

GUIDELINES FOR DEVELOPMENT
IN BUSHFIRE PRONE AREAS
OF TASMANIA



LIVING WITH FIRE IN TASMANIA

This document was written by the Bushfire Planning Group which formed in 1998 following severe bushfires in many parts of Tasmania. The Bushfire Planning Group consists of members from the Tasmania Fire Service, the Department of Primary Industries, Water and Environment, the building industry and Local Government to provide the community with more tools for planning and developing in bush fire prone areas.

This document has been produced to provide guidance for anybody who already has or is thinking of building within a bush-fire prone area, and describes a range of ways a property can be protected from bushfire attack.

The recommendations contained in these Guidelines are based on those in the Tasmania Fire Service Planning Conditions and Guidelines for Subdivisions in Bushfire Prone Areas 1995.

Note that most of the specifications have not changed. However, the results of current research may change future specifications.

As a source of advice, this new document replaces the older Tasmania Fire Service document.

These Guidelines are subject to continuous review and suggestions for improvement may be made to the Bushfire Planning Group c/o Tasmania Fire Service, Box 1526 GPO Hobart 7001 Tasmania.

THESE GUIDELINES ARE NOT INTENDED TO BE USED AS A REGULATORY DOCUMENT

Terms used in this Document

Access provides safe entry and exit for both fire brigade and other vehicles to a building. Access includes roads, fire trails, entrances and driveways.

Building means a structure constructed in accordance with Classes 1-9 of the *Building Code of Australia 1996* to be used as a dwelling or workplace.

Building envelope is the dimensional space in which a building is required to fit in order to satisfy certain requirements such as planning schemes, site conditions, function and access.

Building Protection Zone (BPZ) is the area between the building and the Fuel Modified Buffer Zone where fine fuels are maintained in a minimum fuel condition (see BOX 2, page 7).

Bushfire prone area is land with standing vegetation one hectare or larger in extent, or land within 100 metres of an area of standing vegetation of one hectare or larger (see BOX 1, page 5).

Fine fuel is grasses, bracken, dead or fallen materials such as leaves, bark, twigs and branches up to 6 millimetres in diameter (see BOX 4, page 10).

Fuel Modified Buffer Zone (FMBZ) is the area between the Building Protection Zone and the bush or standing vegetation where fine fuel is maintained in a minimum fuel condition (see BOX 3, page 8).

Fuel reduced condition is where the amount of fine fuels is maintained at a level which will allow effective fire fighting with ordinary resources (see BOX 4, page 10).

Minimum fuel condition is where fine fuels are minimised to the extent that the passage of fire will be restricted, eg short green lawn, paths, drives (see BOX 4, page 10).

Standing vegetation means all forms of vegetation as well as regrowth after clearing, as well as all plantations and any other continuous vegetation in the form of trees and scrub that grows to a height of 2 metres or greater.

Table of Contents

Preface.....	2
Terms used in this document.....	2
1 How to use this document	4
2 Living with the bushfire hazard	5
Background.....	5
Council assistance	5
3 What is a bushfire prone area?	5
BOX 1. Development in Bushfire prone areas	5
4 Development responses for bushfire prone areas	6
a. Defendable space from bushfires	6
BOX 2. Building protection zone (BPZ)	7
BOX 3. Fuel modified buffer zone (FMBZ)	8
Lot layout and design	9
Slope	9
BOX 4. The influences of slope, aspect and vegetation	10
Appropriate methods.....	11
b. Roads.....	12
Road layout	12
Fire trails	13
Road design and construction	14
Appropriate methods.....	14
c. Water supplies for fire fighting.....	16
Appropriate methods.....	17
d. Building siting and design.....	18
Building siting	18
Building design	18
Building construction	19
Appropriate methods.....	20
5 Landscaping and vegetation	21
6 Bushfire hazard management plans	21
7 Local area planning	23
Further information	23

The objective of these Guidelines is: To minimise losses of life and property from bushfires by making living and working places defensible from bushfires.

This document can be used for different purposes:

- » If you intend to create new subdivisions, lots, roads or building sites, all of the information will need to be considered.

With new subdivision development the opportunity exists to 'build-in' all the 'best' design and construction features to achieve the best possible solutions.

- » If you intend to construct a building on an existing lot, you may only need to refer to the later sections on building siting and design.

With new development on existing lots there may be limitations. There are many existing lots which are not of the appropriate size and shape to provide for the protection measures recommended in this document.

For these sites, it is often necessary to be innovative to provide for the best possible solutions for the circumstances.

- » You will also find useful suggestions to improve the safety of an existing building in this document.

There will be many situations where you will be able to carry out some of the suggested measures for an existing building.

Bushfire hazards may occur in both urban and rural areas. The early parts of this document identify places where bushfire hazards warrant protective measures. The remainder of the document provides means for minimising the threat posed by bushfire hazards.

Important terms used in this document are defined.

Important technical issues are discussed in boxes. An objective for each development response is stated, followed by a commentary and examples of appropriate methods to reach the objective.

The methods provided are not the only way of achieving the desired outcomes.

If you cannot use the suggested appropriate methods or if you wish to use other methods you should contact your local Council or the Tasmania Fire Service to discuss your proposal.

Remember that implementing some bushfire safety measures will be subject to other regulations.

Talk to your Council to find out more.

In all cases, bushfire safety features need ongoing maintenance to ensure they will work when they are needed.

Further reading and additional sources of information are also provided.

These Guidelines do not change the requirements of the Building Code of Australia.

Background

Bushfires are a continuing part of the Tasmanian landscape and all members of the community need to be appropriately prepared for when bushfires come.

The planning and development of subdivisions and buildings greatly influence the area in which a bushfire will eventually run and so have a great impact on the inherent safety of the area. Good planning and development will include a series of measures for minimising the bushfire threat and reducing the physical and emotional costs that bushfires can produce.

Bushfire prone areas are defined and a range of planning and development responses are provided which can be used to increase the chances of survival of buildings and their occupants when a bushfire occurs.

The Tasmanian Planning System seeks to encourage sustainable development. The State's planning process obliges Council planning decisions to provide a safe living and working environment.

Sustainable development involves working to ensure that decisions about subdivisions and building siting and design include consideration of other issues such as scenic protection and conservation of the bush.

Councils use strategic planning to balance these sometimes competing needs in preparing their planning schemes.

A balanced assessment of competing issues is also often required when assessing applications for development and use.

If the proposed development is within a bushfire prone area (that is, either inside or beside bushland) then these Guidelines are relevant.

Council Assistance

Anyone considering development inside or beside the bush should contact their Council Planning or Building Officers to obtain Council's requirements for the site and other advice.

This will assist in obtaining approval for a proposed development.

What is a Bushfire Prone Area?

A bushfire prone area is a place where it is likely a bushfire will occur, and so may directly threaten the survival of either the occupants or buildings. Any place inside the bush or beside the bush is likely to be bushfire prone. (See BOX 1, page 5).

During a bushfire, a building may be subject to attack by embers, wind, smoke, radiant heat and flames.

The bushfire disaster in Canberra in January 2003 showed again that places hundreds of metres from the bush edge can be subject to a bushfire attack during a severe event.

The disaster also showed that houses can be successfully defended by people who are well prepared and present.

Some Councils have mapping systems which can show the level of potential for bushfires to occur for places within their municipal areas. However, it is strongly recommended that the definition of bushfire prone area used in this document should always be applied, as maps are not always up-to-date or at a useful scale.

BOX 1. DEVELOPMENT IN BUSHFIRE PRONE AREAS

The definition of bushfire prone areas aims to exclude places where the level of bushfire attack will be low so that specific bushfire protection measures will not be required.

The definition is supported by the experience in major bushfires which shows there is still a small risk of bushfire attack in places normally regarded as not being bushfire prone.

When major bushfires invade places

not considered bushfire prone, the fires spread from structure to structure rather than through the surrounding vegetation.

If development is to proceed safely in a place that can expect bushfire attack then the hazard or fuel needs to be modified or reduced.

