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Planning for
BUSH FIRE
PROTECTION

EXECUTIVE SUMMARY

DEPARTMENT
OF BUSH FIRE
SERVICES

This summary must not be used in isolation and reference to the main text is mandatory if a complete understanding of the reasons for each recommendation is to be gained.

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(v) ***Has recent development had little effect on the existing bush fire pattern? ; and***

(vi) ***Where the general fuel loadings are low or locally discontinuous, are aspect and slope likely to worsen the behaviour of any resultant bush fire ?***

If impact from bush fires is likely the LEP should, where appropriate, provide for a number of measures:

(i) ***the creation of a Fire Protection Zone (FPZ) incorporating at minimum:***

- *a)* ***a 'Fuel Free Zone' (FFZ) bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for that development and a building line on the side of the development; and***
- *b)* ***a 'Fuel Reduction Zone' (FRZ) managed for hazard reduction and located on the bushland side of the perimeter road;***

(ii) ***two way road access which links to the fire trail network;***

(iii) ***a minimum perimeter for the area of land which may be developed;***

(iv) ***controls which avoid placing inappropriate developments in hazardous areas; and***

(v) ***controls on the placement of combustible materials within the fuel free zone.***

Fuel reduced and fuel free zones will generally occupy the following distances:

Aspect : for N, N.W., W, S.W. and S slopes							
Slope	**FPZ**	=	**FRZ**	+	**FFZ**		
0°	30	=	10	+	20		
5°	35	=	15	+	20		
10°	45	=	20	+	25		
15°	70	=	40	+	30		
20°	100	=	60	+	40		

Aspect : for N.E., E, S.E., slopes							
Slope	**FPZ**	=	**FRZ**	+	**FFZ**		
0°	30	=	10	+	20		
5°	30	=	10	+	20		
10°	35	=	15	+	20		
15°	40	=	20	+	20		
20°	60	=	30	+	30		

Note : Distances are in metres measured horizontally.
Perimeter roads will generally take up 20m of the FFZ, the remainder incorporated as part of the allotment's front or rear yard.

Section 90 of the EPA Act also requires that, when considering whether or not to approve a development under the provisions of an LEP, Councils must consider a number of matters. These include:

1. ***the provisions of any relevant planning instrument or development control plans [Section 90(1)(a)];***
2. ***the character, location, siting, bulk, shape, size, height, design or external appearance of the development [Section 90(1)(e)];***
3. ***the size and shape of the land, the siting of any building and the area occupied by the development [Section 90(1)(f)];***
4. ***whether the land is unsuitable for the proposed development by reason of the bush fire or other risk [Section 90 (1)(g)];***
5. ***whether the proposed means of entrance to and exit from the development and the land are adequate [Section 90(1)(1)];***
6. ***the circumstances of the case [Section 90(1)(q)] and the public interest [Section 90(1)(r)].***

Specific bush fire questions include:

1. ***Are the fuels within 50-100 metres of the development site likely to be able to support an intense bush fire at some time in the future?***
2. ***Is the fuel type particularly combustible (i.e. does it burn readily with great vigor)?***
3. ***Is the fuel type prone to generate large amounts of embers?***
4. ***Is the fuel bed sufficiently continuous as to allow maximum rates of spread?***
5. ***Does the fuel bed extend onto the development site?***
6. ***Do the fuel weights regularly reach their upper limits?***
7. ***Are sources of ignition readily available (lightning, children, camp fires, adjacent land uses such as tips)?***
8. ***Do steep slopes lead up to the edge of the development?***
9. ***Is the upwind vegetation extensive, unbroken by water features, irrigated crops, airfields, golf courses or similar large fuel free areas which will allow bush fires to travel long distances?***
10. ***Is the development surrounded by fuel?***
11. ***Are the soils relatively dry (sandy soils, west/north-west aspect or rain-shadow)?***
12. ***Does the proposed development have poor and unsafe access?***
13. ***Is the development dependent on one source of water supply?***
14. ***Do the development standards or any caveats attached to the development lack controls on construction materials or design criteria ?***
15. ***Is there a lack of controls placed on individual developments within the proposed site ?***
16. ***Is the number of trees on the site such that they will be likely to contribute to a buildup of ground fuels ?***
17. ***Will trees overhang any developments on the site ?***

Following their consideration of the application for development, councils may approve the development, approve subject to conditions, or refuse the development.

When imposing conditions on the development, councils should consider the likely reaction of the Land and Environment Court in any appeal against the conditions:

- ***(I) If the LEP gives an owner a right to build, the Court will respect that right. Attempting to impose conditions that seek to stop construction, simply because the LEP is considered wrong or inadequate, will not receive much sympathy;***
- ***(II) Imposing conditions related to bush fire where the level of fuels are minimal, simply to strengthen the defence in other areas, will not usually carry much weight;***
- ***(III) Imposing onerous conditions on one development simply to cover insufficient conditions on a previous development, may be successful but will need a very strong case; and***
- ***(Iv) Conditions that do not have an environmental planning purpose, are not reasonable or do not fairly relate to the development, are unlikely to be accepted by the Court.***

The extent to which the general siting and design of the development has reduced the threat from bush fires will determine the extent to which controls on construction are required.

