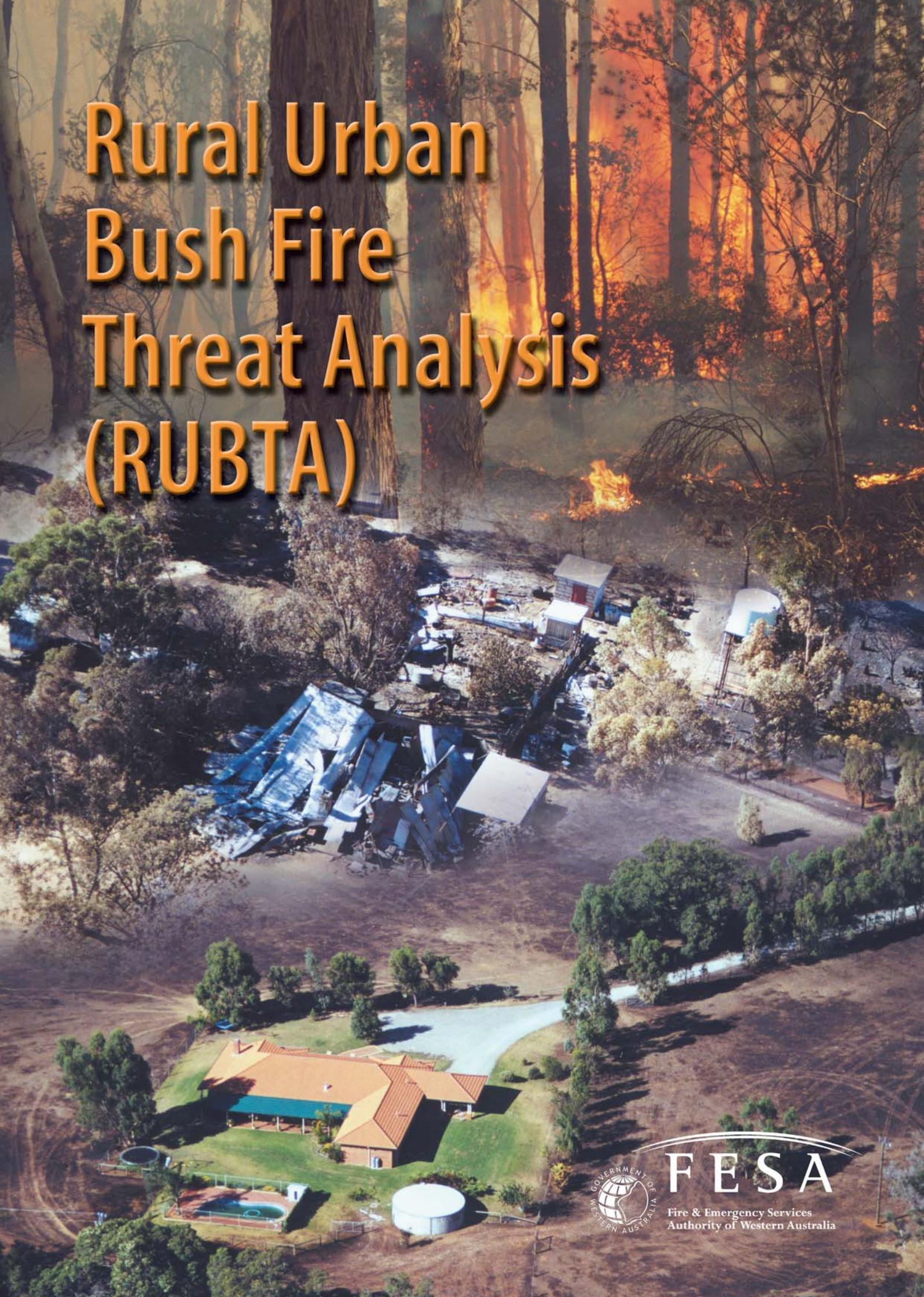


Rural Urban Bush Fire Threat Analysis (RUBTA)



FESA

Fire & Emergency Services
Authority of Western Australia

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Introduction

The purpose of this analysis tool is to provide a system that fire managers can use to quantify decisions associated with bush fire hazards, risks and values to determine the threat that a bush fire would pose.