In some places, only limited work will be needed for fuel management. However, the other bushfire

responses such as adequate water for fire fighting and appropriate access are still needed. In many places, the amount of work required may conflict with planning or environmental requirements. Ultimately, development may not be appropriate in areas likely to be subject to extreme levels of bushfire attack. Defining these areas is a subject of ongoing research.

4 Development Responses for Bushfire Prone Areas

There is no standard formula for development responses that are effective in all cases.

Each site will have its own unique set of threats and opportunities.

There are however several good practices which can be applied to different aspects of development:

a. Defendable Space from Bushfires

Produced by separation of the building from the bushfire hazard and minimisation of nearby hazards;

b. Roads

Planning for network connectivity and designing and constructing roads and fire trails for emergency use;

c. Water Supplies

Provision of adequate and accessible water supplies for effective fire fighting; and

d. Building

Siting, design and construction to maximise fire safety.

4a. Defendable Space from Bushfires

Objective: To provide sufficient space to allow a building to be defended from bushfires.

Fuel management areas are the land (ideally within a lot) directly surrounding buildings and between the buildings and the bushfire hazard.

Existing vegetation needs to be strategically modified and then maintained within these areas to achieve three protection outcomes:

- » to reduce the quantity of windborne sparks and embers reaching buildings;
- » to reduce radiant heat at the building; and
- » to halt or check direct flame attack.

Fuel management areas take two forms:

- » the Building Protection Zone (BPZ) (See BOX 2, page 7); and
- » the Fuel Modified Buffer Zone (FMBZ) (See BOX 3, page 8).

Appropriately created and maintained fuel management areas provide defendable space for a building from bushfires.

Defendable space can be provided either for new lots or existing situations.

In the case of new lots, there is the opportunity to provide sufficient size and shape to incorporate the required BPZ and FMBZ entirely on each lot. If the lots are to be small or if there are other planning considerations, then the fuel management areas can be provided for groups of lots.

The dimensions of existing lots may be insufficient to fully incorporate BPZ and FMBZ. Consequently, innovative solutions are needed to address bushfire hazard minimisation which take into account other planning criteria, such as visual and conservation values.

Lots often contain significant areas of bushland which are valued by residents and the community but which, if left unmanaged, can accumulate large fuel loads that increase the intensity of bushfires.

Many people are not accustomed to the fuel management practices associated with living in a bushfire prone area and so may not have either the knowledge, skills, or motivation to maintain the bush in a safe manner.

Further advice and support is available from Councils and the Tasmania Fire Service.

BOX 2. BUILDING PROTECTION ZONE

A **Building Protection Zone** (BPZ) is required to ensure that potential fuel surrounding a dwelling is minimised (Figure 1).

This zone is directly adjacent to the building and has a significant amount of fuel reduction so that there is little or no material available to burn around the dwelling when bushfires approach.

The Building Protection Zone is achieved by:

- » including non-flammable areas such as paths, driveways, and short cropped lawns;
- » locating dams, orchards, vegetable gardens and effluent disposal areas (septic tank trenches, drains, etc) on the fire prone side of the building;
- » using radiation shields and windbreaks such as stone fences and hedgerows, avoiding highly flammable plants (see Further Information, page 23);
- » removing fire hazards such as wood piles, rubbish heaps and stored fuels;
- » replacing highly flammable plants with low flammability species such as dogwood, white flag iris, native frangipani etc (see Further Information, page 23);
- » ensuring there is horizontal separation between tree crowns as well as vertical separation between ground litter and the canopy by pruning low branches; and
- » maintaining the area in a minimum fuel condition.

It is not necessary to remove all vegetation from within the Building Protection Zone.

Active weed management can often be a major part of implementing a Building Protection Zone. Individual trees rarely cause houses to burn in bushfires.

Trees can screen a building from windblown embers while protecting it from radiant heat. Generally smooth barked trees are favoured for this function as their barks are less likely to catch fire.

Ideally, no vegetation should be able to fall on the building.

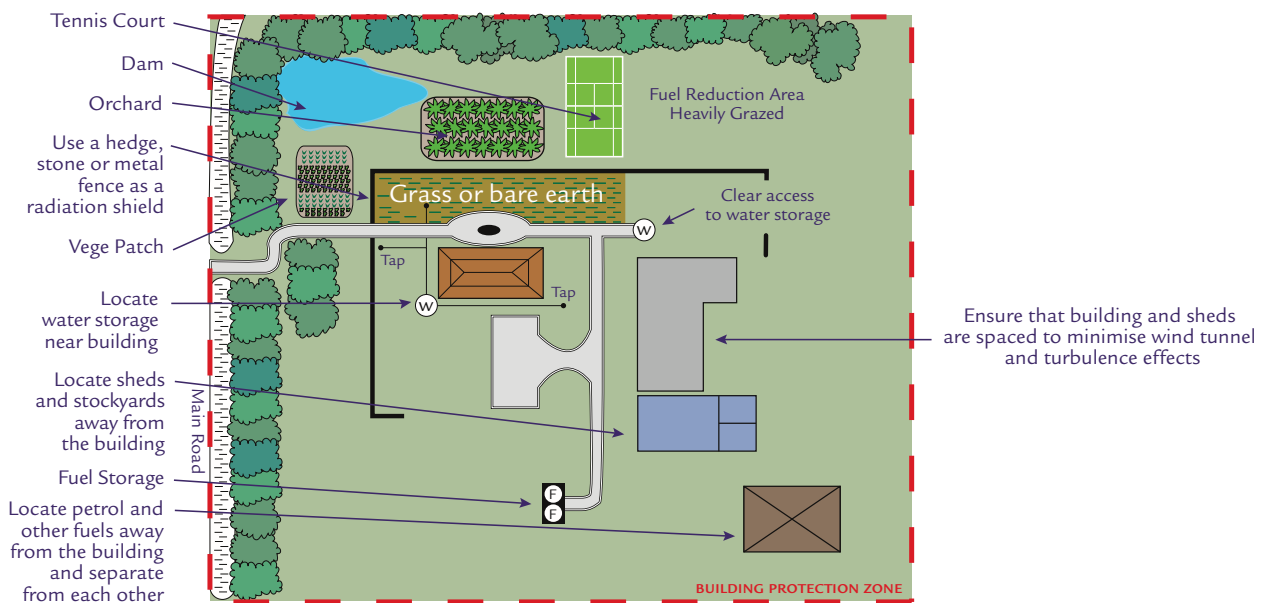


Figure 1. Lot layout showing a building, surrounded by a Building Protection Zone (see also Figure 11).

BOX 3. FUEL MODIFIED BUFFER ZONE

A **Fuel Modified Buffer Zone** (FMBZ) is required to separate the Building Protection Zone from the bushfire hazard. In the Fuel Modified Buffer Zone, fine fuels are removed and larger fuels are strategically modified to reduce the intensity of an approaching bushfire (Figure 2). Fuel amount and continuity, both on the ground and between the ground and any overstorey trees, is modified by selective removal of vegetation, both horizontally and vertically, followed by on-going maintenance.

The Fuel Modified Buffer Zone is achieved by:

- » retaining established trees to trap embers and reduce wind speeds;
- » selectively removing small trees and shrubs to create clumps (rather than a continuous wall) separated by open areas;
- » removing the fuel between the ground and the bottom of the tree canopy or to a height of at least 2 metres (pruning lower branches and shrubs);
- » minimising fine fuels at ground level (moving, slashing, raking, etc).

Active weed management can often be a major part of implementing a Fuel Modified Buffer Zone.

There is no need to remove most trees as they are beneficial in trapping embers and reducing wind speeds and will not be involved in a bushfire once the fuels below (understorey) have been modified. Good landscaping design should be able to provide for safety whilst retaining a pleasant environment.

The final impression, when up close, is of open vegetation, while from a distance it appears all the vegetation has been retained.

