, which is responsible for bushfire sprinklers and sprayers. When he gave evidence in August 2009 he was about to submit a project proposal to Standards Australia for the development of a standard for bushfire sprinklers and sprayers, to be developed using the committee driven development pathway. Mr Eadie estimated that it would take two years to develop the standard using that pathway.

7.4 Without detracting from Mr Eadie’s work in initiating the development of a standard for bushfire sprinklers, two years is a long time to wait for this standard in the current environment. It would be highly desirable for this standard to be completed and ready for publication within a much shorter period, ideally within 12 months. Under Standards Australia’s new business model, effective project management should be able to bring this project to a more timely conclusion.

**Proposed recommendation 10**: Standards Australia, through its technical committee FP-004, develop a standard for bushfire sprinklers and sprayers, for publication by no later than 30 September 2010.

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331 Davey T776:19-T776:28; Hollowood T10646:13-T10646:31, T10649:25-T10650:25 (D & C Lynch) – please note this evidence is subject to suppression order ORD.0015.001.0001
332 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [21], [138]
333 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [8]
334 Eadie T5391:23-T5392:12
8 BUILDING MAINTENANCE

8.1 In October 2003 the House of Representatives Select Committee into the recent Australian bushfires delivered its report *A Nation Charred: Report on the inquiry into bushfires.*\(^{335}\) Recommendation 47 in that report was:\(^{336}\)


8.2 The Committee referred to the range of building maintenance measures that can help to protect a building from a bushfire, such as sealing crevices, cleaning chimneys, maintaining paint work on timber, and replacing rotten boards and loose roof tiles.\(^{337}\) Other “maintenance” measures referred to by the Committee concerned the maintenance of a defendable space around the home, such as removing vegetation and hazardous material, maintaining lawns and raking grounds.\(^{338}\) It concluded that appropriate building maintenance is not widely performed and that the lack of building maintenance could be attributed to regulations that focus specifically on construction and only in bushfire prone areas\(^{339}\) – hence Recommendation 47.

8.3 Recommendation 47 disappeared almost without trace. The ABCB made no response to the recommendation, because it was directed to Standards Australia.\(^{340}\) Standards Australia did not act on or respond to the recommendation,\(^{341}\) perhaps because it regarded maintenance as outside the scope of a construction standard referenced in the BCA.\(^{342}\)

8.4 The COAG Report, *National Inquiry on Bushfire Mitigation and Management*, also noted that a shortcoming of AS 3959-1999 was “the absence of any requirement or mechanism for ensuring continuing building maintenance”, and supported AFAC’s work to develop a position for the protection and construction of habitable buildings

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335 Exhibit 160 - A Nation Charred: Report on the inquiry into bushfires, 2003 (EXH.160.0001)
336 Exhibit 160 - A Nation Charred: Report on the inquiry into bushfires, 2003 (EXH.160.0001) at 0029, Recommendation 47
337 Exhibit 160 - A Nation Charred: Report on the inquiry into bushfires, 2003 (EXH.160.0001) at 0294, Table 7.4
338 Exhibit 160 - A Nation Charred: Report on the inquiry into bushfires, 2003 (EXH.160.0001) at 0294, Table 7.4
339 Exhibit 160 - A Nation Charred: Report on the inquiry into bushfires, 2003 (EXH.160.0001) at 0305-0306, [7.76]-[7.77]
340 Exhibit 177 – Statement of Donaldson (WIT.6001.002.0001) [56]-[58]
341 Exhibit 171 – Statement of Tucker (WIT.7501.001.0001) [129]-[130], Exhibit JDT-100 (WIT.7505.005.0277); Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [142]
342 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [21]; Eadie TS392:23-TS292:30
in bushfire prone areas, including by incorporating building maintenance in AS 3959.343

8.5 AFAC remains concerned that there are no provisions for the ongoing maintenance of the bushfire safety features of a building during its life.344 The law requires a house in a bushfire prone area to be constructed to a specified standard for the protection of all those who might own or reside in that house during its life.345 The benefit of that requirement will be eroded or lost altogether if:

(a) the house is poorly maintained, with holes in window screens, loose roof tiles and flaking paint on the eaves;
(b) it is modified in a way that is inconsistent with the standard, for example by the construction of a deck or pergola; or
(c) growth of vegetation around the house increases the BAL for the site.

