



Protecting your home against bushfire attack

Effective 1 November 2000



Acknowledgements

The following are acknowledged as source publications:

- *Building in bushfire-prone areas—information and advice* (SAA HB 36-1993) CSIRO/Standards Australia.
- *Draft planning, building and maintenance in bushfire prone areas* (Feb 1995) City Council of the Blue Mountains.
- *Your country home* (June 1990) Country Fire Authority, Victoria.
- *Building for Bushfire Safety* Country Fire Services, South Australia.

Much appreciation is also expressed to the CSIRO and Standards Australia, who have provided a significant amount of information upon which this booklet is based.



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*Please note a number of terms used throughout the document have been typed in bold.
Please refer to the glossary for explanation of these terms.*



How does a bushfire attack?

Before we tell you about protecting your home from bushfire attack, it may be useful to understand how attacks occur. There are four main ways:

Burning debris

A fire front may not reach your home. However, **burning debris** carried by strong winds may cause your home and property to catch fire. Wind may carry bits of burning vegetation and parts of buildings, as well as other flammable materials, such as particles of wood and fencing. These may set fire to your home or property. Because of the strong winds associated with bushfires, **burning debris** may travel long distances ahead of a fire front.

Radiant heat

Extreme heat levels radiating from a fire last only a few minutes. However, this heat is sufficient to fracture glass and ignite materials both inside and outside a building. The intensity of heat depends largely on the amount and location of **combustible** items (e.g. wood, grass, paper) or 'fuel' around your property. Other influencing factors include:

- how much your land slopes, which affects the speed and intensity of the fire
- wind speed
- aspect or direction the building faces. Some aspects receive greater exposure to the drying effects of the sun. They may also be more exposed to dry winds or shielded from moist breezes. As a result, fires from certain directions are more severe because of the availability of 'dry fuel'.

Direct flame contact

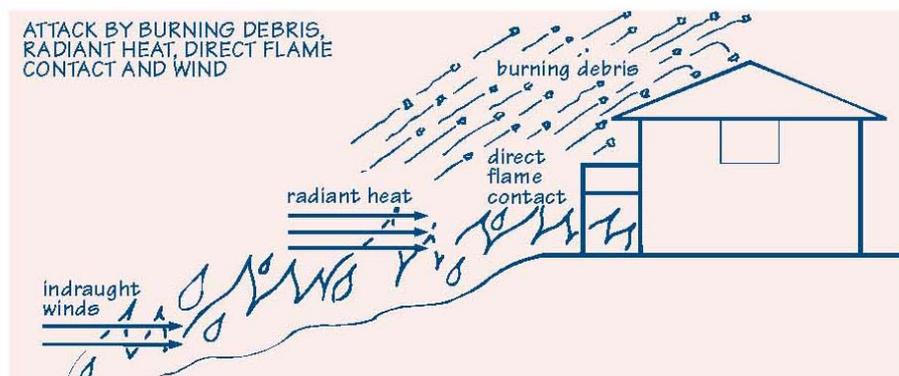
Direct flame contact occurs when flames actually 'touch' a building. As well as other factors, the intensity of flames depends on how many **combustible** items are located around your property and how close they are to buildings.

Wind

Strong winds usually accompany a bushfire and can intensify a bushfire. As mentioned previously, they carry **burning debris**. They can also damage a building by their force.

The risk of damage is increased when strong winds make flames 'flatter' or more horizontal in shape, reducing the distance from the fuel source to buildings.

The force of a wind driving **burning debris** or creating suction may break windows or remove parts of the walls or roof. This assists **burning debris** to enter, which speeds up damage.