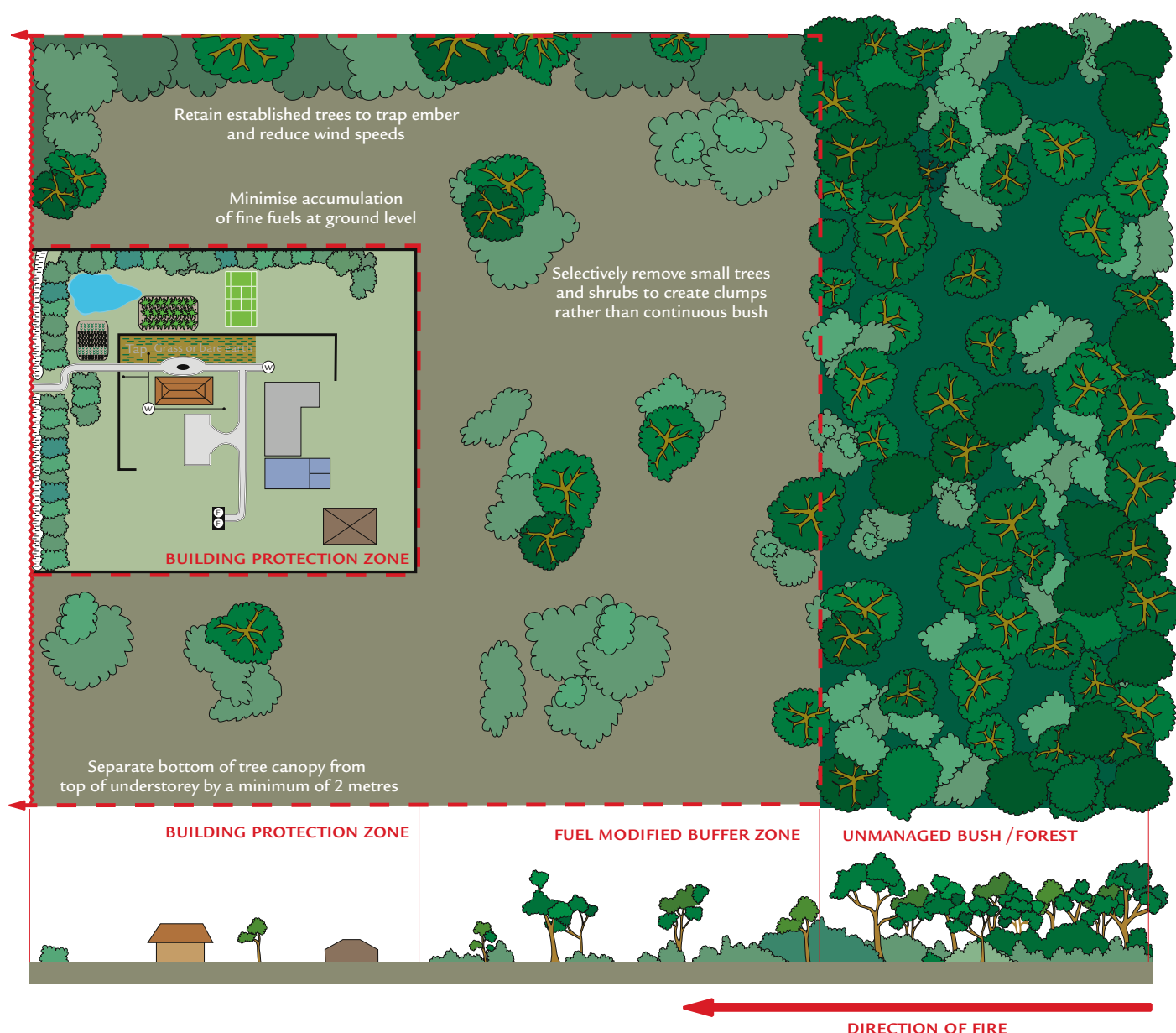


Figure 2. Lot layout showing the Building Protection Zone surrounded by the Fuel Modified buffer Zone (see also Figure 11).

Lot Layout and Design

The general principle is for each lot to be large enough to contain an adequate Building Protection Zone and Fuel Modified Buffer Zone to allow property owners the ability to control the threat to their lives and assets. Alternatively, denser development using smaller lots can be achieved provided they are clustered together and protected from the bushfire hazard by adequate fuel managed

areas and protective features such as roads, fire trails, etc. Clustering developments together will need to meet other planning scheme criteria. Lot design also needs to recognise the ongoing management needs of the site. The shape of lots should allow for appropriate fuel management areas to be established around building envelopes.

Actual size requirements for fuel managed areas are dependent upon slope and vegetation characteristics, and will vary from place to place. Bushfire hazard minimisation and management plans should be part of the initial design process. It will be easier and cheaper to implement the bushfire protection measures and will lead to more successful outcomes.

Slope

The slope or steepness needs to be taken into account when planning and designing developments in bushfire prone areas. In many areas of Tasmania the most sought after locations for residential development are on steep, heavily vegetated hill slopes with a northerly aspect which provide high aesthetic attraction, privacy and maximum sunlight for solar efficiency.

Unfortunately, all these desirable factors contribute to a potential high bushfire hazard. Generally, as fires travel faster and burn with greater intensity when moving upslope, the steeper the slope the greater the hazard. As slopes increase, the amount of ground required for fuel managed areas also increases.

Problems with steep slopes include:

- » restrictions on roads and access tracks for fire control due to erosion potential, visual impact considerations and expense;
- » potentially limited water supplies; and
- » larger lot sizes are needed to provide for fuel managed areas on-site.

When considering a site, Table 1 should be used to assess the average slope of the ground under the vegetation that is likely to be burning during a bushfire threatening the site being considered.

Table 1 – Describing and Measuring Slopes

Description	Slope Angle (degrees)	Slope Percentage (approximate)	Slope Ratio (approximate)
Flat	0	0	-
Gentle to Moderate	5	9	1:11
Moderate	10	17	1:6
Moderate to Steep	15	27	1:3.7
Steep	20	36	1:2.7

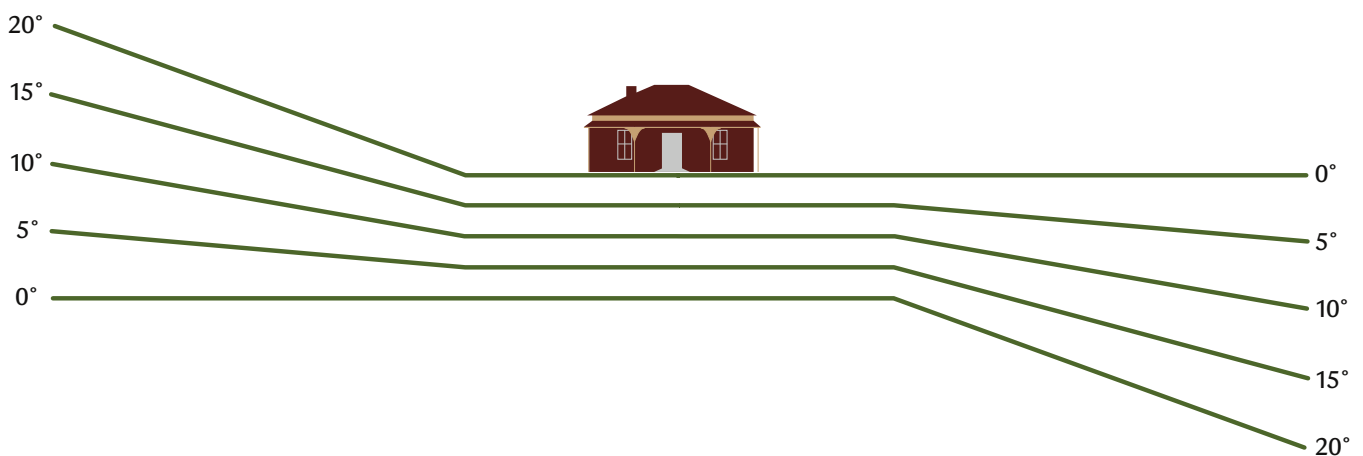


Figure 3. Diagram comparing different slopes

BOX 4. THE INFLUENCES OF SLOPE, ASPECT AND VEGETATION

Slope is important because the rate of spread of a fire, flame length and fire intensity all increase with increasing steepness. Slopes of about 15 degrees (1 in 3.7 or 27%) will have forward rates of spread about 3 times faster than flat ground elsewhere in Australia, slope is often combined with aspect to assess the degree of bushfire hazard. For Tasmanian conditions it is preferred to use knowledge of the vegetation on a site rather than its aspect.

