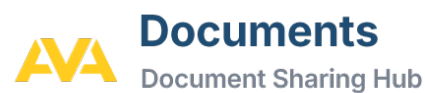




AS 3959:2018 Construction of buildings in bushfire-prone areas



Delivered by



This Australian Standard® was prepared by Committee FP-020, Construction of Buildings in Bushfire-Prone Areas. It was approved on behalf of the Council of Standards Australia on 23 October 2018.

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The following are represented on Committee FP-020:

- Australasian Fire and Emergency Service Authorities Council (AFAC)
 - Australian Building Codes Board
 - Australian Garage Door Association
 - Australian Institute of Architects
 - Australian Institute of Building Surveyors
 - Australian Roofing Tile Association
 - Australian Steel Institute
 - Australian Window Association
 - Bushfire Building Council of Australia
 - Consumers Federation of Australia
 - Department of Health and Human Services, Vic.
 - Fire Protection Association Australia
 - Forest and Wood Products Australia
 - Housing Industry Association
 - Insulated Panel Council Australasia
 - Insurance Council of Australia
 - Master Builders Australia
 - Roofing Tile Association of Australia
 - Think Brick Australia
 - Timber Preservers Association of Australia
 - Window and Door Industry Council
-

This Standard was issued in draft form for comment as DR AS 3959:2018.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Message from Adrian O'Connell, CEO of Standards Australia



Standards Australia is proud to be partnering with the Federal Government to provide access to AS 3959:2018, *Construction of buildings in bushfire-prone areas*.

When the scale of the recent disaster became apparent, I wanted to make sure that Standards Australia was directly contributing to the broader Australian response. Providing this standard is a simple and practical way we can assist the recovery and rebuild of bushfire ravaged communities.

This standard provides guidance to professionals in the building and construction industry and is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand bushfires.

By funding access to this standard together with the Commonwealth Government, it is my great hope that as communities rebuild after these most recent bushfires, they do so with access to Australia's construction standard that deals with bushfire prone areas.

Australian Standard[®]

Construction of buildings in bushfire-prone areas

Originated as AS 3959—1991.
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PREFACE

This Standard was prepared by the Standards Australia Committee FP-020, Construction of Buildings in Bushfire-Prone Areas, to supersede AS 3959—2009.

This Standard incorporates Amendment No. 1 (June 2019) and Amendment No. 2 (December 2020). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This edition incorporates the following changes:

- (a) The site assessment in Section 2 has been simplified to address interpretational issues related to slope, grasslands and low threat vegetation.
- (b) Section 3 clarifies that the shielding concessions relate only to the elements of the wall and do not apply to the subfloor or roofs.
- (c) The protection of gaps and openings has been addressed by requiring suitable measures for doors and windows and providing for other gaps to be suitably sealed.
- (d) The requirements for floors at BAL-12.5 and BAL-19 relating to bearers, joists and flooring within 400 mm above finished ground level now align with BAL-29.
- (e) Windows address the framed material, hardware, glazing, seals and weather strips and screens. Doors address the door panel material, door frame material, hardware, glazing, seals and weather proofing, screens and to be tight fitting. Vehicle access doors recognise that guide tracks do not permit direct access for embers and do not require edge gap protection. Where specified, weather strips are to conform with a flammability index not greater than 5 (AS 1530.2).
- (f) Roofs can now include certain translucent or transparent roof coverings at BAL-12.5 and BAL-19 for verandas, carports or awnings where the roof is separated from the main building.
- (g) Editorial changes have been made for consistency with Section 2 and to locate tables with the relevant sections of the site assessment methodology. Appendices F and H have been combined.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

The use of Notes in this Standard is of an advisory nature only. They provide explanations and guidance on recommended design considerations or technical procedures, as well as an informative cross-reference to other documents or publications.

This Standard incorporates a Commentary on some clauses. The Commentary directly follows the relevant clause, is designated by ‘C’ preceding the clause number and is printed in italics in a panel. The Commentary is for information only and does not need to be followed for conformance with the Standard.

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FOREWORD

This Standard is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

Improving the design and construction of buildings to minimize damage from the effects of bushfire is but one of several measures available to property owners and occupiers to address damage during bushfire. Property owners should be aware that this Standard is part of a process that aims to lessen the risk of damage to buildings occurring in the event of the onslaught of bushfire. Other measures of mitigating damage from bushfire fall within the areas of planning, subdivision, siting, building design, landscaping and maintenance.

Research is continuing with regards to the effects of bushfires on buildings, determination of bushfire-prone areas within various States and Territories and particular construction techniques designed to maximize the performance of buildings when subjected to bushfire attack. The outcomes of this research will be reflected in subsequent editions of this Standard.

The measures set out in this Standard to improve construction, and thus better equip a building to withstand the effects from bushfire, may also be used as a guide for those who wish to voluntarily adopt such measures in situations where regulatory compliance is not mandated.

Although this Standard provides for the highest Bushfire Attack Level (BAL), that is, BAL—FZ, there may be circumstances advised by authorities having jurisdiction that building in a particular bushfire location is either not recommended or not permitted based on unrealistic risk exposures.

Of significance to this Standard is the publication of methods of test in the AS 1530.8 series. Building materials, elements of construction and systems subjected to the tests of the AS 1530.8 series will satisfy the construction requirements prescribed in Sections 5 to 9 of this Standard. These methods are AS 1530.8.1, *Methods for fire tests on building materials, components and structures, Part 8.1: Tests on elements of construction for buildings exposed to simulated bushfire attack—Radiant heat and small flaming sources* and AS 1530.8.2, *Methods for fire tests on building materials, components and structures, Part 8.2: Tests on elements of construction for buildings exposed to simulated bushfire attack—Large flaming sources*.

The modelling procedure for the assessment of BAL in this Standard uses the nominal inputs shown in Appendix B, Table B1 with an assumed flame temperature of 1090 K. The outputs result in the production of Tables 2.4 to 2.7.

It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.

The survivability of buildings is also dependent on a combination of measures such as landscaping, water supplies, access, building design and maintenance. Care should also be exercised when siting and designing for these measures when constructing a building under this Standard.

STANDARDS AUSTRALIA

Australian Standard
Construction of buildings in bushfire-prone areas

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the construction of buildings in bushfire-prone areas in order to improve their resistance to bushfire attack from burning embers, radiant heat, flame contact and combinations of the three attack forms.

Although this Standard is designed to improve the performance of buildings when subjected to bushfire attack in designated bushfire-prone areas there can be no guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

This Standard does not provide any requirements for fencing and screen walls. Fencing and screen walls may reduce exposure of a building to embers, radiant heat and flame contact from the bushfire front and from other potential fire sources such as adjacent buildings. The efficacy of fencing and walls depends on its resistance to ember, radiant heat and flame attack and potential for ignition and subsequent sustained flaming, height and structural design and specific site configurations. Therefore no specific advice has been provided in this Standard but designers may consider utilizing fencing and walls to improve house survivability beyond the base levels provided in this Standard.

NOTES:

- 1 The construction measures contained in this Standard apply to any building class and are not the only measures that can be considered to address bushfire attack as there are other means available that are outside the scope of this Standard.
- 2 This Standard does not address the infiltration of smoke nor any associated health and safety risk. The combustion of material and coatings during a bushfire may present a health and safety risk. Selection of external material should be considered in relation to potential health and safety risk in a bushfire.
- 3 The vulnerability of a building is also affected by building design and maintenance. The provision of water, access and landscaping is also important but falls outside the scope of this Standard. The overall survivability of a building is dependent on a combination of these measures in achieving improved safety.

1.2 OBJECTIVE**1.2.1 Objective of this Standard**

The objective of this Standard is to prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire, appropriate to the—

- (a) potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire; and
- (b) intensity of the bushfire attack on the building.

1.2.2 Objective of this edition

The objective of this edition is to provide additional and detailed methods of assessing bushfire attack together with the applicable construction requirements, arranged by BAL.

1.3 APPLICATION

This Standard is limited to those sites where the Bushfire Attack Level (BAL) has been determined as BAL—LOW, BAL—12.5, BAL—19, BAL—29, BAL—40 or BAL—FZ (see Table 3.1).

NOTE: Although there are no specific construction requirements in the BAL designated as LOW, this does not imply these buildings are not at risk.

1.4 NORMATIVE REFERENCES

The following documents are indispensable to the application of this Standard.

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

- 1288 Glass in buildings—Selection and installation
- 1445 Hot-dipped zinc-coated, aluminium/zinc-coated or aluminium/zinc/magnesium-coated steel sheet—76 mm pitch corrugated
- 1530 Methods for fire tests on building materials, components and structures
 - 1530.1 Part 1: Combustibility test for materials
 - 1530.2 Part 2: Test for flammability of materials
 - 1530.4 Part 4: Fire-resistance test of elements of construction
 - 1530.8.1 Part 8.1: Tests on elements of construction for buildings exposed to simulated bushfire attack—Radiant heat and small flaming sources
 - 1530.8.2 Part 8.2: Tests on elements of construction for buildings exposed to simulated bushfire attack—Large flaming sources
- 1684 Residential timber-framed construction (series)

A2 | **‘Text deleted’**

- 1905 Components for the protection of openings in fire-resistant walls
 - 1905.1 Part 1: Fire-resistant doorsets
 - 2047 Windows and external glazed doors in buildings
 - 2049 Roof tiles
 - 2050 Installation of roof tiles
 - 3999 Bulk thermal insulation—Installation
- AS/NZS
- 2588 Gypsum plasterboard
 - 3837 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter

A2 | **‘Text deleted’**

- 4859 Materials for the thermal insulation of buildings
 - 4859.1 Part 1: General criteria and technical provisions
- 60335 Household and similar electrical appliances—Safety
 - 60335.2.98 Part 2.98: Particular requirements for humidifiers (IEC 60335-2-98 Ed 2.2, MOD)

ASTM

- D2898 Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

NCC

- National Construction Code

1.5 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.5.1 Bushfire

An unplanned fire burning in vegetation; also referred to as wildfire.