Protecting buildings from attack

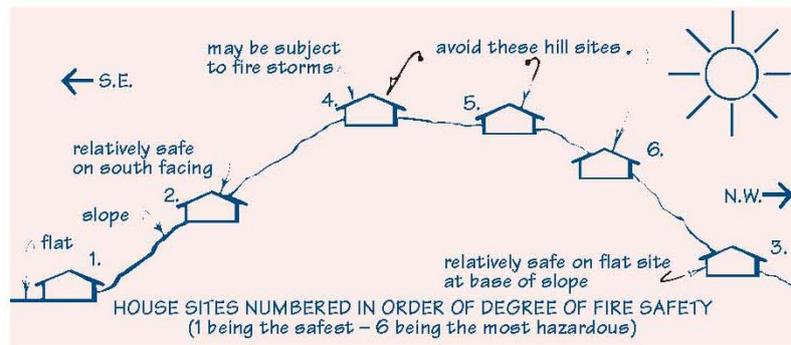
There is no one answer for protecting buildings from bushfire attack. Rather, a combination of methods is the best defence. These include:

Correct siting of buildings

The way a building is sited on land is a basic factor influencing survival. As the pattern of fires is very predictable, it is possible to determine the most favourable areas to maximise survival.

For example:

- check data about previous fires in your district to determine the possible direction a fire would travel
- be aware most bushfires occur during dry conditions, particularly in times of hot temperatures and low humidity, and are often accompanied by strong winds.
- remember fires accelerate going uphill and decrease in speed travelling down hill.



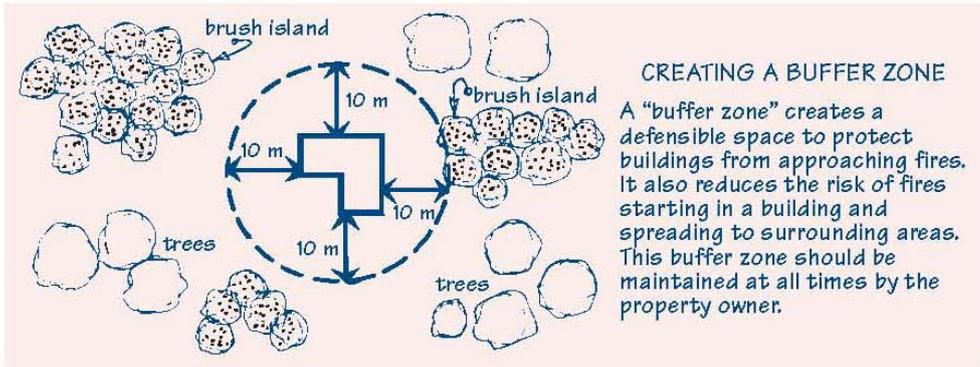
It is better to build your home and other buildings on the gentle down slope of a hill, away from the most likely direction of a fire front. A flat site at the base of a slope is also preferable. A 'cut and fill' arrangement (see above diagram) mid-way on a slope is another alternative. In this instance, the fire is more likely to pass over a building. The top of a hill is the most hazardous location.

When thinking about buying an allotment, consider prevailing wind directions. As mentioned, an allotment on a gentle slope aspect or flat ground is preferable. Also, check with your local government office as to whether the allotment is in a **designated bushfire prone area**. A **designated bushfire prone area** is land declared by the local government as likely to be subject to bushfires. Contact your local rural fire district inspector, rural fire brigade or nearest Queensland fire and rescue authority station for more information (see also page 12).

Creating barriers and buffer zones

You can slow down a bushfire by creating barriers and buffer zones around buildings. The barriers may include planting suitable trees, vegetation and building permanent barriers such as low stone or masonry walls. This procedure helps to protect buildings from possible attack by **burning debris**, heat radiation and direct flame contact. In between the barriers and buildings, a 'buffer zone' can be created by reducing the number of **combustible** items (e.g. trees) near buildings. This means that if **burning debris** passes through the barriers, there is minimal opportunity to create further outbreaks and it gives the occupants an opportunity to put out any spot fires that may occur within this zone.

A buffer zone of at least 10 metres clear area around buildings is advisable (see below diagram). In areas under extreme fire threat, a greater distance may be necessary.



Using the appropriate design, construction methods and materials for new residential buildings

Under Queensland's current building legislation, any new residential building constructed in a **designated bushfire prone area** must be provided with protection in the event of a bushfire to reduce the risk of ignition by embers, direct flame contact and high levels of radiant heat.

The appropriate design, construction methods and materials can greatly affect the chances of survival of any building in a bushfire. In this context, reference should be made to Australian Standard AS 3959–1999 (deemed to satisfy under the current legislation) which sets out the detailed requirements for the construction of buildings in bushfire prone areas.