It is expected that the Rural Urban Bush Fire Threat Analysis (RUBTA) tool will be applicable in situations where bush land and communities interface. This may include several streets in the metropolitan area, or a brigade zone, or local government authority area. The expectation is that the hazards, risks and values analysed and the resultant threat determined by use of this analysis tool can be applied with equal success in all areas. This analysis tool is not designed to be applied in isolated areas that contain little residential or commercial development. In these isolated areas it is recommended that the Department of Conservation and Land Management 'Wildfire Threat Analysis' be used.

As most bush fires are caused by human activity, either by deliberate actions or carelessness, risk can be equated with human activity and available fuels. For the development of this analysis (RUBTA), a zone is any area that is being assessed. It can be a local government area, brigade area, or a subdivision.

This analysis tool acknowledges that community needs be placed in the context of:

- people (eg. residents, employer/ees, students, patients and visitors);
- property (eg. houses, businesses, public buildings); and
- infrastructure/systems (eg. utilities, transport, communications).

All of these are components of the "community" section of the threat analysis, but they are also significant components of the "risk" section. They fall in both sections because people start the majority of bush fires and also have values that are potentially under threat. Therefore people make up a large portion of the problem of the risk of bush fires.

The RUBTA is designed to identify where a more significant potential problem may exist when compared with other areas after completing a threat analysis of the jurisdiction or assessment zone.

Component

Likelihood of Occurrence (risk of ignition)

By using the fire history of an area we are able to identify whether the area has a high risk of bush fires starting either by natural causes or through the intervention and activities of humans. If the area has not been subject to change that either increases the number of people to the area, or the vegetation is altered so that the risk of ignition has changed, then it can be anticipated that the likelihood of a fire will remain relatively consistent with past trends. If visitor use patterns or a housing subdivision has occurred then it can be anticipated that the risk of ignition will increase.

HIGH = Regular path of summer electrical storms, recent history of ignitions (greater than 5 per dry season/summer month)

LOW = Few past ignitions (between 0 and 5 per dry season/summer month)

Vegetation (fuel quantity – intensity)

The standard fuel loading, for at least 80% of the natural environment zone, will be based on:

- 8 t/ha jarrah forest fuels, 5 years since last fire;
- 15 t/ha karri forest fuels;
- 8–10 t/ha mallee-heath and banksia woodland, 5 years since last fire;
- 4–5 t/ha for pasture fuels; and
- 2000 kg/ha + 40% fuel cover – northern Australia (Kimberley and Pilbara).

This will give an indication of the difficulty of suppressing the fire if a fire should start. As fire intensity is a factor of the fuel consumed, by maintaining an available fuel load less than the standard should allow firefighters to apply a direct attack fire suppression strategy. Conversely, maintaining fuel loads in excess of the standard will make fire suppression more difficult as the fire will be more intense.

HIGH = Above standard fuel loads

LOW = Below standard fuel loads

Vegetation (structure and distance – manageability)

The methodology for the assessment of bush fire hazard is similar to that used in *Planning for Bush Fire Protection*¹ and also *Australian Standard 3959*. The methodology rates bush fire hazard using a combination of vegetation type, distance from vegetation and slope. Any mechanism that modifies any one of these three components will also modify the fire hazard.