1.5.2 Bushfire attack

Attack by wind, burning embers, radiant heat or flame generated by a bushfire.

1.5.3 Bushfire-prone area

An area that is subject to, or likely to be subject to, bushfire attack.

1.5.4 Bushfire Attack Level (BAL)

A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.

1.5.5 Bushfire-resisting timber

Timber that is in solid, laminated or reconstituted form that meets the test specified in Appendix F.

1.5.6 Bushfire shutter

A shutter that is constructed and fitted to the exterior of a building in accordance with Clause 3.7, to protect a window or a door from exposure to bushfire attack.

1.5.7 Classified vegetation

Vegetation that has been classified in accordance with Clause 2.2.3.

1.5.8 Combustible

Combustible as determined by AS 1530.1.

1.5.9 Decking

That part of the structure of verandas, decks, steps, ramps and landings that forms the trafficable surface of the structure.

1.5.10 Door frame

A2 | The frame surrounding and supporting a door where the frame consists of two jambs, a head and sometimes a transom and a sill, and is machined or made from solid stock or with a planted doorstep (see Figure 3.2).

1.5.11 Effective slope

The slope under that classified vegetation which most influences the bushfire attack (see Figure 2.3).

1.5.12 Ember attack

A2 | Attack by smouldering or flaming windborne debris that is capable of entering or accumulating around a building, and that may ignite the building or other combustible material and debris.

1.5.13 Ember guard

A cover inserted in or over an opening or cavity to prevent the entry of burning embers.

1.5.14 Fire Danger Index (FDI)

The chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects.

NOTES:

- 1 FDI in this Standard refers to the Forest Fire Danger Index calculated by the McArthur Mk 5 Forest Fire Danger Meter using the equations published by Noble, I.R., Bary, G.A.V, and Gill, A.M., 1980 (Ref. 5, Appendix B).
- 2 Grassland Fire Danger Index values are calculated by the McArthur Mk 4 Grassland Fire Danger Meter using the equations published by Purton, C.M., 1982 (Ref. 6 and Commentary CB2, Appendix B).

1.5.15 Fire resistance level (FRL)

The nominal grading period, in minutes, that is determined by subjecting a specimen to the standard time temperature curve regime as set out in AS 1530.4, to specify—

- (a) structural adequacy,
- (b) integrity, and
- (c) insulation,

which are expressed in that order.

NOTE: For example, a building element with an FRL of 120/60/30 will maintain, when tested in accordance with AS 1530.4—

- (a) structural adequacy for a period of 120 min;
- (b) integrity for a period of 60 min; and
- (c) insulation for a period of 30 min.

1.5.16 Fire-resistant sealant

A sealant that has achieved an FRL of at least -/60/- when tested in accordance with AS 1530.4.

1.5.17 Flame temperature

The assumed effective flame temperature sustained for a 2 minute period over a fire front width of 100 m. Instantaneous flame temperature may peak above 1090 K.

1.5.18 Flame Zone (FZ)

The highest level of bushfire attack as a consequence of direct exposure to flames from the fire front in addition to heat flux and ember attack.

1.5.19 Flammability index

The index number as determined by AS 1530.2.

1.5.20 Foliage cover

The proportion of the ground that would be shaded by foliage when the sun is shining directly overhead, expressed as a percentage for each stratum or identifiable layer of vegetation.

1.5.21 Glazed elements and/or assemblies

Any combination of glass and any other material that fills a window or door opening; also known as a glazing system. This includes but is not limited to: glazed louvres, window walls with one-piece framing elements, faceted glazing, fin-supported glazing and partly and unframed glass assemblies.

1.5.22 Metal-reinforced uPVC

uPVC applied to a continuous metal frame such that if the uPVC fell away no gaps greater than 2 mm would form and the glass pane would continue to be supported.

1.5.23 Non-combustible

Not deemed combustible as determined by AS 1530.1 or not deemed combustible in accordance with the NCC.

1.5.24 Overstorey

The canopy, being the tallest stratum of the vegetation profile.

1.5.25 Relevant authority

An independent agency authorized by legislation or regulation to issue determinations, orders, or other instructions in respect of any subject covered by this Standard.

1.5.26 Resistance to the incipient spread of fire (in respect of a floor system)

The ability of the membrane to insulate and thereby limit the rise in temperature of the combustible elements of the floor system to a level that will not permit the rapid and general spread of fire throughout the floor system and to any adjoining fire compartments, in accordance with AS 1530.4.

1.5.27 Sarking

A material (such as a reflective foil or other membrane) that is normally used for a purpose such as water proofing, vapour proofing, breathing (vapour permeable), or thermal reflectance, and which conforms with Clause 3.10.

1.5.28 Shall

Indicates a mandatory requirement.

1.5.29 Should

Indicates a recommendation or that which is advisory but not mandatory.

1.5.30 Site

The part of the allotment of land on which a building stands or is to be erected.

1.5.31 Total fuel

The sum of the understorey and overstorey fuel loads within classified vegetation.

1.5.32 Understorey

The vegetation beneath the overstorey.

1.6 PROCESS OF DETERMINING CONSTRUCTION REQUIREMENTS

The process for determining construction requirements is diagrammatically shown in Figure 1.1.

CI.6 Before construction requirements covered by this Standard can be determined, it is first necessary to determine the Bushfire Attack Level (BAL) by an assessment of the subject allotment and classified vegetation impacting on the site. Assessment methodologies are provided in Section 2 and Appendices B and C. The assessment outcomes are expressed in BALs and radiant heat levels provide the range on which the construction requirements are based.

1.7 BUSHFIRE ATTACK LEVELS (BALs)

The following BALs, based on heat flux exposure thresholds (see Table 3.1), are used in this Standard:

- (a) BAL—LOW
- (b) BAL—12.5
- (c) BAL—19
- (d) BAL—29
- (e) BAL—40
- (f) BAL—FZ

NOTE: See Appendix G for a description of the threats associated with each BAL.

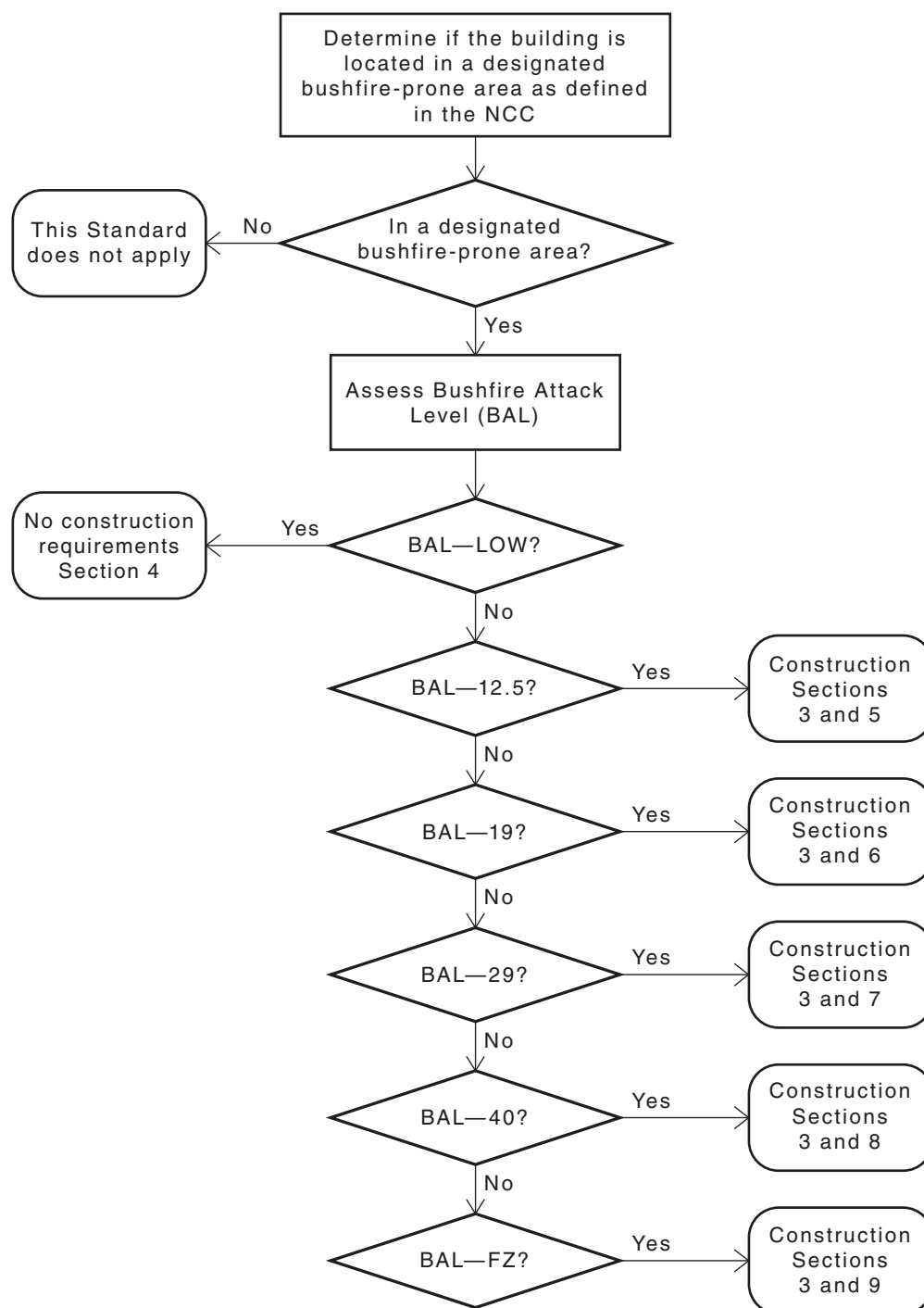


FIGURE 1.1 FLOW DIAGRAM SHOWING THE PROCESS FOR DETERMINING CONSTRUCTION REQUIREMENTS

SECTION 2 DETERMINING THE BUSHFIRE ATTACK LEVEL (BAL)

2.1 GENERAL

The BAL shall apply to the entire building and to any attached or adjacent structures within 6 metres of the building. It shall be determined by using the—

- (a) simplified procedure described in Clause 2.2 (Method 1); or
NOTE: See Appendix C for a flow diagram to summarize the process.
- (b) detailed procedure described in Appendix B (Method 2).