8.6 The means of addressing this issue proposed in Recommendation 47, expanding AS 3959 to incorporate maintenance of buildings, is impractical. There is force in Mr Eddie’s view that maintenance is beyond the scope of a construction standard referenced in the BCA.346

8.7 There are very real difficulties in regulating the ongoing maintenance of a house and its surrounds. Mr Chladil suggested a maintenance regime such as that found in the BCA for fire protection features in commercial buildings, where there is a requirement for an annual statement of compliance.347 Another possibility would be for the building surveyor to attach conditions as to the maintenance of bushfire safety features to occupancy permits for houses constructed in bushfire prone areas, enforced by an inspection regime.348 These suggestions were rejected as impractical by two of the building surveyors who gave evidence, largely because of difficulties with enforcement.349

8.8 While maintenance of a house’s bushfire safety features or the BAL for the site might be the subject of a note on the occupancy permit, it would appear that making these matters conditions of the occupancy permit is not supported by the Act or the Regulations in their current form. The Building Commission provided the Commission with advice to the effect that vegetation management cannot be enforced as a

343 Exhibit 142 – COAG, National Inquiry on Bushfire Mitigation and Management (TEN.049.001.0001) at 0130-0131
344 Exhibit 174 – Statement of Chladil (WIT.7506.001.0001) [47]
345 Watson T5846:5-T5846:22
346 Exhibit 172 – Statement of Eadie (WIT.7502.001.0001) [21]; Eadie T5392:23-T5292:30
347 Chladil T5451:18-T5452:3. In Victoria the relevant provisions are found in the Building Regulations 2006, Part 12 – Maintenance of Buildings and Places of Public Entertainment
348 Chladil T5452:4-T5452:17
349 Woolcock T5792:17-T5793:5; Watson T5839:1-T5845:2
condition of an occupancy permit issued under the Act, because it is not “building work” and is therefore beyond the scope of the Act.\textsuperscript{350} Even if the legislation were to be amended, the difficulties of enforcing conditions of this nature would remain and potentially render the amendments ineffective.

8.9 Both Mr Chladil and Mr Arnel spoke of the important role of community information and education.\textsuperscript{351} The CFA already provides a good deal of information to the community about maintaining houses and defendable space, exemplified by its publication \textit{Living in the Bush}.\textsuperscript{352} In addition, maintenance issues will be covered in the forthcoming Standards Australia Handbook 330 – \textit{Living in bushfire-prone areas}.\textsuperscript{353} This information would be complemented by similar information published by the Building Commission, with accompanying community education.

8.10 However, it is submitted that some measure beyond community information and education is required to ensure the effectiveness of building controls in bushfire prone areas throughout the life of a building. Two measures are proposed.

8.11 First, it is proposed that s 32 of the \textit{Sale of Land Act 1962} be amended to require that a vendor’s statement under that section contain, in relation to the sale of land in a designated bushfire prone area on which a dwelling is situated, a current BAL assessment of the site of the dwelling and a statement as to the standard (if any) to which the dwelling was constructed and the BAL assessment at the time of construction. This would ensure that future purchasers of a house in a bushfire prone area will have notice of the current risk level of the site and the standard and risk level for which the house was constructed. Any increase in risk level over that for which the house was constructed is likely to have an impact on price, which will provide an incentive for owners to maintain the original BAL for the site or take steps to improve the BAL prior to sale.

8.12 Second, it is proposed that the Victorian Government develop and introduce a bushfire safety rating scheme for dwellings in bushfire prone areas, similar to the “star rating” scheme for energy efficiency. Under this scheme, the bushfire safety of the dwelling would be assessed and rated by reference to factors including its current level of compliance with building and planning controls for bushfire safety. The

\textsuperscript{350} Exhibit 206 – Memorandum of Advice (TEN.074.001.0002). This is contrary to advice previously given by the Building Commission in its practice notes on building controls for bushfire safety: Exhibit 169 – Statement of Arnel, Annexure M (WIT.3000.002.0361), Annexure O (WIT.3000.002.0368); see also Arnel T5206:31-T5207:14, T5754:1-T5755:11
\textsuperscript{351} Arnel T5208:17-T5208:23; Chladil T5452:18-T5452:25
\textsuperscript{352} Exhibit 9 – \textit{Living in the Bush} - Bushfire Survival Plan Workbook - Second Edition 2008 (TEN.001.001.0004) at 0023-0024
\textsuperscript{353} Eadie T5392:13-T5393:17; Exhibit 483 – Implementation Plan for Bushfire Handbook by Standards Australia, dated 25 September 2009 (CORR.0909.0153)
bushfire safety rating of the property could then be communicated to owners, occupiers (including tenants) and potential purchasers of the property.

