A guide to assessing your property's Bushfire Attack Level (BAL)

This guide responds to the community's desire to determine the potential level of bushfire risk their homes are likely to endure. It explains how to assess a property's BAL under the new residential building Standard using an easy six-step approach.

By following the six steps in the guide accurately you should be able to determine your building site's BAL. However, you will still need to satisfy the relevant building surveyor that the BAL is correct.

Plumbing Industry Commission

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Bushfire Building Advice Line

Victoria
The Place To Be

1300 360 320

Building Commission (9am – 5pm Monday to Friday)

Assessing a property's
Bushfire Attack Level (BAL)

Six steps to a successful BAL assessment

Victoria has endured Australia's worst ever natural disaster with more than 2,000 properties destroyed and countless others damaged.

As a community we have quickly responded to the needs of the many thousands of people who have been displaced by this ordeal.

The Victorian Government understands the desire for many bushfire affected people to now start the rebuilding process. At the same time, it was essential that the right building measures were in place to provide certainty to people that their new homes, repairs, alterations and additions would be safer with higher levels of bushfire protection.

That's why Victoria acted to become the first State to adopt the Australian Standard AS 3959-2009 through its ***Building Regulations 2006*** on 11 March 2009.

The new Australian Standard applies to the whole State, and sites are now defined under six Bushfire Attack Level (BAL) categories from low to extreme. There are increasing construction requirements ranging from ember protection to direct flame contact protection.

This guide responds to the community's need to determine the potential level of bushfire risk their homes are likely to be under. It explains how to assess a property's BAL under the new building Standard using its simplified method in an easy six-step approach.

By following the six steps in the guide accurately you should be able to determine your building site's BAL. However, you will still need to satisfy the relevant building surveyor that the BAL is correct. This guide is an indication of your site's BAL only.

Importantly, if the BAL is accurate then the appropriate construction methods will need to be incorporated in the design documents and specifications that you submit to your relevant building surveyor for a building permit.

For further information on the new residential building Standard contact your builder, architect, building designer, private or local Council's Building Surveyor. The Building Commission publication ***A guide to building in Victoria after the bushfires*** is also available at your local Council or via the website **www.buildingcommission.com.au**

You can also contact the **Bushfire Building Advice Line on 1300 360 320.**

Six steps to assess your property's Bushfire Attack Level (BAL)

Step one	Determine your Fire Danger Index (FDI)
Step two	Determine your site's vegetation types
Step three	Determine the distance from the site to the vegetation
Step four	Determine the slope of the land under the vegetation
Step five	Determine the BAL
Step six	Apply the construction requirements set out in Australian Standard AS 3959-2009

A guide to assessing a property's Bushfire Attack Level (BAL)

The aim of the residential building standard Australian Standard, AS 3959-2009, is to improve the ability of buildings to withstand attack from bushfires. This provides greater protection for the occupants of a building while the fire front passes as well as to the building itself.

The Standard sets out construction requirements based on Bushfire Attack Levels (BAL). The BAL takes into consideration a number of factors including the Fire Danger Index, the slope of land, types of surrounding vegetation and its proximity to any building. The chart below describes the six bushfire attack levels (BAL) that are used in the Standard.

Bushfire Attack Levels under the Australian Standard 3959-2009

Bushfire Attack level (BAL)	Description of predicted bushfire attack and levels of exposure
BAL – LOW	There is insufficient risk to warrant specific construction requirements
BAL – 12.5	Ember attack
BAL – 19	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux between 12.5 and 19 kW m^2
BAL – 29	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux between 19 and 29 kW m^2
BAL – 40	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of exposure to flames
BAL – FZ	Direct exposure to flames from fire front in addition to heat flux and ember attack

A site assessment can be made by an owner, architect, building designer, building surveyor or builder to ascertain its BAL, which determines the construction methods that must be used. The construction methods must be included on the design documents lodged for a building permit. The relevant building surveyor will check that these requirements are met.

The information in this guide summarises the simplified method for people to determine their BAL using an easy six-step approach. Sufficient information should be provided to the relevant building surveyor to allow confirmation of the assessment. A more accurate assessment can be attained using the detailed method in Appendix B of Australian Standard AS 3959 – 2009.

Assessing a property's
Bushfire Attack Level (BAL)

Six-steps to assess your BAL

Step one
Determine your Fire Danger Index (FDI)

The Fire Danger Index (FDI) is a measure of the probability of a bushfire starting, its rate of spread, intensity and difficulty of suppression according to various combinations of temperature, relative humidity, wind speed and estimate of fuel state, all of which is influenced by daily rainfall and the time elapsed since the last rainfall.