Aspect is the direction that a slope faces and so is an indicator of the likely moisture and temperature regime of that slope. Aspect will also partly determine the amount of exposure a slope has to prevailing winds, and especially the winds associated with bad fire weather. In general, slopes facing from west through north to the northeast will be drier and warmer than those facing other directions. This is due to the amount of sunlight received which in turn modifies the soil structure and finally the on site vegetation. In many places in eastern and southern Australia, strong northwesterly winds are associated with bad fire weather. In Tasmania, location and local topography greatly modify the direction of winds received at the surface.

Therefore aspect is inappropriate for use for general fire hazard assessment in Tasmania without detailed knowledge of the local climate and fire weather.

Vegetation on a site will be influenced by the light, temperature and moisture regimes experienced by the site, as well as the underlying geology and soils and the fire and land management history of the site. Assessing the hazard posed by the vegetation type and amount integrates all the other factors and gives certainty about the degree of hazard. During a bushfire, it is the available fine fuels which mostly contribute to the spread of the fire. These are the kindling for a bushfire, just as small sticks and paper are used as kindling in a fireplace. Fuel management therefore is mostly concerned with the location, type, amount and arrangement of fine fuels. Managing an area in a minimum fuel condition may mean both reducing the amount and changing the arrangement of fuels. Most fine fuels are at or close to the ground, often as part of a grass, litter or shrub layer. If there is enough fuel, then when a fire comes these fuels will ignite the trees above or set the bark alight which will burn up into the tree canopy.

A crown fire occurs when the trees are alight and the fire travels through the tree tops. This is the most dangerous situation because of the high fire intensity produced. Without fire burning below, a crown fire should not be sustained. To prevent crown fires it is therefore necessary to remove the “ladder of fuel” between the ground and the tree crowns and to make sure the amount of ground fuel is not sufficient to set the crowns alight. This means that the shrub layer needs to be modified so it is not a tall continuous wall of vegetation and so there is a clear separation between the ground and the bottom of the tree canopy. Fuels do not need to be totally removed. Fuels close to the building in the Building Protection Zone are minimised and further out in the Fuel Modified Buffer Zone fuel levels are kept low. Fire fighters talk about fine fuel amount in tonnes per hectare. About 5 tonnes per hectare is accepted as being controllable with normal fire fighting resources. This can be visualised as grass cut to about 10 centimetres height or ground litter about 2 centimetres thick. This is considered to be a low fuel level.

Appropriate Methods

Defendable Space

- » Developments are designed so that buildings are surrounded by a BPZ and separated from the bushfire hazard by a FMBZ.
- » The required widths for BPZ and FMBZ are provided in Table 2. However, if the required width of the BPZ is exceeded, the width of the FMBZ may be reduced by that additional width, thus maintaining the same total width of the fuel managed area. (Note the width of the BPZ cannot be reduced).
- » The required fuel managed areas are on each lot, or where this is not possible or desirable, FMBZ is within the boundaries of the subdivision, and BPZ is within the boundaries of each lot.
- » Developments may be designed to place buildings in clusters, providing fuel managed areas, while preserving other planning values.
- » The slope and distance combinations in Table 2 are applied where there is no increased fire resistance in the construction of the building.
- » There is little additional benefit in increasing these distances.

Table 2 – Widths of Fuel Managed Areas

Slope	Building Protection Zone (Measured from the external walls of the building in metres along the ground)	Fuel Modified Buffer Zone (Measured from the Building Protection Zone in metres along the ground)	
		Grassland	Forest
Flat	20	10	15
5 degrees	20	15	25
10 degrees	25	20	30
15 degrees	30	30	45
20 degrees	40	40	50

Note: The distances shown may be able to be reduced if the building has its fire resistance increased in accordance with AS3959.

4b. Roads

Objective: To provide safe access to sites and buildings for emergency and other vehicles.

Road Layout

Many roads in Tasmania pass through steep country and dense vegetation and may be narrow dead-ends. Such roads can be particularly dangerous as there is only one way in and out which could be blocked by traffic, fire, fallen trees or even smoke.

Roads should avoid steep slopes because fire intensities will generally increase upslope. They should be through roads to allow safe

two-way travel into non-bushfire prone areas or away from the likely advance of a bushfire.

Cul-de-sac and battle-axe lots with long access ways are not recommended.

An ideal road layout places a perimeter road around developed areas separating the buildings from the bushfire hazard by a wide, permanent and low maintenance fire break.

Perimeter road layouts allow relatively easy access to the bushfire hazard for fire fighting and management. Perimeter roads can also be very effective in providing connectivity whilst improving the amenity of residential streets. However, other related planning considerations such as visual and conservation values will need to be considered before such arrangements are approved by Council.

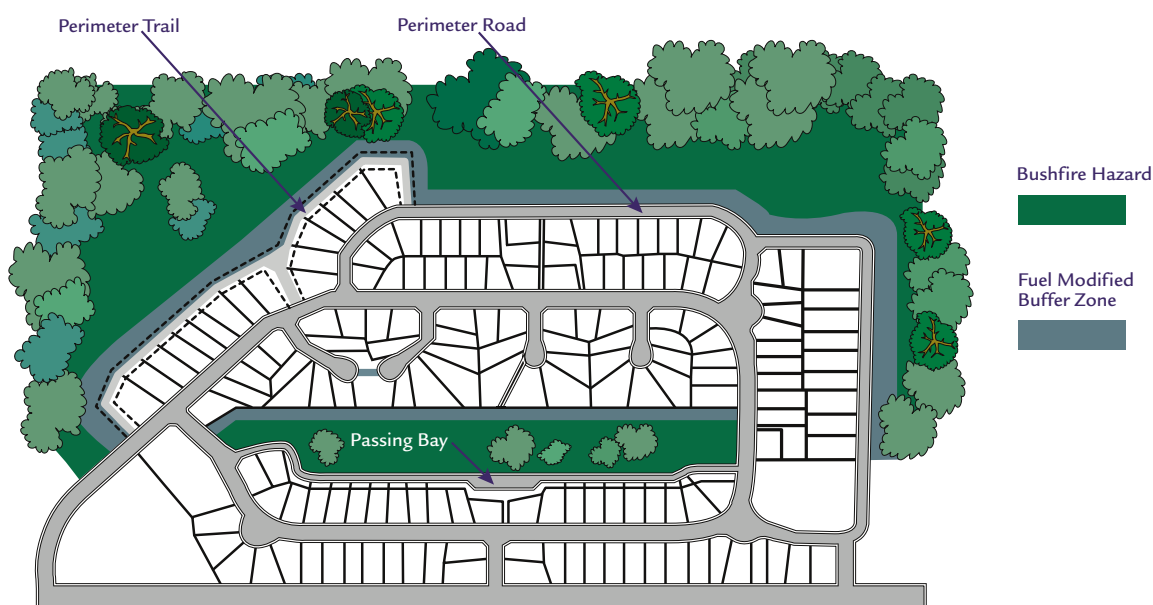


Figure 4. Diagram showing a sub division layout with perimeter roads, bushline and lots.

If access to the perimeter is not provided, fire fighting operations can only be based from internal access roads, decreasing firefighting ability and efficiency and increasing the risk to lives and buildings under attack.

Where a perimeter road is not provided, a fire trail should be established to give access to the bushfire hazard.

There are cases where two dead end roads can be linked by an access which can be used in emergencies.

This is not a preferred method of providing a safe access for dead end roads but may be the only solution in some places.