BALs are based on levels of exposure defined in Table 3.1.

C2.1 *There are two methods for determining BALs:*

Method 1—A simplified procedure that involves five steps to determine BALs, which is subject to limitations on the circumstances in which it can be used (see Appendix C).

Method 2—A detailed procedure, set out in Appendix B, using calculations to determine BALs, appropriate where a more specific result is sought or where the site conditions are outside of the scope of Method 1.

BALs are used to determine which, if any, construction requirements contained in Sections 3 to 9 of this Standard are appropriate for a particular site.

2.2 SIMPLIFIED PROCEDURE (METHOD 1)

2.2.1 General

For Method 1, the following steps shall be used to determine the BAL for all circumstances except where the effective slope under the classified vegetation, determined in accordance with Clause 2.2.5, is more than 20° downslope.

The steps are summarized below, with specific requirements provided in the following clauses.

Step	Clause	Procedure
Step 1	2.2.2	Determine the relevant FDI (see Table 2.1).
Step 2	2.2.3	Determine the classified vegetation type(s) (see Table 2.3 and Figure 2.4).
Step 3	2.2.4	Determine the distance of the site from the classified vegetation type(s) [(Point A to Point B; see Figure 2.1)].
Step 4	2.2.5	Determine the effective slope(s) under the classified vegetation type(s) (see Figure 2.3).
A2 Step 5	2.2.6	Determine the BAL from the appropriate table (see Tables 2.4, 2.5, 2.6, and 2.7).
Step 6	2.2.7	Determine the appropriate construction requirements.

2.2.2 Step 1—Relevant Fire Danger Index (FDI)

The relevant FDI shall be determined in accordance with Table 2.1 for the identified jurisdiction or region within a jurisdiction.

TABLE 2.1
JURISDICTIONAL AND REGIONAL VALUES FOR FDI⁽¹⁾

State/region	FDI
Australian Capital Territory	100
New South Wales	
(a) Greater Hunter, Greater Sydney, Illawarra/Shoalhaven, Far South Coast and Southern Ranges fire weather districts ⁽²⁾	100
(b) NSW alpine areas ⁽³⁾	50
(c) NSW general (excluding alpine areas, Greater Hunter, Greater Sydney, Illawarra/Shoalhaven, Far South Coast and Southern Ranges fire weather districts)	80
Northern Territory	40
Queensland	40
South Australia	80
Tasmania	50
Victoria	
(a) Victoria alpine areas ⁽³⁾	50
(b) Victoria general (excluding alpine areas)	100
Western Australia	80

NOTES:

- 1 The FDI values may be able to be refined within a jurisdiction or region where sufficient climatological data is available and in consultation with the relevant authority.
- 2 Example of NSW general fire weather areas refer to <http://www.bom.gov.au/nsw/forecasts/fire-forecasts.shtml>
- 3 Alpine areas are defined as per the National Construction Code (NCC) of Australia, Volume Two.

2.2.3 Step 2—Vegetation classification types

2.2.3.1 General

Vegetation shall be classified in accordance with Table 2.3. Where there is more than one vegetation type, each type shall be classified and assessed separately.

NOTES:

- 1 Classification of vegetation should not be based solely on the edge of the vegetation, which may be invaded by weeds or by recent fire activity alone.
- 2 See Figures 2.4(A) to 2.4 (H) which show indicative heights.

C2.2.3.1 *In assessing vegetation, care should be exercised to ensure that a sufficient level of distance is used to determine predominant vegetation. This may necessitate the consideration of vegetation out to distances in excess of 100 metres from the site.*

Vegetation classes may appear to be modified as a result of previous uses, clearing, weed invasion or due to disturbance factors such as fire which may affect short term fire behaviour. The expansion of additional vegetation classes would make implementation of this Standard more difficult. The presence of disturbance by bushfire or past use does not of itself warrant any reduction in the classification of the vegetation. The potential for re-vegetation should be considered.

2.2.3.2 Exclusions—Low threat vegetation and non-vegetated areas

The following vegetation shall be excluded from a BAL assessment:

- (a) Vegetation of any type that is more than 100 m from the site.
- (b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.
- (c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.
- (d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.
- (e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.
- (f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

- 1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).
- 2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

2.2.4 Step 3—Distance of the site from classified vegetation

For each vegetation type classified in Clause 2.2.3, the distance of the site from the classified vegetation shall be determined, measured in the horizontal plane (see Figure 2.1 Point A to Point B).

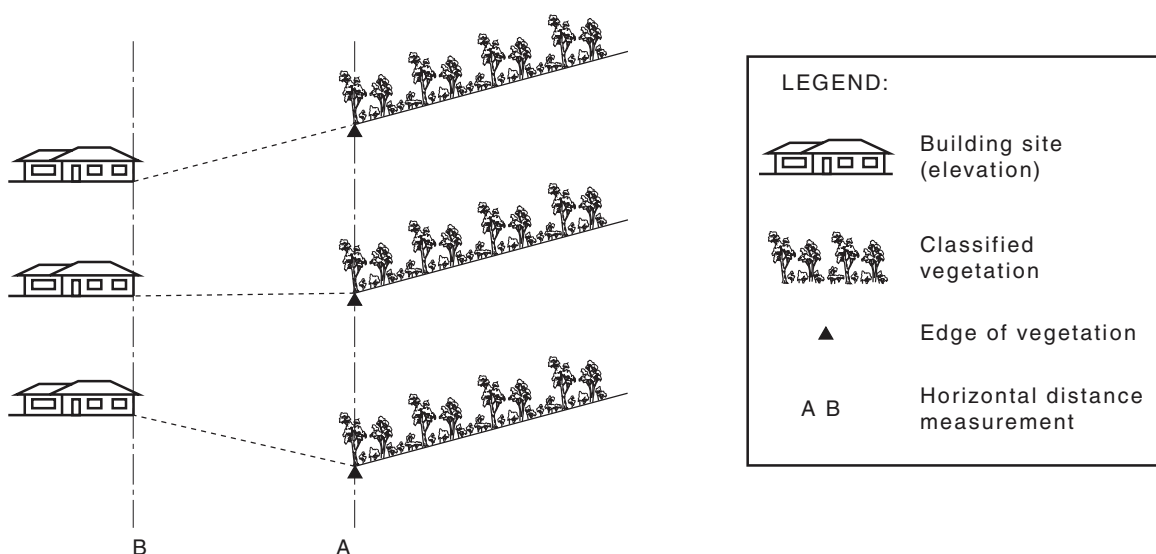


FIGURE 2.1 DETERMINATION OF DISTANCE OF SITE FROM CLASSIFIED VEGETATION

NOTES TO FIGURE 2.1:

1 The measurement of distance A to B is measured in plan (i.e. horizontally) and is taken to the nearest part of an external wall of the proposed building (or the site in the absence of a detailed building design) from the unmanaged vegetation. For those parts of the building that do not have external walls (including carports, verandas, decks, landings, steps and ramps), the distance is measured to the supporting posts or columns. The following parts of the building are excluded when determining the distance A to B:

- (a) Eaves and roof overhangs.
- (b) Rainwater and domestic fuel tanks.
- (c) Chimneys, pipes, cooling or heating appliances or other services.
- (d) Unroofed pergolas.
- (e) Sun blinds.

2 In the three illustrations above, the distance A to B is the same horizontal distance from the classified vegetation to the site. The area between A and B may contain vegetation not required to be classified in accordance with Clause 2.2.3.

2.2.5 Step 4—Effective slope of land under the classified vegetation

‘Slope’ refers to the slope under the classified vegetation in relation to the building—not the slope between the vegetation and the building.

For each vegetation type classified in Clause 2.2.3, the effective slope of the land under the classified vegetation shall be determined in degrees, along with whether it is upslope or downslope in relation to the site (see Figure 2.3). Where there is more than one slope within the classified vegetation, each slope shall be individually assessed and the worst case Bushfire Attack Level shall apply.

Effective slope of land under classified vegetation is presented in degrees within Tables 2.4 to 2.7. As fires travel slower down a hill, all classified vegetation that is upslope will assume a value of 0° (i.e. flat land). Table 2.2 provides comparisons between degrees, slope ratios and percentages.