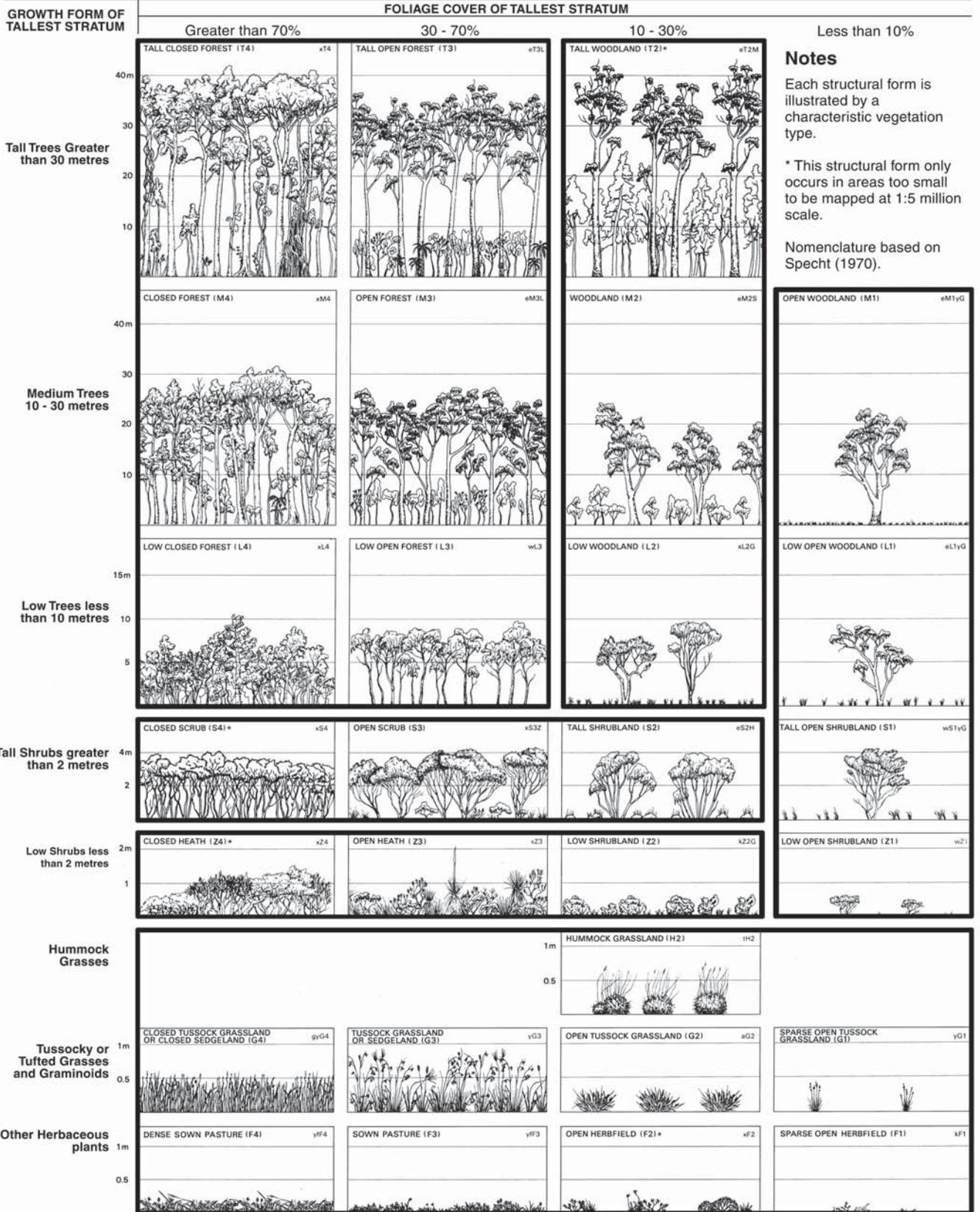
RUBTA uses a modified AUSLIG² vegetation classification for the vegetation assessment.

The classifications will be: forest (class A), woodland (class B), tall shrubs (class C), low shrubs (class D), open woodland and open shrubland (class E), grassland (class F).

¹ Fire and Emergency Services Authority & Department of Planning and Infrastructure, 2001, *Planning for Bush Fire Protection*, Western Australian Planning Commission, Perth

² Australian Surveying and Land Information Group (AUSLIG), 1990, *Atlas of Australian Resources Vegetation*, Commonwealth Government Printer, Canberra.

PICTORIAL KEY TO THE STRUCTURAL FORMS OF AUSTRALIAN VEGETATION



Notes

Each structural form is illustrated by a characteristic vegetation type.