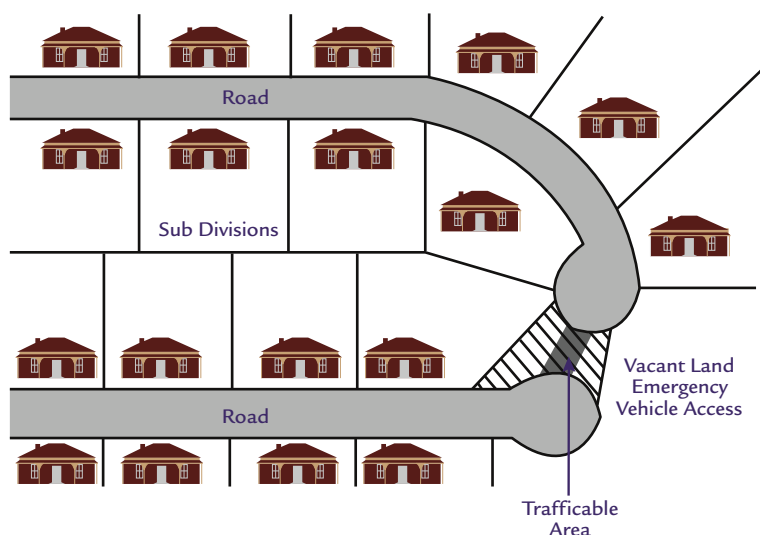


Figure 5. Diagram showing two cul-de-sacs joined by a minor/emergency access.

Fire Trails

A system of fire trails can provide safe access for fire fighters and equipment to inaccessible but strategic locations.

A peripheral fire trail system should be provided between the outer final stage of developments and the adjoining bushland unless a perimeter road is provided.

However, other related planning considerations such as visual and conservation values will need to be considered before such arrangements are approved.



Figure 6. Diagram showing fire trails that are not part of the road network but are working for a precinct.

Fire trails need to be maintained so they are available when needed.

The *Land Use Planning and Approvals Act 1993* provides for Councils to enter into agreements to ensure fire trails are maintained in perpetuity.

General principles for the design and construction of fire trails are:

- » Safe for use by four wheel drive fire trucks
- » Connected to road networks with no dead ends; and

- » Passing bays and turning circles at strategic points.

Category 1 to 4 roads under the **Forest Practices Code 2000** are acceptable providing they are suitable for all weather use.

Road Design and Construction

Fire trucks (appliances) are wide and heavy, and at times operate in conditions of poor visibility. Therefore, the normal minimum requirements for road design and construction may not be sufficient.

Also, like other large vehicles, fire fighting vehicles need access right to the building under threat, not just to the boundary of a property.

The general principle for road design and construction is to provide easy access and cater for the needs of fire trucks.

For example:

- » Road construction should allow two way traffic flow for large vehicles or have frequent passing bays;
- » Curves and gradients need to be gentle for use by heavily laden fire trucks; and
- » Parking should be provided on-site so that parking on the road or in passing bays (which could restrict access) is minimised.

The **Tasmanian Code for Residential Development** (TASCORD) provides a hierarchy of streets.

All street types in TASCORD other than 'Access Lanes' are acceptable in bushfire prone areas provided the carriageway is not less than 4 metres wide.

Other aspects of road design such as traffic management, visual impacts and user safety need to be considered from the beginning of the design process.

Appropriate Methods

Road Layout

- » Subdivisions have a compliant access to non-bushfire prone areas.
- » Non-through roads do not exceed 200 metres in length or service more than 8 lots.
- » For subdivisions where a non-through road is proposed, a plan which provides for the

eventual connection of a non-through road to the existing road network may be approved by the Tasmania Fire Service and Council.

- » A non-through road connected to a formed fire trail may be approved by the Tasmania Fire Service and Council.

- » A road is provided around the perimeter of a subdivision. Alternatively, a fire trail, which is connected to a road, is provided around the perimeter of the subdivision.

Fire Trails

- » Fire trails are constructed to permit 4WD vehicles to pass over them at a design speed of 15 kmph.
- » Fire trails have a minimum carriageway width of 4 metres.

- » Fire trails are clear of any obstructions within 2 metres of the edge of the formed width of the trail at any time.
- » There is vertical clearance to a height of 4 metres above the trafficable width of the fire trail.

Road Design and Construction

- » All roads and accesses are constructed and maintained to allow ease of access/egress by fire-fighting and ordinary two wheel drive vehicles at all times for a minimum design speed of 15 kmph.
- » Access is provided to within 30 metres of the building (measured as a hose lay along the ground).
- » Driveways which will not be used by fire fighting vehicles are not required to meet the access requirements.

- » To avoid obstruction to fire-fighting and other vehicles, the amount and location of parking places needs to be sufficient to discourage people from parking vehicles within passing bays and on roads and fire trails.
- » At the end of all non-through accesses there are suitable turning areas (see Table 4).
- » Roads and other accesses are constructed in accordance with the contents of Table 4.

- » The width of the carriageway may be reduced from six (6) metres to a minimum of four (4) metres provided passing bays (a minimum two (2) metres wide and 20 metres long) are installed a maximum of 90 metres apart.

(NB: The combined width of the passing bay and roadway should be a minimum 6 metres wide).

Table 4 – Construction Standards for Roads and other Access

Element	Standards
Pavement Type	All-weather construction
Minimum Design Speed	15 kmph
Minimum Load	20 tonnes (including culverts and other road structures). Bridges should conform to Austroads Bridge Design Specification T44.
Minimum Trafficable Width	Dual lane access with 6 metre carriageway (includes consolidated, formed, surfaced and drained shoulders). Single lane access with a 4 metre carriageway for 90 metres length without turning areas or passing bays is acceptable
Minimum Clearance	2 metres on each side of the carriageway for a height of 4 metres
Curves	Minimum inner radius of 10 metres.
Dips	Not more than 15 degree (1 in 3.7 or 27%) entry and exit angle
Minimum Turning Area	A circular turning area with a minimum trafficable radius of 10 metres (shoulders, seal or other consolidated edges may be acceptable); or hammerhead 'T' or 'Y' turnarounds with minimum 4 metres width and 8 metres length
Passing Bays	Width 2 metres, length 20 metres

Note: Where the access is less than 6 metres trafficable width, passing bays of a minimum length of 20 metres should be provided every 90 metres along the access. The combined width of the access and the passing bay should be a minimum 6 metres

4c. Water Supplies for Fire Fighting

Objective: To ensure adequate water supplies are available for people and fire fighters to defend buildings from bushfires.

Fire fighting uses large amounts of water.

If fire fighters need to leave a site to obtain more water, that site will be undefended and may be damaged or lost. If fire fighters don't have access to adequate water supplies at a site they may not even attempt to defend the site because it will be unsafe to go there.

Water therefore needs to be provided and easily accessible at all times, although it does not need to be drinkable (potable).

A fire truck has to be within about 3 metres from a water supply to be able to pump from it.

In areas serviced by reticulated water mains built to modern standards, the fire hydrants provided are sufficient, provided they are no more than 120 metres from all building envelopes.

In areas without a reticulated water supply, or where the flow rate is insufficient, an adequate stored (static) water supply with good access will need to be provided, either for each property or for groups of properties.

Dams, tanks and swimming pools may be used.

It is important that water supplies (including pipelines, hydrants, fittings and storages) are:

- » provided before building construction commences;
- » designed, located and fitted to ensure reliability during a fire (eg polypipes are buried or shielded); and
- » properly maintained and accessible at all times.