C2.2.5 *The slope of the land under the classified vegetation is much more important than the slope of the land between the site and the edge of the classified vegetation. The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the severity of the fire and the ultimate level of radiant heat flux.*

For Method 1 it is not important to determine the slope of the land between the site and the edge of the classified vegetation (see Figure 2.1, Point B to Point A). The further the distance, the less radiant heat reaches the site.

It may be necessary to consider the slope under the classified vegetation for distances greater than 100 m in order to determine the effective slope for that vegetation classification.

Where the slope of the land under the classified vegetation is downhill from the edge of the classified vegetation nearest the site, it is considered ‘downslope’ regardless of the slope of the land between the site and the edge of the classified vegetation [see Figure 2.3].

Where the slope of the land under the classified vegetation is uphill from the edge of the classified vegetation nearest the site, it is considered ‘upslope’ regardless of the slope of the land between the site and the edge of the classified vegetation [see Figure 2.3].

Where the slope varies but falls within the range given in Tables 2.4 to 2.8, there is no need to take separate assessments. Where the slopes vary over two or more slope ranges, then each slope range has to be assessed separately, in conjunction with the relevant vegetation classification. See Figure 2.2 below for example of varying slope ranges to be assessed.

In assessing vegetation classes for forests, woodlands and rainforests, the classified vegetation will be determined by the unmanaged understorey rather than either the canopy (drip line) or the trunk of any trees.

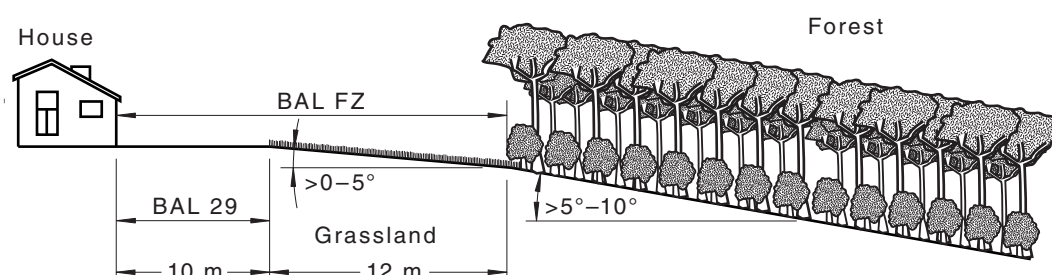
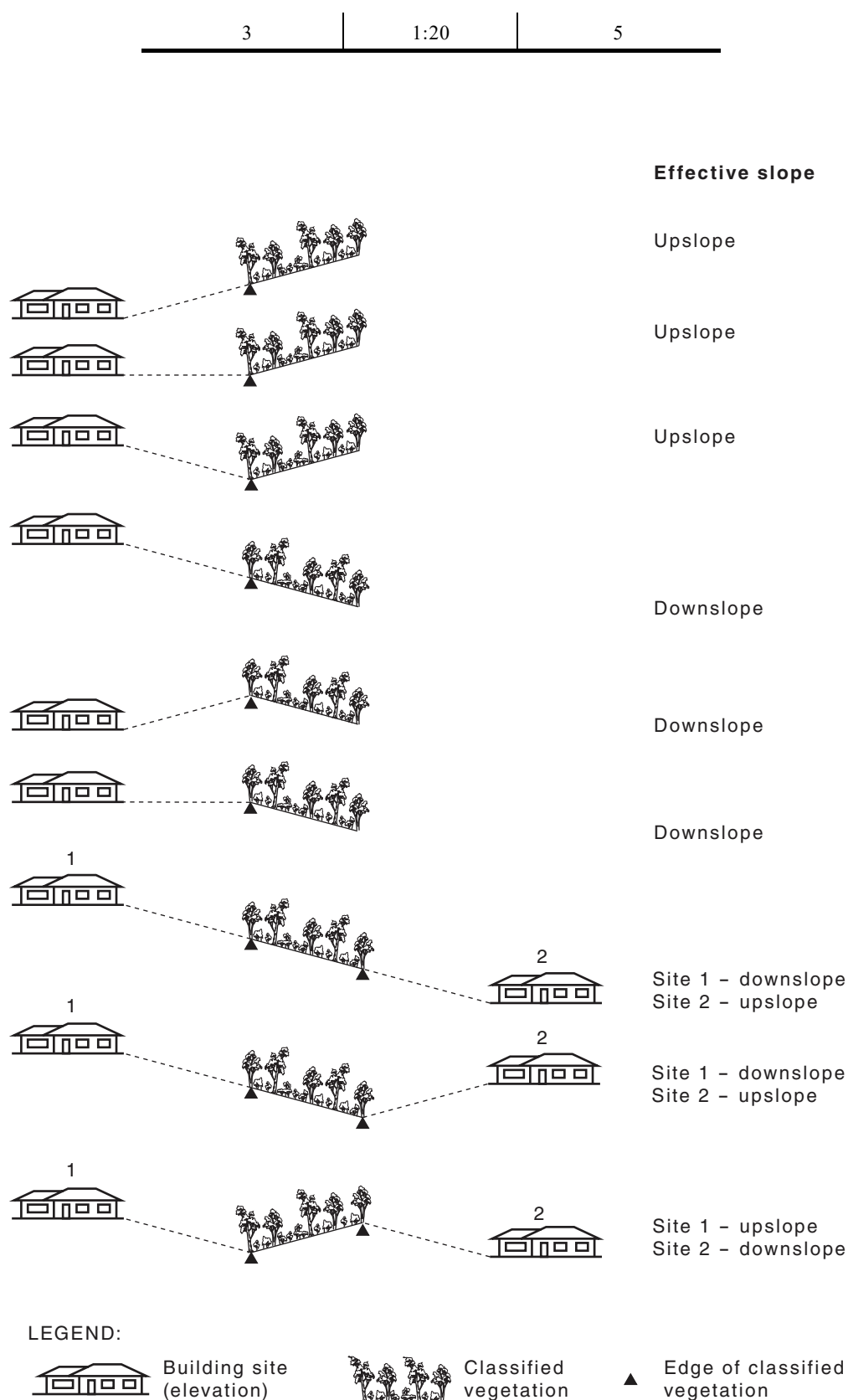


FIGURE 2.2 EXAMPLE OF VARYING SLOPE RANGES FOR ASSESSMENT

**TABLE 2.2
SLOPE COMPARISONS**

Degrees	Ratio	Percentages
45	1:1	100
34	1:1.5	66
26	1:2	50
21	1:2.5	40
18	1:3	33
15	1:3.5	28
14	1:4	25
12	1:4.5	22
11	1:5	20
10	1:5.5	18
9	1:6	16
9	1:6.5	15
8	1:7	14
8	1:7.5	13
7	1:8	12
7	1:8.5	11
6	1:9	11
6	1:10	10
5	1:11	9
5	1:12	8
4	1:13	8
4	1:14	7
4	1:15	7
4	1:16	6
3	1:17	6
3	1:18	5.5
3	1:19	5



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 slope is determined on the basis of the fire moving towards the building and the rate of spread of the fire and not on the basis of the relative elevation of vegetation alone.

FIGURE 2.3 DETERMINATION OF EFFECTIVE UPSLOPE AND DOWNSLOPE

2.2.6 Step 5—Determination of Bushfire Attack Level (BAL)

The BAL shall be determined in accordance with the following:

- (a) Select the relevant FDI table from Tables 2.4 to 2.8 as determined at Clause 2.2.2 (Step 1).
- (b) Using the relevant FDI table, determine the BAL for each of the vegetation classifications determined at Clause 2.2.3 (Step 2), the distance from the site determined at Clause 2.2.4 (Step 3) and the effective slope determined at Clause 2.2.5 (Step 4).
- (c) Select the highest BAL obtained from Item (b) above.
- (d) The assessed highest BAL applies to the entire building.
- (e) Any adjacent structures that are within 6 metres of the building shall be assessed separately (see Clause 3.2.3).

NOTES:

- 1 The determinations in Tables 2.4 to 2.8 are based on input values contained in Table B1, Appendix B.
- 2 A worked example of determining the BAL is shown in Appendix A.

2.2.7 Step 6—Determination of the appropriate construction requirements

Proceed to Section 3 to determine the appropriate construction requirements.