Current legislation specifies only minimum requirements. There are a number of issues to keep in mind when constructing a new residential building in any bushfire prone area:

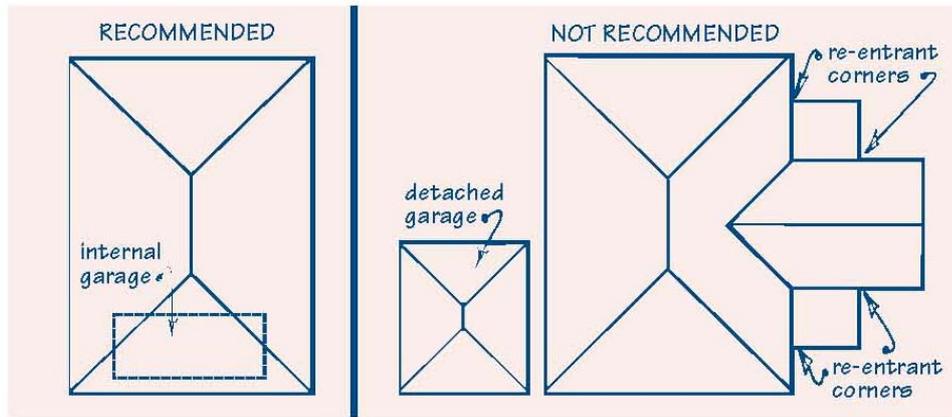
Design

When designing a building, the main aim is to protect areas where ignition is likely to occur. An appropriately designed building should demonstrate the following criteria:

- external parts of the building should provide a barrier to prevent **burning debris** (including embers) from reaching its interiors, below floors and within roofs
- open spaces such as ceilings should be sealed off
- exterior surfaces should preferably be non-combustible
- **plan of the building:**

The ideal shape for the plan of a building is circular or oval. Since this is not always practical or desirable, the best alternative is a simple square or rectangular shape. In any case, re-entrant corners (i.e. internal corners) or deep porches are not desirable.

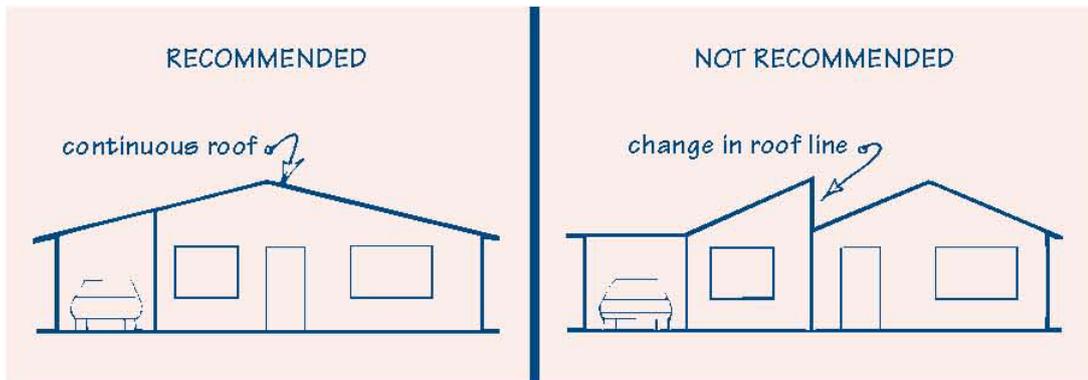
Garages, carports and the like should be built as part of the building.



▪ **elevation of the building:**

Buildings with unchanged roof profiles at verandahs, garages and carports are preferable. This means a simple elevation with a uniform roof pitch and no windows within the roof area.

A minimum of projections such as chimneys, vent pipes and the like is preferable. If changes in the roof are necessary, they need to be small and gradual.