* This structural form only occurs in areas too small to be mapped at 1:5 million scale.

Nomenclature based on Specht (1970).

Source: *Atlas of Australian Resources Vegetation, 1990*, AUSLIG, Australian Government Publishing Service, Canberra

Table 1:Vegetation of Western Australia

| Name | Description | Height | Foliage cover | Comment |
|----------------------------|---------------------------------------|---------|---------------|--|
| Tall closed forest | Trees | >30 m | >70% | Rainforest |
| Tall open forest | Trees | >30 m | 30–70% | Karri forest |
| Medium closed forest | Trees | 10–30 m | >70% | Rainforest |
| Medium open forest | Trees | 10–30 m | 30–70% | Eucalypts predominant |
| Woodland | Trees | 10–30 m | 10–30% | Transitional zone between higher rainfall forest margins and arid interior |
| Woodland open | Trees | 10–30 m | <10% | Eucalypt studded grasslands |
| Low trees closed forest | Trees | <10 m | >70% | Widespread but patchy across north Australia |
| Low trees open forest | Trees | <10 m | 30–70% | Acacia forest of NT & Queensland |
| Low woodland | Trees | <10 m | 10–30% | Floristically very diverse |
| Open woodland | Trees | <10 m | <10% | Throughout much of inland Aust. scarce water and poor soils |
| Tall shrubs open scrub | Shrubs | >2 m | 30–70% | |
| Tall shrubland | Shrubs | >2 m | 10–30% | Mallee and Mulga |
| Open shrubland | Shrubs | >2 m | <10% | Most widespread structural form of vegetation |
| Low shrubs open heath | Shrubs | <2 m | 30–70% | |
| Low shrubland | Shrubs | <2 m | 10–30% | Saltbush & bluebush |
| Low open shrubland | Shrubs | <2 m | <10% | Extreme environment—rocky ranges or skeleton soils |
| Hummock grasses | | | 10–30% | Grass steppe |
| Tussocky or tufted grasses | Closed tussock grassland or sedgeland | | >70% | |
| Tussock grasses | Open tussock grassland | | 10–30% | Mitchell grass |
| | Sparse open tussock grassland | | <10% | Mainly on clay plains |

Reference: *Atlas of Australian Resources Vegetation*, 1990, AUSLIG, Australian Government Publishing Service, Canberra

Table 2: Bush Fire Hazard Assessment Levels (from “Planning for Bush Fire Protection”)

| Predominant Vegetation Class and Type | *Fire Hazard in relation to distance of the site from Predominant Vegetation Class and Slope | | | | | | | |
|---|--|-------------|---------|-------------|-----------|-------------|-------|-------------|
| | < 15m | | 15m–40m | | >40m–100m | | >100m | |
| | >10° | 10° or less | > 10° | 10° or less | >10° | 10° or less | >10° | 10° or less |
| A Forest | Extreme | Extreme | High | High | Medium | Medium | Low | Low |
| B Woodland | Extreme | Extreme | High | High | Medium | Low | Low | Low |
| C Tall Shrubs | Extreme | Extreme | High | High | Medium | Low | Low | Low |
| D Low Shrubs | High | Medium | Medium | Low | Low | Low | Low | Low |
| E Open Woodland and Open Shrubland | Medium | Medium | Low | Low | Low | Low | Low | Low |
| F Grassland | Medium | Low | Low | Low | Low | Low | Low | Low |

* "Fire hazard in relation to distance of the site from predominant vegetation class and slope" refers to the distance between the dwellings or buildings from the vegetation within the internal zone.

When analysing the predominant vegetation type it is also necessary to consider the buildings distance from the vegetation type and slope.

For the purposes of identifying the hazard the following scoring applies:

High and Extreme = HIGH

Low and Medium = LOW

High Level of Permanent Human Activity and Hazard Reduction

If there is an accumulation of available fuels within the assessment zone, the risk increases if there is human activity in the area, and/or it is a known location for lightning. Conversely, if there is a mitigation of risk, including hazard reduction activities, then the bush fire risk and consequences diminish. Available fuels are that portion of the total fuel load at the site that will burn under the given conditions being considered.