TABLE 2.3
CLASSIFICATION OF VEGETATION

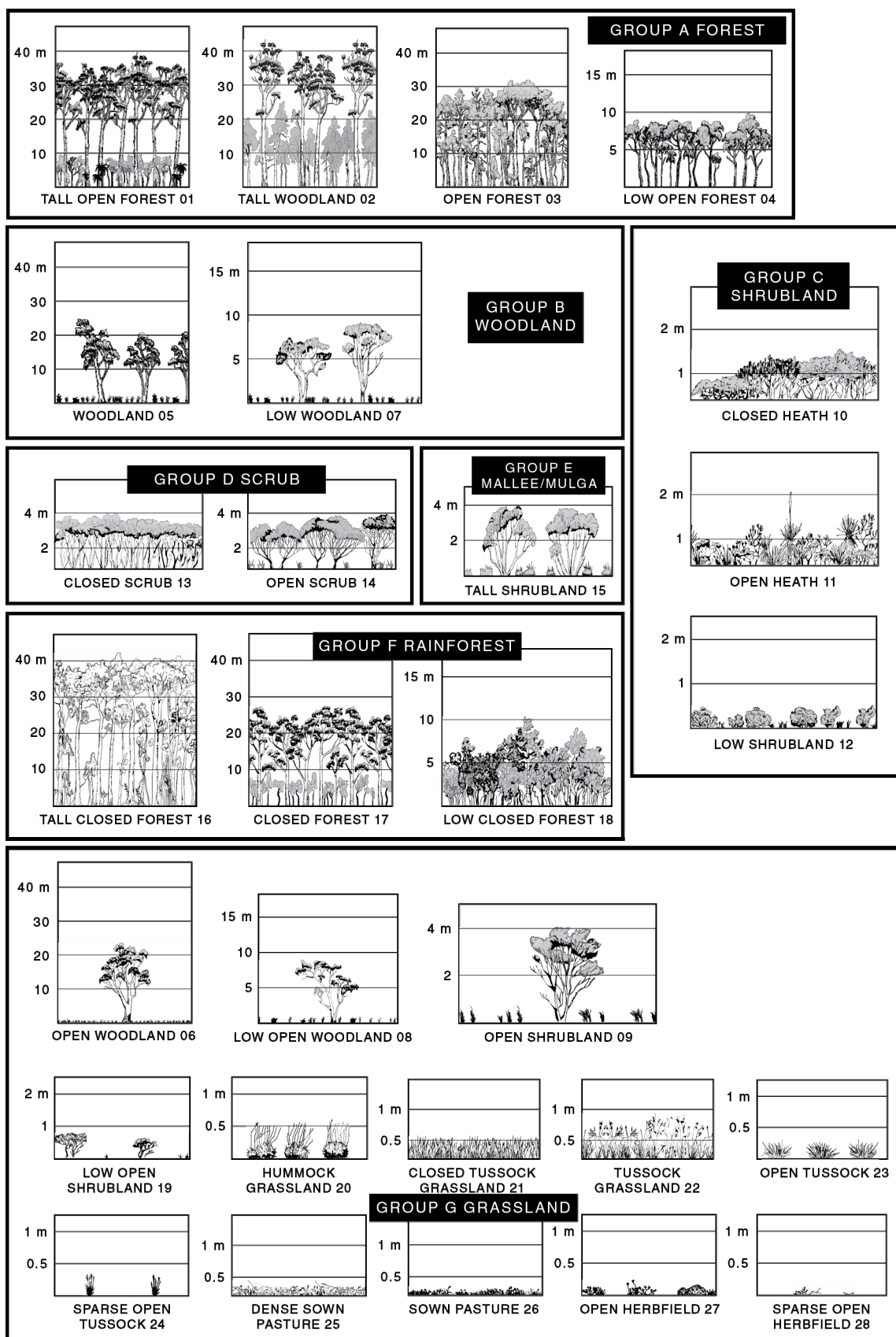
A2	Vegetation classification	Vegetation type	Figure No. in Figures 2.4(A) to 2.4(H)	Typical characteristics
A2	A Forest	Tall open forest Tall woodland	01 02	Trees over 30 m high; 30%–70% foliage cover (may include understorey ranging from rainforest species and tree ferns to low trees and tall shrubs). Found in areas of high reliable rainfall. Typically dominated by eucalypts with a sub-dominant tree layer.
		Open forest Low open forest	03 04	Trees up to 30 m high; 30%–70% foliage cover (may include understorey of sclerophyllous low trees or shrubs). Typically dominated by eucalypts, melaleuca or callistemon (may include riverine and wetland environments) and callitris. Includes eucalypt plantations.
		Pine plantation	Not shown	Trees 30 m in height at maturity, generally comprising Pinus species or other softwood species, planted as a single species for the production of timber.
A2	B Woodland	Woodland Low woodland	05 07	Trees up to 30 m high; 10%–30% foliage cover dominated by eucalypts and/or callitris with a prominent grassy understorey. May contain isolated shrubs.
		Closed (low) heath Open heath	10 11	Found in wet areas and/or areas affected by poor soil fertility or shallow soils. Shrubs 1 m–2 m high. Wet heaths occur in sands adjoining dunes of the littoral (shore) zone. Montane heaths occur on shallow or water-logged soils.
A2	C Shrubland	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.
		Closed scrub (Tall heaths)	13	Found in wet areas and/or areas affected by poor soil fertility or shallow soils; >30% foliage cover. Dry heaths occur in rocky or sandy areas. Shrubs >2 m high. Typical of coastal areas and tall heaths up to 6 metres in height. May be dominated by Banksia, Melaleuca or Leptospermum with heights of up to 6 metres.
A2	D Scrub	Open scrub	14	Shrubs greater than 2 m high; 10%–30% foliage cover with a mixed species composition.
		Tall shrubland	15	Vegetation dominated by low trees or tall shrubs (especially eucalypts and acacias) some with a multi-stemmed habit (mallee); usually greater than 2 m in height; <30% foliage cover. Understorey of widespread dense low shrubs or sparse grasses and generally found in the arid and semi-arid zones, but not within the rangelands.
A2	F Rainforest	Tall closed forest	16	Trees >90% foliage cover; understorey may contain a large number of species with a variety of heights. Not dominated by eucalypt species.
		Closed forest	17	
		Low closed forest	18	

(continued)

TABLE 2.3 (continued)

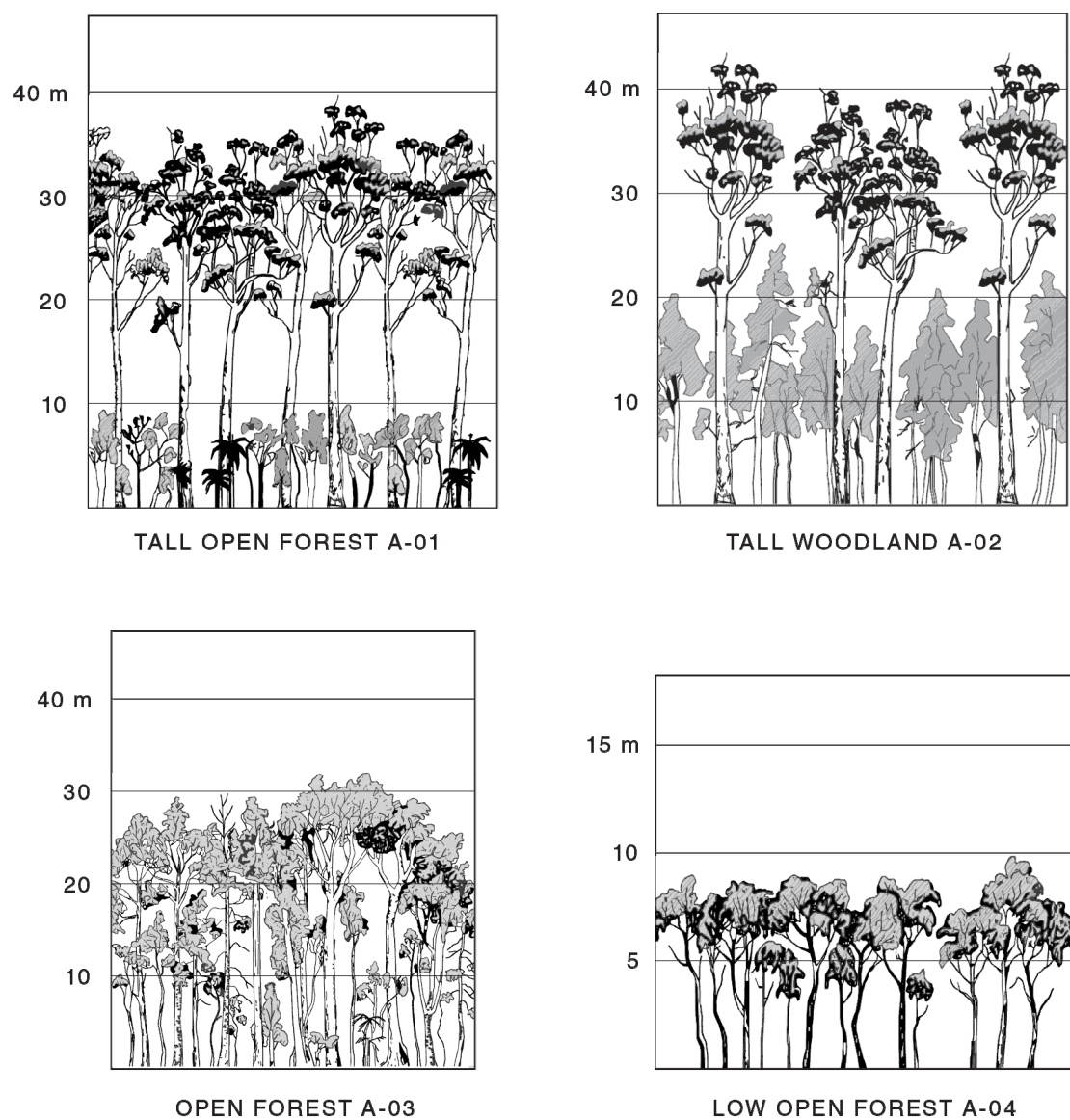
A2

Vegetation classification	Vegetation type	Figure No. in Figures 2.4(A) to 2.4(H)	Typical characteristics
G Grassland	Open woodland	06	All forms (except tussock moorlands), including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland. NOTE: Grassland managed in a minimal fuel condition and non-curing cropland is regarded as low threat vegetation for the purposes of Clause 2.2.3.2.
	Low open woodland	08	
	Open shrubland	09	
	Low open shrubland	19	
	Hummock grassland	20	
	Closed tussock grassland	21	
	Tussock grassland	22	
	Open tussock	23	
	Sparse open tussock	24	
	Dense sown pasture	25	
	Sown pasture	26	
	Open herbfield	27	
	Sparse open herbfield	28	
H Tussock Moorland	Tussock Moorland	Not shown	All forms of vegetation where the overstorey is dominated by the species Buttongrass (<i>Gymnoschoenus sphaerocephalus</i>). Only occurs as a significant vegetation type in Tasmania.