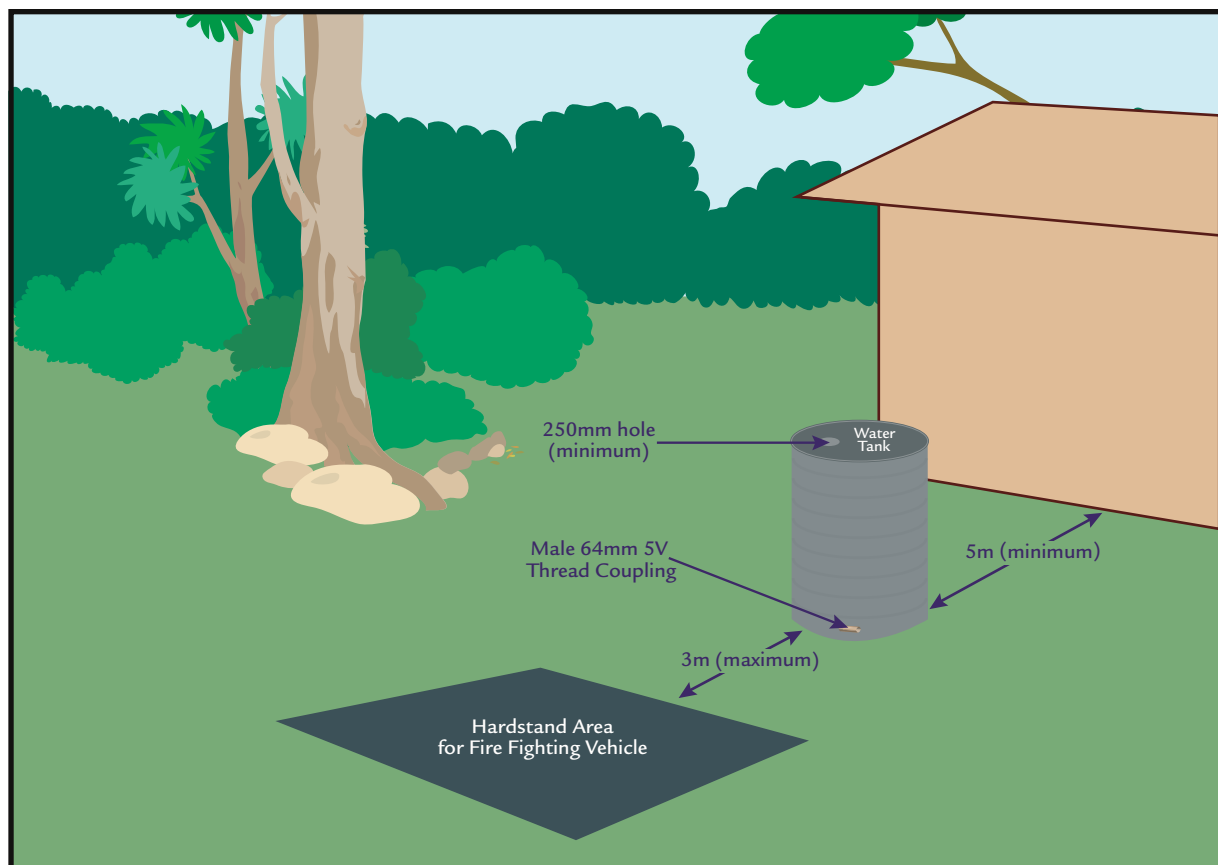


Figure 7. Diagram showing water tank, required fittings and proximity to hardstand area.

Appropriate Methods

Reticulated Areas

- » The development has a reticulated water supply with a minimum flow rate of 600 litres per minute unless more is required under the Building Code of Australia (BCA).
- » The building envelope should be no more than 120 metres from the nearest fire hydrant.
- » If either of the above requirements cannot be met, developments need to meet the requirements for non-reticulated areas.

Non Reticulated Areas

- » A development has solely, for fire suppression, at least 10,000 litres of stored water for a property less than 2500 square metres in area, and has at least 20,000 litres of stored water for a property 2500 square metres or larger.
- Note some development may require more water to comply with the Building Code of Australia (BCA).
- » A stored water supply will be located within the development to be accessible by emergency vehicles at all times.
- The supply may be from a single source or a combination of storages for either individual properties or for a cluster of properties.
- Storages need to be accessible by vehicles from all the properties they are intended to serve.

Access to Water Supplies

- » There should be a suitable hardstanding area within 3 metres of the water supply.
- » The storage needs to be a minimum of 5 metres from the building.
- » Above ground storages need to be accessible, and have a male 64 millimetre 5v thread coupling to
- Tasmania Fire Service specifications installed on the storage tank, or the tank has a suitable opening in the top of 250 millimetres diameter.
- » Below ground storages need to be accessible.
- » An inaccessible storage needs to have an accessible delivery point via a pipe capable of delivering water at a minimum flow rate of 270 litres per minute, through a male 64 millimetre 5v thread coupling, to Tasmania Fire Service specifications.

Construction Details (water supply)

- » Water storage tanks need to be constructed of non-combustible and non-rust materials (eg, galvanised steel or concrete). Otherwise, the lowest 400 millimetres from the ground should be protected from the effects of heat and flame by some form of fire resistant insulation. Tanks which may melt or deform should not be used without adequate defensible space.
- » Above ground pipelines and fittings need to either be constructed of non-combustible and non-rust materials (eg, galvanised steel or copper) or protected from the effects of heat and flame by some form of fire resistant insulation.
- » All below-ground water pipelines need to be installed to the depth specified in the **National Plumbing and Drainage Code AS3500** (commonly 300 millimetres).

4d. Building Siting and Design

Objective: To increase the chances of survival of a building and its occupants during a bushfire through appropriate siting and design of buildings.

Any building and its contents will burn if allowed to catch fire.

However, buildings, and the people who live in them, stand a better chance of survival if they consider all the measures mentioned in these Guidelines.

The measures in this section reduce the risk of the building catching fire and allow people to stay with their properties to put out any spot fires which may start in or around the building, provided basic equipment and an adequate water supply is available (see Section 4c and Further Information, page 23).

Siting and design can be used in a coordinated way to:

- » prevent the establishment of small spot fires from windborne embers and direct flame contact within or around the building;
- » protect the building by providing adequate separation from vegetation; and
- » allow the building to withstand the impacts of high winds, heat and flames for the relatively short period of time taken for the bushfire to pass.
- » Provide a safe haven during the passage of a fire.

Bushfire protection requirements need to be considered together with other planning issues, such as:

- » visual impact – blending the house, outbuildings, access and water tanks into the landscape, retain skylines and hills faces, etc.
- » optimising the design for energy conservation – orientation and solar access, insulation and materials, glazing system, heating and cooling schemes, etc.
- » conservation and heritage requirements – threatened species, biodiversity, cultural heritage, significant trees, tree planting and removal, etc.

Building Siting

Buildings should be sited to avoid the windborne embers, flames and heat of a bushfire. Sites at or close to hill crests are the most dangerous and should be avoided. Buildings on slopes, which are cut into the slope will be more sheltered during a bushfire.

Care should be taken to ensure cut and fill arrangements do not create other problems such as slope instability.

Buildings on slabs on the ground are the safest.

Outbuildings, access tracks, yards, water supplies, vegetable gardens etc can be placed to shield and separate the building from the bushfire hazard (ie, the vegetation).

Building Design

The shape of the building can minimise the entry of windborne embers, and the area exposed to flames and heat. It is best to use simple designs with few changes from a basic rectangle.

Complicated forms with many nooks and crannies increase wind turbulence, and aid in trapping burning particles against the building.

Single level buildings with low walls and low pitched roofs minimise

wind turbulence, surface exposure to windborne embers, and the area exposed to flames and heat.

Buildings on a slab or with enclosed undersides cannot have a fire start under them and so are harder to ignite.

During bushfires, buildings often catch fire internally because of the failure of windows and other glazed openings due to windborne debris or high levels of radiation.

This risk can be significantly reduced by providing protection for glass, using stronger glass, or reducing the area of glass, etc.

At present there are few applicable Standards for design features such as shutters, external sprinklers, gutter guards or other means of protection.

Research is ongoing and advice should be sought from your Council or the Tasmania Fire Service.

Building Construction

When combined with the other features mentioned in these Guidelines, elements of a building's construction can be part of an integrated solution to people's bushfire problems and to address various conflicts.

This is because the choice of building materials and how they are incorporated into the design of a building have the potential to increase the resistance of a building to bushfire attack.

A more bushfire resistant building may need a smaller set of Protective Features compared to a building with less bushfire resistance.

This will often provide more flexibility and choices for people who may wish to minimise the amount of land being managed, or need to reduce the impact of land management because of other constraints.

