

Bushfire Management Overlay Mapping Methodology and Criteria

This advisory note outlines the mapping methodology and criteria used to determine where the Bushfire Management Overlay (BMO) will apply.

What is the BMO?

The BMO is a planning scheme provision used to guide the development of land in areas of high bushfire hazard. The location, design and construction of development and the implementation of bushfire protection measures must be considered under a BMO.

The BMO applies to areas where there is potential for extreme bushfire behaviour, such as a crown fire and extreme ember attack and radiant heat.

See *Practice note 65: Bushfire Management Overlay and bushfire protection: planning requirements* for more information about the BMO.

The difference between bushfire hazard and bushfire risk

A **hazard** is a specific source of potential damage or harm. The bushfire hazard consists of three key elements:

1. **Vegetation** (fuel) – Plants are the primary source of fuel for a bushfire. The amount, type and arrangement of vegetation affects how quickly a bushfire will spread and its intensity.
2. **Topography** (slope) - Fire burns faster uphill. As the slope increases so does the spread of fire and its intensity.
3. **Weather** – Hot, dry and/or windy weather increases the flammability of vegetation making it easier to ignite.

Risk is the chance or probability of damage or harm if exposed to a hazard and the severity of the impact. It includes consideration of the impacts from bushfire on life and property.

How does the BMO address bushfire hazard and risk?

The BMO deals with bushfire hazard and risk in the following ways:

1. The BMO is applied to areas based on the bushfire hazard following the methodology and criteria outlined in this advisory note.

- When a planning permit application is required under the BMO a site-based assessment of the bushfire hazard is undertaken and submitted as part of the application. This localised assessment considers vegetation types and slope to give an accurate picture of the bushfire hazard as it relates to a specific site.
- A risk assessment of a proposal is undertaken as part of a planning permit application. This involves considering a proposal against the objectives, standards and decision guidelines of the BMO and Clause 52.47 of a planning scheme.

The impact of fire on structures beyond the vegetation

The ways that a bushfire can impact a structure informs the criteria used to define the areas where the BMO will apply.

The three main ways a bushfire can impact a structure are ember attack, radiant heat and direct flame contact. Each of these elements can impact a structure at different distances beyond vegetation itself. The BMO mapping takes this variable distance into account.

Ember attack is the most common way houses catch fire during a bushfire. Ember attack occurs when small burning twigs, leaves and bark are carried by the wind, landing in and around houses and their gardens. If they land on or near flammable materials, such as leaf litter and dead plant matter, they can develop into spot fires. Embers can also ignite a house if they land on or near vulnerable parts of the building (such as decks).



Figure 1 – Ember attack on a structure

Embers can travel several kilometres ahead of the fire front. However, the most intense ember attack occurs within 150 metres of

the fire. Ember attack will have the most significant impact on the extent of the BMO map because radiant heat and direct flame contact impact at a much shorter distance.

Radiant heat can:

- ignite surfaces without direct flame contact or ember attack
- crack and break windows, allowing embers to enter a building
- distort and melt materials such as plastic.

Radiant heat can also dry out vegetation ahead of the bushfire so that it burns more readily and the bushfire spreads more quickly and with greater intensity.

Direct flame contact occurs when flames touch a structure. Burning vegetation can ignite a structure if it is close enough.

BMO mapping methodology and criteria

The BMO is applied to areas where there is potential for extreme bushfire behaviour, such as a crown fire, extreme ember attack and radiant heat.

There are two steps in the BMO mapping methodology.

- Hazard data is developed by the Department of Environment and Primary Industries (DEPI).
- A verification process is undertaken by the Department of Transport, Planning and Local Infrastructure (DTPLI).

Both of these steps are explained in more detail below.

Step 1 – Bushfire hazard data

The 2009 Victorian Bushfires Royal Commission recommended that a central point of responsibility for, and with expertise in, mapping bushfire be established to review mapping criteria used in the planning system based on the best available science. DEPI is the responsible agency for implementing this recommendation and has created updated hazard data to inform mapping for the BMO.