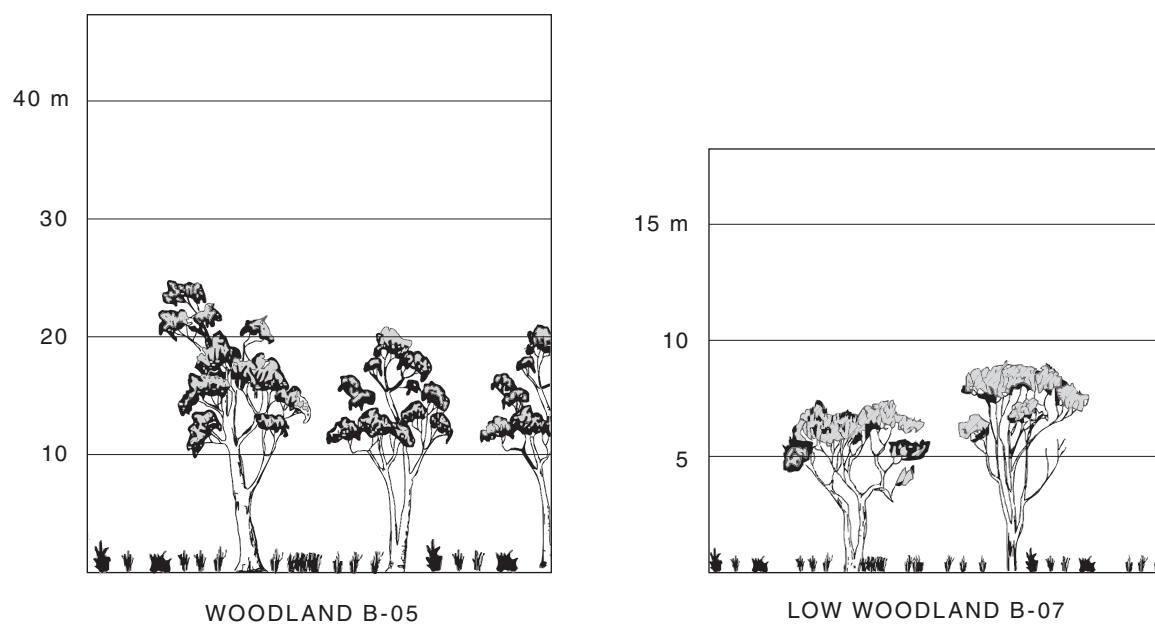
NOTE: See Figures 2.4(B) to 2.4(H) for greater vegetation detail.

FIGURE 2.4(A) CLASSIFICATION OF VEGETATION—SUMMARY



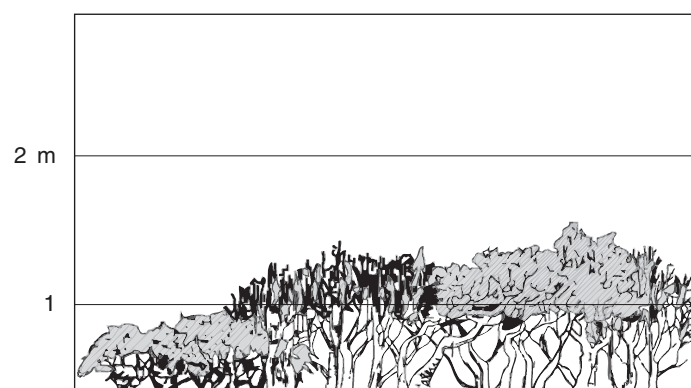
NOTE: See Table 2.3.

FIGURE 2.4(B) CLASSIFICATION OF VEGETATION—FOREST

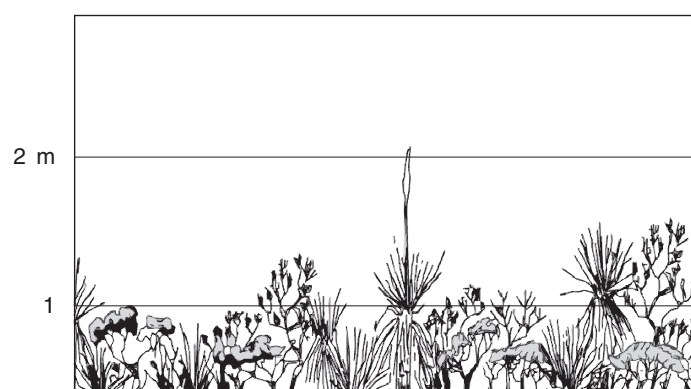


NOTE: See Table 2.3.

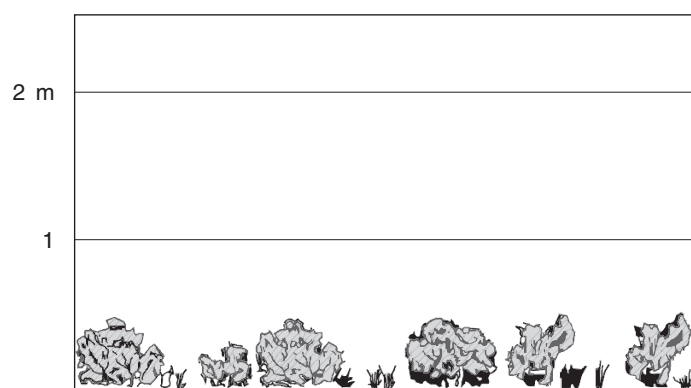
FIGURE 2.4(C) CLASSIFICATION OF VEGETATION—WOODLAND



CLOSED HEATH C-10



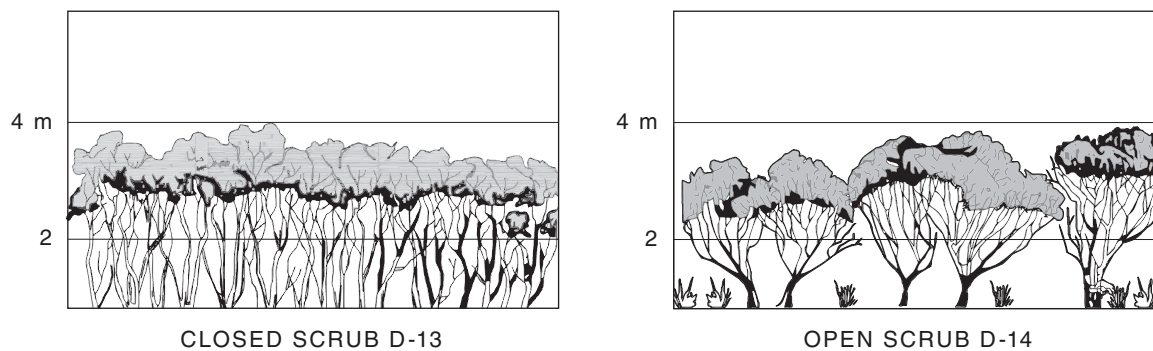
OPEN HEATH C-11



LOW SHRUBLAND C-12

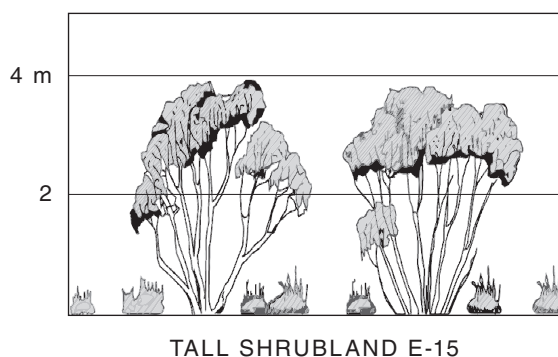
NOTE: See Table 2.3.

FIGURE 2.4(D) CLASSIFICATION OF VEGETATION—SHRUBLAND



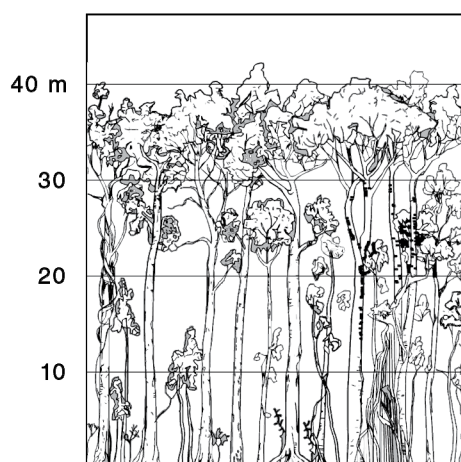
NOTE: See Table 2.3.

FIGURE 2.4(E) CLASSIFICATION OF VEGETATION—SCRUB (TALL HEATH)

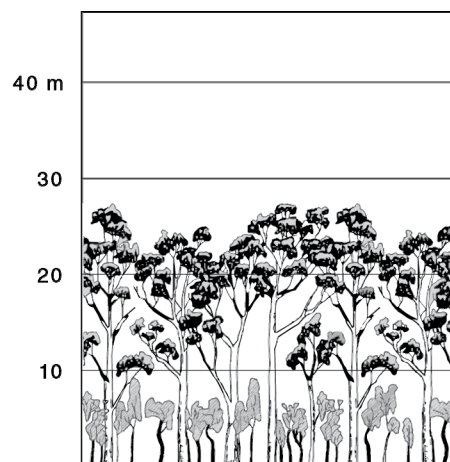


NOTE: See Table 2.3.