Under the simplified method in the Standard there are two levels of FDI that apply to Victoria. The Fire Danger Index is either 50 in an alpine area or 100 elsewhere. Most properties in Victoria will be 100. This will then determine which of the final BAL tables to use to assess your property in Step five.

Step two
Determine your site's vegetation types

Classifying the vegetation type is not difficult. The Standard provides tables that set out in words and visually seven types of vegetation classification. Just look for the description and drawings that are most like your site's vegetation type in the tables on the following pages.

The Standard does contain some exclusions for vegetation types. The vegetation would be classified at the lowest bushfire attack level BAL-LOW if it is one or a combination of the following:

- Vegetation that is more than 100 metres from the site
- Single areas of vegetation less than 1 hectare in area and not within 100 metres of other classifiable vegetation
- Multiple areas of vegetation less that 0.25 hectares in area and not within 20 metres of the site or each other
- Strips of vegetation less than 20 metres in width and not within 20 metres of the site or each other or other areas of classifiable vegetation
- Non-vegetated areas including waterways, roads, footpaths, buildings or rock outcrops
- Low threat vegetation including managed grassland, maintained lawns, golf courses and public reserves.

Textual classification of vegetation

Vegetation classification	Vegetation type	Figure No. (see page 7)	Description
A Forest	Tall open forest Tall woodland	01 02	Trees over 30 m high; 30–70% foliage cover (may include understorey ranging from rainforest and tree ferns to low trees and tall shrubs). Found in areas of high reliable rainfall. Typically dominated by eucalypts.
	Open forest Low open forest	03 04	Trees 10–30 m high; 30–70% foliage cover (may include understorey of sclerophyllous low trees and tall scrubs or grass). Typically dominated by eucalypts.
	Pine plantation	Not shown	Trees 10–30 m in height at maturity, generally comprising Pinus species or other softwood species, planted as a single species for the production of timber.
B Woodland	Woodland Open woodland	05 06	Trees 10–30 m high; 10–30% foliage cover dominated by eucalypts; understorey low trees to tall shrubs typically dominated by Acacia, Callitris or Casuarina.
	Low woodland Low open woodland Open shrubland	07 08 09	Low trees and shrubs 2–10 m high; foliage cover less than 10%. Dominated by eucalypts and Acacias. Often have a grassy understorey or low shrubs. Acacias and Casuarina woodlands grade to Atriplex shrublands in the arid and semi-arid zones.
C Shrubland	Closed heath Open heath	10 11	Found in wet areas affected by poor soil fertility or shallow soils. Shrubs 1–2 m high often comprising Banksia, Acacia, Hakea and Grevillea. Wet heaths occur in sands adjoining dunes of the littoral (shore) zone. Montane heaths occur on shallow or waterlogged soils.
	Low shrubland	12	Shrubs <2 m high; greater than 30% foliage cover. Understoreys may contain grasses. Acacia and Casuarina often dominant in the arid and semi-arid zones.
D Scrub	Closed scrub	13	Found in areas wet enough to support eucalypt trees, which are affected by poor soil fertility or shallow soils. >30% foliage cover. Dry heaths occur in rocky areas. Shrubs 1–2 m high. Typical of coastal wetlands.
	Open scrub	14	Trees greater than 2 m high, 10–30% foliage cover. Dominated by eucalypts or co-dominant Melaleuca and Myoporum with a mixed understorey.
E Mallee/ Mulga	Tall shrubland	15	Vegetation dominated by shrubs (especially eucalypts and Acacias) with a multi-stemmed habit; usually greater than 2 m in height <30% foliage cover. Understorey of widespread to dense low shrubs (Acacia) or sparse grasses.
F Rainforest	Tall closed forest Closed forest Low closed forest	16 17 18	Trees 10–40 m in height; >90% foliage cover; understorey may contain a large number of species with a variety of heights.
G Grassland (FDI 50 only)	Low open shrubland Hummock grassland Closed tussock grassland Tussock grassland Open tussock Sparse open tussock Dense sown pasture Sown pasture Open herbfield Sparse open herbfield	19 20 21 22 23 24 25 26 27 28	All forms, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%.