Bushfire hazard data for use in the Victorian planning and building system

DEPI has created hazard data for use in the planning and building systems based on fire behaviour generated from several factors including topography, fire fuel type and load and weather. A key output is modelled head fire intensity levels. Head fire intensity is a measure of the rate of energy release per unit length of fire front expressed as kW/m.

To enable the hazard data to be used in the planning and building systems, three different bushfire hazard levels have been created.

Bushfire Hazard Level Two (BHL2) – the most significant bushfire hazard where head fire intensity is modelled to be 30,000kW/m or more. This level of hazard informs where the BMO should apply. It also informs areas declared as bushfire prone in the building system.

Bushfire Hazard Level One (BHL1) – moderate bushfire hazard can be expected in these areas with head fire intensity modelled to be between 4,000kW/m and 30,000kW/m. This level of hazard informs areas declared as bushfire prone in the building system. Areas at the upper end of the bushfire intensity range (that is 28,000kW/m and above and referred to as BHL1b) will be considered, where appropriate, for applying the BMO based on the advice of the relevant fire authority.

Bushfire Hazard Level Low (BHL Low) – Areas where the extent, configuration and/or management of vegetation results in low potential for bushfire spread. BHL Low does not inform the BMO.

BHL2 data provides the target area for the BMO. The inputs used to model BHL2 include:

- physical conditions such as vegetation based on Ecological Vegetation Classes, topography, hydrology, roads, and so on)

- vegetation categories including forests, woodlands, scrub, shrublands, mallee and rainforests
- modelled fuels (at maximum fuel hazard/ fuel load)
- calculations used in AS3959-2009 Construction of Buildings in Bushfire Prone Areas (Standards Australia) but adjusted where necessary to reflect Victoria's unique bushfire conditions including:
 - a Fire Forest Danger Index (FFDI) of 120 (that is a scenario of 40 degree heat, 9% relative humidity and 56km/h winds)
 - a flame temperature of 1200kelvin
- separate fire behaviour models for forest fires, heath fires, mallee fires and grass fires.

BHL2 data is further refined by:

- excluding contiguous vegetation with an area of less than 4ha. Areas of contiguous vegetation less than 4ha do not generate a fire intensity that warrants the BMO.
- adding an ember protection buffer of 150m. This distance is based on research on house loss which indicates that 92% of house loss occurs within 150m of the bushfire hazard.

BHL2 does not consider public/private land boundaries, townships or human populations, previous bushfire history, or planned fuel reduction works.

Important note : BHL2 does not provide a representation of the bushfire risk.

Step 2 – Verification process

The BHL2 data is subjected to a verification process undertaken by DTPLI in partnership with fire authorities and municipal councils. The purpose of the verification is to:

- refine the accuracy of the map
- ensure the map reflects the purposes of the BMO planning provisions
- ensure that the map can be readily used as a statutory tool in planning schemes.

The verification process involves the following:

- additional information sources used to refine the accuracy of the map including:
 - aerial photography where this better defines the extent of vegetation
 - topographical and land use information that enables areas of lower hazard, where consistent with bushfire protection, to be removed. This includes water bodies and irrigated agricultural areas
- qualitative assessment which may include consideration of:
 - bushfire history data
 - landscape-scale bushfire hazards which indicate that areas meet the purpose of the BMO even though it was not identified in Step 1
 - other relevant bushfire risk activities and processes such as the Victorian Fire Risk Register
 - whether land within Bushfire Hazard Level 1b should also be included having regard to the purpose of the BMO
- **GIS processing** so that the final map is suitable for statutory purposes, including smoothing of lines, ensuring the 150 metre buffer from the hazard is consistently applied and only includes vegetation with a minimum patch size of 4ha or more.

More information

More information about the bushfire provisions introduced by Amendment VC83 is provided in:

[Advisory note 40 – Bushfire protection: Bushfire planning provisions](#)

[Advisory note 33 – Bushfire protection: Community fire refuge and private bushfire shelter exemptions](#)

[Advisory note 39 – Bushfire protection: Vegetation exemptions](#)

[Practice note 64 – Local planning for bushfire protection](#)

[Practice note 65 – Bushfire Management Overlay and bushfire protection: planning requirements](#)

More bushfire related information is available at www.dpcd.vic.gov.au/planning/bushfire

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