8.13 This measure could build on the work already done in response to recommendation 7.2 in the Commission’s interim report, that the CFA consider the means of providing individual advice to residents in bushfire prone areas as to the defendability of their homes\(^{354}\), and the Household Bushfire Self-Assessment Tool developed in response to that and other recommendations\(^{355}\).

8.14 It is envisaged that this would be a voluntary scheme that could be used by current owners wanting an assessment of the bushfire safety or otherwise of their house to assist them in their fire planning and preparation; by vendors wishing to enhance the price of their property by providing an assessment of its bushfire safety rating; and by prospective tenants or purchasers of a house who need to know its level of bushfire safety.

8.15 No proposal is made as to the agency that should be responsible for the scheme – both the Building Commission and the CFA have relevant expertise, as do local councils.

Proposed recommendation 11: The Building Commission, in conjunction with the CFA, develop and publish information about maintaining the bushfire safety measures and BAL assessments of buildings in bushfire prone areas, and provide community education in relation to those measures.

Proposed recommendation 12: Section 32 of the Sale of Land Act 1962 be amended to require that a vendor’s statement under that section contain, in relation to the sale of land in a designated bushfire prone area on which a dwelling is situated, a current BAL assessment of the site of the dwelling and a statement as to the standard (if any) to which the dwelling was constructed and the BAL assessment at the time of construction.

Proposed recommendation 13: The Victorian Government develop and introduce a bushfire safety rating scheme for dwellings in bushfire prone areas, under which the bushfire safety of a dwelling is assessed and rated by reference to factors, including its current level of compliance with building and planning controls for bushfire safety.

\(^{354}\) 2009 Victorian Bushfires Royal Commission Interim Report at [7.2]
\(^{355}\) Exhibit 324 – Implementation Plan of the State of Victoria (RESP.3000.003.0001) at 0014
9 RETROFITTING OF BUILDINGS

9.1 The Building Commission’s analysis of homes destroyed by the fires on 7 February 2009 found that 87% of those homes were not required to be built to any bushfire standard.\textsuperscript{356} The requirement to build homes that comply with AS 3959 is prospective only, applying only to new buildings and extensions. This raises the question of what, if anything, should be done to improve the bushfire resistance of the very high number of existing buildings in areas of high bushfire risk that were not built to any bushfire standard.

9.2 AFAC’s tentative position on this subject is set out in the Draft Discussion Paper – Habitable Buildings in Bushfire Prone Areas:\textsuperscript{357}

5.7 Encourage owners of properties to upgrade and improve the bushfire preparedness of existing buildings.

Residential areas throughout Australia have been developed without consideration of bushfire impact. As such, existing housing has been placed in high risk areas with little or no protection measures. Member agencies are encouraged to develop programs with other relevant stakeholders such as local councils, to raise the awareness of residents and provide incentives to upgrade their existing assets and services to reduce the risk of bushfire damage.

9.3 The CFA already makes available advice as to modifications that can be made to existing homes to make them better able to withstand ember attack and the passage of a bushfire. Its publication \textit{Living in the Bush} contains numerous suggestions as to modifications that can be made to roofs, windows, doors, decks, sub-floor spaces, external vents and so forth.\textsuperscript{358} Each suggested modification is accompanied by a brief explanation of why the modification will make the building more bushfire resistant. Another possible modification is the installation of a sprinkler system, discussed above.

9.4 The useful work done by the CFA in this area would be enhanced if similar information were also published by the Building Commission, targeted at both the community and the building industry, together with community and industry education.

9.5 That leaves the question of whether there should be a legal requirement to modify or retrofit houses and other buildings in bushfire prone areas to make them compliant

\textsuperscript{356} See paragraph 2.28 above
\textsuperscript{357} Exhibit 174 – Statement of Chladil, Attachment 2 (WIT.7506.001.0024) at 0034
\textsuperscript{358} Exhibit 9 - \textit{Living in the Bush}: A Bushfire Survival Plan Workbook, CFA, 2nd ed, 2008 (TEN.001.001.0004) at 0021-0023
with AS 3959-2009. Mr Arnel acknowledged that there is some precedent for applying new regulations to existing buildings, in relation to pool and spa fencing, and some smoke alarms and fire sprinklers. However, in light of the substantial cost involved in modifying existing houses to meet AS 3959-2009, he expressed caution about making such retrofitting mandatory in the absence of a cost/benefit analysis.