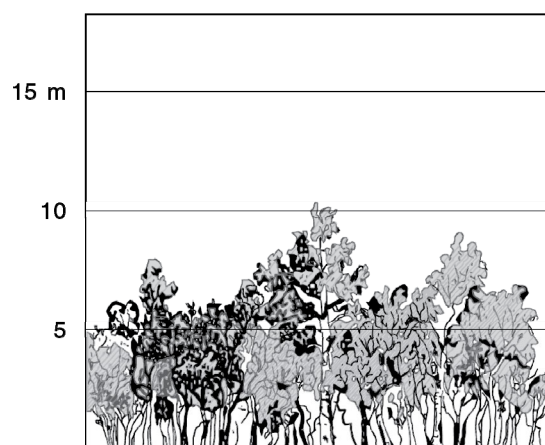
FIGURE 2.4(F) CLASSIFICATION OF VEGETATION—MALLEE/MULGA



TALL CLOSED FOREST F-16



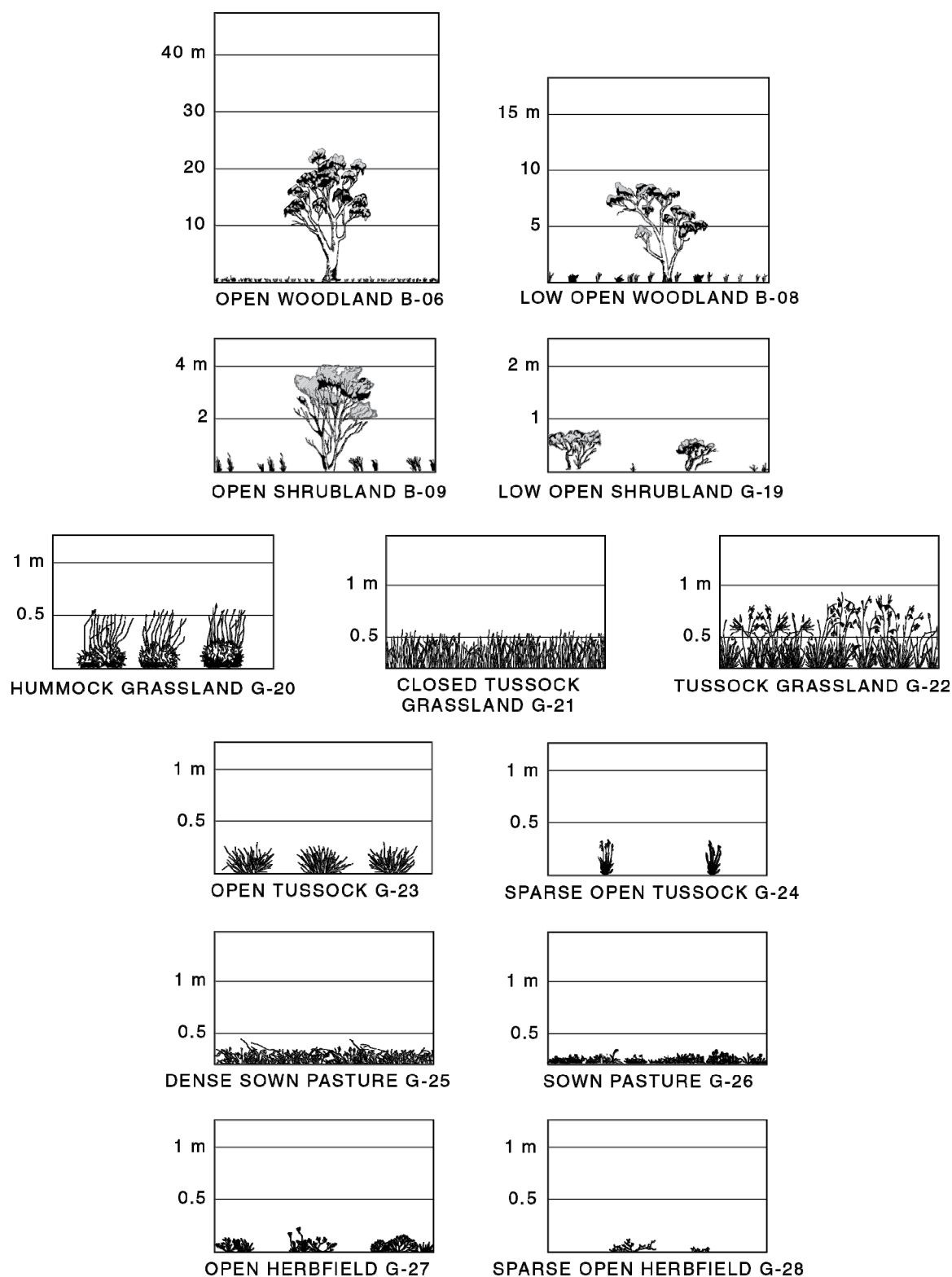
CLOSED FOREST F-17



LOW CLOSED FOREST F-18

NOTE: See Table 2.3.

FIGURE 2.4(G) CLASSIFICATION OF VEGETATION—RAINFOREST



NOTE: See Table 2.3.

FIGURE 2.4(H) CLASSIFICATION OF VEGETATION—GRASSLAND (UNMANAGED)

TABLE 2.4
DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 100 (1090 K)

Vegetation classification	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	<7	7–<9	9–<13	13–<19	19–<100
D. Scrub	<10	10–<13	13–<19	19–<27	27–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<8	8–<11	11–<16	16–<23	23–<100
G. Grassland	<6	6–<9	9–<13	13–<19	19–50
	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	<7	7–<10	10–<15	15–<22	22–<100
D. Scrub	<11	11–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<10	10–<14	14–<20	20–<29	29–<100
G. Grassland	<7	7–<10	10–<15	15–<22	22–<50
	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	<8	8–<11	11–<17	17–<25	25–<100
D. Scrub	<12	12–<17	17–<24	24–<35	35–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<13	13–<18	18–<26	26–<36	36–<100
G. Grassland	<8	8–<11	11–<17	17–<25	25–<50
	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	<9	9–<13	13–<19	19–<28	28–<100
D. Scrub	<14	14–<19	19–<28	28–<39	39–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<17	17–<23	23–<33	33–<45	45–<100
G. Grassland	<9	9–<13	13–<20	20–<28	28–<50
	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	<10	10–<15	15–<22	22–<31	31–<100
D. Scrub	<15	15–<21	21–<31	31–<43	43–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<22	22–<29	29–<42	42–<56	56–<100
G. Grassland	<11	11–<15	15–<23	23–<32	32–<50

TABLE 2.5
DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 80 (1090 K)

Vegetation classification	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	<16	16–<21	21–<31	31–<42	42–<100
B. Woodland	<10	10–<14	14–<20	20–<29	29–<100
C. Shrubland	<7	7–<9	9–<13	13–<19	19–<100
D. Scrub	<10	10–<13	13–<19	19–<27	27–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<6	6–<9	9–<13	13–<19	19–<100
G. Grassland	<6	6–<8	8–<12	12–<17	17–<50
	Downslope >0 to 5 degrees				
A. Forest	<20	20–<27	27–<37	37–<50	50–<100
B. Woodland	<13	13–<17	17–<25	25–<35	35–<100
C. Shrubland	<7	7–<10	10–<15	15–<22	22–<100
D. Scrub	<11	11–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<8	8–<11	11–<17	17–<24	24–<100
G. Grassland	<7	7–<9	9–<14	14–<20	20–<50
	Downslope >5 to 10 degrees				
A. Forest	<26	26–<33	33–<46	46–<61	61–<100
B. Woodland	<16	16–<22	22–<31	31–<43	43–<100
C. Shrubland	<8	8–<11	11–<17	17–<25	25–<100
D. Scrub	<12	12–<17	17–<24	24–<35	35–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<11	11–<15	15–<22	22–<31	31–<100
G. Grassland	<8	8–<10	10–<16	16–<23	23–<50
	Downslope >10 to 15 degrees				
A. Forest	<33	33–<42	42–<56	56–<73	73–<100
B. Woodland	<21	21–<28	28–<39	39–<53	53–<100
C. Shrubland	<9	9–<13	13–<19	19–<28	28–<100
D. Scrub	<14	14–<19	19–<28	28–<39	39–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<14	14–<19	19–<28	28–<39	39–<100
G. Grassland	<9	9–<12	12–<18	18–<26	26–<50
	Downslope >15 to 20 degrees				
A. Forest	<42	42–<52	52–<68	68–<87	87–<100
B. Woodland	<27	27–<35	35–<48	48–<64	64–<100
C. Shrubland	<10	10–<15	15–<22	22–<31	31–<100
D. Scrub	<15	15–<21	21–<31	31–<43	43–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<18	18–<25	25–<36	36–<48	48–<100
G. Grassland	<10	10–<14	14–<21	21–<30	30–<50

TABLE 2.6
DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 50 (1090 K)