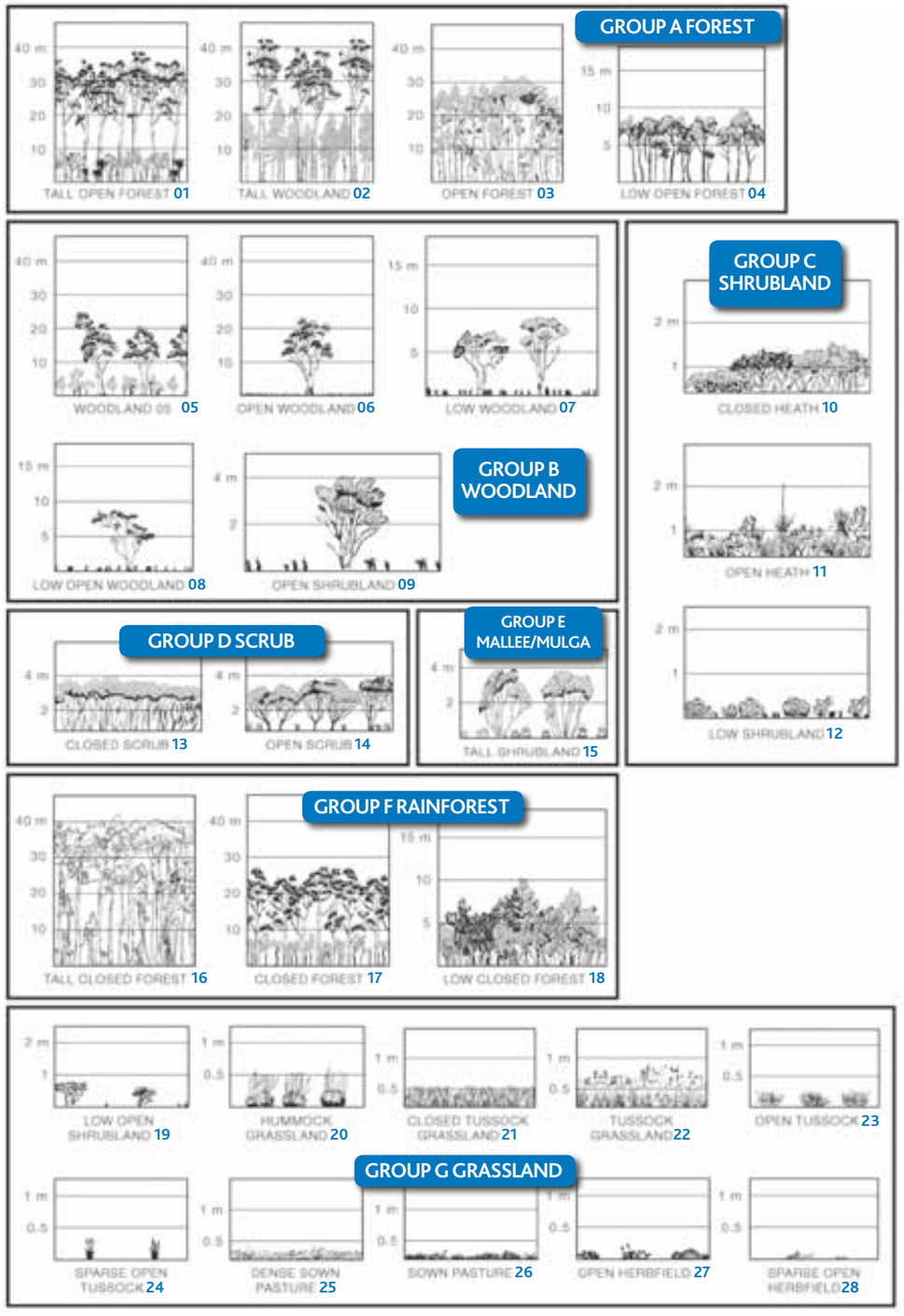
NOTES:

1 *Grassland, although classified as unmanaged, is not considered in the Bushfire Attack Level (BAL), except in Tasmania.*

2 *Overstoreys of open woodland, low open woodland, tall open shrubland and low open shrubland should be classified to the vegetation type on the basis of their understoreys; others to be classified on the basis of their overstoreys.*

3 *Vegetation height is the average height of the top of the overstorey.*

Visual classification of vegetation



Step three

Determine the distance from the site to the vegetation

After determining your site's vegetation type, the next step is to determine the distance from your site to the vegetation itself.

This is because the proximity of the vegetation to the building site will have an influence on the level of bushfire risk.

You must measure this horizontally from the edge of the vegetation (closest to the building site) to the external wall of the proposed building, or for parts of the building that do not have external walls (including car ports, verandahs, decks, landings, decks ramps) to the supporting posts or columns.