To maintain the level of protection, private householders must undertake regular maintenance programs.

There are a number of measures that can be taken to protect residential dwellings and other buildings from the impact of bush fires.

Essentially they involve protection from embers, flames and radiation by:

- ***managing fuel loads to reduce fuel levels adjacent to developments;***
- ***siting and designing developments to maximise the distance between fuels and developments; and***
- ***constructing buildings to maximise their resistance to bush fires.***

Of all the measures available, research has identified six that are statistically important causes of house loss:

1. ***High fuel loads within 50-100m of the development;***
2. ***The presence of combustible objects near houses;***
3. ***The presence of trees over 5m tall within 40m of the house;***
4. ***Failure to use fire resistant roofing materials or extremes in roof pitch;***
5. ***Failure to use fire resistant or durable materials in wall structures; and***
6. ***The absence of able bodied people to extinguish small outbreaks of fire.***

The provisions of the Bush Fires Act require that local District Fire Committees prepare fuel management plans to keep fuel loads in check. Local councils can also require residents to prepare fire breaks and remove combustible matter from their properties.

The provisions of the Environmental Planning and Assessment (EPA) Act require the inclusion of fire protection measures into the development process. This occurs at two levels:

1. ***The Local Environmental Plan (LEP) process ensures that the types of development permitted in areas subject to the impact of bush fires are controlled by land use zones and that development standards are set for certain types of development within each zone.***
2. ***The development control process ensures that individual development proposals comply with the development standards set out in the LEP.***

The Minister for Planning has directed, under Section 117 of the EPA Act, that, before an LEP is prepared, local councils must take into account whether the land to which the LEP will apply is subject to impact from bush fires by reason of the vegetation on the land or on any adjacent land.

In determining whether or not impact from bush fires is likely, the following considerations are relevant:

- ***(i) Are bush fires known to occur in the area and if so, to what size and extent? ;***
- ***(ii) Do the shrubs and grasses that form the understorey of the vegetation communities and hence the fuel bed, regularly dry out and burn readily? ;***
- ***(iii) Is the vegetation pattern such that extensive (rather than localised) native forests, woodlands or grasslands are found in the area (i.e. is it continuous) ?;***
- ***(iv) Are any gaps in native vegetation filled with pine plantations or crops? Will these crops burn in the bush fire season? If so, with more or less intensity and with greater or lesser resistance to control then the native vegetation they have replaced ? ;***

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APPENDIX 1

CLASSIFYING VEGETATION COMMUNITIES

There are a number of ways by which vegetation communities can be classified and it is important that before planners begin to understand the nature of hazard, a basic understanding of the factors which determine the nature of vegetation communities be gained.

This appendix summarizes the general factors by which vegetation communities can be classified and why particular communities adopt the characteristics which make them a fire hazard.

The material is taken from "The Vegetation of Australia," by N.C.W.Beadle.

Plant species form the fuel complex and are commonly found in one of three forms:

1. Trees: Woody plants with a main stem commonly called a trunk or bole. In older trees the lower branches are generally absent and there are usually large branches and foliage at the top forming a crown.

2. Shrubs: Woody stemmed plants, differing from trees in their lesser stature and in the number of stems that arise at or near the ground, giving the plant a bushy appearance. Shrubs sometimes assume the appearance of a small tree.

There is no exact line of demarcation between a tree and a shrub. Under certain conditions trees may adopt the growth habits of shrubs and vice versa.

3.Grasses: Non-woody, multi-stemmed plants.

Particular plant species group together in response to a particular set of environmental conditions (*rainfall, temperature, soil fertility, etc.*) to form communities.

Plant communities can be classified by:

1.Structural Form: where the community is described by the size and density of the dominant species (*e.g. rainforest, woodland, etc.*); or

2.Floristic Composition: where the community is described by the name (s) of the dominant species (*e.g. Eucalyptus regnans Alliance*).

Classification by structure is ideal for general survey work by non-botanists and is the basis for many hazard classification schemes.

Structural classification uses the following factors:

1. the usual height of the woody component (*except for grasslands*):

   - forest : trees with long trunks, 15-80 metres
   - woodland : trees with short trunks, 5-15 metres
   - shrubs : bushy plants, 1-6 metres

2. the extent to which the canopy blocks out the sky:

   - closed : 70-100%
   - open : 30-70 %
   - very open : 30 %; and

3. the type of understorey plants:

   - grasses
   - shrubs.