The Building Code of Australia (BCA) and the Australian Standard for Construction in Bushfire Prone Areas (AS3959) contain methods for increasing the bushfire resistance of a building, as do several of the resources listed in Further Information.

Designated bushfire prone areas for the purposes of the BCA have to be specially declared and are not the same as bushfire prone areas which are the subject of these Guidelines. You should contact your Council for advice regarding BCA requirements.

In general, the roofs and exterior walls of buildings should be constructed of low flammability materials and detailed to minimise risk of ignition from windborne embers, radiant heat and direct flame.

The Tasmania Fire Service recommends that houses in bushfire prone areas should be as ember proof as possible which will complement the fuel management occurring in the building protection and fuel modified buffer zones.

Remember that any one bushfire safety feature alone will not provide an integrated solution and that even if fire resistant building construction is chosen, fuel management, water supplies and access will still need to be considered.

Please note, there is an opportunity to install building construction elements which have benefits for various issues, such as energy efficiency, as well as providing for protection from bushfire attack, for minimal additional cost.

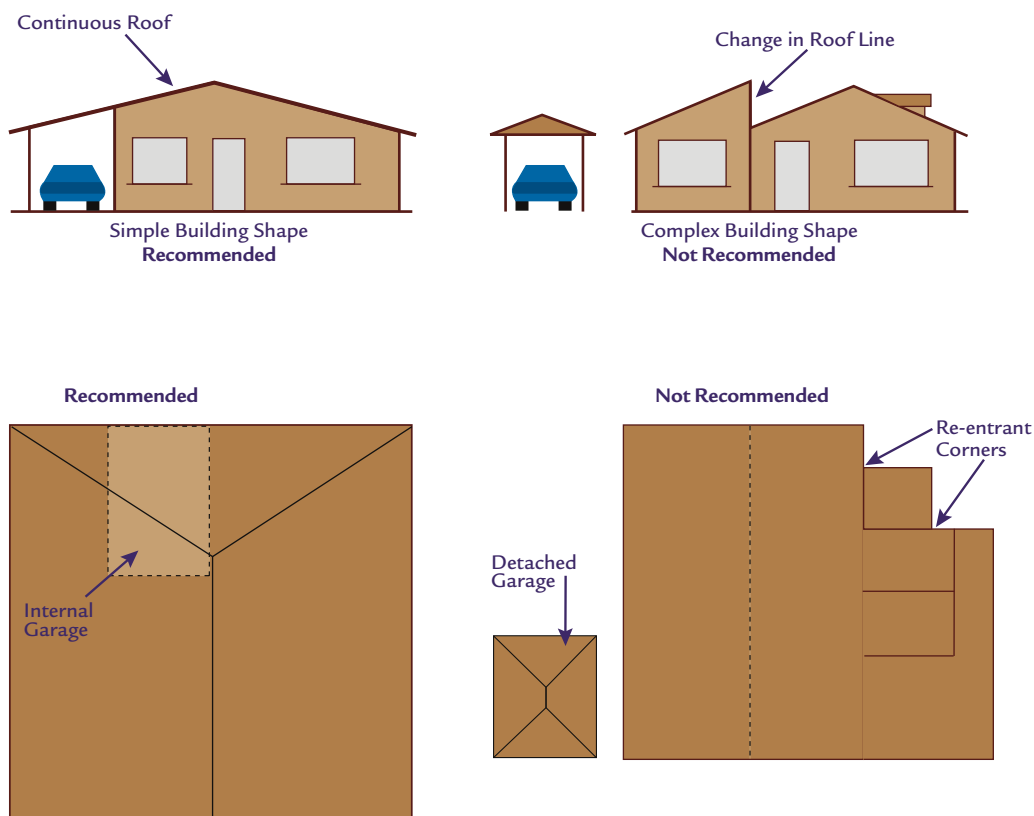


Figure 8. Diagram showing a simple building shape and a complex building shape, highlighting where ledges will encourage the accumulation of embers and windborne fuel.

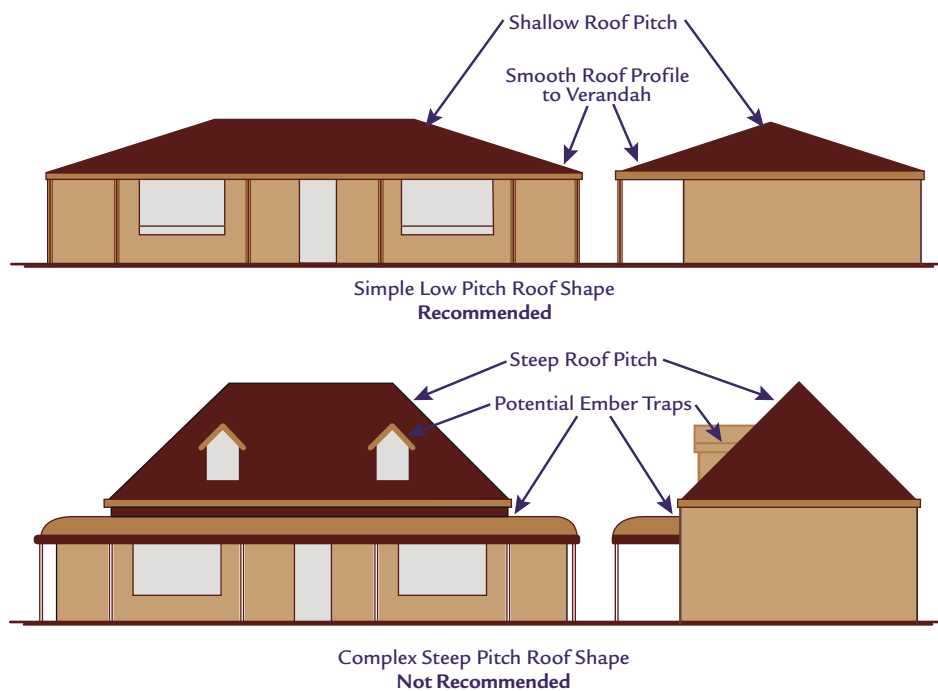


Figure 9. Diagram showing windborne fuel and ember accumulation areas with varying building shapes.

Appropriate Methods

Building Siting

- » The building is located in an area with Low or Moderate bushfire hazard.
- » The building is not located at or close to the crest of a hill.



Figure 10. Diagram showing preferred and dangerous building locations.

Building Design

- » The overall shape of the building is simple in design with a minimum number of offsets.
- » The building is of single level where possible.
- » The building is constructed on a concrete slab on the ground.
- » Buildings suspended above the ground have the underfloor space enclosed by non-combustible materials.
- » Buildings at mid slope positions are cut into the hill.
- » The building has a low profile to reduce the exposure to the wind.
- » The building has a low pitched roof (up to 20 degrees maximum).
- » The roof has constant pitch and no roof valleys.
- » Building features and architectural features such as decks, pergolas, and solar screens should be of non-combustible materials or suitably separated from the dwelling.

Building Construction

- » The building minimises the use of combustible materials on its exterior.
- » The building minimises the potential for wind driven debris and embers to penetrate its exterior.
- » Openings such as doors, windows and vents have appropriate protection from bushfire attack (without compromising opportunities for passive solar gain).

5 Landscaping and Vegetation

The landscaping of a property in a bushfire prone area should incorporate measures to reduce the bushfire hazard. These measures can also be used for existing buildings.

With bushfire protection in mind, landscaping may:

- » reduce the amount of potential fuel;
- » act as a barrier to flames and heat;
- » intercept sparks and embers;
- » slow and deflect winds; and
- » provide a safe refuge for people.

Landscaping measures should provide Building Protection and Fuel Modified Buffer Zones.

The recommended width of the zones is determined from Table 2 and the zone requirements are provided in BOXES 2 and 3, pages 7 and 8.

In open situations windbreaks are useful for bushfire protection. By reducing wind speed, a windbreak slows the rate of spread of fires and absorbs heat. If the windbreak is reasonably dense it will also intercept many embers.