The following parts of the building are excluded from determining the distance from the vegetation to the building site:

- Eaves and roof overhangs
- Rainwater and domestic fuel tanks
- Chimneys, pipes, cooling and heating appliances or other services
- Unroofed pergolas
- Sun blinds
- Landings, terraces, steps and ramps, not more than one-metre in height.

Step four

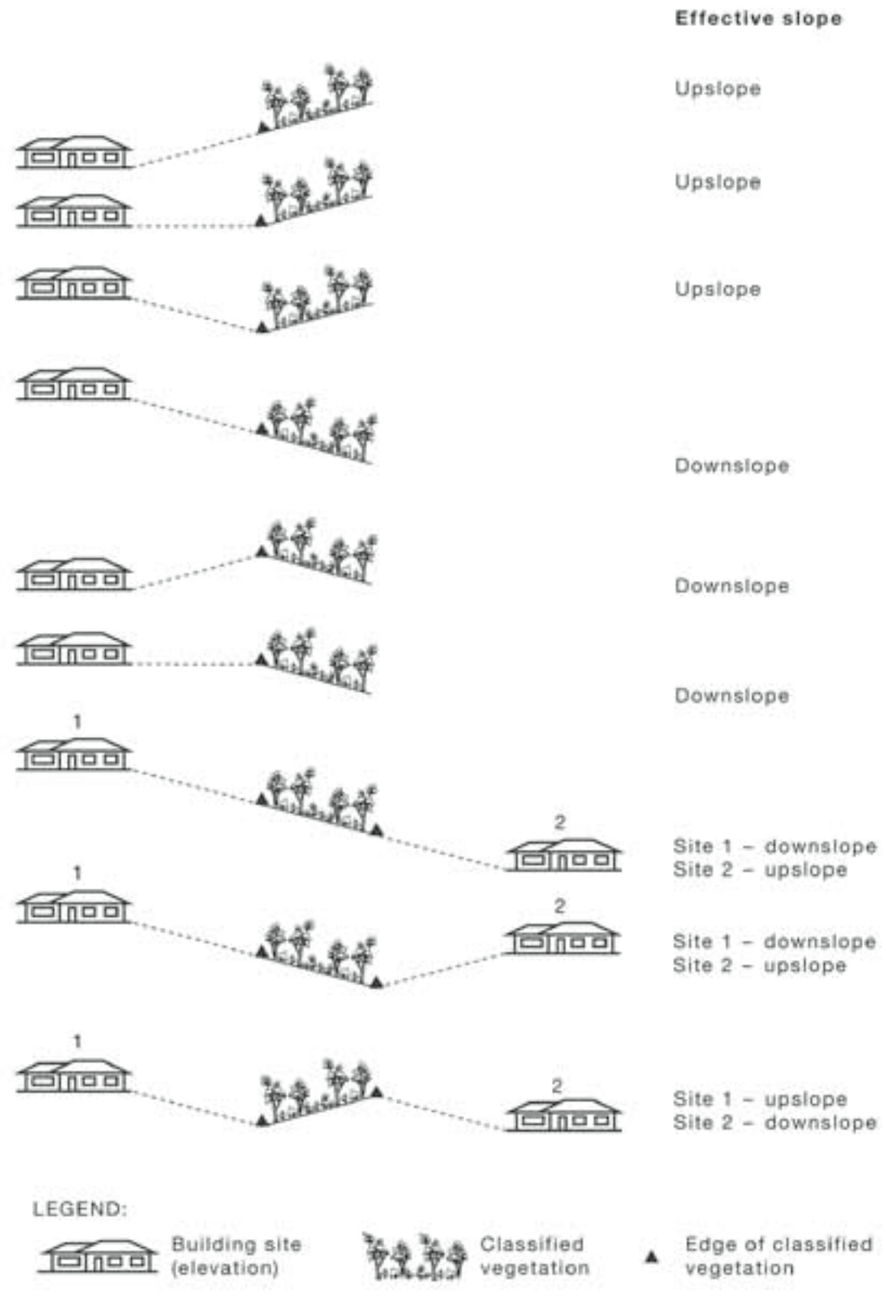
Determine the slope of the land under the vegetation

The slope of the land under the vegetation has a direct influence on the severity of a bushfire and consequently is considered in assessing your site's BAL. Bushfires have a tendency to move up more rapidly than down hills.

When determining your slope, it is the slope **under the classified vegetation** in relation to the building – not the slope between the classified vegetation and the building.

