Assessing a property's Bushfire Attack Level (BAL)

NOTE: Information from the Standard AS 3959-2009 is required to perform an assessment. It is available for purchase from the SAI Global Infostore www.saiglobal.com/search-publications/

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 from a bushfire as well as protection to the building itself.

The National Construction Code performance requirements require residential buildings in a bushfire prone area to be protected from embers, radiant heat and flame contact; safeguard occupants from injury; assist fire fighting and occupant evacuation and ensure availability of water for fire fighting purposes.

The Standard AS 3959 sets out construction requirements based on Bushfire Attack Levels (BAL). The BAL takes into consideration a number of factors including the Fire Danger Index (FDI), the slope of land, types of surrounding vegetation and its proximity to any building. The chart below describes the six bushfire attack levels that are used in the Standard.

Bushfire Attack Levels under the Australian Standard AS 3959-2009 (adapted from Table 3.1)

Bushfire Attack Level (BAL)	Predicted bushfire attack and exposure levels
BAL - LOW	**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 m² (kilowatts per square metre)**
BAL - 29	**Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux between 19 and 29 kW m²**
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 – Flame Zone	**Direct exposure to flames from fire front in addition to heat flux and ember attack**

A BAL assessment for a design can be made by an architect, building designer or a TFS-accredited bushfire hazard assessor. This 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 survey the BAL assessment documentation and that the construction requirements are met.

Six Steps to assess a BAL

The information in this guide summarises the simplified method for accredited practitioners to determine a BAL using an easy six-step approach. Sufficient information should be provided to the relevant building surveyor to allow confirmation of the assessment. 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, the FDI that applies to Tasmania is 50.

Before You Start

The BAL assessor must have:

1. A copy of AS 3959 -2009 (incorporating Amdts 1, 2 & 3) *Construction of buildings in bushfire-prone areas.*
2. The Building Code of Australia, Volume Two, see Part 3.7.4.
3. The *Building Regulations 2004* as amended 28 November 2012.
4. A site plan for the building work.
5. Access to aerial photographs, satellite mapping, "the List" or other spatial and cadastral information.

Note: a site visit will be required in almost all cases. Measurements of distances and slopes and photographs of the vegetation will be required for the four quadrants around the building.

Step One - Determine if the site is in a bushfire-prone area

The definition of a "bushfire-prone area" in regulation 3 of the *Building Regulations 2004* is:

> (a) land that is within the boundary of a bushfire-prone area shown on an overlay on a planning scheme map; and
>
> (b) where there is no overlay on a planning scheme map, or where the land is outside the boundary of a bushfire-prone area shown on an overlay on such a map, land that is within 100 metres of an area of bushfire-prone vegetation equal to or greater than one hectare;

In those regulations there is also a definition of 'bushfire-prone vegetation' which is: "contiguous vegetation including grasses and shrubs but not including maintained lawns, parks or gardens, nature strips, plant nurseries, golf courses, vineyards, orchards or vegetation on land that is used for horticultural purposes". "Contiguous" means separated by less than 20 metres.

Step Two - Determine the site's vegetation types

Classifying the vegetation type (structure) is not difficult. The Standard provides tables that set out both textually and visually seven types of vegetation classification. Look for the description and drawings that are most like the site's vegetation type in Table 2.3 and Figure 2.3 of AS 3959.

Remember that AS 3959 now includes grassland as bushfire-prone vegetation

The Standard does contain exclusions for some 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 (other than grassland) that is more than 100 metres from the site
- Grassland that is more than 50 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 .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.

Step Three - Determine the distance from the site to the vegetation

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

- The slope of the land **under the classified vegetation** has a direct influence on the severity of a bushfire and consequently is considered in assessing the site's BAL.
- The effective slope refers to the slope of the land under the classified vegetation and not the slope between the vegetation and the land
- An upslope under the vegetation, such as where a home is in a valley and the fire would burn downhill towards the home, under the simplified method is regarded as having the same level of bushfire risk as flat land surrounding the building site.
- A downslope under the vegetation, such as where a home is on a hill and the fire would burn uphill towards the home, is considered to have a higher level of bushfire risk than that for an upslope or flat land.
- To determine this, the approximate slope (or averaged slope) of the land must be measured or estimated in degrees. The table below will assist with converting the gradient (see ratio) of the land to the slope in degrees (see degrees). Inclinometers will be very useful to measure the slope.

Step Five - Determine the BAL

- To determine the BAL start by selecting Table 2.4.4 of AS 3959, (Fire Danger Index of 50).
- Then for each predominant vegetation classification in each quadrant you determined at Step Two, use the horizontal distance from your building site determined at Step Three, and the effective slope of the vegetation determined at Step Four to determine the BAL for that vegetation.
- Finally, select the highest BAL obtained from above.

Step Six - Apply the construction requirements set out in AS 3959-2009

Now the accredited building designer or accredited architect can apply the construction requirements set out in the Standard AS 3959-2009 that correspond to the BAL determined at Step Five.

NOTE:

While AS 3959-2009 will improve protection for new homes, as well as alterations and additions built in Tasmania'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. Correct use of the simplified method in AS 3959 will always produce a conservative outcome. In some cases it may be advantageous to obtain a report from an accredited bushfire hazard assessor to achieve a more cost-effective outcome.

Other resources - Workplace Standards website:

A Building Regulation Advisory Note and a list of Bushfire Assessors: Go to http://workplacestandards.tas.gov.au/resources/building_guides/building_in_special_areas