HIGH = Zone mitigation tasks undertaken successfully in less than 80% of zone, where the available fuel load is reduced to less than the standard.

LOW = Zone mitigation tasks undertaken successfully in excess of 80% of zone, where the available fuel load is reduced to less than the standard.

Facilities that Encourage Visitors

Are there structures in the assessment zone that encourage non-resident visitors to the site during the periods that the area could be subject to a bush fire?

Do the structures (eg. picnic sites or other amenities) encourage visitors to the area during periods of high bush fire risk?

Visitors encouraged? YES or NO

Demographics of the Area

Changes to the demographics within an area can have a significant effect on the risk of ignition and also the fuel type and the values at risk. As an example, if an isolated native forest block that had been subject to a rotational burn system that maintained fuel loads at less than 8 tonnes per hectare suddenly changed to isolated two hectare absentee farmlet holdings. This development may result in having many homes built, and this will potentially result in a marked increase in people and activities around the area and potentially less strategic bush fire fuel management, such as burning. Smoke management issues can also result in reduced hazard reduction burning.

A decrease in fuel reduction will result in an increased fuel load and corresponding increase in fire

intensity when a fire does occur. The increased level of fire intensity can make fire suppression much more difficult. When these factors are coupled with a lack of general community knowledge on bush fire management it may lead to a dramatic increase in the number of bush fires and also the intensity of bush fires. Any fires that are lit under these circumstances are likely to become bush fires requiring immediate suppression attention.

Are there recent residential or industrial developments in the area (within the last five years), or intended in the period until the next review of the area? YES or NO

Access Roads and Trails

Many bush fires start adjacent to access points into the bush. If the area is covered by a comprehensive network of good quality access roads or tracks then it may result in an increase in the number of bush fires. If the area is poorly serviced by access roads, or it has access tracks that hamper the opportunity for a fire-setter to easily escape then it can be a disincentive to the fire-setter as it increases the risk of identification.

The following is a description of the access roads:

HIGH = Area is covered with a comprehensive network of good quality access roads and paths that permit easy two wheel drive access or bicycle or foot access.

LOW = Reasonable level of two wheel drive access roads and tracks, not all roads or tracks suitable for two wheel drive vehicles. Few walk or bicycle tracks.

Bush Fire Suppression Response

The response time is critical in the fire development cycle. If the response time is immediate, that is suppression effort is applied to the fire in less than ten minutes, then the risk of the fire developing is greatly diminished regardless of the fuel load and for all but the most severe fire weather conditions. As the response time increases the potential for the fire to become a significant event also grows. A question that must be answered is "Are there appropriately equipped and trained suppression forces readily available to respond to the outbreak of fire during the peak fire danger of the day?"

Is the response time (the time from the call being received by the dispatcher to the first arriving suppression forces attempting the fire suppression):

HIGH = >30 minutes

LOW = <30 minutes

Adequate Water Supply

During extensive bush fire suppression activities will there be sufficient easily accessible water supply available to permit the incident controller to undertake the suppression activity unencumbered.

HIGH = Limited water (<50,00 litres) available within 30 minutes.

Limited water available greater >30 minutes.

Inadequate water supply.

LOW = Unlimited immediately available uninterrupted water supply.

Unlimited available water between 10 and 30 minutes travel time.

Adequate water supply.

Resources

The resources readily available to suppress any bush fire are critical for the early suppression and increased protection to the community. The time delay between suppression action commencing and the ignition of the fire are all contributing factors to the size and intensity of the fire. In general terms bush fires start with low intensity and develop a circular pattern of development. The fire then develops an identifiable head fire and rapidly increases in intensity. A bush fire in continuous, heavy available fuel loads will develop relatively quickly.