Windbreaks should be:

- » on the sides of the building from which a bushfire is likely to come;
- » at least 1-2 times the maximum height of the trees from the building;
- » planted with low flammability species (see Further Information); and
- » without gaps of a size which would allow wind to funnel through.

6 Bushfire Hazard Management Plans

Good design is not sufficient on its own. For long-term safety the design needs to be implemented and maintained.

Bushfire Hazard Management Plans can assist greatly with informing current and future property owners of appropriate practices for the on-going management of the bushfire hazard.

Some Councils require Bushfire Hazard Management Plans as part of

development applications and/or as conditions of development approval, depending on circumstances.

People living in bushfire prone areas are urged to develop plans for their properties.

At a minimum, a Bushfire Hazard Management Plan would include a plan showing the layout of the development and location of the

protective features together with notes describing how the plan will be implemented and maintained.

The minimum contents would be:

- » fuel management areas and their maintenance;
- » access arrangements;
- » water supplies; and
- » vegetation to be removed, retained, modified and planted.

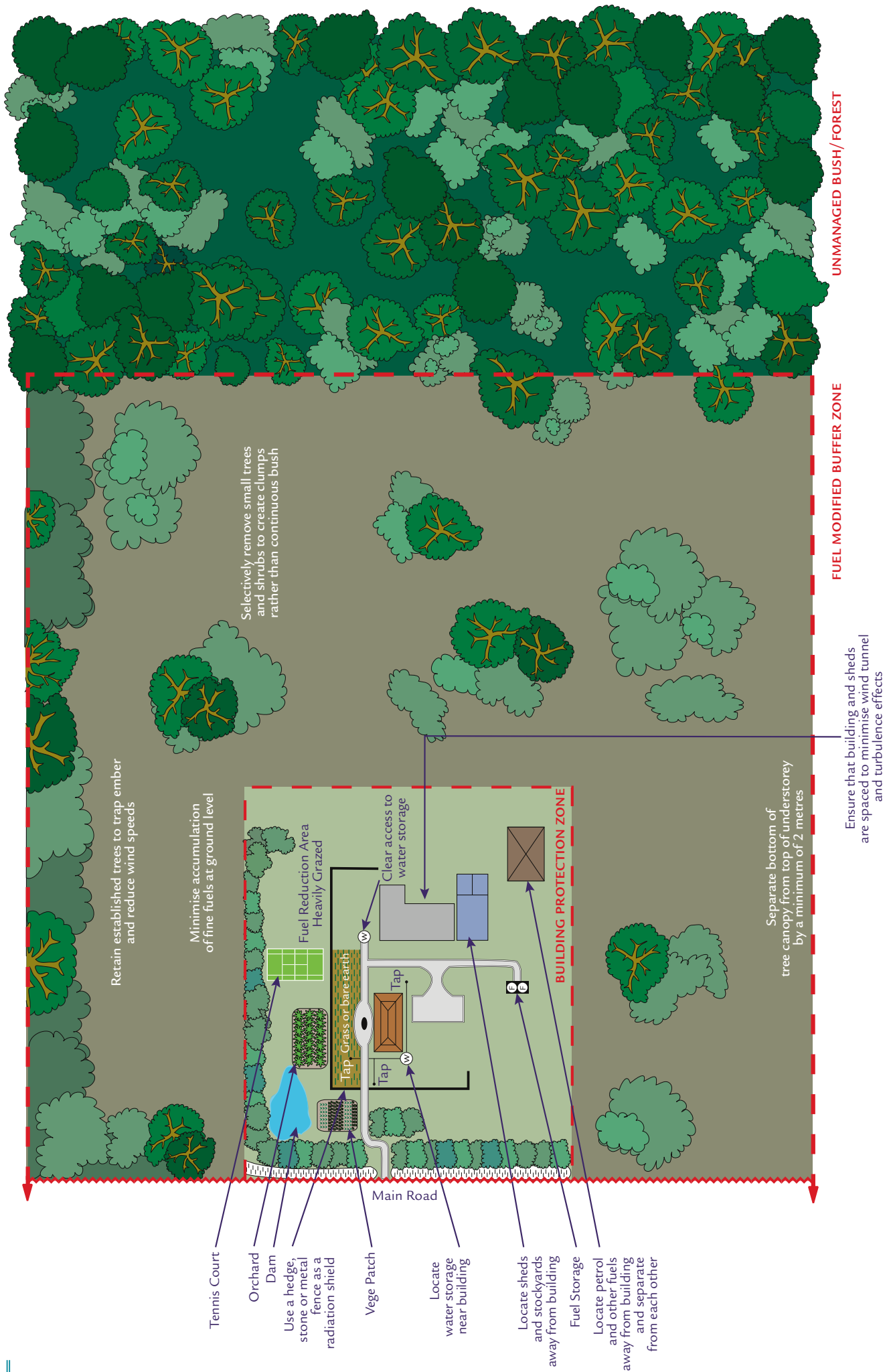


Figure 11. Lot layout for a house in a bushfire prone area showing the building, the Building Protection Zone, the Fuel Modified Buffer Zone and the bush beyond the fuel managed areas.

The planning scheme for an area should always be examined when considering a development. In most cases, developing a low density residential zone or urban neighbourhood will involve many titles and have a partly established road network.

Planning tools, such as structure plans, development plans and local area plans, provide the opportunity to integrate planning for road networks, fire trails, lot size and shape, and landscaping to minimise bushfire hazard whilst also addressing conservation, visual, recreational and other values.

Such tools overcome three key problems of responding to individual development applications:

- » they provide a comprehensive approach to designing the layout of an area to incorporate the principles of bushfire hazard minimisation;
- » they enable wider issues than those contained in planning schemes to be considered for a particular place; and
- » they enable Councils and communities to address planning for local areas in a pro-active way rather than reacting to individual development applications.

Local area planning will enable the principles of design and layout which minimise bushfire hazard to be incorporated into conceptual or detailed plans for specific sites.

It follows that a subdivision design needs to address bushfire safety measures as well as the other values mentioned above to show how it responds to a local area plan.

Some bushfire safety provisions may have negative or even unacceptable impacts on these other values. The impacts on these other values may restrict or even prohibit development on this site.

Further Information

A visit to your Council, a Tasmania Fire Service office, or the library will reveal many books and pamphlets that will help.

Some Suggested Reading:

Anon. 2003. **Fire Retardant Garden Plants for Urban Fringe and Rural Areas.**

Tasmanian Fire Research Fund and Royal Tasmanian Botanical Gardens, Hobart.

Provides advice on fire retardant plants including what to plant and what to remove. Available from the Royal Tasmanian Botanical Gardens and Tasmania Fire Service and Council offices (no cost).

Ramsay, G. Caird and Dawkins, D., 1993. **Building in bushfire-prone areas: Information and Advice, (SAA HB 36-1993).**

Standards Association of Australia and CSIRO.

Provides background and advice for implementing the Australian Standard on building in bushfire prone areas, and general bushfire survival. Available from the State Library (call number 693.820994 BUI).

Ramsay, G Caird and Rudolph, Lisle, 2003.

Landscape and Building Design for Bushfire Areas.

CSIRO, Melbourne.

A design manual for bushfire prone areas. Available from the State Library (call number 712.0994 RAM).

Schauble, J., 2004.

The Australian Bushfire Safety Guide: The essential survival guide for every home.

Harper Collins, Pymble. NSW
Comprehensive and easy to read. Available from the State Library (call number 363.377 SCH).

Standards Australia.

Construction of buildings in bushfire-prone areas, AS 3959.

Provides methods of improving the resistance of buildings to bushfire attack.

The most recent edition will be available from Standards Australia.

Tasmania Fire Service,

Will You Survive? Pamphlet.

Provides people with advice on how to prepare themselves and their homes for bushfires and what to do when a bushfire comes.

Available from Tasmania Fire Service and Council offices (no cost).

Webster, J. 1986.

The Complete Australian Bushfire Book.

Nelson, Melbourne.
Provides background and suggestions for a wide range of situations. Available from the State Library (call number 634.96180994 WEB).



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