9.6 No recommendation as to mandatory retrofitting is proposed.

9.7 Mr Arnel suggested that a suitably qualified practitioner could undertake an assessment of an existing house for the purposes of recommending modifications consistent with AS 3959-2009. The difficulty with this suggestion is the apparent absence of a pool of Victorian building practitioners qualified in bushfire planning and design, an issue discussed under the heading of Education and Training, below.

Proposed recommendation 14: The Building Commission, in conjunction with the CFA, develop and publish information as to ways in which existing buildings in bushfire prone areas can be modified to incorporate bushfire safety measures, and provide community and industry education in relation to those measures.

10 NON-RESIDENTIAL BUILDINGS

10.1 In Victoria AS 3959-2009 currently applies only to Class 1, 2, 3 and associated class 10a buildings – in essence to dwellings and nearby outbuildings. There are no bushfire related construction requirements for Class 4 to 9 buildings – such as schools, child care centres, hospitals, aged care facilities, shops and offices – constructed in bushfire prone areas, under the BCA generally or as varied by the Regulations. Many such buildings were destroyed in the Black Saturday fires.

10.2 Mr Arnel told the Commission that consideration should be given to extending the bushfire safety provisions of the BCA to all non-residential buildings. It is submitted that this should be done by the ABCB, with a particular focus on Class 9 buildings.

10.3 In New South Wales, the application of the BCA is varied to apply the bushfire safety provisions in Volume One to certain Class 4 and 9 buildings, known as “special fire protection purpose buildings”, whose occupants are particularly vulnerable to bushfire

359 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [256]
360 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [259][260]
361 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [261]
362 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [241]
363 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [246][252]
attack.\textsuperscript{364} The Building Commission is in the process of consulting with the NSW RFS about this variation.\textsuperscript{365} It is proposed that, pending the ABCB’s consideration of extending the bushfire safety provisions of the BCA to non-residential buildings, the application of the BCA in Victoria be varied to extend the application of those provisions to buildings that will be occupied by particularly vulnerable people, including schools, children’s services, hospitals and aged care facilities.

**Proposed recommendation 15:** The ABCB give consideration to extending the bushfire construction provisions of Volume One of the BCA to non-residential buildings, in particular Class 9 buildings.

**Proposed recommendation 16:** The Victorian Government amend the Building Regulations to modify the adoption of the BCA in Victoria so that the bushfire construction provisions of the BCA apply to the construction of non-residential buildings that will be occupied by people particularly vulnerable to bushfire attack, including schools, children’s services, hospitals and aged care facilities.

11 **EDUCATION AND TRAINING**

11.1 At present a BAL assessment must be undertaken in order to obtain a permit to build a dwelling anywhere in Victoria. The necessity for BAL assessments in bushfire prone areas will continue, whether on a statewide basis or in areas designated as bushfire prone following the comprehensive mapping of Victoria’s bushfire risk outlined above.

11.2 There is evidence before the Commission of difficulties experienced by building practitioners in interpreting and applying the site assessment methodology in AS 3959-2009.\textsuperscript{366} These difficulties manifest themselves in inconsistent BAL assessments and the poor quality of supporting information.\textsuperscript{367}

11.3 Following the adoption of AS 3959-2009 the Building Commission conducted 22 technical seminars for the building industry and 16 seminars for community members.\textsuperscript{368} In consultation with the Building Commission the CFA has developed a

364 See paragraph 3.26 above
365 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [250]-[251]
366 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [204]-[208]; Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [55]-[58]; Exhibit 185 – Statement of Woolcock (WIT.7505.001.0001) [54]-[66]; Exhibit 183 - Statement of Watson (WIT.4001.001.0001) [33], third dot point
367 Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [208]; Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [56]
one day course that has been used to train the Building Commission’s BAL assessment volunteers.\textsuperscript{369} At present the training available in relation to the site assessment methodology in AS 3959-2009 is occasional and informal, available through the Building Commission and professional associations.\textsuperscript{370} Mr Arnel acknowledged the desirability of there being more formal training available, and foreshadowed further developing the CFA’s one day course into a TAFE course.\textsuperscript{371} At a minimum, the Building Commission should continue to present seminars on AS 3959-2009, including the site assessment process, at regular intervals.