Does the community have available suitable fire suppression resources available within 30 minutes to deal with a fire in high fire danger rating period? YES or NO

Community Values

High

- Includes hospitals, schools and special rural subdivisions, rural residential and settlements with restricted evacuation access options.
- Public buildings with regular use with access for suppression and evacuation is poor.
- Essential utilities are potentially threatened.
- Fire vulnerable threatened species or ecological community.
- Areas of regionally significant species richness or vegetation structural diversity.
- Fire vulnerable registered heritage site.
- Fire vulnerable registered Aboriginal site.
- High visitation recreation site with restricted evacuation access options.

Medium

- Rural residential subdivisions with multiple access/escape routes.
- Public buildings with limited regular use.
- Long established research areas with scientific reference to remain fire free.
- Threatened species habitats (no species known to be present).
- Fire vulnerable endangered priority two species or ecological communities.
- Fire vulnerable cultural/historical sites.
- Fire vulnerable cultural site of local significance but is not suitable to meet registration as a registered. site

Low

- Scattered houses.
- Scattered public utilities.
- Scattered visitor infrastructure, although the infrastructure is high cost.

Scoring

HIGH or YES = 1

LOW or NO = 0

Step 1: Hazard Assessment

| Question | Yes | No |
|---|-------------------|---------------------|
| Risk of ignition | | |
| Fuel load > standard (intensity) | | |
| Vegetation assessment area with fire hazard (manageability) | | |
| Hazard reduction <80% of assessment zone | | |
| High visitor usage | | |
| Recent or proposed residential and industrial developments | | |
| Extreme = 6 | High = 4-5 | Medium = 2-3 |
| | | Low = 0-1 |

Step 2: Management Assessment

| Question | Yes | No |
|---------------------------|-----------------|-------------------|
| Easily accessible | | |
| Response time >30 minutes | | |
| Inadequate water supply | | |
| Inadequate resources | | |
| Extreme = 4 | High = 3 | Medium = 2 |
| | | Low = 1 |

Step 3: Threat Assessment and Action

| | Hazard | Management |
|---------|--|--|
| Extreme | Immediate action required which should include community notification and awareness of the consequences. | Immediate action required with community notification and awareness of the consequences. |
| High | Community, FESA and local government senior management attention required. | Community, FESA and local government senior management attention required. |
| Medium | Community and management responsibility must be specific and recorded. | Community and management responsibility must be specific and recorded. |
| Low | Manage by routine procedures. | Manage by routine procedures. |

Actions

—specific to achieve a Community Safety Outcome

Whilst RUBTA provides the opportunity to undertake a considered structured approach to identifying the potential threat to a community from bush fires, it does not recommend what should be done to mitigate the potential threat. The RUBTA process seeks to document the items that may cause a bush fire control problem and potentially damage community assets and values.

It is recommended that after undertaking the RUBTA analysis, which itself should have suitable community representation, the community should be consulted as to how the potential bush fire threat can be mitigated. In most instances this consultation should be undertaken via the local Bush Fire Advisory Committee.

The bush fire threat must be mitigated to a level that the community is willing to accept. The potential consequences of the action, or alternatively inaction, must be understood by those making the decision as a pre-requisite for it to be appropriate for that community.

Methodology

- 1 Have suitable people present who can provide expert advice, opinions and represent stakeholders over the range of areas to be considered or affected.
- 2 Have a map or aerial photo of a suitable scale available.
- 3 Determine and mark the assessment zone on the map or aerial photo. This assessment zone size and location is subjective, but needs to be sufficiently extensive to cover the protection needs of the key facilities or items requiring protection.
- 4 Mark the area of non-standard fuel loads. This should include low fuel and high fuel zones (refer to page 5).
- 5 Work sequentially through RUBTA analysis process and mark the determinations onto the assessment sheet.
- 6 After completing the analysis determine what the relative threats are.
- 7 Ascertain if that threat exceeds what the community is willing to accept.
- 8 If components of the threat analysis exceed what the community is willing to accept, undertake appropriate mitigation steps that will result in acceptance, reduction, elimination or transference of the threat to an acceptable level.