Construction methods and materials

Current legislation requires new residential buildings to be protected to reduce the risk of ignition by wind borne embers, radiant heat and direct flame contact. The following considerations are advisable:

1. Outside walls—use materials such as masonry, concrete, rammed or stabilised earth. Where **combustible** items such as framed walls with timber cladding are to be installed, use a suitable fire-retardant treated timber.
2. Posts and columns—use masonry or concrete. Steel may deform under intense radiation and cause the building to collapse. Timber is also acceptable, providing it is treated full height with a suitable fire-retardant.
3. Elevated buildings—the exposed underside of a verandah floor or deck which is inaccessible, should not be combustible. But if so, alternative sheeting of the underfloor with a suitable non-combustible material is necessary. To prevent **burning debris** entry to areas below an elevated building between the main floor and the ground, the preferred construction method is to 'block off' all external openings below that floor. The materials used to 'block off' these openings must be non-combustible for a distance of at least 400 mm above the ground (also see above advice for outside walls).
4. Window panes—heat radiation can crack and shatter unprotected window panes. You can protect window openings by using shutters made of materials which are non-combustible or metal wire screens.
5. Roofing—use concrete or terracotta roof tiles, sheet steel (which is corrugated or ribbed) if full **sarking** is installed. Metal sheet roofing (particularly aluminium) may distort from intense heat radiation or flame contact, and allow **burning debris** to



- enter (this phenomenon has not been confirmed). Installing roof lights and any window openings in the roof is not recommended.
6. Wind forces—buildings must be designed and constructed to resist the forces of the wind. This includes tie down of the roof, walls, posts, columns and the like, and the fixing of roofing materials and wall claddings in accordance with the relevant Australian Standards.
 7. Water storage and pipelines—if using plastic piping, place it underground as it may melt under severe heat conditions.

You are also required to protect buildings from attack by subterranean termites. In performing any bushfire protection measures, it is desirable that you provide a system that will enable you to carry out inspections to see if any termites have entered the building. Systems include chemical treatment or physical barriers (e.g. metal shields, concrete slabs or paths) as approved by a building certifier.

Upgrading of existing residential buildings

Only a new residential building constructed in a **designated bushfire prone area** is required to be protected against bushfire risk under Queensland's current legislation. However, if you own an existing building in any bushfire prone area, you may wish to increase its protection against a bushfire attack.

The same methods used to assess a new building should apply when assessing an existing building to find the problem areas most in need of attention.

Remember, design and construction should not allow for catchment of **burning debris** and provide entry points into the building. Where alterations or extensions are planned, make sure these design problems are not introduced into your building nor are magnified.

Ongoing maintenance

Even well designed and constructed buildings can burn down due to inadequate maintenance. Ember attack directly on a building, adjoining structures or any available fuels nearby (e.g. fallen leaves and trees) can cause destruction. This is despite fuel reduction measures beyond your property boundary. Ongoing maintenance is therefore essential.

Outdoor and yard maintenance

Yards need to be kept as free as possible from **combustible** materials, fuels and debris.

- Think about flammable materials and fuel storage. Where is the fire wood stored? Never store it under the house and preferably not in a wooden shed.
- Store petrol and any large quantities of other liquid fuels away from the house in a brick or metal shed.
- Avoid storing gas barbeques near a building.
- Avoid storing any spare gas bottles or oxy-acetylene cylinders near or under the building or where direct flame can heat them.
- Beware of vegetation which is near or overhanging a building.
- Avoid storing any felled trees and rubbish on your property.
- Keep compost heaps or piles of grass clippings away from buildings.
- Remove dead shrubs and avoid long grasses, bracken or neglected masses of tall quick-curing annuals.

Vulnerable parts of buildings

The most vulnerable parts of buildings are any openings or areas that **burning debris** can enter or lodge in, including:

- roof cavities and valleys
- areas below floors, decks and verandahs
- window sills and door frames



- gutters and open eaves.
- ventilation openings
- skylights.

To minimise the risks:

- Make sure **burning debris** cannot enter or blow under a building. These areas should be sealed off.
- Check there is no litter and debris deposits around the base of the building.
- Don't let litter build up in roof valleys and gutters or in crevices leading under the roof.
- Check your buildings for possible access points and check seals on skylights.
- Find out what insulation should be used in walls and ceilings.