11.4 An interim practice note was issued by the Building Commission in August 2009, which provides some guidance as to the interpretation and application of the site assessment methodology.\textsuperscript{372} The practice note should be further developed and refined, including worked examples and case studies,\textsuperscript{373} and should include information about the interaction between bushfire planning and building controls that was included in earlier versions of the practice note.\textsuperscript{374}

11.5 Mr McLennan of the AIBS also identified a broader issue of a lack of knowledge in the building community of good bushfire design.\textsuperscript{375} He had surveyed attendees at the Building Commission seminars on AS 3959-2009, and estimated that less than 1% of them had done any bushfire specific training.\textsuperscript{376} One reason for this may be the absence of any training course in bushfire design in Victoria.\textsuperscript{377}

11.6 The University of Western Sydney offers a Graduate Diploma course in bushfire planning and design, the only institution in Australia that does so.\textsuperscript{378} Mr Orr, who has completed this course, described it as covering subjects ranging from fire behaviour, bushfire fighting and emergency management, to planning, defendable space and construction.\textsuperscript{379} The course focuses on legislation and practice in New South Wales, particularly in relation to planning issues.\textsuperscript{380} A practitioner who has completed this course will be well placed to take a holistic approach to planning and building in a bushfire prone area.

\textsuperscript{369} Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [209]
\textsuperscript{370} Arnel T5193:14-T5193:19; McLennan T5677:27-T5678:16
\textsuperscript{371} Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [209]; Arnel T5192:20-T5192:26, T5194:8-T5194:18
\textsuperscript{372} Exhibit 169 – Statement of Arnel (WIT.3000.002.0220) [206], Annexure R (WIT.3000.002.0396)
\textsuperscript{373} Exhibit 185 – Statement of Woolcock (WIT.7505.001.0001) [59]; Woolcock T5788:22-T5788:31
\textsuperscript{374} Exhibit 169 – Statement of Arnel, Annexure M (WIT.3000.002.0361), Annexure O (WIT.3000.002.0368)
\textsuperscript{375} Exhibit 180 – Statement of McLennan (WIT.068.001.0001) [55], [109]-[112]
\textsuperscript{376} McLennan T5677:4-T5677:19
\textsuperscript{377} McLennan T5677:27-T5678:16
\textsuperscript{378} Exhibit 188 – Statement of Orr (WIT.060.001.0001) [62]
\textsuperscript{379} Orr T5898:22-T5899:30
\textsuperscript{380} Orr T5898:25-T5898:31
Victoria University offers a Graduate Certificate and a Graduate Diploma in Fire Safety through its Centre for Fire Safety, although these courses focus on building fire safety rather than bushfire safety.\(^ {381}\) There is obvious potential for the development of a course in bushfire planning and design, specific to Victorian conditions, legislation and practice, at a Victorian university or TAFE college, perhaps at Victoria University in conjunction with the building fire safety courses already offered at that institution. The evidence before the Commission suggests a need for such a course.

The Commission should also note the FPAA’s Bushfire Planning and Design certification scheme, described by Mr Orr in his evidence.\(^ {382}\) It is currently the only scheme in Australia that benchmarks practitioners and businesses providing bushfire planning and design services.\(^ {383}\) Completion of the University of Western Sydney course is a criterion for accreditation, with the result that the scheme operates mainly in New South Wales.\(^ {384}\) Establishment of an equivalent course in Victoria would enable the FPAA to expand the operation of the scheme in Victoria, so that the Victorian community and building industry can benefit from this useful scheme.

**Proposed recommendation 17:** The Building Commission continue to conduct seminars on AS 3959-2009 - Construction of buildings in bushfire prone areas, including the site assessment methodology, at regular intervals of no more than 6 months.

**Proposed recommendation 18:** The Building Commission publish a revised practice note in relation to buildings controls for bushfire safety, which explains the site assessment methodology in AS 3959-2009 in more detail, using worked examples and case studies, and includes reference the interaction of bushfire planning and building controls.

**Proposed recommendation 19:** The Victorian Government, with the involvement of the CFA, establish a course in bushfire planning and design at a Victorian university or TAFE college.

\(^ {381}\) Exhibit 188 – Statement of Orr (WIT.060.001.0001) [62]
\(^ {382}\) Exhibit 188 – Statement of Orr (WIT.060.001.0001) [59]-[66]; Orr T5896:16-T5902:22
\(^ {383}\) Exhibit 188 – Statement of Orr (WIT.060.001.0001) [61]; T5902:9-T5902:22
\(^ {384}\) Exhibit 188 – Statement of Orr (WIT.060.001.0001) [61]-[62]