Vegetation classification	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	<7	7–<9	9–<13	13–<19	19–<100
D. Scrub	<10	10–<13	13–<19	19–<27	27–<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. Grassland	<5	5–<6	6–<10	10–<14	14–<50
H. 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	<7	7–<10	10–<15	15–<22	22–<100
D. Scrub	<11	11–<15	15–<22	22–<31	31–<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. Grassland	<5	5–<7	7–<11	11–<16	16–<50
H. 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	<8	8–<11	11–<17	17–<25	25–<100
D. Scrub	<12	12–<17	17–<24	24–<35	35–<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. Grassland	<6	6–<8	8–<13	13–<19	19–<50
H. 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	<9	9–<13	13–<19	19–<28	28–<100
D. Scrub	<14	14–<19	19–<28	28–<39	39–<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. Grassland	<7	7–<10	10–<15	15–<22	22–<50
H. 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	<10	10–<15	15–<22	22–<31	31–<100
D. Scrub	<15	15–<21	21–<31	31–<43	43–<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. Grassland	<8	8–<11	11–<17	17–<25	25–<50
H. Tussock moorland	<11	11–<15	15–<23	23–<33	33–<100

TABLE 2.7
DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 40 (1090 K)

Vegetation classification	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	<10	10–<13	13–<20	20–<28	28–<100
B. Woodland	<6	6–<9	9–<13	13–<19	19–<100
C. Shrubland	<7	7–<9	9–<13	13–<19	19–<100
D. Scrub	<10	10–<13	13–<19	19–<27	27–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<4	4–<5	5–<8	8–<12	12–<100
G. Grassland	<4	4–<5	5–<8	8–<12	12–<50
	Downslope >0 to 5 degrees				
A. Forest	<12	12–<16	16–<24	24–<34	34–<100
B. Woodland	<8	8–<11	11–<16	16–<23	23–<100
C. Shrubland	<7	7–<10	10–<15	15–<22	22–<100
D. Scrub	<11	11–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<5	5–<7	7–<10	10–<15	15–<100
G. Grassland	<4	4–<6	6–<9	9–<14	14–<50
	Downslope >5 to 10 degrees				
A. Forest	<15	15–<20	20–<29	29–<41	41–<100
B. Woodland	<9	9–<13	13–<19	19–<28	28–<100
C. Shrubland	<8	8–<11	11–<17	17–<25	25–<100
D. Scrub	<12	12–<17	17–<24	24–<35	35–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<6	6–<8	8–<13	13–<19	19–<100
G. Grassland	<5	5–<7	7–<11	11–<16	16–<50
	Downslope >10 to 15 degrees				
A. Forest	<19	19–<25	25–<36	36–<49	49–<100
B. Woodland	<12	12–<16	16–<24	24–<35	35–<100
C. Shrubland	<9	9–<13	13–<19	19–<28	28–<100
D. Scrub	<14	14–<19	19–<28	28–<39	39–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<8	8–<11	11–<16	16–<24	24–<100
G. Grassland	6	6–<8	8–<13	13–<19	19–<50
	Downslope >15 to 20 degrees				
A. Forest	<24	24–<31	31–<44	44–<59	59–<100
B. Woodland	<15	15–<21	21–<31	31–<42	42–<100
C. Shrubland	<10	10–<15	15–<22	22–<31	31–<100
D. Scrub	<15	15–<21	21–<31	31–<43	43–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<10	10–<14	14–<21	21–<30	30–<100
G. Grassland	<7	7–<9	9–<15	15–<22	22–<50

SECTION 3 GENERAL CONSTRUCTION REQUIREMENTS

3.1 GENERAL

This Section specifies general requirements for the construction of buildings for all Bushfire Attack Levels (BALs).

The BALs and the corresponding Sections for specific construction requirements are listed in Table 3.1.

TABLE 3.1
BUSHFIRE ATTACK LEVELS AND CORRESPONDING SECTIONS FOR SPECIFIC CONSTRUCTION REQUIREMENTS

Bushfire Attack Level (BAL)	Classified vegetation within 100 m of the site and heat flux exposure thresholds	Description of predicted bushfire attack and levels of exposure	Construction Section
BAL—LOW	See Clause 2.2.3.2	There is insufficient risk to warrant specific construction requirements	4
BAL—12.5	$\leq 12.5 \text{ kW/m}^2$	Ember attack	3 and 5
BAL—19	$> 12.5 \text{ kW/m}^2$ $\leq 19 \text{ kW/m}^2$	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 and 6
BAL—29	$> 19 \text{ kW/m}^2$ $\leq 29 \text{ kW/m}^2$	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 and 7
BAL—40	$> 29 \text{ kW/m}^2$ $\leq 40 \text{ kW/m}^2$	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of direct contact with flames	3 and 8
BAL—FZ	$> 40 \text{ kW/m}^2$	Direct exposure to flames from fire front in addition to heat flux and ember attack	3 and 9

3.2 CONSTRUCTION REQUIREMENTS FOR SPECIFIC STRUCTURES

3.2.1 Attached structures and structures sharing a common roof space

Where any part of a garage, carport, veranda, cabana, studio, storage area or similar roofed structure is attached to, or shares a common roof space with, a building required to conform with this Standard, the entire garage, carport, veranda or similar roofed structure shall conform with the construction requirements of this Standard, as applicable to the subject building.

Alternatively, the structure shall be separated from the subject building by a wall that extends to the underside of a non-combustible roof covering, and that conforms with one of the following:

- (a) The wall shall have an FRL of not less than 60/60/60 for loadbearing walls and –/60/60 for non-loadbearing walls when tested from the attached structure side and shall have openings protected as follows:
 - (i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.
 - (ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

A2

- (iii) *Other openings*—by construction with an FRL of not less than $-/60/-$ when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

- (b) The wall shall be of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and shall have openings protected as follows:

A2

- (i) *Doorways*—by self-closing fire doors with an FRL of $-/60/30$, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.
- (ii) *Windows*—by fire windows with an FRL of $-/60/-$ when tested in accordance with AS 1530.4 and permanently fixed in the closed position.
- (iii) *Other openings*—by construction with an FRL of not less than $-/60/-$ when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.2.2 Garages and carports beneath the subject building

Where a garage or carport is beneath a building required to comply with this Standard, it shall conform with the construction requirements of this Standard, as applicable to the subject building.

Alternatively, any construction separating the garage or carport (including walls and flooring systems) from the remainder of the building shall conform with one of the following:

- (a) The separating construction shall have an FRL of not less than 60/60/60 for loadbearing construction and $-/60/60$ for non-loadbearing construction when tested from the garage or carport side and shall have openings protected in accordance with the following:

A2

- (i) *Doorways*—by self-closing fire doors with an FRL of $-/60/30$, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.
- (ii) *Windows*—by fire windows with an FRL of $-/60/-$ when tested in accordance with AS 1530.4 and permanently fixed in the closed position.
- (iii) *Other openings*—by construction with an FRL of not less than $-/60/-$ when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

- (b) Where part or all of the separating construction is a wall, the wall need not conform with Item (a) above, provided the wall is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and the wall has openings protected in accordance with the following:

A2

- (i) *Doorways*—by self-closing fire doors with an FRL of $-/60/30$ that conforms with AS 1905.1 and tested in accordance with AS 1530.4.
- (ii) *Windows*—by fire windows with an FRL of $-/60/-$ when tested in accordance with AS 1530.4 and permanently fixed in the closed position.
- (iii) *Other openings*—by construction with an FRL not less than $-/60/-$ when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.2.3 Adjacent structures on the subject allotment

Where any garage, carport, or similar roofed structure on the subject allotment is not attached to a building required to conform with this Standard, that structure shall conform with the construction requirements of this Standard.

Alternatively, the adjacent structure shall be separated from the subject building by one of the following:

- (a) A distance of not less than 6 m from the building required to conform with this Standard. This distance is measured as any of the horizontal straight lines from the adjacent structure to the subject building.

or

- (b) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and has an FRL of not less than 60/60/60 for loadbearing walls and –/60/60 for non-loadbearing walls when tested from the outside. Any openings in the wall shall be protected in accordance with the following:

A2

- (i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.
- (ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.
- (iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

- (c) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness. Any openings in the wall shall be protected in accordance with the following:

A2

- (i) *Doorways*—by self-closing fire doors with an FRL of –/60/30, that conforms with AS 1905.1 and tested in accordance with AS 1530.4.
- (ii) *Windows*—by fire windows with an FRL of –/60/– when tested in accordance with AS 1530.4 and permanently fixed in the closed position.
- (iii) *Other openings*—by construction with an FRL of not less than –/60/– when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.3 EXTERNAL MOULDINGS

Unless otherwise required in Clause 3.6.1 and Sections 5 to 9, combustible external mouldings, jointing strips, trims and sealants may be used for decorative purposes or to cover joints between sheeting material.

3.4 HIGHER LEVELS OF CONSTRUCTION

The construction requirements specified for a particular BAL shall be acceptable for a lower level.

NOTE: For example, if the site has been assessed at BAL—12.5, BAL—12.5 construction is required; however any element or combination of elements contained in BAL—19, BAL—29, BAL—40 and BAL—FZ levels of construction may be used to satisfy this Standard.

3.5 REDUCTION IN CONSTRUCTION REQUIREMENTS DUE TO SHIELDING

Where an elevation is not exposed to the source of bushfire attack, then the construction requirements for that elevation can reduce to the next lower BAL. However it shall not reduce to below BAL—12.5.

An elevation is deemed to be not exposed to the source of bushfire attack if all of the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the same building (see Figure 3.1). However it shall not reduce to below BAL 12.5.

The shielding of an elevation shall apply to all the elements of the wall, including openings, but shall not apply to subfloors or roofs.