If you have any concerns about vulnerable parts of your building and the types of materials which should be used, contact your local rural fire district inspector, rural fire brigade, or nearest Queensland Fire and Rescue authority station or your local government.

Maintenance to reduce the risks

It is important to look at the condition of the outside of the building:

- If the building is timber clad, is the timber weathering badly, splitting or fraying? If so, sand and re-paint the boards or replace them.
- For brick buildings, check the bricks aren't loose or have cracks or gaps in the mortar joints that would allow embers to enter. Fill in all gaps.
- Check all joints and crevices. Seal holes and ensure no part of the structure can be broken or removed by the wind.
- Pay careful attention to windows which face any potential direction of fire attack—can they withstand wind pressure and heat?
- If the roof is sheet metal, ensure all sheets are securely fastened in place. If the roof is tiled, ensure there are no loose tiles and that embers cannot be driven between them.

Remember—anything that can be lifted in the wind will allow ember entry.

To reduce indoor risks:

- Have a look at all flammable or **combustible** materials in the building and see if it will be a safe refuge during a fire. Determine if the building contains materials which will release toxic gasses when heated, or are potentially explosive.
- Carefully consider the storage of dangerous goods, including materials under kitchen and laundry sinks and in the bathroom cupboard.
- Keep flammable and explosive materials at a minimum.
- Don't store old newspapers.

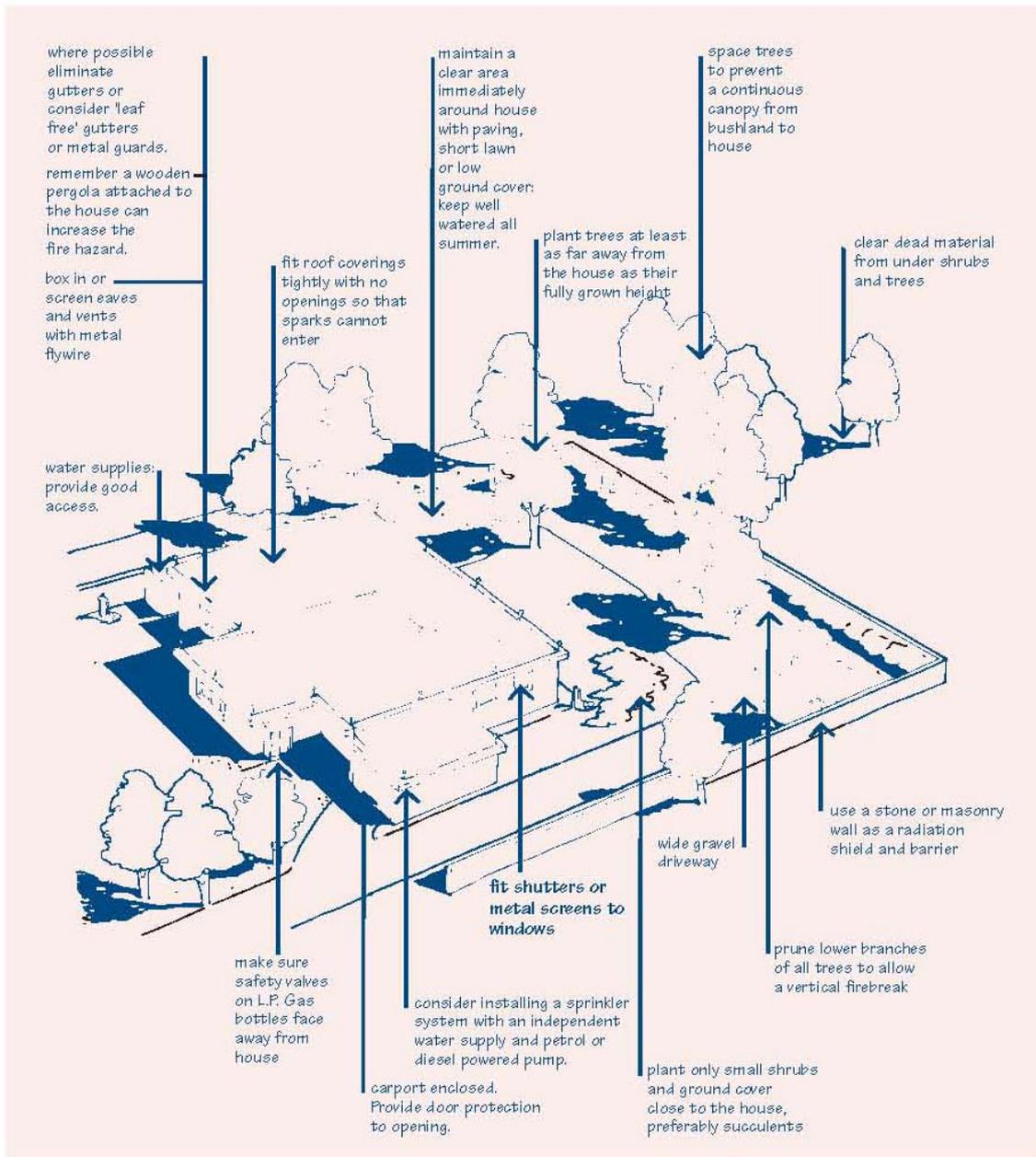
Routine preparation for the bushfire season