The following diagrams are useful in helping you determine whether the vegetation in relation to your building site is on an upslope or a downslope.

Determination of effective upslope and downslope



NOTE: *Effective 'slope' refers to the slope under the classified vegetation in relation to the building – not the slope between the classified vegetation and the building.*

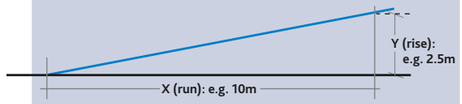
The approximate slope of the land must also be estimated in degrees. The table below will assist with converting the gradient (see **ratio** – right column) of the land to the slope in degrees (see **degrees** – left column). If your site is on an upslope or flat land, it assumes a value of 0 degrees, skip Step four and proceed to Step five.

Determination of slope in degrees

Slope Comparisons

Degrees	Ratio
45	1:1
34	1:1.5
26	1:2
21	1:2.5
18	1:3
15	1:3.5
14	1:4
12	1:4.5
11	1:5
10	1:5.5
9	1:6
9	1:6.5
8	1:7
8	1:7.5
7	1:8
7	1:8.5
6	1:9
6	1:10
5	1:11
5	1:12
4	1:13
4	1:14
4	1:15
4	1:16
3	1:17
3	1:18
3	1:19
3	1:20

Most people will determine the angle of their slope of land visually. However to accurately assess the slope in degrees, the diagram below will help with converting the gradient or ratio of the land to the slope in degrees.



The ratio of a slope is expressed comparing the length of the run to each 1 unit of measurement of the rise. To work out the length of the run for each unit rise, divide the run by the rise.

$$\frac{X\ (=10m)}{Y\ (=2.5m)} = 4$$

The ratio is then expressed as 1:4 (that is for each 1m of rise, there is 4m of run)

Note: The table to the left then converts this 1:4 ratio to 14 degrees.

Step five
Determine the BAL

To determine the BAL start by selecting the appropriate tables below, dependent on the Fire Danger Index (FDI) of 100 or 50 that you determined in Step one.

DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL) – FDI 100 (1090 K)

Vegetation classification	Bushfire Attack Levels (BALs)				
	BAL – FZ	BAL – 40	BAL – 29	BAL – 19	BAL – 12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
A. Forest	<19	19–<25	25–<35	35–<48	48–<100
B. Woodland	<12	12–<16	16–<24	24–<33	33–<100
C. Shrubland	<10	10–<13	13–<19	19–<27	27–<100
D. Scrub	<7	7–<9	9–<13	13–<19	19–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<8	8–<11	11–<16	16–<23	23–<100
	Downslope >0 to 5 degrees				
A. Forest	<24	24–<32	32–<43	43–<57	57–<100
B. Woodland	<15	15–<21	21–<29	29–<41	41–<100
C. Shrubland	<11	11–<15	15–<22	22–<31	31–<100
D. Scrub	<7	7–<10	10–<15	15–<22	22–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<10	10–<14	14–<20	20–<29	29–<100
	Downslope >5 to 10 degrees				
A. Forest	<31	31–<39	39–<53	53–<69	69–<100
B. Woodland	<20	20–<26	26–<37	37–<50	50–<100
C. Shrubland	<12	12–<17	17–<24	24–<35	35–<100
D. Scrub	<8	8–<11	11–<17	17–<25	25–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<13	13–<18	18–<26	26–<36	36–<100
	Downslope >10 to 15 degrees				
A. Forest	<39	39–<49	49–<64	64–<82	82–<100
B. Woodland	<25	25–<33	33–<45	45–<60	60–<100
C. Shrubland	<14	14–<19	19–<28	28–<39	39–<100
D. Scrub	<9	9–<13	13–<19	19–<28	28–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<17	17–<23	23–<33	33–<45	45–<100
	Downslope >15 to 20 degrees				
A. Forest	<50	50–<61	61–<78	78–<98	98–<100
B. Woodland	<32	32–<41	41–<56	56–<73	73–<100
C. Shrubland	<15	15–<21	21–<31	31–<43	43–<100
D. Scrub	<10	10–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<22	22–<29	29–<42	42–<56	56–<100

1. If you are on the border of BALs, choose the higher of the two.
2. As fire travels slower down a hill, all classified vegetation that is upslope will assum a value of 0 degrees the same as flat land.

DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL) – FDI 50 (1090 K)

Vegetation classification	Bushfire Attack Levels (BALs)				
	BAL – FZ	BAL – 40	BAL – 29	BAL – 19	BAL – 12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
A. Forest	<12	12–<16	16–<23	23–<32	32–<100
B. Woodland	<7	7–<10	10–<15	15–<22	22–<100
C. Shrubland	<10	10–<13	13–<19	19–<27	27–<100
D. Scrub	<7	7–<9	9–<13	13–<19	19–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<5	5–<6	6–<9	9–<14	14–<100
G. Tussock moorland	<7	7–<9	9–<14	14–<20	20–<100
	Downslope >0 to 5 degrees				
A. Forest	<14	14–<19	19–<27	27–<38	38–<100
B. Woodland	<9	9–<12	12–<18	18–<26	26–<100
C. Shrubland	<11	11–<15	15–<22	22–<31	31–<100
D. Scrub	<7	7–<10	10–<15	15–<22	22–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<6	6–<8	8–<12	12–<17	17–<100
G. Tussock moorland	<8	8–<10	10–<16	16–<23	23–<100
	Downslope >5 to 10 degrees				
A. Forest	<18	18–<24	24–<34	34–<46	46–<100
B. Woodland	<11	11–<15	15–<23	23–<32	32–<100
C. Shrubland	<12	12–<17	17–<24	24–<35	35–<100
D. Scrub	<8	8–<11	11–<17	17–<25	25–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<7	7–<10	10–<15	15–<22	22–<100
G. Tussock moorland	<9	9–<12	12–<18	18–<26	26–<100
	Downslope >10 to 15 degrees				
A. Forest	<22	22–<30	30–<41	41–<56	56–<100
B. Woodland	<14	14–<19	19–<28	28–<40	40–<100
C. Shrubland	<14	14–<19	19–<28	28–<39	39–<100
D. Scrub	<9	9–<13	13–<19	19–<28	28–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<9	9–<13	13–<19	19–<28	28–<100
G. Tussock moorland	<10	10–<13	13–<20	20–<29	29–<100
	Downslope >15 to 20 degrees				
A. Forest	<28	28–<37	37–<51	51–<67	67–<100
B. Woodland	<18	18–<25	25–<36	36–<48	48–<100
C. Shrubland	<15	15–<21	21–<31	31–<43	43–<100
D. Scrub	<10	10–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<12	12–<17	17–<25	25–<35	35–<100
G. Tussock moorland	<11	11–<15	15–<23	23–<33	33–<100

1. If you are on the border of BALs, choose the higher of the two.
2. As fire travels slower down a hill, all classified vegetation that is upslope will assum a value of 0 degrees the same as flat land.

Next, using the table go to the section that corresponds to your upslope or downslope degrees calculation that you determined in Step four. Then select the vegetation classification you determined at Step two, use the distance from your building site that you determined at Step three and finally, select the highest BAL obtained.

Congratulations, you have assessed your site's BAL!

Step six

Apply the construction requirements set out in the Australian Standard AS 3959-2009

Now you can apply the construction requirements set out in the Australian Standard AS 3959-2009 that correspond to the BAL.

Importantly, this will improve the ability of your building to withstand a bushfire attack at a higher temperature level, providing better protection to the occupants.

While the Australian Standard AS 3959-2009 will improve protection for new homes, as well as alterations and additions built in Victoria's bushfire-prone areas, it is important to note that it does not guarantee a building will survive a fire due to the unpredictable and often devastating nature of bushfires.

Checklist to assess your BAL (see tables at Step five)

Step one	Determine your Fire Danger Index (FDI)	**50 or 100?**	
Step two	Determine your site's vegetation types	**A-G?**	
Step three	Determine the distance from the site to the vegetation	**What is the distance?**	m
Step four	Determine the slope of the land under the vegetation (If upslope or flat 0 degrees applies)	**Upslope or downslope?**	
		Angle of slope in degrees?	0
Step five	Determine the BAL	**See BAL FDI 50 or 100 on pages 11 or 12**	
Step six	Apply the construction requirements set out in Australian Standard AS 3959-2009	**Talk to your builder or architect, building designer, private or local Council Building Surveyor.**	

Notes

Assessing a property's
Bushfire Attack Level (BAL)

Notes

Things to do

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Bushfire Building Advice Line

1300 360 320

Building Commission (9am – 5pm Monday to Friday)

Need more information?

Building Commission

Level 27, Casselden Place, 2 Lonsdale Street, Melbourne, Victoria 3000

Telephone +61 3 9285 6400 Facsimile +61 3 9285 6464

www.buildingcommission.com.au

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