Generally, the biomass of the vegetation community is co-related to moisture, except in the coldest areas. In NSW, rainfall decreases in a westerly direction from the coast and tablelands. Accordingly, the major structural forms change as one moves from the wettest areas near the coast (*characterized by the tallest forest communities*) to the driest inland areas (*characterized by arid grasslands*).

The division of the State into three fire zones corresponds to this pattern of decreasing rainfall and similarly, the State can be divided into five vegetation zones:

FIRE ZONE	VEGETATION ZONE	GEOGRAPHIC AREA
Eastern	Eastern Coastal Lowlands	Coastal Plains
Eastern	Eastern Highlands	Tablelands
Central	Eastern Inland Lowlands	Western Slopes
Western	Semi Arid and Arid Zone	Western Plains
Western	The Mallee	South West corner

Generally, the sequence of communities is as follows:

1. **Rainforest:**
   Forests of varying height in the coastal lowlands and highlands from six to 45 metres high, characterised by non-eucalypt species with a closed canopy and understorey of ferns, bracken and moss, with vines common at all levels. Soils are fertile and rainfall generally exceeds 1500mm. Temperature controls the diversity of species and the height of the rainforest. High decomposition rates limit the amount of fuels although in periods of severe drought leafy litter fall may produce a combustible fuel load.

2. **Tall or Wet Sclerophyll Forest:**
Eucalypt forests in the coastal and inland lowlands and highlands between 25 and 80 metres high and commonly adjoining rainforest, characterized by a closed to open canopy and an understorey that ranges from rainforest species to tall shrubs. Soils are slightly less fertile and rainfall varies from 700 to 1500 mm.

Highlands species which are adapted to cool to cold temperatures or cooler temperatures can give higher fuel weights due to higher rates of leaf shedding and slow decomposition.

3. **Low or Dry Schlerophyll Forest:**
Eucalypt forests in the highlands and inland lowlands between 15 to 25 metres high, with open canopies and understoreys dominated by drought resistant shrubs. Human interference may lead to grassy understoreys. Rainfall may be quite high and the limiting factor is lower fertility, perhaps because of rocky terrain.

4. Woodland:
Eucalypt trees are less dominant in woodland communities due to much lower rainfall ranging from 400 to 700 mm. Tree heights range from 5 to 15 metres and canopies are open to very open dependent on rainfall. Understoreys can contain shrubs and grasses. *Acacia* and *Causaurina* replace *Eucalypts* in the arid and semi- arid zones.

5. **Shrubland:**
Acacia and *Causaurina* woodlands grade to *Atriplex* shrublands in the arid and semi-arid zones. Soils generally have a high clay content which may be saline.

6. **Grassland or Native pasture:**
These communities occur in a variety of forms and locations where environmental factors prevent the growth of trees and shrubs. In the Highland zone, dominated by *Poa* and other species, frosts are important, while *Stipa* and *Astrebla* occur across the State on clays that periodically waterlog. In the arid zone *Triodia* and others are common. In many cases, these arid grasslands become savannah where scattered trees can find places to take root.

Factors other than rainfall influence the distribution of communities and disrupt the sequence outlined above:

7. **Mallee:**
A variety of communities characterised by eucalypt species that possess many stems, rather like large shrubs. Tree height ranges from 3 to 8 metres. Mallee communities dominate but are not limited to the Mallee zone in south western NSW. Rainfall ranges from 220 to 375mm. The major influence on mallees is the presence of coarse, well drained soils. The extent of canopy closure, which may approach 100%, depends on rainfall. Shrubs and grasses compete for the understorey.

8. **Heath:**
Ranging in height from 1 to 2 metres, heaths are found in areas wet enough to support eucalypt trees, but which are affected by poor soil fertility or shallow soils. Wet heaths occur on sands adjoining dunes of the littoral zone. Dry heaths occur in rocky areas and sometimes in the west. Montane heaths occur on shallow or waterlogged soils in the highlands.

9. Swamp Forest: Forests that occur adjacent to the littoral zone with an understorey dominated by grasses and other swamp vegetation.

10. Riverine Forest: Various Eucalypts follow the main watercourses in semi-arid zones.

11. Pine Plantation: Pines are introduced and normally found in plantation formations.

12. Improved pasture: Forest, woodland and mallee communities where the top storey has been removed. As these result from human interference, they can occur anywhere in the State.

Fires will burn in most of these communities if soil conditions dry out sufficiently. The fire behaviour that will be experienced depends upon:

(i) the type of understorey (grass vs. shrub) and arrangement;

(ii) the amount of fuel;

(iii) the continuity of the fuel bed;

(iv) the presence of fuel ladders (loose bark on the trunk); and

(v) the density of the canopy.

These factors were discussed earlier, but it is important to remember that as the characteristic of each community changes, so to does the fire behaviour.