Prior to the **bushfire danger period**, there are a number of things you can do to protect your buildings and your household:

- Clean gutters regularly and remove debris from roofs.
- Tidy yards regularly of fallen leaves, twigs and sticks.
- Check any equipment such as water tanks and pumps. Make sure that, if installed, the bushfire sprinkler system works and that shutters and screens fitted to openings are in good order.
- Prepare a list of contingency procedures in the event of a fire and ensure everyone in your household is familiar with them.
- Make sure you have adequate protective clothing, including sturdy boots, overalls and face masks which will filter heavy smoke.
- Avoid going outside in summer clothing (particularly t-shirts, light dresses, shorts or thongs). This type of clothing offers no protection in a bushfire.



If you live or own property in a **designated bushfire prone area** or any area at risk from bushfire attack, it is suggested that you learn as much as possible about protecting your buildings (see below diagram).





To find out more

This booklet offers only general information about protecting your buildings from attack. For more definitive information, please refer to our companion handbook *Bushfire prone areas, siting and design of residential buildings*.

For further information on the design and construction measures outlined in this booklet, please refer to Australian Standard AS 3959–1999 *Construction of buildings in bushfire-prone areas* and chapter 4 of the publication titled *Building in bushfire-prone areas—information and advice* (SAA HB 36-1993) by CSIRO/Standards Australia. These publications can be purchased from:

Standards Australia
232 St. Pauls Terrace
Fortitude Valley Qld 4006
Telephone (07) 3216 1355
Facsimile (07) 3216 0277

For further advice on the legislative requirements applying to the protection of a new residential building constructed in a **designated bushfire prone area**, contact your relevant local government or:

Building Codes Queensland
Department of **Infrastructure and Planning**
PO Box 15009 City East Qld 4002
tel +61 7 3239 6369
fax +61 7 3237 1248
buildingcodes@dip.qld.gov.au

Rural Fire Service
Queensland Fire and Rescue Authority
GPO Box 1425
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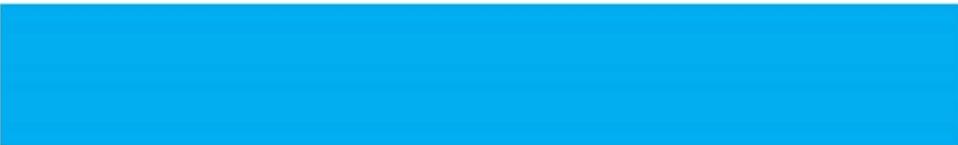
Glossary

Burning debris—flaming or smouldering brands, bark or other pieces of ignitable materials including embers. Refer term in Australian Standard AS 3959.

Combustible—capable of catching fire. Refer term in Building Code of Australia.

Designated bushfire prone area—land that has been declared by the local government's planning scheme to be likely to be subject to bushfires. Refer term in Building Code of Australia.

Sarking—where a sheeting of waterproof material has been used beneath the roof covering or behind the wall cladding. This material should have a maximum flammability index of 5 in accordance with Australian Standard AS 3959.



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